

June 2, 2015

Via Electronic Filing

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

**SUBJECT: Bear Swamp Project, FERC Project No. 2669  
Filing of Proposed Study Plan**

Dear Secretary Bose:

Bear Swamp Power Company, LLC (BSPC), a limited liability company jointly owned indirectly by Brookfield Renewable Energy Group and Emera, Inc., is the Licensee, owner, and operator of the 610 megawatt (MW) Bear Swamp Project (Project or BSP). The Project is located along the Deerfield River in Berkshire and Franklin counties, in the Commonwealth of Massachusetts. The Project consists of the Bear Swamp Pumped Storage Development (PSD) and the Fife Brook Development. In support of preparing an application for a new license for the Project, BSPC has elected to use the Integrated Licensing Process (ILP), as defined in 18 C.F.R. Part 5 of the Commission's regulations. BSPC filed a Pre-Application Document (PAD) and associated Notice of Intent (NOI) with the Commission on December 19, 2014 to initiate the ILP.

On February 18, 2015, the Federal Energy Regulatory Commission (FERC) issued notice of the PAD and NOI and commencement of the pre-filing process. FERC's February 18, 2015 notice also requested comments and study requests. Concurrently, FERC issued Scoping Document 1 (SD1) to outline subject areas to be addressed in its environmental analysis of the projects pursuant to the National Environmental Policy Act (NEPA). On March 18, 2015 FERC held its agency and public scoping meetings at the Holiday Inn Berkshires in North Adams, Massachusetts. A site visit to the Project was held on March 19, 2015, and comments on the PAD and study requests were due on April 18, 2015 (effectively April 20, 2015 as deadline fell on a weekend).

Building upon study concepts proposed by BSPC in the PAD and in response to those formal study requests prepared in accordance with FERC's study criteria set-forth in §5.9(b) (including those contained in Schedule C of FERC's April 16, 2015 letter), BSPC has prepared the enclosed Proposed Study Plan (PSP).<sup>1</sup>

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<sup>1</sup> BSPC's response to Schedule A (Comments on the PAD) and Schedule B (Additional Information) contained in FERC's April 16, 2015 letter are addressed under separate filing and available at <http://elibrary.ferc.gov> and <http://bearswampproject.com/>.

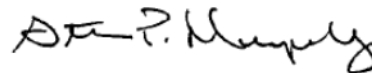
As required by 18 C.F.R. §§ 5.5(c) and 5.6(a)(1), BSPC is providing a copy of the PSP (by electronic means) to appropriate federal and state resource agencies, local governments, Indian tribes, and members of the public likely to be interested in the proceeding, as set forth in the attached distribution list. The PSP can be downloaded from the Project's relicensing website at: [www.bearswampproject.com](http://www.bearswampproject.com). Further, the PSP is available from FERC's eLibrary at [www.ferc.gov/docs-filing/elibrary.asp](http://www.ferc.gov/docs-filing/elibrary.asp) by searching under Docket P-2669. Copies of the PSP can also be obtained by contacting the undersigned at the phone number or email address as shown below.

In accordance with 18 CFR § 5.12, BSPC plans to hold the Initial Study Plan Meeting required by the ILP within 30 days after the deadline for filing the PSP. The Initial Study Plan Meeting will be held on June 29 and June 30, 2015, at the Cohn Family Dining Commons in the Main Building at Greenfield Community College, located at One College Drive in Greenfield, Massachusetts, 01301. The background, concepts, and studies described in the PSP will be presented during the Initial Study Plan Meeting. Additional information regarding the meeting location and the agenda will be made available through BSPC's public relicensing website at [www.bearswampproject.com](http://www.bearswampproject.com). To assist with meeting planning and logistics, BSPC requests that all agencies or stakeholders who plan to attend the meeting RSVP by sending an email to [Steven.Murphy@brookfieldrenewable.com](mailto:Steven.Murphy@brookfieldrenewable.com) by June 15, 2015. Meeting RSVPs or questions about the meeting may also be directed by phone or mail to:

Mr. Steven P. Murphy  
Licensing Manager  
Brookfield Renewable Energy Group  
33 West 1st Street South  
Fulton, New York 13069  
(315) 598-6130  
[Steven.Murphy@brookfieldrenewable.com](mailto:Steven.Murphy@brookfieldrenewable.com)

BSPC looks forward to working with the Commission, agencies, Indian tribes, local governments, and members of the public to timely develop a license application and supporting record that fully meets regulatory requirements in relicensing the Project. If you have questions or require additional information, please contact me as noted above.

Steven P. Murphy



Manager, Licensing  
Brookfield Renewable Energy Group

Enclosures

cc: Attached Distribution List

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Charlene Dwin Vaughn, Assistant Director  
Advisory Council on Historic Preservation  
Old Post Office Building  
1100 Pennsylvania Ave NW Suite 803  
Washington, DC 20004

John Seebach  
American Rivers  
1104 14th St NW, Suite 1400  
Washington, DC 20005

Kevin Richard Colburn  
National Stewardship Director  
American Whitewater  
PO Box 1540  
Cullowhee, NC 28779

Robert Nasdor, NE Stewardship Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776

Kenneth Kimball, PhD, Director of Research  
Appalachian Mountain Club  
PO Box 296  
Gorham, NH 03581-0296

Norman Sims, PhD  
Appalachian Mountain Club  
77 Back Ashuelot Road  
Winchester, NH 03470

Patrick S Moriarty, Operations Manager  
Bear Swamp Pumped Storage Station  
Brookfield Renewable Energy Group  
PO Box 461  
Rowe, MA 01367

Marshall L Olson, Compliance Manager  
Brookfield Renewable Energy Group  
314 Growdon Blvd  
Tallassee, TN 37878

Randy Garletts, Compliance Specialist  
Brookfield Renewable Energy Group  
14 Riverview Terrace  
Oakland, MD 21550

Steven P Murphy, Licensing Manager  
Brookfield Renewable Energy Group  
33 West 1st Street South  
Fulton, NY 13069

Franklin Keel  
Bureau of Indian Affairs  
545 Marriott Dr, Suite 700  
Nashville, TN 37214

Simeon Bruner  
Cambridge Development Corporation  
130 Propect Street  
Cambridge, MA 02139

Andrew Fisk, Executive Director  
Connecticut River Watershed Council  
15 Bank Row  
Greenfield, MA 01301

Andrea Donlon, MA River Steward  
Connecticut River Watershed Council  
15 Bank Row  
Greenfield, MA 01301

CrabApple Whitewater, Inc.  
3 Lake Moxie Road  
The Forks, ME 04985

Frank Mooney, River Manager  
CrabApple Whitewater, Inc.  
PO Box 295  
Charlemont, MA 01339

Deerfield River Portage  
617 Hoosac Road  
Conway, MA 01341

Brian Yellen, President  
Deerfield River Watershed Association  
15 Bank Row Suite A  
Greenfield, MA 01301

Robert May  
Deerfield River Watershed Association  
PO Box 431  
Montague, MA 01351

Kim Marsili  
Chief Environmental Health and Safety Officer  
Essential Power  
15 Agawam Avenue  
West Springfield, MA 01089

Kimberly Bose, Secretary  
Federal Energy Regulatory Commission  
888 1st St NE  
Washington, DC 20426

FEMA Region 1  
99 High Street  
Boston, MA 02110

Commander  
First Coast Guard District  
408 Atlantic Avenue  
Boston, MA 02110

## **Bear Swamp Project (FERC No. 2669) Distribution List**

John Howard, FERC Hydro Compliance Director  
FirstLight Hydro Generating Co.  
Northfield Mountain Station  
99 Millers Fall Road  
Northfield, MA 01360

Kimberly Noake MacPhee  
Land Use & Natural Resources  
Planning Program Manager  
Franklin Regional Council of Governments  
12 Olive Street, Suite 2  
Greenfield, MA 01301

Peggy Sloan  
Franklin Regional Council of Governments  
12 Olive Street, Suite 2  
Greenfield, MA 01301

Hyytinen Hollow Tubes  
7 Tea Street Ext  
Charlemont, MA 01338

Massachusetts Department of  
Conservation and Recreation  
251 Causeway Street, Suite 900  
Boston, MA 02114-2104

Office of Dam Safety  
Massachusetts Department of  
Conservation and Recreation  
John Augustas Hall  
180 Beaman Street  
West Boylston, MA 01583-1109

Paul Jahnige, Director  
Greenways and Trails  
Massachusetts Department of  
Conservation and Recreation  
136 Damon Road  
Northampton, MA 01060

Hydro Section  
Massachusetts Department of Energy Resources  
100 Cambridge Street, Suite 1020  
Boston, MA 02114-2533

Massachusetts Department of  
Environmental Protection  
One Winter Street  
Boston, MA 02108-4747

Michael Gorski, Regional Director  
Western Regional Office  
Massachusetts Department of  
Environmental Protection  
436 Dwight Street  
Springfield, MA 01103

Robert David Kubit  
Environmental Engineer  
Massachusetts Department of  
Environmental Protection  
627 Main Street  
Worcester, MA 01608

Massachusetts Department of Fish and Game  
251 Causeway Street, Suite 400  
Boston, MA 02114

Massachusetts Department of Public Utilities  
One South Station  
Boston, MA 02110

Brian Harrington  
Massachusetts Dept of Environmental Protection  
436 Dwight Street  
Springfield, MA 01103

Director  
Massachusetts Division of Fisheries & Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Caleb Slater, Ph.D.  
Andromous Fish Project Leader  
Massachusetts Division of Fisheries & Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Paul J Diodati, Director  
Massachusetts Division of Marine Fisheries  
251 Causeway Street  
Suite 400  
Boston, MA 02114-2512

Massachusetts Executive Office of Energy &  
Environmental Affairs  
100 Cambridge Street  
Suite 900  
Boston, MA 02114

Jonathan Patton  
Preservation Planner  
Massachusetts Historical Commission  
220 Morrissey Blvd  
Boston, MA 02125-3314

Secretary of the Commonwealth  
Massachusetts Historical Commission  
220 Morrissey Blvd  
Boston, MA 02125-3314

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Gailanne M Cariddi  
Massachusetts House of Representatives  
MA State House  
Room 155  
Boston, MA 02133

Paul W Mark  
Massachusetts House of Representatives  
PO Box 114  
Dalton, MA 01227

Valerie Gingrich  
Massachusetts Office of Coastal Zone Management  
251 Causeway Street  
Suite 800  
Boston, MA 02114-2136

Massachusetts Office of the Attorney General  
One Ashburton Place  
Boston, MA 02108-1518

Russel Cohen  
Rivers Advocate  
Massachusetts Riverways Program  
251 Causeway Street, Suite 400  
Boston, MA 02114-2119

Benjamin B Downing  
Massachusetts Senate  
7 North Street Suite 307  
Pittsfield, MA 01201

Charles Olchowski  
Massachusetts-Rhode Island Council of Trout  
Unlimited  
28 Smith Street  
Greenfield, MA 01301-2018

Moxie Outdoor Adventures  
1609 US Route 201  
The Forks, ME 04985

Doug Harris  
Narragansett Indian Tribal Historic Preservation  
Office  
PO Box 268  
Charlestown, RI 02813

Misty Anne Marold  
Senior Review Biologist  
Natural Heritage Endangered Species Program  
Division of Fish and Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Tom Christopher  
New England FLOW  
252 Fort Pond Inn Road  
Lancaster, MA 01523

John Bullard, Regional Administrator  
NOAA Fisheries Service  
Greater Atlantic Regional Fisheries Office  
55 Great Republic Drive  
Gloucester, MA 01930-2276

Harvey Scudder, President  
Northeast Center for Social Issue Studies  
PO Box 158  
Brattleboro, VT 05302-0158

Michael Hornstein, Partner  
Orrick, Herrington & Sutcliffe, LLP  
500 8th St NW  
Washington, DC 20004

Roger Hunt, Director  
Quinebaug Associates, LLC  
370 Main Street  
Suite 800  
Worcester, MA 01608-1741

Steven Frias, Legal Counsel  
Rhode Island Public Utilities Commission  
89 Jefferson Boulevard  
Warwick, RI 02888

Wallace A Miller, Acting President  
Stockbridge Munsee Community, Wisconsin  
N8476 Mo He Con Nuck Road  
Bowler, WI 54416

The Berkshire Visitors Bureau  
66 Allen Street  
Pittsfield, MA 01201

Department of Geosciences  
The Massachusetts Geological Survey  
University of Massachusetts  
269 Morrill Science Center  
611 North Pleasant Street  
Amherst, MA 01003-9297

Kathy Reynolds, Town Clerk  
Town of Charlemont Town Hall  
157 Main Street  
Charlemont, MA 01339

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Michael Walsh  
Director Emergency Management  
Town of Charlemont  
PO Box 325  
Charlemont, MA 01339

Town Clerk  
Town of Florida  
379 Mohawk Trail  
Drury, MA 01343

Doreen Aldrich  
Town Clerk  
Town of Rockingham  
PO Box 370  
Bellows Falls, VT 05101-0370

Jennifer Morse  
Town Clerk  
Town of Rowe  
321 Zoar Road  
Rowe, MA 01367

Matthew Cole  
TransCanada Hydro  
3A School Street  
PO Box 9  
Monroe Bridge, MA 01350

Ann Birch, Regulatory Analyst  
TransCanada Pipelines Ltd  
450 1st St SW  
Calgary, Alberta T2P 5H1  
CANADA

John Ragonese  
FERC License Manager  
TransCanada Power Mktg Ltd  
One Harbour Place, Suite 330  
Portsmouth, NH 03801

Michael Hachey  
Eastern Commercial Director  
TransCanada Power Mktg Ltd  
110 Turnpike Road, Suite 203  
Westborough, MA 01581

Leon Szeptycki  
Environmental Council  
Trout Unlimited  
1300 17th Street N, Suite 500  
Arlington, VA 22209

Donald Pugh  
Trout Unlimited  
10 Old Stage Road  
Wendell, MA 01379

Kevin Parsons  
Deerfield River Watershed Chapter  
Trout Unlimited  
PO Box 133  
Shelburne Falls, MA 01370

Karen Adams  
New England District  
US Army Corps of Engineers  
696 Virginia Road  
Concord, MA 01742-2751

North Atlantic Division  
US Army Corps of Engineers  
302 General Lee Avenue  
Brooklyn, NY 11252

Greenfield Field Office  
US Department of Agriculture  
Natural Resources Cons Service  
55 Federal Street  
Greenfield, MA 01301

Pittsfield Field Office  
US Department of Agriculture  
Natural Resources Cons Service  
78 Center Street Suite 206  
Pittsfield, MA 01201

Office of the Solicitor  
US Department of the Interior  
1849 C Street Northwest MS 6557  
Washington, DC 20240

Andrew Tittler  
US Department of the Interior  
1 Gateway Center  
Suite 612  
Newton, MA 02458-2881

Andrew L Raddant  
Off of Envir Policy & Comp  
US Department of the Interior Northeast Region  
15 State Street, Suite 400  
Boston, MA 02109

David Turin  
US Environmental Protection Agency  
5 Post Office Square, Suite 100  
Boston, MA 02109-3946

New England Headquarters  
US Environmental Protection Agency  
5 Post Office Square, Suite 100  
Boston, MA 02109-3912

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Wendy Weber  
NE Regional Director  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01036-9589

Curt Orvis, Fisheries Program  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01036-9589

Tom Chapman, Supervisor  
US Fish and Wildlife Service  
New England Field Office  
70 Commercial Street Suite 300  
Concord, NH 03301-5094

Brett Towler, CT River Coordinator  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01035-9589

Kenneth Sprankle, CN River Coordinator  
US Fish and Wildlife Service  
103 East Plumtree Rd  
Sunderland, MA 01375

Massachusetts Office  
US Geological Survey  
New England Water Science Center  
10 Bearfoot Road  
Northborough, MA 01532

Richard E Neal  
US House of Representatives  
78 Center Street  
Pittsfield, MA 01201

Kevin Mendik, NPS Hydro Program Coordinator  
US National Park Service  
15 State Street, 10th Floor  
Boston, MA 02109

Duncan Hay  
Northeast Region  
US National Park Service  
15 State Street  
Boston, MA 02109

Edward Markey  
US Senate  
218 Russell Senate Office Building  
Washington, DC 20510

Elizabeth Warren  
US Senate  
317 Hart Senant Office Building  
Washington, DC 20510

Secretary's Office  
Vermont Agency of Natural Resources  
1 National Life Drive Davis 2  
Montpelier, VT 05620-3901

Vermont Public Service Department  
112 State Street 3rd Floor  
Montpelier, VT 05620-2601

Richard Roos-Collins  
Legal Services Director  
Water & Power Law Group  
2140 Shattuck Ave Suite 801  
Berkeley, CA 94704-1229

Bruce Lessels  
Zoar Outdoor  
PO Box 245  
Charlemont, MA 01339

Kevin D Parsons  
PO Box 133  
Shelburne Falls, MA 01370

Karl Meyer  
85 School Street No 3  
Greenfield, MA 01301

Jon Elmer  
Director of Operations  
Brookfield Renewable Energy Group  
800 Starbucks Avenue  
Suite 802  
Watertown, NY 13601

John Baummer  
Project Manager  
FERC - Office of Energy Projects  
888 1st St NE  
Washington, DC 20426

**BEAR SWAMP PROJECT  
(FERC NO. 2669)**

**PROPOSED STUDY PLAN**



**Prepared for:**  
**BEAR SWAMP POWER COMPANY, LLC**  
**Rowe, Massachusetts**

**Prepared by:**  
**HDR**  
**Syracuse, New York**

**JUNE 2015**



# PROPOSED STUDY PLAN FOR THE BEAR SWAMP PROJECT (FERC NO. 2669)

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**PROPOSED STUDY PLAN FOR THE  
BEAR SWAMP PROJECT (FERC NO. 2669)**

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# List of Acronyms

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ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
ADCP	Acoustic Doppler Current Profiler
AMC	Appalachian Mountain Club
APE	area of potential effects
AR	American Rivers
AW	American Whitewater
BSP	Bear Swamp Project
BSPC	Bear Swamp Power Company, LLC
CFR	Code of Federal Regulations
cfs	cubic feet per second
CHEOPS™	Computer Hydro Electric Operations and Planning Software
CLF	Conservation Law Foundation
CMR	Code of Massachusetts Regulations
CPUE	catch per unit of effort
CRWC	Connecticut River Watershed Council
DAIP	digital aerial image platform
DEIS	Draft Environmental Impact Statement
DLA	Draft License Application
DO	dissolved oxygen
DRC	Deerfield River Compact
DRIC	Deerfield River Impact Committee
DRP	Deerfield River Project
DRWA	Deerfield River Watershed Association
DRWM	Deerfield River Watershed Model
DSS	Decision Support System
EA	Environmental Assessment
EAP	Emergency Action Plan
EAV	emergent aquatic vegetation
EBTJV	Eastern Brook Trout Joint Venture
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
FERC	Federal Energy Regulatory Commission
FLA	Final License Application
FLOW	New England FLOW
FPA	Federal Power Act
FPC	Federal Power Commission
FR	Federal Register
GIS	Geographic Information Systems
GPS	Global Positioning System
HPMP	Historic Properties Management Plan
IA	Ichthyological Associates
IFIM	Instream Flow Incremental Methodology
IHAC	Inventory of Historic Assets of the Commonwealth



ILP	Integrated Licensing Process
ISR	Initial Study Report
MACRIS	Massachusetts Cultural Resource Information System
MADEP	Massachusetts Department of Environmental Protection
MADFW	Massachusetts Division of Fish and Wildlife
MassGIS	Massachusetts Office of Geographic Information Systems
MEOAF	Massachusetts Executive Office of Administration and Finance
MEOEEA	Massachusetts Executive Office of Energy and Environmental Affairs
MESA	Massachusetts Endangered Species Act
MET	Massachusetts Environmental Trust
MHC	Massachusetts Historical Commission
MRCTU	Massachusetts-Rhode Island Council of Trout Unlimited
MW	megawatt
NAGPRA	Native American Graves Protection and Repatriation Act
NEP	New England Power Company
NEPA	National Environmental Policy Act
NGO	Non-governmental organization
NHESP	National Heritage & Endangered Species Program
NHPA	National Historic Preservation Act of 1966
NIT	Narragansett Indian Tribe
NLEB	northern long-eared bat
NOI	Notice of Intent
NPS	National Park Service
NRHP	National Register of Historic Places
NRHP	National Register of Historic Places
NVUM	National Visitor Use Monitoring Program
NWI	National Wetland Inventory
PA	Programmatic Agreement
PAD	Pre-Application Document
PAL	The Public Archaeology Laboratory
PM&E	protection, mitigation, and enhancement
PSD	Pumped Storage Development
PSP	Proposed Study Plan
QAPP	Quality Assurance Project Plan
RM	river mile
RSP	Revised Study Plan
RTE	rare, threatened, and endangered
SAV	submerged aquatic vegetation
SCORP	Statewide Comprehensive Outdoor Recreation Plan (Massachusetts)
SD1	Scoping Document 1
Settlement	Deerfield River Project Settlement
SPD	Study Plan Determination
SUR	small upland river
TCP	traditional cultural property

THPO	Tribal Historic Preservation Officer
TU	Trout Unlimited
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGen	USGen New England, Inc.
USR	Updated Study Report
WET	Wetland Evaluation Technique
WG	Whitewater Groups (AMC, AW, FLOW, Crab Apple, and Zoar)
WQC	Water Quality Certification

# Section 1

## Introduction and Background

---

Bear Swamp Power Company, LLC (BSPC), a limited liability company jointly owned indirectly by Brookfield Renewable Energy Group and Emera, Inc., is the Licensee, owner, and operator of the 610 megawatt (MW) Bear Swamp Project (Project or Bear Swamp Project or BSP). The Project is located along the Deerfield River in Berkshire and Franklin counties, in the Commonwealth of Massachusetts. The Project consists of the Bear Swamp Pumped Storage Development (PSD) and the Fife Brook Development.

On April 28, 1970, the Federal Power Commission (FPC), predecessor to the Federal Energy Regulatory Commission (FERC or Commission), issued an original license for the Bear Swamp Project in accordance with the FPC's delegated authority under the Federal Power Act.<sup>1</sup> The license expires on March 31, 2020.

The Project was commissioned and placed into service in 1974. BSPC acquired the Bear Swamp Project pursuant to the March 11, 2005, Commission order approving the transfers of license for the Project.<sup>2</sup> Both developments are owned and operated by BSPC for the generation and sale of electrical energy.

### 1.1 Study Plan Overview

In support of preparing an application for a new license for the Project, BSPC has elected to use the Integrated Licensing Process (ILP), as defined in 18 Code of Federal Regulations (CFR) Part 5 of the Commission's regulations. BSPC filed a Pre-Application Document (PAD) and associated Notice of Intent (NOI) with the Commission on December 19, 2014, to initiate the ILP. Copies of the PAD can be found through FERC's e-library at <http://www.ferc.gov/docs-filing/elibrary.asp> or through BSPC's public relicensing site at <http://www.bearswampproject.com>. On February 18, 2015, FERC issued notice of the PAD and NOI and commencement of the pre-filing process. FERC's February 18, 2015, notice also requested comments and study requests. Concurrently, FERC issued Scoping Document 1 (SD1) to outline the subject areas to be addressed in its environmental analysis of the Project pursuant

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<sup>1</sup> 16 U.S.C. § 791(a), *et seq.*

<sup>2</sup> Order Approving Transfers of License. 110 FERC ¶ 62,245 (2005).

to the National Environmental Policy Act (NEPA)<sup>3</sup>. On March 18, 2015, FERC held the agency and public scoping meetings at the Holiday Inn Berkshires in North Adams, Massachusetts. A site visit to the Project was held on March 19, 2015.

In the PAD, BSPC proposed to conduct studies where Project operations may have an impact on various resources. The purpose of this Proposed Study Plan (PSP) is to further describe BSPC's proposed approaches for conducting these studies and to address agency and stakeholder study requests. This PSP also provides FERC, regulatory agencies, and interested parties with the opportunity to comment on the studies proposed by BSPC. This PSP is being filed with the Commission pursuant to Section 5.11 of FERC's ILP regulations and the Process Plan and Schedule provided in the PAD and referenced in FERC's SD1. Notifications of availability of this PSP are also being distributed to the stakeholders and interested parties listed in Appendix A.

On or before September 30, 2015, BSPC will file a Revised Study Plan (RSP) with FERC incorporating applicable revisions based on comments received on the PSP. FERC will issue its study plan determination by October 30, 2015.

Based on studies proposed in the PAD and in response to the study requests and comments received during the scoping period, BSPC is proposing studies and information gathering regarding the following resource areas:

1. Water Quality Study
2. Fish Assemblage Assessment Study
3. Aquatic Mesohabitat Assessment and Mapping
4. Baseline Study of Terrestrial Wildlife and Botanical Resources
5. Wetland, Riparian, and Littoral Habitat Study
6. Recreation Survey
7. Rare, Threatened, and Endangered Species Survey
8. Cultural Resources Survey
9. Operations Model

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<sup>3</sup> 42 U.S.C. § 4321 *et seq.*

- 10. Instream Flow Assessment
- 11. Fife Brook Flow Attenuation Study
- 12. Entrainment Evaluation

Specific study requests relevant to the above-listed resource areas are referenced in Section 3 of this PSP. FERC's ILP regulations at 18 CFR § 5.9 specify required components of such study requests to allow BSPC, as well as FERC staff, to determine the appropriateness and relevance of the proposed study to the relicensing. Under Section 5.9(b) of FERC's ILP regulations, these required components of a study request (the "Study Criteria") are as follows:

- (1) *Describe the goals and objectives of each study and the information to be obtained (§ 5.9(b)(1));*

This section describes why the study is being requested and what the study is intended to accomplish, including the goals, objectives, and specific information to be obtained. The goals of the study should clearly relate to the need to evaluate the effects of the Project on a particular resource. The objectives are the specific information that needs to be gathered to allow achievement of the study goal.

- (2) *If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied (§ 5.9(b) (2));*

This section should clearly establish the connection between the study request and management goals or resource of interest. A statement by an agency connecting its study request to a legal, regulatory, or policy mandate needs to be included that thoroughly explains how the mandate relates to the study request, as well as the Project impacts.

- (3) *If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study (§ 5.9(b) (3));*

This section is for non-agency requestors or Indian tribes to establish the relationship between the study request and the relevant public interest considerations.

- (4) *Describe existing information concerning the subject of the study proposal, and the need for additional information (§ 5.9(b) (4));*

This section should discuss any gaps in existing data by reviewing the available information presented in the PAD or information relative to the Project that is known from other sources. This section should explain the need for additional information and why the existing information is inadequate.

- (5) *Explain any nexus between Project operation and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements (§ 5.9(b) (5));*

This section should clearly connect Project operations and Project effects on the applicable resource. This section should also explain how the study results would be used to develop protection, mitigation, and enhancement (PM&E) measures. The PM&E measures should include those related to any mandatory conditioning authority under Section 401 of the Clean Water Act<sup>4</sup> or Sections 4(e) and 18 of the Federal Power Act (FPA), as applicable.

- (6) *Explain how any proposed study methodology is consistent with generally accepted practices in the scientific community or, as appropriate, considers relevant tribal values and knowledge. This includes any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration (§ 5.9(b) (6));*

This section should provide a detailed explanation of the study methodology. The methodology may be described by outlining specific methods to be implemented or by referencing an approved and established study protocol and methodology.

- (7) *Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs (§ 5.9(b)(7));*

This section should describe the expected level of cost and effort to conduct the study. If there are proposed alternative studies, this section should address why the alternatives would not meet the stated information needs.

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<sup>4</sup> 33 U.S.C. § 1251 *et seq.*

### 1.1.1 Comments on the Proposed Study Plan

Comments on BSPC's PSP, including any revised information or study requests, must be filed with FERC within 90 days after the deadline for filing this PSP, or by August 31, 2015. Pursuant to 18 CFR § 5.12, comments must also include an explanation of any study plan concerns and any accommodations reached with BSPC regarding those concerns. All proposed modifications to the PSP must also meet the aforementioned study criteria.

### 1.1.2 Initial Study Plan Meeting

The purpose of the Initial Study Plan Meeting is to clarify the intent and contents of BSPC's PSP and identify any outstanding issues or information needed with respect to the proposed studies. In accordance with 18 CFR § 5.12, BSPC plans to hold the Initial Study Plan Meeting required by the ILP within 30 days after the deadline for filing the PSP. The Initial Study Plan Meeting will be held on June 29 and June 30, 2015, at the Cohn Family Dining Commons in the Main Building at Greenfield Community College, located at One College Drive in Greenfield, Massachusetts, 01301. The background, concepts, and studies described in this PSP will be presented during the Initial Study Plan Meeting. Additional information regarding the meeting location and the agenda will be made available through BSPC's public relicensing website at [www.bearswampproject.com](http://www.bearswampproject.com).

To assist with meeting planning and logistics, BSPC requests that all agencies or stakeholders who plan to attend the meeting RSVP by sending an email to [Steven.Murphy@brookfieldrenewable.com](mailto:Steven.Murphy@brookfieldrenewable.com) by June 15, 2015. Meeting RSVPs or questions about the meeting may also be directed by phone or mail to:

Mr. Steven P. Murphy  
Licensing Manager  
Brookfield Renewable Energy Group  
33 West 1<sup>st</sup> Street South  
Fulton, New York 13069  
(315) 598-6130  
[Steven.Murphy@brookfieldrenewable.com](mailto:Steven.Murphy@brookfieldrenewable.com)

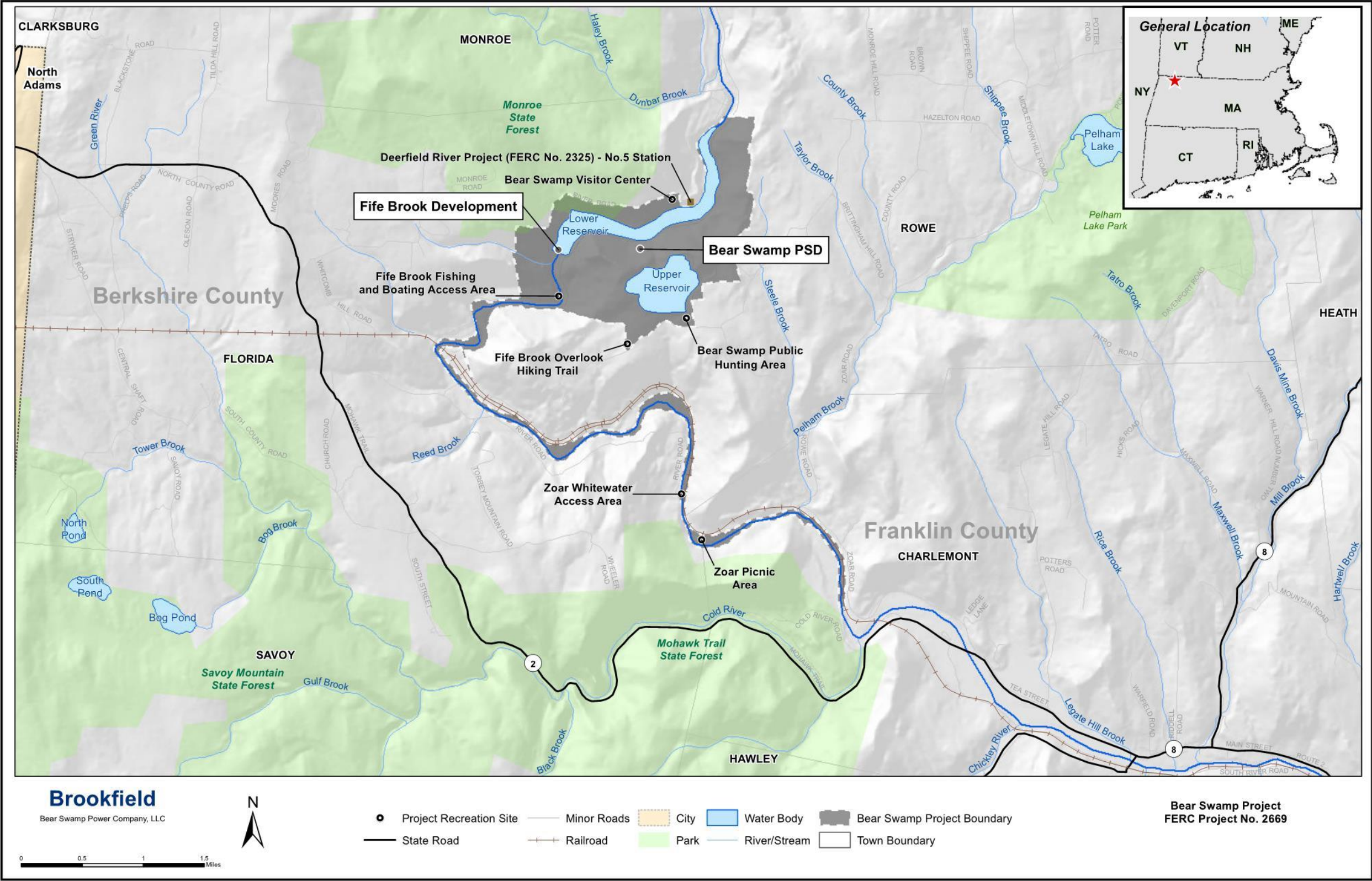
## **1.2 Project Location and Description**

As described more fully in the PAD, the Project consists of the Bear Swamp PSD and the Fife Brook Development. The Bear Swamp PSD generally consists of an Upper Reservoir retained by four dikes and an emergency spillway, a submerged inlet/outlet structure and associated tunnel which bifurcates into two penstocks, an underground powerhouse containing two reversible Francis-type pump-turbine units and motor-generator units with a combined capacity of 600 MW, two tailrace tunnels leading to an individual inlet/outlet structure in the Lower Reservoir, and the Lower Reservoir (Fife Brook impoundment) formed by the Fife Brook Dam on the Deerfield River. The Fife Brook Development generally consists of the Fife Brook Dam and impoundment, which is common to both developments, a tainter gate spillway structure, a concrete intake structure, and a single penstock leading to a concrete powerhouse containing one conventional Francis turbine-generator unit with a capacity of 10 MW.

The Bear Swamp PSD is operated as a pumped storage facility generally producing electricity during daylight hours, with water from the Lower Reservoir (Fife Brook impoundment) pumped to the Upper Reservoir overnight. The Fife Brook Development is operated as a run-of-release system in response to regulated, peaking inflows received from the immediately upstream Deerfield No. 5 station, which is owned and operated by TransCanada Hydro Northeast, Inc. (TransCanada), and also to provide scheduled recreational releases and a continuous minimum downstream flow release of 125 cubic feet per second (cfs).



FIGURE 1.2-1  
PROJECT LOCATION MAP



### **1.3 Background and BSPC's Approach to the PSP**

As described in detail in the PAD, today's operation of the Bear Swamp Project is authorized by the original April 28, 1970, FERC license, as well as all subsequent FERC Orders and Amendments issued to-date. However, the Commission's April 4, 1997, Order Amending the Bear Swamp Project License (1997 Amendment) stands as one of the more notable amendments that governs today's operations. Although not subject to relicensing at that time, the Commission found it necessary to amend the Bear Swamp Project license in 1997 in order to maintain compatibility with the new license it concurrently issued for the Deerfield River Project P-2323 (DRP), which incorporated the October 6, 1994, Settlement (Settlement) developed in support of relicensing the eight-development peaking DRP. Key provisions of the 1997 Amendment to the Bear Swamp Project's license included the Settlement requirements to provide 106 scheduled recreational releases and a continuous minimum downstream flow release of 125 cfs from the Fife Brook Development.

Based on the comment letters and study requests associated with BSPC's PAD, BSPC fully recognizes and appreciates the clear and deserved support expressed for the Deerfield River Project Settlement. BSPC has developed more than a dozen similar hydropower settlements throughout the country, and BSPC fully appreciates the challenges in reaching such a settlement – especially this Settlement that values and leverages the continuation of peaking operations of the DRP throughout the Deerfield River as a means of providing an important array of PM&E measures. As such, it is noteworthy the large number of comments and study requests (especially from parties who are signatory to the Settlement) pertaining to, or taking issue with (and imply change to) measures that were clearly analyzed, vetted, and agreed-upon within the Settlement.

One of the largest issues woven through numerous comments and study requests on the Bear Swamp Project (BSP) relates to examining the effects of the overall peaking flow regime that exists throughout the Deerfield River as established by the Settlement, 401 Water Quality

Certification (WQC), and license for the DRP.<sup>5</sup> These comments and study requests appear to treat the BSP as if it were the source or cause of the flow regime throughout the river, and that BSPC is, therefore, somehow responsible for studying speculative potential adverse effects that are actually the result of, or stem from, operations established by the Settlement. BSPC understands the interest in examining the aspects over which BSPC has direct control; however, BSPC disagrees with attempts to establish a nexus between the BSP and an overall river-wide flow regime that BSPC does not create and that is expressly authorized by the Settlement and the DRP's existing FERC license. Based on a review of a number of the study requests, it appears that a number of the parties are interested in reopening the existing Settlement and amending the DRP's existing license, as compared to focusing on the resource aspects directly under BSPC's control. Since the term of the Settlement and DRP license run well beyond expiration of the present BSP license, BSPC strongly maintains that the BSP relicensing proceeding not be used to, or construed as a forum by which to generate information to leverage reopening the Settlement or the DRP license. Accordingly, BSPC is proposing a series of robust studies that are consistent with FERC's seven study criteria and that evaluate the resources or aspects BSPC can directly control absent changes to the Settlement and DRP license. BSPC is not proposing to perform certain requested studies, or portions of requested studies that would, in effect, be an evaluation of DRP operations that are fully authorized by the Settlement and its license.

### 1.3.1 The DRP Flow Regime is Authorized by its Settlement and License

As described in the PAD, the peaking flow regime within the Deerfield River: (a) pre-dates construction of the BSP, (b) pre-dates the Settlement, and (c) continues today as agreed to by stakeholders in the Settlement and as authorized by the DRP's 401 WQC and existing FERC license. Based on these authorizations and agreements, the DRP operates on a daily basis in a peaking mode, which now appears to be of interest to a number of the parties who have provided study requests to BSPC.

The pass-through of the DRP peaking flow regime by the BSP, serves the purposes of supporting the requisite 106 scheduled whitewater releases downstream of Fife Brook, as well as to provide

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<sup>5</sup> As agreed to by the Settlement parties, BSPC recognizes and supports the DRP licensee's right to operate the entire DRP in a peaking mode in accordance with the terms and conditions of its FERC license.

the flows necessary to allow downstream facilities to operate in the peaking mode authorized by those projects' current FERC licenses. This pass-through is also necessary for downstream facilities to comply with the terms and conditions of their licenses.

Consistent with the fact that peaking within the Deerfield River has always existed upstream and downstream of the BSP, and that whitewater flows are peaking flows customized by the Settlement, the Appalachian Mountain Club's (AMC) January 27, 1998, letter to FERC (on behalf of AMC/New England FLOW [FLOW]/American Whitewater [AW] and responding to Trout Unlimited's (TU's) January 9, 1998, letter seeking rehearing on the DRP whitewater release plan) provided the following additional insight;

*(3) Trout Unlimited asserts that the whitewater releases create what they call "high flows" on the Fife Brook section of the Deerfield. This is out of context. The flows were not created by the Settlement Agreement. They are standard hydroelectric generation flows. The whitewater agreement improved the timing of those flows for both whitewater boating and from the perspective of fishermen. Before the agreement, the flows occurred at odd and unpredictable hours, usually late in the day during hatches. Now they occur at reliable times in the middle of the day, and as an added benefit they have a cooling effect on the river, which favors trout. This water has to come downstream at some time. The agreement makes the generation flows usable by whitewater boaters and NEPCO and makes them as beneficial to fishermen as possible. Trout Unlimited agreed with those assessments at the negotiating table.*

Since water that passes through the BSP comes from upstream (there is no other source of sustainable water at the BSP aside from precipitation), the AMC is correct as they note; *"This water has to come downstream at some time."* The Settlement created the overarching parameters managing the current flow regime, as it commemorated the specific set of conditions and timing requiring the continuation of the peaking flow regime in the form of minimum flows and scheduled whitewater releases downstream of Fife Brook.<sup>6</sup>

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<sup>6</sup> It should be noted that nothing in the DRP Settlement, 401 WQC, or license precludes the DRP licensee from operating in a peaking mode at times when scheduled whitewater releases are not required.

Essential to the conversation regarding the pass-through of the DRP peaking flows by the BSP is that the Settlement establishes the framework and reason today's peaking and whitewater flow regime *is to exist* downstream of the Fife Brook Development. In addition, the reason why the overall peaking and whitewater flow regime *can exist* is because it is specifically recognized and allowed-for by Item A of the Massachusetts Department of Environmental Protection (MADEP) 401 WQC for the DRP, which is incorporated in the existing DRP license. Item A states;

*A. The project shall be operated in accordance with the provisions included in the FERC application (#2323), any modification made to the application based upon supplemental information, the Offer of Settlement provisions as related to water quality and with the conditions contained in this certification. The operation of the hydrofacilities (including high flow, peaking releases) should not interfere with the attainment of the designated uses of the Deerfield River as outlined in the Massachusetts Surface Water Quality Standards (314 CMR 4.00) and the maintenance of an integrated and diverse biological community in the Deerfield River.*<sup>7</sup>

### 1.3.2 The BSP Does Not Cause the Peaking Whitewater Flow Regime in the Deerfield River

The only way the authorized peaking flows generated by the DRP developments upstream of the BSP can possibly reach the peaking facilities downstream of the BSP (and for these flows to serve their intended function downstream of Fife Brook as prescribed in the Settlement), is if they are passed through by the Fife Brook Development. FERC recognized this in its 1996 Draft Environmental Impact Statement (DEIS) for the DRP as it noted the likelihood of amending the BSP license, and again when it initiated amendment proceedings in 1997 for the BSP. The DRP licensee (New England Power Company, or NEP, who was also the BSP licensee at that time)

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<sup>7</sup> BSPC notes that MADEP's April 17, 2015, letter states; "As of February 2015, after staff review and concurrence, the Mass DEP changed the aquatic life use designation from support to impaired for the upper Deerfield River (segment MA33-01 including the Project area) because of hydropower modifications to the natural stream flow. This decision is based on a benthic macroinvertebrate study conducted by Mike Cole for the Deerfield River Watershed Association as part of the Deerfield River updated for the 2016 Integrated Report cycle". Given the unique nature and timing of this change, BSPC expects to examine this in the context of the Settlement requirements and information relative to the basis for the change (e.g. to what standard, reference, or index is "impaired" derived from or compared to, and is MA33-01 considered impaired because of operations required by the Settlement).

did not see the need for such an amendment as described in its April 19, 1996, comment letter regarding the Commission's DEIS in which it states;

*The Settlement provides for a series of whitewater flows from Fife Brook and the provision of a year round minimum flow of 125 cfs. However, the whitewater releases are equivalent to the normal generation releases inherent in the normal operation of Fife Brook under the existing Bear Swamp license. This amounts to little more than rescheduling generation releases to coincide with a schedule developed in cooperation with the whitewater community.*

In its July 26, 1997, filing in reference to FERC's 1997 amendment proceedings for the BSP, the DRP licensee stated that it had not initiated amendment proceedings for the BSP, that such an amendment was not necessary, and that it would voluntarily operate the BSP such that the requirements of the Settlement would be met. FERC did not find these arguments compelling precisely because of the fact that the Settlement relies upon the Fife Brook Development as a key enabling mechanism by which the benefits of the Settlement are realized downstream. FERC ultimately issued its April 4, 1997, Order Amending the Bear Swamp license (Amendment) in which FERC states;

*For the reasons discussed below, we are construing the Settlement as a proposal by New England Power to amend the terms of the Bear Swamp license, and are amending the license accordingly... The Settlement negotiated by New England Power and 12 state and federal resource agencies and non-government organizations, provides the terms and conditions for the resolution of issues regarding fisheries, fish passage, wildlife, water quality, project lands management and control, recreation, and aesthetic resources raised by the parties in the Deerfield River Project No. 2323 relicense proceeding. The proposed changes in operation of the Bear Swamp Project, particularly the increase in minimum flows and the whitewater releases, are integral and significant components of the Settlement, on which the Commission has relied in its decision to grant a new license to the Deerfield River Project. In this circumstance, while the Bear Swamp project license may not preclude New England Power from carrying out the Bear Swamp aspects of the settlement agreement, those aspects must become license conditions, in order that the*



*Commission can enforce this component of the public interest/comprehensive development determination that it made when approving the settlement.*<sup>8</sup>

In essence, FERC recognized the Settlement, 401 WQC, and license associated with the DRP as the causing-agent of the overall, peaking, and whitewater flow regime upstream and downstream of the BSP, and the BSP as an enabling-agent necessary to the implementation of the Settlement terms and conditions. The BSP simply supports the delivery of the DRP flows as a pass-through mechanism, as compared to establishing these flows. It is equally important to note that FERC did not find it necessary to limit or modify the Bear Swamp PSD's use of the full storage available in either its lower or upper reservoir. Instead, FERC only noted (in Article 401) that use of reservoir storage was allowed to enable the provision of the 125 cfs minimum flow below Fife Brook in light of the obvious 52 cfs disconnect between the incoming 73 cfs minimum flow from the Deerfield No. 5 station and the outgoing required 125 cfs minimum flow from the Fife Brook Development.

Accordingly, NEP (licensee of both the DRP and BSP in 1997) set forth administering the provisions of the Settlement, the new DRP license, and the newly amended BSP license. Such administration resided "under one roof" with NEP until 1998, and then with USGen New England, Inc. (USGen) when it was licensee of both projects from 1998 until 2005. When BSPC became licensee of the BSP in March 2005, it became necessary to commemorate how such administrative aspects would be achieved among two licensees instead of one. In recognition of the need for each party to maintain its ability to comply with the terms and conditions of its respective licenses, BSPC and USGen developed an administrative agreement in March 2005, focusing on communication and provision of each licensee's obligations relative to minimum flows and peaking whitewater releases. The agreement calls for cooperation, notification, information exchange, and communication between both licensees relative to scheduling, schedule changes, outages, maintenance, emergency conditions, inspections, and testing. The agreement also contains key aspects pertaining to each licensee as noted below.

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<sup>8</sup> Up until the 1997 BSP Amendment, the FERC project boundary for the BSP ended just below the Fife Brook Development. In addition to adding Articles pertaining to whitewater releases and the 125 cfs minimum flow, FERC also required (under Article 405) that the project boundary be extended the some 7.5 miles downstream to include the 201 acres of corridor lands addressed by the conservation easement provisions of the Settlement. Note that this extension of the Project boundary was based on the purpose of the conservation easement, as compared to any indication of an area of influence associated with the operation of the BSP.

Key aspects pertaining to the DRP licensee include:

- provide instantaneous total Deerfield No. 5 discharge information to the BSP licensee,
- operate the Deerfield No. 5 Development to allow the Fife Brook Development to meet its minimum flow and whitewater recreation release requirements,
- coordinate with the BSP licensee as well as with whitewater boating interests and other Deerfield River recreation stakeholders in developing annual whitewater release schedules, and
- provide makeup water from its reservoirs as needed to the Bear Swamp PSD.

Key aspects pertaining to the BSP licensee include:

- operate the upper and lower reservoirs of the Bear Swamp PSD in-balance such that water from the upstream DRP developments passes through the Fife Brook impoundment unaffected by Bear Swamp PSD operation, and
- operate the Fife Brook Development such that Fife Brook outflow maintains inflow/outflow balance so as to enable the DRP's Deerfield No. 4, No. 3, and No. 2 developments in meeting their minimum flow requirements.

The aspects pertaining to the DRP licensee were transferred from USGen to TransCanada when it became licensee of the DRP in 2005. TransCanada filed this agreement as part of its' June 9, 2008, Motion to Intervene on BSPC's upgrade amendment proceeding which accurately notes; *"The lower reservoir associated with the Bear Swamp Project is maintained by the Fife Brook Dam, which through the Agreement must pass inflows through to enable TC Hydro's downstream stations to meet their generation schedule, fish passage and minimum flow requirements."* From this, it is evident that the BSP does not create today's flow regime downstream of Fife Brook and that it is the Settlement and downstream licensees who rely upon the Fife Brook Development to move water received from the Deerfield No. 5 station.



### 1.3.3 Today's Flow Regime Has its Roots and Nexus with the Settlement, 401 WQC, and FERC License for the DRP

The notion of the DRP as the controlling factor of today's flow regime is accurately reflected in the Massachusetts Division of Fish and Wildlife's (MADFW) April 17, 2015, letter in which MADFW recognizes that "*Habitat mapping below Fife Brook dam will require days to complete and flows during this period may vary due to operations of the Deerfield River Hydroelectric Project.*" However, many comment letters and study requests (including other portions of MADFW's letter) seek either direct or implied change to today's flow regime. For example, TU's April 17, 2015, letter asserts; "*We believe hydro-peaking must stop,*" and numerous study requests contain goal statements that lead with; "*The goal of this study is to determine an appropriate flow regime that will...*" (implying today's flow regime is inappropriate).

Such sentiments now expressed by the Settlement parties are at odds with the very Settlement they created, especially in light of the extensive support for the Settlement and FERC's treatment of the Settlement. For example, such support is reflected in the April 18, 1996, Conservation Law Foundation (CLF) letter (representing American Rivers (AR), AW, AMC, CLF, Deerfield River Compact (DRC), Deerfield River Watershed Association (DRWA), FLOW, and commenting on FERC's February 1996 DEIS for the DRP) which states;

*"The Deerfield DEIS is truly a comprehensive environmental review. It considers the combined, cumulative impacts of all of the hydroelectric projects in the Deerfield River Basin. It ignores individual project boundaries and treats the river as an ecosystem, not as a series of isolated dams. It recognizes the importance of analyzing the cumulative impacts of multiple projects in the same river basin. It properly identifies the ecosystem boundaries to include the entire affected watershed – from the East Branch of the Deerfield to the mainstem river to its confluence with the Connecticut River. It also considers the cumulative impact of land use practices occurring on adjacent watershed lands."* The letter further states; "*Furthermore, the Commission's treatment of NEP's Bear Swamp project illustrates that the Commission intends to use information generated by its cumulative impact analysis to improve management throughout the watershed.*

*The DEIS properly considers the impacts and needed enhancements at NEP's Bear Swamp project, even though its license does not expire for many years. Based on the cumulative impact analysis, FERC correctly directs NEP to file an amendment application for the existing Bear Swamp license in order to mitigate all cumulative impacts at all projects in the basin". Finally, the letter closes with; "We now urge the Commission to issue new licenses as soon as possible that implement all the terms of the Settlement, including license amendment of the Bear Swamp project, so that the river can be restored and improved in the public interest."*

Given this (and many additional) resounding endorsements of the Settlement and the fact that FERC did as requested (namely issue a new license for the DRP and amend the BSP license consistent with the Settlement), there appears to be no evidence of a systemic or wholesale problem that needs to be solved. Furthermore, since today's flow regime was fully supported and documented through and by the Settlement parties, BSPC questions the reasons associated with, or behind, the potential concerns and issues that are being raised through this relicensing proceeding. Since the term of the Settlement and DRP license run well beyond expiration of the BSP license, BSPC strongly maintains that the BSP relicensing proceeding not be used to leverage reopening the Settlement or the DRP license at what is effectively the mid-point of their authorized license term. Nor should the BSP relicensing proceeding be used or construed as a forum in which BSPC funds research efforts whose stated goals or use of results suggest or rely upon change to the Settlement or DRP license. Instead, BSPC intends to perform studies to a level that is commensurate with the degree to which BSPC can affect change - without change to the Settlement or DRP license.

#### 1.3.4 BSPC's Approach to the Proposed Study Plan

Based on the preceding, BSPC's overarching approach to the PSP is to appropriately apply FERC's study criteria with emphasis on matters and issues for which it has direct control and are not based on speculation. This is supported by FERC's March 2012 Guide To Understanding And Applying The Integrated Licensing Process Study Criteria which states; *"Staff would not, however, typically recommend that a licensee conduct studies on effects caused by*

*developmental activities over which the licensee has no control.*” With regard to speculation, BSPC’s approach is supported by *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals) where the Court held that an applicant does not have “*a duty to determine if a problem exists*” and that it is not enough to speculate that a problem may exist with “*evidence*” of a problem based on a “*prediction based on opinions.*” Accordingly, BSPC does not envision performing certain requested studies or elements of requested studies whose goals and objectives (or pre-conceived outcome):

- are to directly or indirectly second-guess or seek change to the terms and conditions of a Settlement that runs beyond expiration of the BSP license,
- rely-upon, or can only be implemented through changes to another FERC-licensed project (or otherwise used as a wedge or lever for stakeholders to pursue change at another FERC-licensed project), or
- seek answers to speculative adverse effects of conditions and measures that have their roots and nexus with a Settlement that BSPC has no direct control over or ability to unilaterally change.

That is, study requests, or elements of study requests on matters outside of BSPC’s direct control, that are created or caused by the Settlement or which are based on speculation, are either modified/limited or deemed not appropriate for study.

For example, the Connecticut River Watershed Council’s (CRWC) letter states “*we would like to see a study of the actual benefits from that Settlement Agreement*” (meaning the Settlement). BSPC does not envision studying the economic benefits of a settlement it did not create and has no authority to unilaterally open or modify. This type of study request clearly has its nexus with developmental activities having their roots with a different FERC-licensed project. Similarly, BSPC does not envision performing the requested controlled whitewater release study within the upper reach of the Fife Brook impoundment (lower reservoir). Such a study would be to no avail or purpose to informing license conditions for the BSP since BSPC has absolutely no ability to control the delivery of water into that reach – only the DRP licensee (and FERC) can control how much water is released from the upstream dam. Therefore, such a request (study of an

appropriate amount of water delivered from another licensee's upstream dam) does not have a nexus to the BSP.

Additionally, BSPC notes a dichotomy among the comments and study requests in which the answer is stated as known, but a study is still requested. For example, several letters request a controlled whitewater release study downstream of Fife Brook, yet Crab Apple Whitewater, Inc.'s (Crab Apple) April 9, 2015, letter clearly identifies the answer as being 800 cfs for certain times, with higher flows of 1,000 cfs to 1,400 cfs at other times, and more guaranteed releases overall. Such insight serves as a starting point for discussion, and obviates the need for the requested extensive field study since the answer is already known.<sup>9</sup> That is, BSPC can certainly consider alternate whitewater release schedules downstream of Fife Brook so long as the water necessary to do so can be delivered from the DRP, the ultimate source for this water.

Accordingly, BSPC proposes to develop a Flow Regime Working Group which, based on BSPC's extensive relicensing and settlement experience, can serve as an effective forum to identify potential opportunities and review the viability of such opportunities. As part of this, BSPC intends to perform operations modeling of its facilities that will inform of potential refinements that work within the context of the existing Settlement and DRP license and that do not adversely impair the 600 MW Bear Swamp PSD from serving its intended purpose of operating in response to ISO New England and regional generation, capacity, and reliability needs.

For example, and as described in the PAD, BSPC manages the 52 cfs disconnect between the incoming 73 cfs minimum flow from Deerfield No. 5 and the outgoing 125 cfs minimum flow from Fife Brook through modest use of storage as allowed for under Article 401. However, this management is contingent on receiving replenishing water from the DRP. If this difference were instead taken from the storage reserved for the Bear Swamp PSD *without replenishment from the DRP*, the entire Bear Swamp PSD storage would be depleted in less than 50 days at a net negative drain rate of 52 cfs (higher net negative differences will only result in faster draining).

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<sup>9</sup> Given that 106 scheduled releases have been provided for more than 15 years below Fife Brook (some 1,500+ scheduled releases), and whitewater boating occurs at these and other flows, it is reasonable that the whitewater community already has a very strong understanding of the merits of various flow levels.

If the Bear Swamp PSD storage were so drained (nullifying the Bear Swamp PSD and jeopardizing grid stability in the process), the system would have no choice but to revert back to what already occurs today - where outflow from Fife Brook is a direct function of inflow received from the DRP. That is, the BSP cannot manufacture water and imbalanced, net-negative scenarios, where the volume of water released below Fife Brook dam is substantially and regularly greater than the volume of water coming in from the DRP, are not sustainable.

In summary, these collective guiding principles are factored into BSPC's PSP with each proposed study (or response to study request) providing additional detail as appropriate. BSPC believes this PSP is balanced and appropriate to examining those aspects for which BSPC has direct control and avoids studying potential effects created by, or associated with a different, separate FERC-licensed project and the existing Settlement.

## Section 2

# Execution of Study Plan

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As required by Section 5.15 of FERC’s ILP regulations, BSPC will prepare progress reports as study work progresses, file an Initial Study Report (ISR), hold a meeting with stakeholders and FERC staff to discuss the initial study results (ISR Meeting), prepare and file an Updated Study Report (USR) with an associated USR Meeting, as appropriate. BSPC will submit all study documents that must be filed with FERC via FERC’s eFiling system. Public study documents will also be provided through BSPC’s public relicensing website ([www.bearswampproject.com](http://www.bearswampproject.com)).

## 2.1 Schedule

The Process, Plan, and Schedule is presented in Table 2.1-1.

**TABLE 2.1-1  
PROCESS, PLAN, AND SCHEDULE**

Activity	Responsible Parties	Time Frame	Deadline
File Notice(s) of Intent (NOI) and Pre-Application Document (PAD) (18 CFR § 5.5(d))	BSPC	As early as five and one half but no later than five years prior to license expiration.	12/19/2014
Initial Tribal Consultation Meeting (18 CFR § 5.7)	FERC	No later than 30 days of filing NOI and PAD.	1/18/2015
Issue notice of NOI/PAD and Scoping Document 1 (SD1) (18 CFR § 5.8(a))	FERC	Within 60 days of filing NOI/PAD.	2/17/2015
Conduct scoping meetings and site visit (18 CFR § 5.8(b) (viii))	FERC	Within 30 days of NOI/PAD notice and SD1 issuance.	3/18-19/2015
Comments on PAD, SD1, and Study Requests (18 CFR § 5.9(a))	Stakeholders	Within 60 days of NOI/PAD notice and issuance of SD1	4/18/2015
File Proposed Study Plan (PSP) (18 CFR § 5.11)	BSPC	Within 45 days of deadline for filing comments on PAD	6/2/2015
Issuance of Scoping Document 2 (SD2), if necessary (18 CFR § 5.10)	FERC	Within 45 days of deadline for filing comments on SD1	6/2/2015
Study Plan Meetings (18 CFR § 5.11(e))	BSPC	First meeting to be held within 30 days of filing PSP	7/2/2015
Conduct Preliminary Field Study Activities (in advance of formal Study Plan determination)	BSPC		TBD
Comments on PSP (18 CFR § 5.12)	Stakeholders	Within 90 days after PSP is filed	8/31/2015

Activity	Responsible Parties	Time Frame	Deadline
File Revised Study Plan (RSP) (18 CFR § 5.13(a))	BSPC	Within 30 days of deadline for comments on PSP	9/30/2015
Comments on RSP (18 CFR § 5.13 (b))	Stakeholders	Within 15 days following RSP	10/15/2015
Issuance of Study Plan Determination (18 CFR § 5.13(c))	FERC Director	Within 30 days of RSP	10/30/2015
Formal Study Dispute Resolution Process if requested (18 CFR § 5.14(a))	Agencies and Tribes with mandatory conditioning authority	Within 20 days of study plan determination	11/19/2015
Dispute Resolution Panel Convenes (18 CFR § 5.14(d))	Dispute Resolution Panel	Within 20 days of a notice of study dispute	12/9/2015
Comments on Study Plan Disputes (18 CFR § 5.14(i))	BSPC	Within 25 days of notice of study dispute	12/14/2015
Third Panel Member Selection Due (18 CFR § 5.14(d)(3))	Dispute Resolution Panel	Within 15 days of when Dispute Resolution Panel convenes	TBD
Dispute Resolution Panel Technical Conference (18 CFR § 5.14(j))	Dispute Resolution Panel, BSPC, Stakeholders	Prior to engaging in deliberative meetings	TBD
Dispute Resolution Panel Findings and Recommendations (18 CFR § 5.14(k))	Dispute Resolution Panel	No later than 50 days after notice of dispute	1/8/2016
Study Dispute Determination (18 CFR § 5.14(1))	FERC Director	No later than 70 days after notice of dispute	1/28/2016
Conduct First Season of Studies (18 CFR § 5.15)	BSPC		TBD
Study Progress Report (18 CFR § 5.15(b))	BSPC	Schedule and frequency to be determined in study plans	TBD
Initial Study Report (18 CFR § 5.15(c))	BSPC	Pursuant to the Commission-approved study plan and schedule provided in § 5.13 or no later than 1 year after Commission approval of the study plan	10/30/2016
Initial Study Report Meeting (18 CFR § 5.15(c)(2))	BSPC and Stakeholders	Within 15 days of filing the initial study report	11/14/2016
File Initial Study Report Meeting Summary (18 CFR § 5.15(c)(3))	BSPC	Within 15 days of study results meeting	11/29/2016

Activity	Responsible Parties	Time Frame	Deadline
File Meeting Summary Disagreements (18 CFR § 5.15(c)(4))	Stakeholders	Within 30 days of study results meeting summary	12/29/2016
File Responses to Meeting Summary Disagreements (18 CFR § 5.15(c)(5))	BSPC	Within 30 days of filing meeting summary disagreements	1/28/2017
Resolution of Disagreements (18 CFR § 5.15(c)(6))	FERC Director	Within 30 days of filing responses to disagreements	2/27/2017
Conduct Second Season of Studies (if necessary)	BSPC		TBD
File Updated Study Report (18 CFR § 5.15(f)) (if necessary)	BSPC	Pursuant to the approved study plan and provided in § 5.13 or no later than 2 years after Commission approval	10/30/2017
Updated Study Report Meeting (18 CFR § 5.15(f)) (if necessary)	BSPC and Stakeholders	Within 15 days of updated study report	11/14/2017
File Updated Study Report Meeting Summary (18 CFR § 5.15(f)) (if necessary)	BSPC	Within 15 days of study report meeting	11/29/2017
File Meeting Summary Disagreements (18 CFR § 5.15(f))	Stakeholders	Within 30 days of study results meeting summary	12/29/2017
File Responses to Meeting Summary Disagreements (18 CFR § 5.15(f))	BSPC	Within 30 days of filing meeting summary disagreements	1/28/2018
Resolution of Disagreements (18 CFR § 5.15(f))	FERC	Within 30 days of filing responses to disagreements	2/27/2018
File Preliminary Licensing Proposal or Draft License Application (18 CFR § 5.16)	BSPC	No later than 150 days prior to the deadline for filing a new or subsequent license application	11/1/2017
Comments on Preliminary Licensing Proposal or Draft License Application Due (18 CFR § 5.16(e))	Stakeholders	Within 90 days of filing Preliminary License Proposal or draft license application	1/30/2018
Final License Application Filed (18 CFR § 5.17)	BSPC	No later than 24 months before the existing license expires	3/31/2018

<sup>1</sup> If the due date falls on a weekend or holiday, the deadline is the following business day.

<sup>2</sup> All Director's determinations are subject to request for rehearing to the Commission pursuant to 18 CFR § 375.301(a) and 385.713. Any request for rehearing must be filed within 30 days of determination.

<sup>3</sup> Shaded actions are not necessary if there are no study disputes.



## **2.2 Safety Constraints and Considerations**

All fieldwork that may be performed by BSPC personnel, contractors, or other entities or individuals during the course of the relicensing studies will be conducted in accordance with Brookfield's safety policies and procedures.

The following general understandings, concepts, and practices will apply to all field aspects of the relicensing studies:

- Safety is the most important consideration of each fieldwork team.
- Field crews may make minor variances to the FERC-approved study in the field to accommodate actual field conditions and safety considerations. When minor variances are made, they will be documented.

## Section 3

# Responses to Stakeholder Study Requests

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### 3.1 Study Requests

BSPC filed its PAD on December 19, 2014. FERC issued SD1 on February 18, 2015, and conducted public scoping meetings on March 18, 2015, in North Adams, Massachusetts. In accordance with ILP regulations, comments on the PAD and SD1 and study requests were due to FERC by April 18, 2015. The correspondence from resource agencies and stakeholders requesting studies and providing comments is provided in Appendix B. Table 3.1-1 summarizes the formal study requests filed with the Commission.<sup>10</sup>

Comments by the organizations listed below were also filed with or forwarded to FERC. These submittals did not include formal study requests that meet the Commission's study criteria, but did include comments on the PAD, SD1, or the scope of or methodology for studies proposed by BSPC:

- New England Flow
- Massachusetts Historical Commission
- Crab Apple
- AMC
- AW
- DRWA
- National Park Service
- TransCanada

While not required to do so by FERC's ILP regulations, BSPC undertook a thorough effort to identify and evaluate individual study requests regardless of whether these requests made a reasonable attempt to demonstrate consistency with FERC's study criteria. BSPC's determination on the appropriateness of a study request is based on the seven criteria for study requests contained in the ILP regulations (18 CFR § 5.9(b)) and listed in Section 1. Table 3.1-2 summarizes the results of BSPC's review of the formal study requests and determination based on the Study Criteria.

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<sup>10</sup> AMC, AW, FLOW, Crab Apple, and Zoar jointly filed combined study requests with FERC on April 16, 2015. For purposes of this PSP, this group is referred to collectively herein as the "Whitewater Groups" or "WGs."

**TABLE 3.1-1  
FORMAL STUDY REQUESTS FILED WITH FERC**

	<b>Requested Study</b>	<b>MADFW</b>	<b>CRWC</b>	<b>USFWS*</b>	<b>WGs**</b>	<b>TU</b>	<b>MADEP</b>	<b>FERC</b>
1	Project Operations Model	✓	✓	✓	✓			
2	Aquatic Mesohabitat Assessment and Mapping	✓	✓					
3	Fish Assemblage Assessment	✓	✓	✓				
4	Instream Flow Habitat Assessment	✓	✓	✓				
5	Entrainment of Riverine Fish	✓	✓	✓				
6	Wild Trout Spawning and Abundance	✓	✓					
7	State-Listed Rare Plants, Baseline Data Collection and Assessment of Operational Impacts	✓						
8	Freshwater Mussel Species of Greatest Conservation Need, Baseline Data Collection and Assessment of Operational Impacts	✓	✓	✓				
9	State-Listed Odonates, Baseline Data Collection and Assessment of Operational Impacts	✓						
10	Northern Long-Eared Bat Acoustic Survey	✓		✓				
11	Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation and Invasive Species	✓	✓	✓				
12	Baseline Study of Terrestrial Wildlife and Botanical Resources	✓	✓	✓				
13	Water Quality Study	✓	✓				✓	

	<b>Requested Study</b>	<b>MADFW</b>	<b>CRWC</b>	<b>USFWS*</b>	<b>WGs**</b>	<b>TU</b>	<b>MADEP</b>	<b>FERC</b>
14	Cultural Resources Survey							✓
15	Recreation Survey		✓		✓			✓
16	Economic Analysis of Project Operations and Recreation		✓		✓			
17	Deerfield River Angling Access, Flow and Safety Study					✓		
18	Controlled Flow Release		✓		✓			

\*U.S. Fish and Wildlife Service

\*\*Whitewater Groups (AMC, AW, FLOW, Crab Apple, and Zoar).

**TABLE 3.1-2**  
**SUMMARY OF STUDY REQUESTS FILED IN RESPONSE TO THE**  
**PAD AND SD1 AND BSPP'S RESPONSES**

	<b>Requested Study</b>	<b>Appropriate for Study/Appropriate for Study with Alterations</b>	<b>Not Deemed Appropriate for Full Study as Requested</b>	<b>Correlation to BSPP Study</b>
1	Project Operations Model	✓		Operations Model (Section 12)
2	Aquatic Mesohabitat Assessment and Mapping	✓		Aquatic Mesohabitat Assessment and Mapping (Section 6)
3	Fish Assemblage Assessment	✓		Fish Assemblage Assessment (Section 5)
4	Instream Flow Habitat Assessment	✓		Instream Flow Assessment (Section 13)
5	Entrainment of Riverine Fish	✓		Entrainment Evaluation (Section 15)
6	Wild Trout Spawning and Abundance		✓	Certain aspects addressed in Fish Assemblage Assessment (Section 5) and Aquatic Mesohabitat Assessment and Mapping (Section 6)
7	State-Listed Rare Plants, Baseline Data Collection and Assessment of Operational Impacts	✓		Baseline Study of Terrestrial Wildlife and Botanical Resources (Section 7), Wetland, Riparian, and Littoral Habitat Study Plan (Section 8) and Rare, Threatened, and Endangered (RTE) Species Study (Section 10)
8	Freshwater Mussel Species of Greatest Conservation Need, Baseline Data Collection and Assessment of Operational Impacts		✓	Certain aspects addressed in Fish Assemblage Assessment (Section 5), Aquatic Mesohabitat Assessment and Mapping (Section 6) and RTE Species Study (Section 10)

	<b>Requested Study</b>	<b>Appropriate for Study/Appropriate for Study with Alterations</b>	<b>Not Deemed Appropriate for Full Study as Requested</b>	<b>Correlation to BSPC Study</b>
9	State-Listed Odonates, Baseline Data Collection and Assessment of Operational Impacts		✓	Certain aspects addressed in RTE Species Study (Section 10)
10	Northern Long-Eared Bat Acoustic Survey		✓	Certain aspects addressed in Baseline Study of Terrestrial Wildlife and Botanical Resources (Section 7) and RTE Species Study (Section 10)
11	Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation and Invasive Species	✓		Baseline Study of Terrestrial Wildlife and Botanical Resources (Section 7), Wetland, Riparian, and Littoral Habitat Study Plan (Section 8) and Fife Brook Flow Attenuation Study (Section 14)
12	Baseline Study of Terrestrial Wildlife and Botanical Resources	✓		Baseline Study of Terrestrial Wildlife and Botanical Resources (Section 7)
13	Water Quality Study	✓		Water Quality Study Plan (Section 4)
14	Cultural Resources Survey	✓		Cultural Resources Survey (Section 11)
15	Recreation Survey	✓		Recreation Survey (Section 9)
16	Economic Analysis of Project Operations and Recreation		✓	n/a
17	Deerfield River Angling Access, Flow and Safety Study	✓		Fife Brook Flow Attenuation Study (Section 14)
18	Controlled Flow Release		✓	Certain aspects addressed in Recreation Survey (Section 9) and Operations Model (Section 12)

### **3.2 General Study Considerations**

The studies proposed by BSPC in this PSP are intended to collect information and data to inform the development of the Draft License Application (DLA), Final License Application (FLA), the Commission's Environmental Assessment (EA), and eventual license conditions. As such, BSPC intends to perform studies that collect information that would be used to inform the assessment of Project-related resource impacts (if any) in the DLA, FLA, and the Commission's EA.

To assist in this data collection, BSPC intends to develop a substantial digital aerial image platform (DAIP) in association with Geographic Information Systems (GIS) to serve as a composite platform for data presentation and interpretation. Accordingly, BSPC proposes to collect high-precision digital aerial images with a pixel resolution of less than six centimeters. The DAIP will include all lands within the Project boundary and even extend beyond the Project boundary to the confluence of the Deerfield and Cold Rivers. Images will be ortho-corrected using existing LiDAR data available from the Massachusetts Office of Geographic Information Systems (MassGIS). Ortho-corrected (rectified) digital aerial images will serve as a platform for analyses, consultation, and integration of GIS study data to inform and facilitate the relicensing process.

### **3.3 Study Requests Deemed Appropriate for Study**

A total of 18 formal and individual study requests were made by stakeholders and FERC. Many study request letters were duplicative or similar in purpose and scope to that of another letter. Where possible, BSPC consolidated common themes and elements resulting in 12 individual studies, which are detailed in Sections 4 through 15 of this PSP, to address study requests and comments made by FERC, resource agencies, and stakeholders.

### 3.4 Study Requests Deemed Not Appropriate for Study

#### 3.4.1 State-Listed Odonates, Baseline Data Collection, and Assessment of Operational Impacts

The MADFW has requested a study of State-Listed Odonates, Baseline Data Collection, and Assessment of Operational Impacts. BSPC believes this request does not meet the Commission's Study Criteria for the following reasons:

- **Lack of connection between Project operations and an effect on a resource (Study Criteria No. 5):** Under FERC policy and regulations, a study requestor must demonstrate a reasonable connection between Project operations and effects on the resource in question. This “nexus” between the Project’s operation and a resource impact must not amount to mere speculation, but have a basis in fact and/or be informed by professional judgment. The DRP, upstream and downstream of the Fife Brook impoundment, is authorized to operate under today’s peaking flow regime. This flow regime is not initiated or created by the BSP. Accordingly, the requested study and any effects the flow regime may have on the resource have their nexus with another FERC project. That is, if BSPC were to perform this study, it would be studying the effects of a developmental action that is not directly caused by the BSP and which have their roots and nexus with the Settlement.
- **There is no evidence of a problem and/or the study request is an attempt to search for the existence of a “nexus” (Study Criteria No. 5):** The MADFW only indicates a possibility of an effect and concedes that it needs a study to determine if a Project effect might actually exist. If the study request is an attempt to search for a Project effect, then it does not meet the criteria for a study request. In the *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals), the Court found that an applicant could be required “*to conduct a study when there is some evidence of a problem and a study is necessary to determine the extent of the harm.*” The Court also held that an applicant does not have “*a duty to determine if a problem exists,*” and that it is not enough to speculate that a problem may exist or that the “*evidence*” of a problem is based on a “*prediction based on opinions.*”



The MADFW has requested a survey of odonate fauna to collect qualitative data on species presence downstream from the Fife Brook Dam and a quantitative assessment of emergence habitat within the Lower Reservoir to determine if, and to what degree, Project operations may affect rare and protected natural resources. The MADFW believes that *“these data will provide a baseline of information to which to compare future duplicate studies as a method to document changes that are occurring along the river, and to assess alternative water management strategies on listed odonates”* (MADFW 2015).

The MADFW states that effects of Project operations on listed odonates in the Deerfield River are unknown, but that the *“timing, rate, and magnitude of releases from the Bear Swamp Project, and the water level fluctuations in the impoundment may have direct, adverse effects on rare odonate populations and their habitats, but these effects are not well understood”* (MADFW 2015).

In the first instance, BSPC notes that the timing, rate, and magnitude of flow releases from Fife Brook Dam are the direct result of the Settlement, 401 WQC, and license associated with the Deerfield River Project. BSPC’s Fife Brook Development is limited to operating in a run-of-release mode reacting to and passing inflows from the Deerfield River Project. The MADFW’s speculation regarding potential effects on odonates downstream from Fife Brook Dam is related to the peaking operations authorized by the Settlement parties through the relicensing of the Deerfield River Project and over which BSPC has no direct control. Therefore, the nexus described in the MADFW’s study request is not to the Bear Swamp Project, but to an overall flow regime in the Deerfield River that the Bear Swamp Project neither creates nor can exercise direct, substantive change upon. The study request would require BSPC to conduct studies on effects caused by other hydroelectric developments over which the licensee has no control and is, therefore, contrary to FERC’s guidance (FERC 2012). For these reasons, the request does not meet the criteria for a study request described in 18 CFR § 5.9(b).

Secondly, the MADFW’s request to conduct a quantitative assessment of emergence habitat within the Lower Reservoir contradicts the division’s recent comments on proposed odonate studies in support of relicensing the Northfield Mountain Pumped Storage Project (FERC No. 2485) (Northfield Mountain) along the Connecticut River. In a letter dated August 29, 2013, the

MADFW provided the following comments related to odonate surveys at Northfield Mountain Upper Reservoir:

*In its comments on the UPSP, the Division expressed concern about the proposed omission of surveys for state-listed odonates within the Upper Reservoir. However, the Division was not aware that water elevations in the Upper Reservoir currently fluctuate 10 – 40 feet a day, depending on power demand, as detailed within the RSP. The Division concurs that water level fluctuations of this magnitude are likely to preclude the presence of state-listed odonates in the Upper Reservoir and the surveys are **not** warranted at this time [emphasis in original].*

BSPC notes that water levels in both the Bear Swamp Project's Upper and Lower reservoirs fluctuate up to 10-40 feet during pumping/generating cycles. This fluctuation typically occurs on a daily basis. BSPC agrees with the MADFW's assessment that "*water level fluctuations of this magnitude are likely to preclude the presence of state-listed odonates.*" For these reasons, BSPC does not believe that odonate surveys of the Project's Upper and/or Lower reservoirs are warranted. As described by the MADFW, there is no nexus between reservoir level fluctuations and state-listed odonates, as the odonates are not expected to be present in the fluctuation zone. This request does not meet the criteria for a study request described in 18 CFR § 5.9(b).

In addition, BSPC notes that the Project has been in service since 1974, and for the past 18 years, the Project has operated in accordance with 1997 Amendment. Odonate populations in the Lower Reservoir have likely adapted to the daily operating regime that has been in place since 1974 and 1997. Indeed, the fact that the ocellated darter (*Boyeria grafiana*) has been observed in the Deerfield River immediately upstream from the Lower Reservoir and downstream from Fife Brook Dam (MADFW 2015) indicates that this reach of the river supports habitat for this species under current operating conditions. In any case, the MADFW has not provided any evidence of specific effects on odonates as result of fluctuating surface water levels in the Lower Reservoir or downstream from Fife Brook Dam.

Indeed, the MADFW admits that the potential effects on odonates as a result of water level fluctuations are “*not well understood*” (MADFW 2015) by the division, but repeatedly speculates in its study request on what those effects may be. The MADFW further states that a study is needed “*to make the connection (if any exists) between project operations and odonate emergence*” (MADFW 2015). The MADFW needs a study to determine if a problem even exists. BSPC does not have a duty to determine if a problem exists, and it is not enough to speculate that a problem may exist or that the evidence of a problem is based on a prediction based on opinions.

For these reasons, the request does not meet the criteria for a study request described in 18 CFR § 5.9(b), and BSPC does not intend to conduct this research project to search for potential effects on odonates as a result of fluctuating water levels in the Lower Reservoir or downstream of Fife Brook.

Although BSPC does not propose to conduct this study as specifically requested, BSPC will be addressing odonates within the Rare, Threatened, and Endangered (RTE) Study described in Section 10 below. As part of this effort, BSPC will consult with the MADFW and National Heritage & Endangered Species Program (NHESP) to obtain their existing information regarding the state-listed odonate species specifically known to exist within the Project area or similar habitats. BSPC believes that this body of existing information of documented state-listed odonates will be sufficient, and the MADFW has not demonstrated why existing information is inadequate.

### 3.4.2 Mussels Survey

The MADFW, U.S. Fish and Wildlife Service (USFWS), and CRWC requested studies of freshwater mussels, including:

- Baseline Mussel Survey (USFWS and CRWC); and
- Freshwater Mussel Species of Greatest Conservation Need, Baseline Data Collection, and Assessment of Operational Impacts (MADFW).

BSPC believes these requests do not meet the Commission's Study Criteria for the following reason:

- **There is no evidence of a problem and/or the study request is an attempt to search for the existence of a “nexus” (Study Criteria No. 5).** The MADFW, USFWS, and CRWC indicate the possibility of an effect, but need a study to determine if a Project effect might actually exist. If the study request is an attempt to search for a Project effect, then it does not meet the criteria for a study request. In the *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals), the Court found that an applicant could be required “*to conduct a study when there is some evidence of a problem and a study is necessary to determine the extent of the harm.*” The Court also held that an applicant does not have “*a duty to determine if a problem exists,*” and that it is not enough to speculate that a problem may exist or that the “*evidence*” of a problem is based on a “*prediction based on opinions.*”

A 2008 study of freshwater mussels and the Connecticut River watershed conducted in cooperation with the CRWC characterized the Deerfield River as a small upland river (SUR) (Neddeau 2008). Neddeau (2008) notes that SUR's:

*[t]end to have lower nutrient levels and higher acidity than other rivers. The environmental conditions described are more important than stream size; many large tributaries (e.g., White River, Ammonoosuc River, Deerfield River, Passumpsic River, Sugar River, Millers River) fall into this category because their rocky conditions and steep gradients preclude mussels that might otherwise prefer rivers of that size. Of all the major habitat types, SUR habitats are most likely to support few or no mussels due to challenging environmental conditions.*

A 1996 mussel survey of the Connecticut River Valley in Massachusetts identified four mussel species in the greater Deerfield River watershed: eastern elliptio (*Elliptio complanata*), eastern pearlshell (*Margaritifera margaritifera*), eastern floater (*Pyganodon cataracta*), and alewife floater (*Andodonta implicate*). As noted in the MADFW's study request, no mussels were present in the Cold River and portions of the Deerfield River mainstem that were surveyed in 1996 (McLain 1996). The results of the 1996 mussel survey are consistent with the 2008 report

produced in cooperation with the CRWC which states that SUR habitats (such as the Deerfield River) are *“most likely to support few or no mussels”* (Nedeau 2008). The substrate conditions and steep gradient of the Deerfield River provide challenging habitat for mussels, and CRWC’s 2008 report links their absence from the mainstem to these environmental factors.

BSPC further notes that the alewife floater’s primary host fish are anadromous species such as the alewife (*Alosa pseudoharengus*) and blueback herring (*Alosa aestivalis*). Nedeau (2008) states that the alewife floater *“occurs in the mainstem Connecticut River as far upstream as the Bellows Falls Dam and becomes increasingly uncommon upstream of each of the major hydropower dams at Holyoke, Turners Falls, and Vernon. It was historically eliminated from these areas due to dams that blocked fish passage, but installation of fishways at the three dams restored the species in much of its historic habitat.”* There are four dams located on the Deerfield River downstream from the Bear Swamp Project (TransCanada’s Deerfield Nos. 4, 3, and 2 stations and the Gardners Falls Project), none of which provide upstream fish passage for alewife, blueback herring, or other migratory species. Therefore, it is unlikely that the alewife floater would occur in the reach of the Deerfield River extending from Fife Brook Dam downstream to TransCanada’s Deerfield No. 4 station.

The MADFW, USFWS, and CRWC state that it is *“unclear whether the absence of mussels in 1996 is indicative of the greater habitat and biogeographic constraints in the Deerfield...or whether previous minimum flows were too low for native mussels. Further, it is unclear if the increased flows instituted in 1997 are sufficient for mussels”* (MADFW 2015). The current flow regime in the Deerfield River was evaluated by FERC as part of the Final Environmental Impact Statement (FEIS) prepared in 1996. FERC determined that a minimum flow of 125 cfs downstream from Fife Brook Dam would result in *“more habitat available to aquatic biota”* (FERC 1996). The Settlement parties supported a 125 cfs minimum flow to enhance aquatic habitat downstream from Fife Brook Dam. By their own admission, MADFW, USFWS, and CRWC are now “unclear” as to whether a problem even exists, or what the source of any problem might be. FERC’s Study Criteria require a defined nexus to the Project and more than speculation of a problem.

BSPC notes that the Project has been in service since 1974, and for the past 18 years, the Project has operated in accordance with 1997 Amendment. The MADFW, USFWS, and CRWC recognize that the Lower Reservoir experiences drawdowns that “*typically happen on a daily basis*” (USFWS 2015). Any mussel populations in the Deerfield River have likely adapted to the daily operating regime that has been in place since 1974 and 1997. The MADFW, USFWS, and CRWC have offered no evidence that mussels are present in the fluctuation zone of the Lower Reservoir, or that operation of the Bear Swamp PSD strands mussels, “*leaving them vulnerable to desiccation or predation*” (USFWS 2015). Further, the MADFW, USFWS, and CRWC have offered no evidence that mussels are present in the Deerfield River downstream from Fife Brook Dam or that changes in stage levels between base flows and whitewater releases or generation flows “*restrict mussels from otherwise suitable habitat*” (MADFW 2015). BSPC believes that this study request is an attempt to search for the existence of a nexus with Project operations. The MADFW, USFWS, and CRWC indicate the possibility of an effect, but need a study to: (a) determine if mussel species are even present in the mainstem of the Deerfield River (which the CRWC’s own study conducted in 2008 indicates is unlikely for reasons unrelated to hydropower operations); (b) determine if a problem exists with any mussel species that may be present; and (c) attempt to link any problems to the Bear Swamp Project. Since the study request is an attempt to search for a Project effect, it does not meet the Study Criteria described in 18 CFR § 5.9(b). It is not enough to speculate that a problem may exist.

Although BSPC does not propose to conduct this study as specifically requested, BSPC will be addressing mussels within the Fish Assemblage Assessment, Aquatic Mesohabitat Assessment and Mapping described in Sections 5 and 6 below. As part of this effort, BSPC will document, map, and record any mussel beds and/or shell material observed during aquatic mesohabitat mapping.

### 3.4.3 Northern Long-eared Bat Acoustic Study

The MADFW and USFWS have requested a northern long-eared bat (NLEB) acoustic study to document the presence/absence of this federally listed threatened species. BSPC believes that these study requests do not meet the Commission’s Study Criteria for the following reason:

- **Existing information is sufficient to assess Project effects on this resource and to inform the development of license requirements (Study Criteria Nos. 4 and 5).** Study requests should identify gaps in existing data and describe why additional data is necessary to assess Project effects (FERC 2012). Requestors should also describe why existing information is insufficient to inform the development of license requirements and/or contribute to the development of PM&E measures. Study requests should demonstrate the need for additional, site-specific information for purposes other than general research.
- **There is no evidence of a problem and/or the study request is an attempt to search for the existence of a “nexus” (Study Criteria No. 5).** The MADFW and USFWS indicate the possibility of an effect, but need a study to determine if a Project effect might actually exist. If the study request is an attempt to search for a Project effect, then it does not meet the criteria for a study request. In the *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals), the Court found that an applicant could be required *“to conduct a study when there is some evidence of a problem and a study is necessary to determine the extent of the harm.”* The Court also held that an applicant does not have *“a duty to determine if a problem exists,”* and that it is not enough to speculate that a problem may exist or that the *“evidence”* of a problem is based on a *“prediction based on opinions.”* There is currently no evidence to suggest that ongoing Project operations are having any impact on the northern long-eared bat.

The MADFW and USFWS databases indicate that the NLEB potentially occurs within the Project area. Based on the vegetative communities described in the PAD, the MADFW and USFWS have determined that the Project area *“likely contains suitable habitat for NLEB”* (MADFW 2015). The MADFW and USFWS have concluded that *“without knowing if and where NLEB occur within the project area,”* the MADFW and USFWS cannot *“determine if existing operations (e.g., maintenance activities on project lands) or future activities could result in adverse effects to NLEB populations”* (MADFW 2015).

The MADFW and USFWS have offered no evidence of a nexus between ongoing Project operations and the NLEB. There are no ongoing or proposed Project operations that require tree clearing. With regards to future Project-related activities, both the MADFW and USFWS agree that *“BSPC is not proposing any new construction land management activities that could impact bat habitat or hibernacula”* (MADFW 2015). The MADFW and USFWS speculate in their study requests that trails and/or recreational facilities may be a requirement of a new license and therefore *“could require trees to be cut, which could result in bat mortality if the removal occurs during a time when bats are unwilling or unable to flee a tree that is felled when they are inside”* (MADFW 2015). BSPC believes that it is premature to speculate on the specific potential effects of activities that have not been proposed.

In any case, BSPC recognizes that the Project may provide habitat for the NLEB and believes that the existing information is sufficient to inform the development of potential PM&E measures and license requirements for the Project. The only activities that the BSPC would be undertaking that may have the potential to impact NLEB habitat would be maintenance activities, such as tree-clearing. These activities can be managed to protect NLEB and its habitat (e.g., restrictions on when tree-cutting or clearing could take place). BSPC believes that any NLEB studies would more appropriately be conducted at specific locations where, and at the time of, any future license requirements or maintenance activities that call for land clearing or tree removal. At this time, it is premature to speculate where these activities may occur and a study performed today would likely be deemed dated if it were to apply to a future activity. That is, BSPC does not intend to conduct NLEB acoustic surveys in this pre-filing stage of relicensing only to have to repeat the same studies prior to the commencement of any tree removal or land clearing activities that may be required under a new license.

Instead, BSPC expects that future consultation will occur with the MADFW and USFWS regarding the need for a NLEB Management Plan that specifies NLEB conservation measures at the Project and takes into account the USFWS’s Northern Long-eared Bat Interim Conference and Planning Guidance (USFWS 2014). The existing information regarding northern long-eared bat habitat and potential occurrences of the NLEB in the Project area are sufficient to inform the development of potential PM&E measures, including development of a NLEB Management



Plan. Since existing information is sufficient to assess Project effects on this resource and to inform the development of license requirements and/or PM&E measures, the MADFW's and USFWS's requests for a Northern Long-eared Bat Acoustic Survey does not meet the Study Criteria described in 18 CFR § 5.9(b).

Finally, BSPC notes that the USFWS recently requested a NLEB survey to assess the potential impacts on NLEB of relicensing the New York Power Authority's (Power Authority) Blenheim-Gilboa Pumped Storage Project (FERC No. 2685) in the Catskill Mountains of New York State. As summarized by the Power Authority (2014):

*The USFWS's stated goal for the study would be to provide information on the existence of NLEB within the Project area and allow the USFWS and FERC to determine if existing or proposed Project activities may impact NLEB. The Power Authority does not anticipate proposing any new construction at the Project as part of its relicensing application. The only activities that the Power Authority would be undertaking that may have the potential to impact NLEB habitat would be maintenance activities, such as tree-clearing. These activities can be managed to protect NLEB and its habitat (e.g., restrictions on when tree-cutting or clearing could take place). Accordingly, during a telephone conference between the Power Authority and USFWS representatives on September 3, 2014, a consensus was reached that a field study is not needed at this time. The Power Authority will consult with the USFWS on specific management measures that should be taken in the future if any activities, such as tree-clearing, are proposed that would involve the potential to affect this species or its habitat.*

BSPC is not presently proposing any new construction at the Bear Swamp Project. Likewise, BSPC believes that maintenance and/or other activities conducted under a new license issued by the Commission for the continued operation and maintenance of the Project can be addressed via a management plan to protect NLEB and its habitat – a course of action deemed appropriate by the USFWS at the Blenheim-Gilboa Pumped Storage Project.

Although BSPC does not propose to conduct this study as specifically requested, BSPC will be addressing the northern long-eared bat within the RTE Species Study as described in Section 10 below. As part of this effort, BSPC will document, map, and record observations of northern long-eared bats or northern long-eared bat habitat (e.g., hibernacula, roost trees) during ecological field studies conducted in support of Project relicensing. BSPC will consult with the USFWS on specific management measures that should be taken in the future if any activities, such as tree-clearing, are proposed that would involve the potential to affect NLEB or its habitat.

#### 3.4.4 Economic Analysis of Project Operations and Recreation

The CRWC and Whitewater Groups (WGs) (consisting of AMC, AW, FLOW, Crab Apple, and Zoar) have requested an Economic Analysis of Project Operations and Recreation. The requested study would include an independent analysis to quantify the economic impact of river-based activity on the Deerfield River. The requestors state that *“the economic study should analyze the impact in economic terms of the 1997 Settlement Agreement recreation enhancements and of river use since then. This study will establish a baseline explaining the economic results of the Settlement Agreement and of present operations”* (CRWC 2014; AMC et al. 2015).

BSPC believes that these study requests do not meet the Commission’s Study Criteria for the following reason:

- **Lack of connection nexus between the Project operations and an effect on a resource (Study Criteria No. 5):** Under FERC policy and regulations, a requestor must demonstrate a reasonable connection between Project operations and effects on the resource in question. The nexus described in these study requests is not to the Bear Swamp Project, but to developmental activities created by the Settlement that BSPC cannot directly control or unilaterally affect direct, substantive change upon.
- **The study results would not inform development of license requirements (Study Criteria No. 5):** The requestors assert that *“FERC can use the analysis in determining the appropriate provisions in the license as well as mitigation”* (CRWC 2015). BSPC

notes, however, that in making their licensing decisions FERC does not typically quantify non-power benefits.<sup>11</sup>

BSPC notes that the Settlement values and leverages the continuation of Deerfield River Project peaking operations as a means of providing an important array of PM&E measures that were clearly analyzed, vetted, and agreed-upon. Many of the requesting parties were among the signatories to the Settlement, yet it is these same parties who believe it should be BSPC who conducts a study of the “economic results” of a Settlement it did not create nor can affect unilateral change-upon. The nexus described in these study requests is not to the Bear Swamp Project, but to an overall flow regime and set of provisions developed by the requesting parties themselves in the Settlement for the Deerfield River Project. For this reason, the request does not meet the Study Criteria described in 18 CFR § 5.9(b) as it would involve BSPC studying the effects of developmental activities of others.

BSPC recognizes that FERC staff will analyze socioeconomic data as part of FERC’s EA for the Project and that such analyses may, in part, address the role of river-based recreation in the local and regional economy. The formal ILP study process is, however, only one means by which data for use in FERC’s EA is collected, and nothing in the ILP process precludes third parties from submitting relevant data or studies for consideration by FERC. BSPC believes that Project stakeholders, in particular local outfitters represented by the WGs, are best positioned to define the economic value of their river-based activity on the Deerfield River. It is neither appropriate nor feasible for BSPC to conduct or fund studies to determine or prove the value of non-power benefits. BSPC is not in a position to perform market analyses or to define markets on behalf of Project stakeholders and would have no way to verify stakeholders’ claims, data, or business models. To the extent that CRWC and WGs provide economic or other information that allows BSPC to convey potential impacts of any recommended changes in Project operations on the river-based recreation, BSPC would include such information within the license application.

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<sup>11</sup> See, for example, *State of California v. FERC*, 966 F.2d 1541, 1550 (9th Cir. 1992).

### 3.4.5 Wild Trout Spawning and Abundance

The MADFW and CRWC have requested studies of wild trout spawning and abundance, including:

- Wild Trout Spawning and Abundance (MADFW); and
- Abundance of Naturally Occurring Trout and Distribution of Spawning Areas (CRWC).

BSPC believes these requests do not meet the Commission's Study Criteria for the following reason:

- **There is no evidence of a problem and/or the study request is an attempt to search for the existence of a “nexus” (Study Criteria No. 5).** The MADFW and CRWC indicate the possibility of an effect, but need a study to determine if a Project effect might actually exist. If the study request is an attempt to search for a Project effect, then it does not meet the criteria for a study request. In the *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals), the Court found that an applicant could be required “*to conduct a study when there is some evidence of a problem and a study is necessary to determine the extent of the harm.*” The Court also held that an applicant does not have “*a duty to determine if a problem exists,*” and that it is not enough to speculate that a problem may exist or that the “*evidence*” of a problem is based on a “*prediction based on opinions.*”

The Deerfield River is one of the premiere trout fisheries in the Northeast, and recreational fishing is a primary recreational use of the river reach extending downstream from Fife Brook Dam. The MADFW stocks the Deerfield River and tributaries with several trout species to support the recreational fishery. The MADFW conducted a creel survey between 1972 and 1976 in the Project vicinity and found that 90 percent of the trout captured were hatchery trout stocked directly into the mainstem of the Deerfield River. The remaining 10 percent were a combination of wild and stocked trout moving downstream from tributaries in the river basin (FERC 1996). Historically, the stocking has occurred in reaches upstream and downstream of the Bear Swamp Project. Based on documented presence of naturally reproducing trout populations within the Deerfield No. 5 station bypass reach upstream of the Bear Swamp Project, MADFW stocking is now typically focused in the river reach downstream of Fife Brook Dam, where adult brown and

rainbow trout are stocked (BSPC 2008). The MADFW manages this reach of the Deerfield River as a catch-and-release fishery. For this section of the river, Gilmore (2014) notes that *“there is a good holdover rate and trout in the 15- to 16-inch range are common, with fish up to 24 inches not uncommon and fish from 24 to 30 inches are caught every season.”*

The Deerfield River was recently ranked by TU as one of the 100 best trout streams in the U.S. (Ross 2005). *Trout Unlimited’s Guide to America’s 100 Best Trout Streams* generally describes the flow regime in the Deerfield River and notes that flow fluctuations downstream from Fife Brook *“do not seem to bother trout much”* (Ross 2005). As described by TU, the tailwater fishery downstream from Fife Brook Dam provides excellent habitat for stocked rainbow and brown trout (Ross 2005). TU reports that trout typically range between 12- to 14-inches, although holdovers of 18 inches are reasonably frequent (Ross 2005). Citing local fishing guides, TU notes that the Deerfield River below Fife Brook Dam *“seems to be holding a greater number of fish than formerly. Browns run in the 2 pound range, and rainbows of 18 to 22 inches long are caught ‘every couple of days’”* (Ross 2005).

Other authors concur with TU’s assessment of the Deerfield River downstream from Fife Brook Dam as one of America’s best trout fisheries. Gilmore (2014) notes in *The Flyfisher’s Guide to Eastern Trophy Tailwaters* that the *“releases from Fife Brook Dam provide some of the best trout fishing in New England”* and the minimum flow downstream from the dam *“produces excellent dry fly fishing”* at low water levels (Gilmore 2014). The downstream reach below Fife Brook Dam provides habitat for trout, *“has high-quality water, a good biomass of insect life, and it supports the highest concentrations of wild browns in the river”* (Gilmore 2014).

TU, local guides, and experienced anglers all agree that the Deerfield River is a *“very successful year-round fishery”* (TU 2006). In fact, the best fishing on the entire Deerfield River is the river reach extending downstream from Fife Brook Dam 8.5 miles downstream to the Route 2 Bridge (Gilmore 2014).

While the MADFW and CRWC speculate that peaking flows may limit the productivity of wild trout in the downstream reach below Fife Brook Dam (with MADFW noting in its mesohabitat request that *Habitat mapping below Fife Brook dam will require days to complete and flows*

during this period may vary due to operations of the Deerfield River Hydroelectric Project), they have offered no evidence to support this claim. Rather, the requestors simply cite examples from other watersheds and studies of peaking operations in other river systems (e.g. glacial and alpine rivers in Switzerland dominated by steep canyons and channelized reaches). BSPC does not believe that examples from other river systems (in locations as diverse as Switzerland) are sufficient to prove evidence of a problem in the Deerfield River downstream from Fife Brook Dam, especially when it is recognized that flows vary due to operations of another FERC project. While the MADFW and CRWC lack a “*thorough understanding of the current wild trout population in the Project area,*” they are requesting a study in order to “*examine any potential Project-related impacts*” (MADFW 2015; CRWC 2015). These requests are clearly an attempt to find a problem when there is no evidence that a problem exists.

In contrast to the speculative statements by the MADFW and CRWC, BSPC notes that the Eastern Brook Trout Joint Venture (EBTJV) – a National Fish Habitat Partnership that includes the MADFW, USFWS, TU, National Park Service (NPS), and other resource agencies, conservation organizations, and stakeholders – has classified the Deerfield River as one of less than 11 percent of subwatersheds in Massachusetts that support intact or reduced brook trout populations (TU 2006). The EBTJV assessment team reports that 50 – 90 percent of the historic habitat in the Deerfield River is occupied by self-sustaining brook trout populations (Thieling 2006; Hudy et al. 2008). A majority of the watersheds in the Commonwealth were classified by the EBTJV assessment team as “*reduced*” or “*extirpated*” watersheds with favorable or marginal brook trout habitat conditions. However, the river reach downstream from Fife Brook Dam was classified by the EBTJV as an “*intact watershed*” with “*viable reproducing brook trout populations*” and received the second-highest priority score in the Commonwealth (and one of the highest overall scores in the eastern United States) (Thieling 2006; Hudy et al. 2008).

The high score indicates that the Deerfield River is one of few river systems in the eastern United States with “*the greatest potential for successful protection*” rather than a watershed in need of restoration or enhancement to sustain viable reproducing brook trout populations. As described by the EBTJV (undated):

*These intact subwatersheds have landscape characteristics that are not as vulnerable to an increase in stressors and suggest **they are likely to maintain their favorable habitats and current populations** [emphasis added]. Higher priority scores in this category also suggest that the neighboring subwatersheds also have intact populations and represent patches with higher resiliency and likelihood of persistence. This category represents subwatersheds that are the best options for protection projects.*

Given this context, it is unclear why the MADFW and CRWC now suggest that flow conditions in the Deerfield River downstream from Fife Brook Dam are detrimental to trout spawning and rearing. The status of the robust and healthy wild trout population in the Deerfield River downstream from Fife Brook is supported by anglers and fishing guides who report:

*The Deerfield River in western Massachusetts should be on the “bucket list” of any serious angler in the Northeast, with plenty of stocked rainbows and a robust population of wild brown, rainbow, and indigenous Eastern brook trout to target. The wild browns in particular grow to impressive sizes and are self-sustaining in spite of a lack of any recognition or management plan by the state (C. Jackson, as quoted in Gilmore 2014).*

Further, BSPC notes that peaking flows in the Deerfield River are the direct result of the Settlement, 401 WQC, and license associated with the DRP, not the Bear Swamp Project. BSPC’s Fife Brook Development is limited to operating in a run-of-release mode reacting to, and passing inflows from, the DRP. Thus, any alleged effects on wild trout spawning and abundance downstream from Fife Brook Dam suggested by the MADFW and CRWC would be the result of effects created by the Settlement parties through the relicensing of the DRP. The nexus described in the MADFW and CRWC study requests is not to the Bear Swamp Project, but to an overall flow regime in the Deerfield River that the Bear Swamp Project neither creates nor can exercise direct, substantive change upon. This request would essentially have BSPC conduct studies on speculative effects that are derived from, and have their roots and nexus with, the Settlement over which the licensee has no control and is, therefore, contrary to FERC’s guidance

(FERC 2012). For these reasons, the request does not meet the criteria for a study request described in 18 CFR § 5.9(b).

Finally, BSPC notes that the MADFW manages and is responsible for stocking within the Deerfield River; an activity it has undertaken since at least 1946, including a reclamation project in which the entire river in Massachusetts was treated with rotenone in July 1959 and then restocked with fingerling and catchable trout in the fall (Frost & Easte 1977). BSPC does not intend to conduct studies to evaluate the success of the MADFW's long-term stocking program that is beyond BSPC's control. Nonetheless, BSPC recognizes that the trout fishery is an important recreational resource in the Deerfield River. As such, BSPC has incorporated aspects of the requested study, including recording observations of redds, into the study plans detailed in this PSP.

#### 3.4.6 Controlled Flow Release Studies

The CRWC and WGs have requested controlled flow release studies for both the “*Dryway*” upstream from and leading into the Fife Brook impoundment and the “*Fife Brook*” section of the Deerfield River extending downstream from Fife Brook Dam. Both the Dryway and Fife Brook sections are popular with whitewater boaters.

BSPC believes these requests do not meet the Commission's Study Criteria for the following reasons:

- **Lack of connection nexus between the Project operations and an effect on a resource (Study Criteria No. 5):** Under FERC policy and regulations, a study requestor must demonstrate a reasonable connection between Project operations and effects on the resource in question. This “*nexus*” between the Project's operation and a resource impact must not amount to mere speculation, but have a basis in fact and/or be informed by professional judgment. The CRWC and WGs are requesting a study of flows released into the Dryway from the Deerfield No. 5 station. This flow regime is not initiated or created by the Bear Swamp Project, and BSPC has no control over flows released from the Deerfield No. 5 station.



■ **Existing information is sufficient to assess Project effects on this resource and to inform the development of license requirements (Study Criteria Nos. 4 and 5):**

Requestors have clearly indicated which flows they prefer in comments and study requests filed with the Commission. Further, the whitewater community has participated in more than 1,500 flow releases over 15 years to assess flows in the river reach downstream from Fife Brook Dam. For these reasons, BSPC believes that existing information is sufficient to inform the development of license requirements.

BSPC does not envision performing the requested controlled whitewater release study within the upper reach of the Fife Brook impoundment (Lower Reservoir). Such a study would be to no avail or purpose to informing license conditions for the BSP since BSPC has absolutely no ability to control the delivery of water into that reach either for the study itself, let alone on any going-forward basis – only the DRP licensee (and FERC) can control how much water is released from the upstream dam. Therefore, a study of an appropriate amount of water delivered from another licensee’s upstream dam clearly has its nexus with the upstream project. BSPC recognizes that levels within the Fife Brook impoundment could influence whether water delivered by the DRP affords whitewater opportunities within the upper reach of the Fife Brook impoundment within the BSP Project boundary, and as such, BSPC will examine this aspect within the proposed Recreation Survey and Operations Model.

With respect to controlled flow releases below Fife Brook, BSPC notes a dichotomy among the comments and study requests in which the answer is stated as known, but a study is still requested. For example, Crab Apple’s April 9, 2015, letter clearly identifies the answer as being 800 cfs for certain times, with higher flows of 1,000 cfs to 1,400 cfs at other times, and more guaranteed releases overall. These can serve as starting points for discussion, and obviate the need for the requested extensive field study since the answer is already known.<sup>12</sup> That is, BSPC can certainly consider alternate whitewater release schedules downstream of Fife Brook so long as the water necessary to do so is delivered from the DRP, the ultimate source for this water.

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<sup>12</sup> Given that 106 scheduled releases have been provided for more than 15 years below Fife Brook (some 1,500+ scheduled releases), and whitewater boating occurs at these and other flows, it is reasonable that the whitewater community already has a very strong understanding of the merits of various flow levels.

## Section 4

# Water Quality Study Plan

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### 4.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a Water Quality Study as a proposed study or information gathering activity to characterize water quality within the BSP Project boundary. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on dissolved oxygen (DO) and water temperature in the Deerfield River downstream of the Project.
- SD1 also identified DO and water temperature as resources that could be cumulatively affected by the proposed continued operation and maintenance of the Bear Swamp Project in combination with other hydroelectric projects and other activities in the Deerfield River Basin.

The MADEP, MADFW, and CRWC subsequently submitted formal requests related to water quality, as shown in Table 4.1-1 (see Appendix B).

**TABLE 4.1-1  
WATER QUALITY STUDY REQUESTS**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
MADEP	Water Quality Monitoring	April 17, 2015
MADFW	Water Quality Monitoring	April 17, 2015
CRWC	Water Quality Monitoring	April 16, 2015

### 4.2 Goals and Objectives

The goal of this study is to determine current water quality conditions in the reach of the Deerfield River located within the Project boundary. The information collected during this study

will provide data on baseline water quality conditions to inform the Project relicensing and MADEP 401 WQC processes. The specific objectives of this study are as follows:

- Characterize water quality in the Lower Reservoir and in the river reach extending from Fife Brook Dam downstream to a point just upstream of the confluence of the Deerfield and Cold Rivers.
- Provide data to determine if the Lower Reservoir undergoes thermal and/or DO stratification and, if so, determine the presence and location of the metalimnion.
- Capture an anticipated “*worst case*” condition for DO (low flow, high temperature, antecedent of any significant rainfall event).

### **4.3 Study Area**

The study area includes the Lower Reservoir downstream to a point just upstream of the confluence of the Deerfield and Cold Rivers. The Cold River Subwatershed is one of twelve major subwatersheds that comprise the Deerfield River Watershed (MEOEEA 2004). This is an appropriate study area, as it encompasses that Project boundary and extends beyond the Project boundary to the confluence with a major tributary to the Deerfield River. The proposed study area is shown in Figure 1.2-1.

### **4.4 Background and Existing Information**

Existing relevant and reasonably available information regarding water quality in the Project vicinity was summarized in Section 5.3.7 of the PAD. Since 1995, the MADEP has collected chemical and thermal water quality data for the Deerfield River at two locations upstream from the Bear Swamp Project, at a sampling site approximately 800 feet downstream from the Fife Brook Dam, at an alternate sampling location at RM 33.5 in the downstream reach of the Deerfield River, and at multiple locations in Charlemont. Water quality sampling was conducted at the Charlemont USGS gage in 2000, and toxicity data was collected at the Charlemont Wastewater Treatment Facility on nine occasions between 1996 and 2002. In August 2013, additional chemical and thermal water quality data was collected from eleven locations in the Deerfield River extending from the upstream limit of the Lower Reservoir downstream to the confluence of the Deerfield and Connecticut Rivers (Cole 2014).

## 4.5 Project Nexus

The Project requires a 401 WQC from the MADEP. Results of this study, in conjunction with the previous data collection efforts, will result in an up-to-date set of information specific to water quality in the study area, which will be used to inform resource discussions within the license application materials. This study will collect water quality data to assess baseline water quality conditions sufficient to determine consistency with applicable Commonwealth of Massachusetts water quality standards and designated uses and to support the 401 WQC permitting process.

## 4.6 Methodology

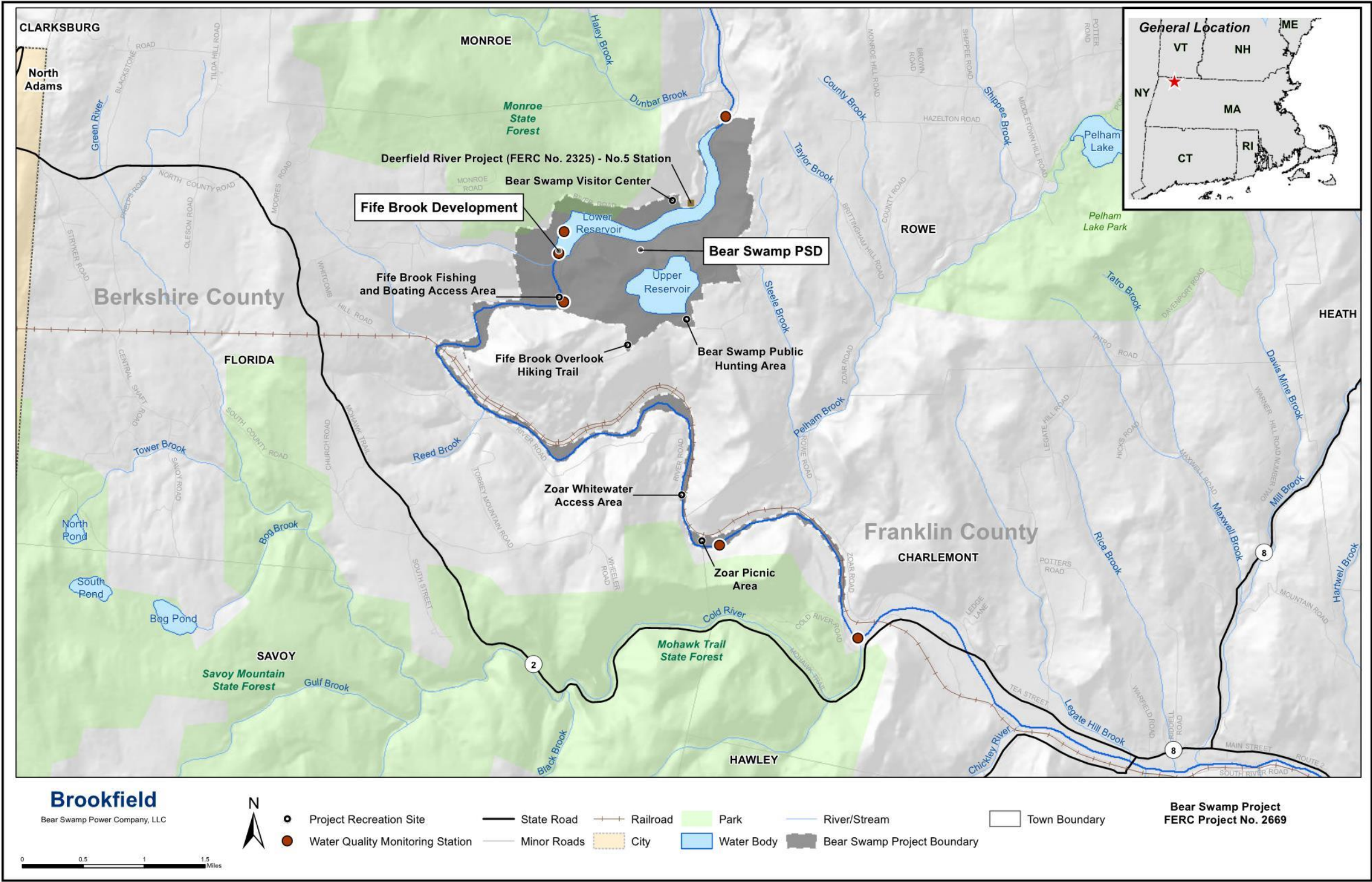
BSPC proposes to monitor water quality parameters as defined below at the following water quality monitoring locations (Figure 4.6-1).

- Upstream End of Lower Reservoir
- Lower Reservoir Deep Location
- Fife Brook Tailrace
- Fife Brook Fishing and Boating Access Area
- Zoar Picnic Area
- Just Upstream of Cold River Confluence

All water quality monitoring locations will be geo-referenced using Global Positioning System (GPS). These GPS locations will be included in a GIS database layer to support the documentation and reporting of collected data. The study period will commence May 1, 2016 (i.e., at the end of the spring high-flow season) and continue until November 1, 2016 (approximately 6 months). BSPC believes that this schedule is sufficient to capture “*worst case*” conditions (low flow, high temperature, antecedent of any significant rainfall).

Water quality data collection will follow a Quality Assurance Project Plan (QAPP), including standard operating procedures which will be submitted to MADEP prior to sampling. As part of preparing this QAPP, BSPC will conduct a literature review of existing water quality information and recent reports used in the MADEP’s February 2015 aquatic life use re-designation.

FIGURE 4.6-1  
WATER QUALITY MONITORING LOCATIONS



#### 4.6.1 Continuous DO and Temperature Monitoring

Combined water temperature and DO data loggers (Onset® HOBO U26 DO Data Logger or similar), set to record at 15-minute intervals, will be deployed at the six monitoring locations for continuous *in situ* measurements during the entire study period. Prior to deployment, the data loggers will be calibrated per the manufacturer's instructions. Two recorders will be placed at each of the six sites to provide data redundancy in case data from one recorder is lost due to equipment malfunction. Instruments will be weighted on the bottom and secured by cable to the shoreline.

Although data will be recorded continuously, data will be downloaded from the data loggers in accordance with the following schedule (with equipment maintenance occurring as well), as flow conditions allow:

- Monthly: May 1 – June 30 and September 1 – November 1
- Biweekly: July 1 – August 31

A primary data logger and a secondary (redundant) data logger will be identified. Data will be preferentially reported and analyzed from the primary data logger at each location; in the event of data loss from the primary data logger, data from the secondary data logger will be used. Consistency between data recorded by the loggers will also inform the data quality assurance process. Prior to and following deployment in the field, each data logger will be tested at three different temperatures and the precision of each device will be recorded and documented.

#### 4.6.2 Discrete Multi-parameter Water Quality Sampling

In situ water quality measurements of temperature, DO, pH, and specific conductance will be collected at DO and temperature monitoring locations using a model MS5 Hach Hydrolab® (Hydrolab) or similar instrument calibrated per the manufacturer's instructions. Discrete multi-parameter water quality sampling will be conducted during DO/temperature data logger deployment and in accordance with the following schedule, as flow conditions allow:

- Monthly: May 1 – June 30 and September 1 – November 1
- Biweekly: July 1 – August 31

The date and time of each discrete sampling event will be recorded and will allow BSPC to cross-reference sampling events with pertinent Project operation records. General weather data including air temperature, precipitation, and estimated cloud cover will also be collected during each discrete multi-parameter sampling event.

#### 4.6.3 Lower Reservoir Profiles

DO and temperature profiles will be collected from a deep location in the Lower Reservoir to determine if the Lower Reservoir undergoes thermal and/or DO stratification and, if so, determine the presence and location of the metalimnion. DO and temperature profile measurements will be collected with a Hydrolab or similar instrument at 5-foot depth intervals. Specific conductance and pH values will also be recorded. DO and temperature profiles will be collected in accordance with the following schedule, as flow conditions allow:

- Monthly: May 1 – June 30 and September 1 – November 1
- Biweekly: July 1 – August 31

BSPC believes that this schedule is sufficient to capture stratification during the “*worst case*” conditions (low flow, high temperature, antecedent of any significant rainfall).

#### 4.6.4 Data Analysis and Reporting

BSPC will prepare a technical report on the results of the Water Quality Study. BSPC anticipates that the Water Quality Study Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited



## **4.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to conduct initial study planning and review existing data following FERC's issuance of the final Study Plan Determination (SPD). Water quality field data collection will be conducted between May 1, 2016 and November 1, 2016. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. BSPC will submit quarterly progress reports based on exact timing of completion of work under this study; BSPC may issue draft products between the ISR and USR to the extent practicable.

## **4.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for water quality monitoring and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.



## Section 5

# Fish Assemblage Assessment Study Plan

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### 5.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a Fisheries Survey to characterize the fisheries in the Lower Reservoir and the downstream reach below Fife Brook Dam. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued Project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.

The USFWS and CRWC subsequently submitted formal requests for a Fish Assemblage Assessment, as shown in Table 5.1-1 (see Appendix B)<sup>13</sup>.

**TABLE 5.1-1**  
**FISH ASSEMBLAGE ASSESSMENT STUDY REQUESTS**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
USFWS	Fish Assemblage Assessment	April 16, 2015
CRWC	Fish Assemblage Assessment	April 16, 2015

### 5.2 Goals and Objectives

The goal of this study is to characterize the fish assemblage in the Upper Reservoir, Lower Reservoir, and the reach of the Deerfield River located within the study area, including baseline data on species composition and abundance. The specific objectives of this study are as follows:

- Summarize existing information on the Deerfield River fishery in the vicinity of the Project.

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<sup>13</sup> The MADFW discussed a Fish Assemblage Assessment in the cover letter accompanying their study requests (listing provided on page 2 of its letter), but a formal Fish Assemblage Assessment study request was not included among the thirteen MADFW study requests filed on April 17, 2015; BSPC assumes that had MADFW included such a request that it would mirror that of USFWS and CRWC.

- Conduct field sampling and analyze sampling data to obtain current information on fish assemblage, distribution, habitat use, and abundance at the Project, including the Upper and Lower reservoirs and the river reach extending from Fife Brook Dam downstream to a point just upstream of the confluence of the Deerfield and Cold Rivers.
- Document federally-listed RTE species observed during field sampling (see RTE Study plan in Section 10 for state-listed species).
- Document invasive species observed during field sampling.
- Document unique attributes such as redds, mussel beds, or shell material observed during field sampling.

### **5.3 Study Area**

The study area includes the Lower Reservoir downstream to a point just upstream of the confluence of the Deerfield and Cold Rivers. The Cold River Subwatershed is one of twelve major subwatersheds that comprise the Deerfield River Watershed, and the Cold River joins the Deerfield River at the Route 2 Bridge in Charlemont (MEOEEA 2004). This is an appropriate study area, as it encompasses that Project boundary and extends beyond the Project boundary to the confluence with a major tributary to the Deerfield River. The proposed study area is shown in Figure 1.2-1.

### **5.4 Background and Existing Information**

Existing relevant and reasonably available information regarding the fish community in the Project vicinity was summarized in Section 5.4.1 of the PAD. The Deerfield River Basin and the Bear Swamp Project support a diverse range of fish communities (MEOEEA 2004; FERC 1996). Specific to the Project, local conditions and a 125 cfs minimum flow (regardless of inflow) below the Fife Brook Development maintain a robust trout fishery that is supplemented with stocking by the MADFW (Gilmore 2014). Most of this reach is managed by the MADFW as a valuable catch-and-release fishing area (MEOEEA 2004). The Bear Swamp Project's Lower Reservoir is not managed by MADFW for any specific species.

Recent data specifically describing fisheries resources within the Project boundary is not readily available. In compliance with Article 44 of the Project's original license, NEP and MADFW

collaborated on a fisheries survey of the Upper Reservoir and Lower Reservoir from 1974 to 1976 (Frost and Easte 1977). Sampling was conducted using a combination of gear types, including gill nets, boat electrofishing, and rotenone (a chemical piscicide).

Fish sampling elsewhere along the Deerfield River was conducted by Ichthyological Associates (IA) in 1990 in support of relicensing the Deerfield River Project. Sampling conducted by IA in the Deerfield No. 5 station reservoir located approximately 2.2 river miles (RMs) upstream from the Bear Swamp Project Lower Reservoir collected 119 fish representing eight species. Game fish collected included rainbow trout (*Oncorhynchus mykiss*), smallmouth bass, rock bass, and pumpkinseed. Abundant non-game species collected included white sucker. Fish sampling conducted by IA in 1990 in the Deerfield No. 4 station reservoir showed similar results with 210 fish captured, representing seven species. Game fish collected included rainbow trout, brown trout (*Salmo trutta*), smallmouth bass, and rock bass. Abundant non-game species collected included white sucker, fallfish (*Semotilus corporalis*), and spottail shiner (*Notropis hudsonius*) (FERC 1996).

Fish species representative of stream habitat were collected in the Deerfield No. 5 station bypass reach, which enters into the upper reach of the Lower Reservoir. From 2000 to 2002, MADFW collected 0+ and 1+ age classes of brown and brook trout which documented natural reproduction of both brown and brook trout within this reach. Other fish species collected include the longnose dace, blacknose dace, and white suckers (BSPC 2008).

The Deerfield River is one of the premiere trout fisheries in the Northeast, and recreational fishing is a primary recreational use of the river reach extending downstream from Fife Brook Dam. The MADFW stocks the Deerfield River and tributaries with several trout species to support the recreational fishery. The MADFW conducted a creel survey between 1972 and 1976 in the Project vicinity and found that 90 percent of the trout captured were hatchery trout stocked directly into the mainstem of the Deerfield River. The remaining 10 percent were a combination of wild and stocked trout moving downstream from tributaries in the river basin (FERC 1996). Historically, the stocking has occurred in reaches upstream and downstream of the Bear Swamp Project. Based on documented presence of naturally reproducing trout populations within the Deerfield No. 5 station bypass reach upstream of the Bear Swamp Project, MADFW stocking is

now typically focused in the river reach downstream of Fife Brook Dam, where adult brown and rainbow trout are stocked (BSPC 2008). The MADFW manages this reach of the Deerfield River as a catch-and-release fishery. For this section of the river, Gilmore (2014) notes that *“there is a good holdover rate and trout in the 15- to 16-inch range are common, with fish up to 24 inches not uncommon and fish from 24 to 30 inches are caught every season.”*

The Deerfield River was recently ranked by TU as one of the 100 best trout streams in the U.S. (Ross 2005). TU’s *Guide to America’s 100 Best Trout Streams* generally describes the flow regime in the Deerfield River and notes that flow fluctuations downstream from Fife Brook *“do not seem to bother trout much”* (Ross 2005). As described by TU, the tailwater fishery downstream from Fife Brook Dam provides excellent habitat for stocked rainbow and brown trout (Ross 2005). TU reports that trout typically range between 12- to 14-inches, although holdovers of 18 inches are reasonably frequent (Ross 2005). Citing local fishing guides, TU notes that the Deerfield River below Fife Brook Dam *“seems to be holding a greater number of fish than formerly. Browns run in the 2 pound range, and rainbows of 18 to 22 inches long are caught ‘every couple of days’”* (Ross 2005).

Other authors concur with TU’s assessment of the Deerfield River downstream from Fife Brook Dam as one of America’s best trout fisheries. Gilmore (2014) notes in *The Flyfisher’s Guide to Eastern Trophy Tailwaters* that the *“releases from Fife Brook Dam provide some of the best trout fishing in New England”* and the minimum flow downstream from the dam *“produces excellent dry fly fishing”* at low water levels (Gilmore 2014). The downstream reach below Fife Brook Dam provides habitat for trout, *“has high-quality water, a good biomass of insect life, and it supports the highest concentrations of wild browns in the river”* (Gilmore 2014). As cited by Gilmore (2014), long-time Deerfield River fishing guide Chris Jackson described the existing trout fishery and habitat conditions in the river:

*The Deerfield River in western Massachusetts should be on the “bucket list” of any serious angler in the Northeast, with plenty of stocked rainbows and a robust population of wild brown, rainbow, and indigenous Eastern brook trout to target. The wild browns in particular grow to impressive sizes and are self-sustaining in spite of a lack of any recognition or management plan by the state. Hatches on*

*the river seldom achieve blizzard like proportions of those to the west in the Catskills, but they are consistent.*

## **5.5 Project Nexus**

The Deerfield River provides important fish habitat and is a premiere fishing destination for anglers. This study, in conjunction with existing information, will result in up-to-date fish assemblage data for the Upper Reservoir, Lower Reservoir, and the river reach extending downstream from Fife Brook Dam to the confluence of the Deerfield and Cold Rivers, which will be used to inform resource discussions within the license application materials.

## **5.6 Methodology**

### **5.6.1 Literature Review/Desktop Analysis and Sample Permit Application**

A literature review/desktop analysis of the study area will be conducted to determine specific sample sites, level of effort, and sampling gear types. As available, BSPC will review mesohabitat information, high-resolution digital aerial images (see Sections 6 and 7 of this PSP), and relevant background literature on previous fisheries surveys in the Deerfield River. The appropriate state and federal (if necessary) collection permits will be obtained as needed.

### **5.6.2 Conduct Field Sampling to Document on Fish Assemblage, Distribution, and Abundance**

BSPC proposes to conduct two sampling events. Sampling will be conducted during safe daylight hours in the late spring/early summer (between May 15 – June 30) and the late summer/early fall (between August 15 – September 30) of 2016. Specific sampling dates within these timeframes will be determined based on factors including (but not limited to) weather conditions, water temperatures, and safety of field staff and the general public. Sampling using multiple gear types including electrofishing equipment and overnight net sets (as requested by the USFWS and CRWC) is incompatible with the safety of recreational boaters, tubers, and other river users during the height of the recreation season on the Deerfield River. Therefore, the temporal scope of studies is intended to document seasonal habitat use while avoiding the peak recreation season in the Deerfield River.

Consistent with study requests from the USFWS and CRWC, BSPC proposes to employ a stratified-random sampling design for the Fish Assemblage Assessment. The study area will be divided into three reaches, the Upper Reservoir, Lower Reservoir, and riverine reach. The impoundments will be further divided into littoral zone and deep-water habitat types. The downstream river reach will be further divided into mesohabitat types (e.g. riffle, pool, run/glide) as defined in the Aquatic Mesohabitat Assessment and Mapping Study (see Section 6 of this PSP). Each mesohabitat type will be further stratified into two broad microhabitat types. The stratified random sampling design will assign sampling stations within particular mesohabitats in proportion to their linear habitat distance.

To the extent practicable, multiple methods of fish capture will be used in each reach. Both near-shore (shallow) and mid-channel (deep) habitats will be sampled to characterize fish communities and life stages that use these different habitat types. Methodologies and gear types used will vary by habitat type, but are expected to include a combination of the following:

- Boat/barge electrofishing (shoreline, littoral, and pelagic habitats)
- Backpack electrofishing (wadeable shoreline and littoral habitats)
- Gill netting (deeper, benthic habitat)
- Seine netting (wadeable shoreline and littoral habitat)
- Minnow traps
- Eel pots

Supporting data will be collected at each sampling site including:

- Location (GPS)
- Sampling gear type
- Mesohabitat type
- Representative photographs
- Time and date
- General descriptions of depth, velocity, and substrate
- Cover type and estimated percentage of cover

In addition to this supporting data, BSPC will collect discrete water quality measurements of temperature, DO, pH, and specific conductance at each sampling location using a Hydrolab or similar instrument calibrated per the manufacturer's instructions. A secchi disk reading will be taken at each site at the time of sampling.

Catch per-unit of effort (CPUE), as recorded in seconds (electrofishing pedal time) or hours (netting) will be recorded for all sites/gear types used. All fish will be collected and identified to the lowest practicable taxon in the field, including any RTE species. Photo vouchers will be taken of all species in the field, and those that cannot be identified will be preserved and identified in a laboratory setting based on the sample permit specifications. Any fish mortalities would be disposed of in an appropriate manner based on consultation with resource agencies and/or the sample permit specifications. All other fish will be returned to the place of capture after processing.

At a minimum, total counts will be recorded at each sample location. Individual length and weight measurements will be recorded for a subset (up to 30 individuals) of each game species collected at a given site.

### 5.6.3 Data Analysis and Reporting

A report describing the overall results, including occurrence, composition, relative abundances, game species condition, distribution, and habitat use will be prepared. The report will include details of all sampling efforts, *in situ* water quality conditions, and general habitat characteristics from each site. BSPC will include tabular data summarizing length, weight, and size class for game fish at each sampling location (as noted above, individual length and weight measurements will be recorded for a subset of up to 30 individuals of each game species at a given sampling site). The Shannon-Weiner index of diversity will be calculated based on field data collected. GIS maps will be created of the Project areas showing sample locations for each event. Collection locations of listed species or state RTE species will be included. BSPC anticipates that the Fish Assemblage Assessment Study report will include the following elements:

- Project Introduction and Background
- Study Area

- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

## **5.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to conduct literature review/desktop analysis and to prepare permit applications following FERC's issuance of the final SPD. Field data will be collected during the late spring/early summer and late summer/early fall of 2016. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **5.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for fish assemblage assessments and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.



## Section 6

# Aquatic Mesohabitat Assessment and Mapping

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## 6.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified Aquatic Habitat Survey/Mapping to characterize and map habitat in the Lower Reservoir and the downstream reach below Fife Brook Dam. The Commission's February 18, 2015, SD1 identified the following environmental resource issues to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.
- Effects of continued project operation, including reservoir fluctuations, on riparian and wetland habitat and associated wildlife, including waterfowl and wetland-dependent birds.

The MADFW and CRWC subsequently submitted formal requests for studies related to aquatic mesohabitat mapping and assessment, as shown in Table 6.1-1 (see Appendix B).

**TABLE 6.1-1**  
**STUDY REQUESTS RELATED TO MESOHABITAT MAPPING AND ASSESSMENT**

Requestor	Requested Study	Date
MADFW	Aquatic Mesohabitat Mapping	April 17, 2015
CRWC	Aquatic Mesohabitat Assessment and Mapping	April 16, 2015

## 6.2 Goals and Objectives

The goal of this study is to quantify the type and extent of aquatic mesohabitat available in the Project boundary, including the Upper Reservoir, Lower Reservoir, and the river reach downstream from Fife Brook Dam. The specific objectives of this study are as follows:

- Conduct field surveys to map, delineate, and characterize mesohabitat within the Project boundary.

- Document federally-listed RTE species observed during aquatic mesohabitat mapping (see RTE Study plan in Section 10 for state-listed species).
- Document invasive species observed during aquatic mesohabitat mapping.
- Document unique attributes such as redds, mussel beds, or shell material observed during aquatic mesohabitat mapping.

### **6.3 Study Area**

The study area includes the Upper and Lower reservoirs and the reach of the Deerfield River extending downstream from Fife Brook Dam to a point just upstream of the confluence with the Cold River. This is an appropriate study area, as it encompasses that Project boundary and extends beyond the Project boundary downstream to the confluence with a major tributary to the Deerfield River, the Cold River. The Cold River Subwatershed is one of twelve major subwatersheds that comprise the Deerfield River Watershed (MEOEEA 2004). The proposed study area is shown in Figure 1.2-1.

### **6.4 Background and Existing Information**

In 2013, Cole conducted an ecological assessment of the Deerfield River (Cole 2014). The ecological assessment was prepared for the DRWA and Massachusetts Environmental Trust (MET), with financial assistance from the MET and TU. As a component of this study, Cole conducted habitat assessments at ten locations along the Deerfield River in July and August of 2013. These locations included three 2,500-meter-long sampling reaches between Fife Brook Dam and the Deerfield River's confluence with the Cold River. These reaches extended 2,500 meters downstream from RM 31.3, RM 34.5, and RM 37, respectively. At each of these sampling reaches, Cole conducted physical habitat assessments comprised of three primary components: a thalweg profile, channel cross sections, and littoral plots with corresponding cross-section locations. Data such as dominant substrate type, habitat type (e.g., pool, glide, riffle, rapid, cascade), presence of large woody debris, and fish cover were also recorded (Cole 2014). The results of the 2013 ecological assessment, including the physical habitat sampling, are summarized in Cole's 2014 report, *Deerfield River Comprehensive Ecological Assessment*.

Cole did not prepare habitat maps as a component of the 2014 ecological assessment. However, based on the results of the physical habitat assessment, small boulders overwhelmingly dominate the substrate type at RM 31.3, RM 34.5, and RM 37. The secondary substrate within these sampling reaches consists of cobble; no other substrate types (e.g., sand, gravel, bedrock) were reported. Based on Cole's assessment, the sampling reach at RM 31.3 and RM 34.5 are dominated by riffles and glides, with lesser percentages (e.g., 15 – 20 percent) of pools. Riffle and pools dominate the aquatic habitat at RM 37, with glides accounting for slightly less than 20 percent of habitat (Cole 2014). Overall fish habitat ratings were calculated for all ten sampling locations based on cover type, presence/absence of large woody debris, and other factors. The sampling reach at RM 37 received the highest overall rating (0.58) of the ten sites examined by Cole in 2013. The sites at RM 34.5 and RM 31.3 also received high ratings relative to the other sampling locations of 0.48 and 0.40, respectively.

## **6.5 Project Nexus**

The Deerfield River provides aquatic habitat for fish and macroinvertebrates and the river reach below Fife Brook Dam is a premiere fishing destination for anglers. Cole (2014) collected habitat assessment data along approximately 1.5 RM of the Deerfield River between Fife Brook Dam and the confluence with the Cold River; however, mesohabitat maps were not prepared in support of Cole's study. This study, in conjunction with existing information, will result in up-to-date aquatic mesohabitat mapping in the Upper and Lower reservoirs and the reach of the Deerfield River extending downstream from Fife Brook Dam to the confluence with the Cold River, which will be used to inform resource discussions within the license application materials.

## **6.6 Methodology**

### **6.6.1 Aquatic Mesohabitat Survey and Assessment Methods**

BSPC will conduct field surveys to identify aquatic mesohabitat present within the study area and to delineate the relative quantity and spatial distribution of each habitat type. As conditions allow, BSPC will conduct field surveys to identify aquatic mesohabitat types in the Upper and Lower reservoirs at normal low pond elevations and available habitat within the fluctuation/

littoral zone. Aquatic mesohabitat surveys downstream from Fife Brook Dam will characterize and map aquatic habitat at minimum flow (125 cfs).

Each mesohabitat type of interest will be assigned specific attributes to be used for field delineation. The classification criteria for each mesohabitat type will include:

- **Riffle:** shallow, moderate velocity, turbulent, high gradient, moderate to large substrates (cobble/gravel);
- **Rapid:** shallow, moderate to high velocity, turbulent, chutes and eddies present, high gradient, large substrates or bedrock;
- **Run:** moderately deep to deep, well-defined non-turbulent laminar flow, low to moderate velocity, well-defined thalweg, typically concave stream geometry, varying substrates, gentle slope;
- **Glide:** moderately shallow, well-defined non-turbulent laminar flow, low velocity, well-defined thalweg, typically flat stream geometry, typically finer substrates, transitional from pool;
- **Pool:** deep, low velocity, well-defined hydraulic control at outlet; and
- **Backwater:** varying depth, minimal or no velocity, long backwatered reaches.

Delineation will be conducted by boat or on foot where too shallow and will occur during a period of low flow (as described below) so that breaks in mesohabitat, substrate, object cover, and hydraulics can be readily observed. Mapping will be conducted in the field using handheld GPS units, and the upstream and downstream boundaries of each mesohabitat unit within the study area will be delineated and geo-referenced.

Where appropriate, additional features of mesohabitats will be recorded, including dominate and subordinate substrates, relative embeddedness, spot velocity measurements, wetted width, channel geometry, cover type and relative abundance, estimated bank slope, range and average water depths, general riparian description, and photos of representative habitat types.

Biological characteristics will also be recorded during mesohabitat surveys, including readily observable aquatic fauna. Any trout redds, mussel beds, or evidence of shell material observed during the aquatic mesohabitat surveys will be documented and their location recorded using GPS.

### 6.6.2 Data Analysis and Reporting

BSPC will prepare mesohabitat maps based on the results of aquatic mesohabitat field surveys. BSPC expects that the DAIP will be used in conjunction with the mesohabitat survey data to develop aquatic mesohabitat maps. Maps will show the extent of habitats, substrates, vegetative cover, locations of RTE and invasive species, and other information as appropriate. BSPC anticipates that the Aquatic Mesohabitat Assessment and Mapping Study Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

## 6.7 Schedule and Level of Effort

At this time, BSPC intends to conduct aquatic mesohabitat surveys so that the data will be available to support other field activities scheduled for 2016.

BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **6.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices and study requests from the MADFW and CRWC. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for mesohabitat mapping and assessments and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.

## Section 7

# Baseline Study of Terrestrial Wildlife and Botanical Resources

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## 7.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified Terrestrial Wildlife and Vegetation Cover Type Mapping to map and characterize existing terrestrial wildlife and vegetation in the Project boundary. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation and maintenance on upland wildlife habitat and associated wildlife.

The MADFW, USFWS, and CRWC subsequently submitted formal requests for studies related to terrestrial wildlife and botanical resources as shown in Table 7.1-1 (see Appendix B).

**TABLE 7.1-1  
STUDY REQUESTS RELATED TO TERRESTRIAL  
WILDLIFE AND BOTANICAL RESOURCES**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
MADFW	Baseline Study of Terrestrial Wildlife and Botanical Resources	April 17, 2015
USFWS	Baseline Study of Terrestrial Wildlife and Botanical Resources	April 17, 2016
CRWC	Baseline Study of Terrestrial Wildlife and Botanical Resources	April 16, 2015

## 7.2 Goals and Objectives

The goal of this study is to characterize and describe the terrestrial wildlife and botanical resources that use representative upland habitats within the Project boundary. The specific objectives of this study are as follows:

- Conduct a desktop assessment of GIS data and high-precision digital aerial imagery collected for the DAIP to inventory and delineate terrestrial vegetation types present in the study area;
- Survey and inventory existing upland wildlife habitats on a representative basis;
- Note the occurrence of wildlife sighting during the course of the surveys;
- Survey and inventory vegetation cover classes and land use on a representative basis;
- Survey and evaluate the presence of targeted RTE species or associated habitats;
- Document federally-listed RTE species observed (see RTE Study plan in Section 10 for state-listed species).
- Document invasive species observed; and
- Inventory the nature and extent of upland invasive plant species observed during the course of surveys.

### **7.3 Study Area**

The study area includes lands within the Project boundary. The study area is shown in Figure 1.2-1. This study area is appropriate, as it includes lands managed by BSPC and necessary for the continued operation of the Project.

### **7.4 Background and Existing Information**

Existing relevant and reasonably available information regarding terrestrial wildlife and botanical resources was summarized in Section 5.5 of the PAD. The region encompassing the Project is characterized by a diversity of terrestrial wildlife and botanical resources that are influenced by geological features, soil type, hydrology, climate, and historic and current land use patterns. The Project is located within the U.S. Environmental Protection Agency (USEPA) Level IV Green Mountains/Berkshire Highlands Ecoregion (Griffith et al. 2009; Swain and Kearsley 2011). Ecoregions, as defined and described by the USEPA, denote areas of general similarity in ecosystems and in the type, quality, and quantity of environmental resources. The USEPA describes the Green Mountains/Berkshire Highlands Ecoregion as follows (Griffith et al. 2009):



*The Green Mountains/Berkshire Highlands ecoregion is characterized by relatively rugged, steep, high elevation mountains, with a colder climate and different vegetation than surrounding lower elevation regions. There are some climate, geology, physiography, and vegetation transitions that occur from north to south (e.g., slightly colder with more snow in the north; more plateau-like granitic areas in the south), although these are not dramatic changes at a national scale. The Massachusetts part of the ecoregion includes the southernmost extent of the Green Mountains, generally the highest elevations of the Berkshire Plateau. There is little evidence on either side of the Massachusetts-Vermont border for dividing the Green Mountains from the Hoosac Range and Berkshire Hills... Elevations range from less than 1,000 feet to more than 3,000 feet, with Mount Carmel the high point at 3,369 feet. Vegetation is predominantly northern hardwoods (sugar maple, beech, yellow birch), with some spruce-fir (red spruce, balsam fir, paper birch) at higher elevations. Montane yellow birch-red spruce forest occurs on some midslopes in the region. At lower elevations, hemlock occurs, and areas of red oak-hardwood forests.*

Due to the generally steep topography surrounding the Project vicinity, the majority of this area is composed of mixed mesophytic hardwood forest and supports numerous wildlife and botanical species. Dominant vegetative assemblages within the Project vicinity fall within several terrestrial systems and forest physiognomic categories. Some confined areas represent other subordinate vegetative communities within forest physiognomic categories. According to the Massachusetts Executive Office of Energy and Environmental Affairs (MEOEEA) (2004), approximately 83 percent of the entire Deerfield River Basin is covered by forest. Northern hardwood forests are the most common forest type within the Deerfield River Basin, accounting for approximately 66 percent of the forest area (MEOEEA 2004). The primary natural plant communities include:

- Northern hardwoods-hemlock-white pine forest
- Spruce-fir-northern hardwoods forest
- Oak-hickory forests

- Rich mesic forests
- Successional northern hardwoods forests

## **7.5 Project Nexus**

Terrestrial habitats within the Project boundary support wildlife and botanical species, and habitat types within the Project area may be suitable for state or federal RTE species. This study, in conjunction with existing information, will result in an up-to-date description of terrestrial habitats, which will be used to inform resource discussions within the license application materials.

## **7.6 Methodology**

### **7.6.1 Literature Review**

The initial step prior to field reconnaissance surveys will include reviewing existing information and data to identify areas of representative habitat and vegetation types within the Project boundary. Accordingly, BSPC will perform the following tasks:

- Acquire and compile existing GIS vegetation cover type layers from available resources;
- Examine any visible vegetation boundaries in high-resolution aerial photos collected for the DAIP;
- Produce a vegetation type map that displays vegetation type polygon boundaries, the study area, and specific Project features; and
- Use the vegetation type map to produce a table of vegetation types and calculate the percent acres of each vegetation type present in the study area.

### **7.6.2 Field Reconnaissance Surveys**

Field surveys will be conducted to document wildlife habitat and occurrence, vegetative cover types, and invasive plant species in the Project area, as described in the following subsections.

#### 7.6.2.1 Vegetation Cover Type Mapping

The goal of the vegetative mapping is to identify vascular botanical species within the study area while focusing on targeted listed species and other RTE plant species as identified during consultation with the NHESP. Botanical assessments will be completed to determine the species composition, structure, and distribution of vegetative communities. The types of data that will be collected within habitat types include percent cover and dominant species within the herbaceous, shrub, and tree strata, along with the general distribution and juxtaposition of vegetative communities.

Timed-meander surveys will be conducted in representative habitat types encountered within the Study Area. The meander survey will involve walking a wandering path through each representative habitat and recording species present until a period of time passes (typically for approximately ten minutes) where no new species are added to the vegetation list. Surveyors will compile a general list of plants found within each respective habitat and will also maintain an overall census list of plant species identified within the study area. Plants will be identified to the species level if possible, or at a minimum, if the plant is outside its phenological peak, the plant will be identified to the genus level if species identification is not possible.

Other general information that will be gathered during meander surveys will include general health of communities and site quality conditions. Vegetation communities will be classified using the NHESP Classification of the Natural Communities of Massachusetts (Swain & Kersey, 2011).

Sample vegetation plots will also be established in each representative habitat type to collect quantitative information to characterize the different habitats and provide species composition of habitat types. Vegetation plot locations will be selected using NHESP guidelines and protocols. A NHESP Quantitative Community Characterization Form (NHESP Form 3) will be completed for representative habitats to document the results of each plot location. Geo-referenced photographs will also be taken to document site conditions at the time of the survey.

#### 7.6.2.2 Wildlife and Habitat Type Mapping

The primary objective of wildlife surveys is to provide information on the distribution and abundance of wildlife habitats within the study area. General habitat field notes will record dominant vegetation cover classes and land use; habitat types; observations of avian, reptile, amphibian, and mammal species; and locations of upland invasive plant species. Wildlife surveys will be conducted through the use of visual encounter surveys concurrent with the habitat type verification mapping.

Transect lines will be placed randomly, or at least objectively, with respect to representative habitats present within the study area. The total number of transects will be determined based on representative habitat type after an initial site reconnaissance and completion of the preliminary GIS base mapping. One transect will be completed for each representative habitat type. The observer will walk a transect at a pace of approximately five minutes per 50 meters, for a total search time of up to approximately two hours.

The transect width will be line-of-sight. During these transect searches, an observer will survey the area to either side of the transect, looking for targeted species or indirect signs (i.e., tracks, scat, den areas, nests, etc.). Each transect will be surveyed only once; however, qualitative data from other similar surveys efforts will also be noted and included in the overall wildlife census list.

While completing field surveys, if a priority habitat is located or a natural community is noted as having a state ranking of S3, S2, or S1 (Community types that range from vulnerable S3, imperiled S2, or critically imperiled S1, due to rarity/vulnerability to extirpation) or natural areas where observed federal or state listed species occur, more intensive searches may be performed. The locations of significant sightings or observations (i.e. bald eagle nests, NLEB roost trees) will be documented through the use of GPS and geo-referenced photographs and then entered into the GIS database. Data collected will be compiled into a Project area species list.

Bald eagles have been documented and observed in the Project area. The occurrence of any bald eagle nests or roosting sites observed during field activities will be documented, assessed (e.g., active, inactive), photographed, and geo-referenced in the field using GPS.

#### 7.6.2.3 Invasive Plant Survey

A diverse range of non-native plants potentially considered invasive are reported to occur in the Deerfield River Watershed, reflecting regional trends. The DRWA identifies the species listed in Table 7.6-1 as occurring in the Deerfield River Valley and potentially threatening natural communities in the Massachusetts portion of the river basin (DRWA 2011). According to MEOEEA (2004), Japanese knotweed (*Fallopia japonica*) has become the most widespread and established invasive terrestrial plant in the Deerfield River Watershed. Large stands of Japanese knotweed can be observed along the mainstem Deerfield River covering riparian areas and mid-channel islands from above Zoar Gap in Florida and Rowe, Massachusetts, to below the Stillwater area in Deerfield, Massachusetts (MEOEEA 2004).

**TABLE 7.6-1**  
**INVASIVE PLANT SPECIES POTENTIALLY OCCURRING**  
**IN THE BEAR SWAMP PROJECT VICINITY<sup>1</sup>**

Common Name	Scientific Name	Habitat
<i>Floodplains and Stream Banks</i>		
Morrow's honeysuckle	<i>Lonicera morrowii</i>	Abandoned fields, early successional forests, edges, floodplain forests, open disturbed areas, pastures, planted forests, roadsides, utility right-of-ways, vacant lots, yards, or gardens
Japanese knotweed	<i>Fallopia japonica</i>	Abandoned fields, early successional forests, edges, floodplain forests, forested wetland, herbaceous wetland, open disturbed areas, roadsides, shrub wetlands, vacant lots, wet meadows, yards, or gardens
Goutweed	<i>Aegopodium podagraria</i>	Agricultural fields, edges, open disturbed areas, pastures, roadsides, vacant lots, yards, or gardens

Common Name	Scientific Name	Habitat
Garlic Mustard	<i>Alliaria petiolata</i>	Abandoned fields, early successional forests, edges, floodplain forest, late successional forest, planted forest, roadsides, vacant lots, wet meadows, yards, or gardens
<b><i>Open Habitats and Forests</i></b>		
Black locust	<i>Robinia pseudoacacia</i>	Abandoned fields, edges, open disturbed areas, pastures, railroad right-of-ways, roadsides, utility right-of-ways, vacant lots, yards, or gardens
Oriental bittersweet	<i>Celastrus orbiculatus</i>	Abandoned fields, agricultural fields, coastal beach or dune areas, early successional forests, edges, pastures, planted forests, railroad right-of-ways, roadsides, salt marsh, utility right-of-ways, vacant lots, yards, or gardens
Japanese barberry	<i>Berberis thunbergii</i>	Abandoned fields, early successional forests, edges, floodplain forests, forested wetlands, late successional forests, pastures, planted forests, railroad right-of-ways, roadsides, shrub wetlands, utility right-of-ways, vacant lots, yards, or gardens
Multiflora rose	<i>Rosa multiflora</i>	Early successional forests, edges, open disturbed areas, pastures, planted forests, railroad right-of-ways, roadsides, utility right-of-ways, vacant lots, yards, or gardens
Garlic Mustard	<i>Alliaria petiolata</i>	Abandoned fields, early successional forests, edges, floodplain forest, late successional forest, planted forest, roadsides, vacant lots, wet meadows, yards, or gardens
Common buckthorn	<i>Rhamnus cathartica</i>	Abandoned fields, early successional forests, edges, floodplain forests, open disturbed areas, pastures, planted forests, roadsides, vacant lots, wet meadows, yards, or gardens

Sources: DRWA 2011; Invasive Plant Atlas of New England (IPANE) (IPANE Undated).

<sup>1</sup>Many of these plants are found in multiple habitat types.

The list of invasive plant species provided in Table 7.6-1 will be utilized to identify upland invasive species when conducting botanical meander surveys. Surveyors will use methods adapted from the USFWS Invasive Species Program, Invasive Species Inventory and Mapping Data Recording Protocols. These adapted methods focus on presence, location, extent, abundance, and other site characteristics to provide site infestation information.

The intent of the upland invasive species survey is to document significant infested areas. Biologists will use GPS at sub-meter accuracy (to the extent practicable) to delineate the boundary of the infestation as defined by the dominant canopy cover of the invasive plant. Lesser areas containing only occasional invasive species will be characterized with a GPS center point and radius necessary to enclose the population. For areas where invasive species are ubiquitous or impractical to map, surveyors will characterize the invasive species population using estimates of aerial coverage and percent of species present. For areas where dense stands of upland invasive species have formed, infestations will be photo-documented and geo-referenced.

### 7.6.3 Data Analysis and Reporting

BSPC will prepare habitat and vegetative cover type maps based on the results of the baseline study of terrestrial wildlife and botanical resources. BSPC expects that the DAIP will be used in conjunction with the terrestrial survey data. Maps will show the extent of cover types, habitats, locations of observed RTE and invasive species, and other information as appropriate. BSPC anticipates that the Baseline Terrestrial Wildlife and Botanical Resources Study Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

## **7.7 Schedule and Level of Effort**

At this time, BSPC intends to conduct baseline studies of terrestrial wildlife and botanical resources in the spring and summer of 2016. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **7.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices and study requests from the MADFW, USFWS, and CRWC. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for baseline terrestrial wildlife and botanical studies and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.



## Section 8

# Wetland, Riparian, and Littoral Habitat Study Plan

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### 8.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified Wetland, Riparian, and Littoral Habitat to map and characterize existing floodplain, wetland, and riparian habitat in select or critical areas within the Project boundary. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation, including reservoir fluctuations, on riparian and wetland habitat and associated wildlife, including waterfowl and wetland-dependent birds.

The MADFW, USFWS, and CRWC subsequently submitted formal requests for studies related to riparian and aquatic vegetation Table 8.1-1 (see Appendix B).

**TABLE 8.1-1  
STUDY REQUESTS RELATED TO WETLAND,  
RIPARIAN, AND LITTORAL HABITAT RESOURCES**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
MADFW	Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation	April 17, 2015
USFWS	Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and Their Associated Habitats	April 17, 2016
CRWC	Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and Their Associated Habitats	April 16, 2015

## 8.2 Goals and Objectives

The goal of this study is to obtain baseline information, map, and describe riparian, wetland, emergent, and submerged aquatic vegetation and associated shallow water aquatic habitats within the Project boundary. The specific objectives of this study are as follows:

- Conduct a desktop assessment of USFWS National Wetland Inventory (NWI) maps, NHESP wetland data, and high-precision digital aerial imagery collected for the DAIP to produce a baseline map of wetland, riparian, and shallow water aquatic habitats within the study area.
- Quantitatively describe and field-verify NWI mapped wetland types, describe and map shallow water aquatic habitat, including submerged aquatic vegetation (SAV) and emergent aquatic vegetation (EAV), substrate type, invasive species, and associated wildlife in the Project boundary.
- Principal wetland functions and values determined using professional judgment.
- Note the occurrence of wildlife sighting during the course of field verification surveys.
- Document federally-listed RTE species observed (see RTE Study plan in Section 10 for state-listed species).
- Document invasive species observed.

## 8.3 Study Area

The study area includes the Project boundary. This is an appropriate study area as it includes lands managed by BSPC under the license. The proposed study area is shown in Figure 1.2-1.

## 8.4 Background and Existing Information

Existing information regarding wetlands, riparian, and shallow water aquatic habitats is presented in Section 5.6 of the PAD. Field verification of wetlands has not been conducted within the study area. Based on USFWS NWI mapping, wetlands along the Deerfield River are primarily confined to narrow bands immediately adjacent to the river, with larger bands found in former river channels adjacent to the Lower Reservoir. These may be riparian wetlands along the shore of the main river channel, or islands within the main river channel, or among a braided

channel area. Generally, smaller isolated wetlands are infrequent within the otherwise-terrestrial portions of the Project boundary.

Three wetland types are currently mapped by the NWI within or adjacent to the Bear Swamp Project boundary: lacustrine, palustrine, and riverine wetlands as defined by Cowardin et al. (1979). According to the NWI, the Upper Reservoir is classified as a lacustrine system. Lacustrine wetlands are associated with large standing bodies of water (such as reservoirs or lakes) and contiguous wetlands formed within the lake basin. According to the NWI, the Lower Reservoir is classified as a riverine system characterized by an unconsolidated bottom consisting largely of cobble and gravel. This riverine system extends to the downstream limits of the Project boundary and is confined to the main channel and immediate floodplain of the Deerfield River (Massachusetts Executive Office of Administration and Finance [MEOAF] 2014).

The remaining NWI-mapped wetlands within the Bear Swamp Project boundary are palustrine wetlands, many associated with the main channel of the Deerfield River and a slightly extended floodplain. Palustrine wetlands are non-tidal wetlands dominated by trees, shrubs, and/or persistent plants/mosses, generally representing marsh, swamp, and small ponds (Cowardin et al. 1979).

In addition to NWI-mapped wetlands, the NHESP has identified four potential vernal pools within the Project boundary located in upland areas on Negus Mountain and not influenced by the Project. Vernal pools are small, shallow ponds characterized by periods of dryness; they provide a specialized habitat for a number of plant and animal species, some of which breed in or are found exclusively in vernal pools (MEOAF 2014). These were identified by remote examination of aerial photos and have not been assessed in the field (MEOAF 2014).

## **8.5 Project Nexus**

Wetland, riparian, littoral, and other shallow water aquatic environments provide wildlife habitat and provide for bank stability, reductions in nutrients and sediment from runoff, and reduced solar heating. While information regarding wetland and riparian habitat types within the study area is provided from NWI maps, field verification of these wetland types is appropriate. This

study, in conjunction with existing information, will result in up-to-date information, which will be used to inform resource discussions within the license application materials.

## **8.6 Methodology**

### **8.6.1 Literature Review and Desktop Mapping**

Prior to field verification surveys, BSPC will conduct a literature review of existing information available from NWI maps, high-precision aerial images collected in support of the DAIP, and other relevant sources. Based on this information, a preliminary wetland, riparian, and littoral habitat map will be produced to assist field surveys.

### **8.6.2 Field Verification Surveys**

Based on the preliminary wetland, riparian, and littoral habitat map, field surveys will be conducted to quantitatively describe and field-verify wetland, riparian, and littoral habitats within the study area. These surveys will be conducted to describe these habitats under low water levels. For each mapped wetland, riparian, and littoral area, the following information will be collected:

- Plant species composition and their relative abundance/density and condition/structure (e.g., seedlings);
- Structured data, including estimates of average heights and aerial cover of each vegetation layer (specifically denoting invasive species);
- Aquatic habitat substrate composition, quantity (i.e., percent types and area), wood structure (relative abundance measure applied by area), water depths (inundated, exposed, and water less than one foot);
- Predominant land use(s) associated with each cover type;
- Wildlife sightings will be noted and any active nest or roost trees utilized by bald eagles will be identified and geo-referenced;

- Principal wetland functions and values will be determined using professional judgment and/or based on rationale associated with wetland value rating systems such as the Wetland Evaluation Technique (WET 2.0) (Adamus et. al. 1991), the Hydrogeomorphic Classification method (Brinson 1993), or the U.S. Army Corps of Engineers (USACE) Highway Methodology (USACE New England District undated); and
- Field-verified wetland, riparian, and littoral and shallow water habitats and invasive species occurrences should be geo-referenced as polygons and incorporated into the DAIP at a suitable scale.

### 8.6.3 Data Analysis and Reporting

BSPC will prepare wetlands, riparian, and littoral habitat maps based on the results of the baseline study of terrestrial wildlife and botanical resources. BSPC expects that the DAIP will be used in conjunction with the field verification survey data to develop wetland, riparian and littoral habitat maps. Maps will show the extent of field-verified wetland, riparian, and littoral and shallow water habitats, invasive species occurrences, locations of observed RTE species and bald eagle nests/roosts, and other information as appropriate. BSPC anticipates that the Wetland, Riparian, and Littoral Habitat Study Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

## 8.7 Schedule and Level of Effort

At this time, BSPC intends to conduct wetland, riparian, and littoral habitat studies in the spring and summer of 2016. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated

USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **8.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices and study requests from the MADFW, USFWS, and CRWC. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for baseline wetland, riparian, and littoral habitat studies and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.

## Section 9

# Recreation Survey

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### 9.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a Recreation Assessment to characterize existing recreation facilities and conditions within the Project boundary and general surroundings. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on recreational use in the project area, including the adequacy of existing recreational access, the adequacy and capacity of existing recreational facilities, and the adequacy of existing whitewater flows.

FERC and the CRWC submitted formal requests for studies related to the inventory and assessment of recreation facilities at the Project. In addition, combined study requests were filed on behalf of the WGs as shown in Table 9.1-1 (see Appendix B).

**TABLE 9.1-1**  
**STUDY REQUESTS RELATED TO INVENTORY AND ASSESSMENT OF**  
**RECREATION FACILITIES AT THE PROJECT**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
FERC	Recreation Survey	April 16, 2015
CRWC	Recreation Site Inventory, Use, and Needs Assessment	April 16, 2016
WGs	Public Access Adequacy for Whitewater Boating, Rafting, Canoeing, Navigation, and Other Non-Motorized Recreational Uses on Project Lands	April 16, 2015
WGs	Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boating	April 16, 2015

## **9.2 Goals and Objectives**

The goal of this study is to identify recreation resources and activities that may be affected by the continued operation of the Bear Swamp Project, as well as PM&E measures that could be implemented. Consistent with FERC's study request, the specific objectives of the study are to:

- Compile information on current and historic recreational use of the Project area;
- Quantify current recreational use based on recent or newly conducted surveys and interviews and consultation with stakeholders, regional and statewide plans, and other available data;
- Evaluate the potential effects of continued operation of the Project on recreation resources and activities in the project area;
- Identify a range of PM&E measures that could be implemented to enhance recreation or mitigate project effects on recreation;
- Gather information on the Project boundary and conservation lands; and
- Gather information on the condition of recreation facilities and identify any need for improvement.

## **9.3 Study Area**

The study area includes the Project boundary. This is an appropriate study area as it includes lands and recreation facilities managed by BSPC under the license. The proposed study area is shown in Figure 1.2-1.

## **9.4 Background and Existing Information**

Section 5.9 of the PAD describes existing information about recreation facilities and opportunities in the Project area. The Deerfield River is one of the most heavily used recreational rivers in New England (MEOEEA 2004). Between 10 and 12 million people live within a 100-mile radius of the Deerfield River Basin, and the region offers these mostly urban populations a variety of four-season recreational opportunities (NEP 1993). The area's proximity to major population centers in the New England and Middle Atlantic region makes it a popular destination for out-of-state tourists from urban areas including New York City, Albany,



Hartford, New Haven, and Boston. Local populations living within the basin also benefit from the recreational opportunities.

Individual recreation users are attracted to the area primarily for angling, rafting, kayaking, and tubing (MEOEEA 2004; AMC 2007). Recreation facilities at the Bear Swamp, Deerfield River, and Gardners Falls projects provide a range of recreational opportunities and amenities including boat launches, picnic areas, campsites, and hiking trails. Several commercial outfitters offer guided excursions on the Deerfield River that include whitewater rafting, tubing, and fishing trips. Other recreational activities within the watershed include snowmobiling, hunting, skiing, and foliage and wildlife viewing (MEOEEA 2004). A number of river guides, outfitters, hotels, and campgrounds provide services and amenities supported by recreation on the Deerfield River.

In particular, the “Monroe” section of the Deerfield River from the Vermont border to the Lower Reservoir and the “Fife Brook” section extending from Fife Brook Dam downstream to just north of Route 2 are popular among visitors. As described in the regulations governing the use of commercial whitewater rafts on the Deerfield River in Massachusetts (see 323 Code of Massachusetts Regulations [CMR] 6.01):

*Specifically, there exist portions of the Deerfield River known as the Fife Brook and Monroe sections beginning at the Vermont border and extending just north of Route 2. These sections have seen an increased interest by commercial whitewater rafting companies because of its excellent whitewater potential. In addition, these sections of the Deerfield presently contain the most popular, pristine, and beautiful angling spot in western Massachusetts, with two catch and release areas, and are among the most popular angling areas in the northeast. Use by anglers, coupled with increased rafting, creates conflicts and safety concerns.*

Recreation at the Project is managed by BSPC to support angling, whitewater rafting, tubing, hunting, hiking, and other recreational activities in accordance with the conditions of the license, regulatory requirements, and agreements. Formal Project recreational facilities are described in

detail in the PAD and include the Bear Swamp Visitor Center, Fife Brook Fish and Boating Access Area, Zoar Picnic Area, Bear Swamp Public Hunting Area, and the Zoar Whitewater Access Area. Formal recreation facilities also include the Fife Brook Overlook Hiking Trail, a section of the Bear Swamp and Hoosac Tunnel Loop Hiking Trail required by the Comprehensive Recreation Plan and Article 402 of the existing license. The remaining sections of the Hoosac Tunnel Loop Hiking Trail are currently scheduled for completion in 2015.

In addition to the formal Project recreation facilities listed above, numerous informal shoreline parking/access areas are available along the Deerfield River between the Fife Brook Dam and the extent of the Project boundary approximately 7.5 miles downstream of Fife Brook Dam. These informal parking areas provide river access to popular fishing spots and put-in/take-out locations. Other recreational activities including fishing, wildlife viewing, cross-country skiing, and picnicking are generally available free to the public on Project lands and waters in accordance with posted informational and safety signage.

Due to its proximity to population centers and the predictability of flow releases, the Deerfield River is one of the premier whitewater boating destinations in the region (MEOEEA 2004). Pursuant to Article 404 of the license and in cooperation with the DRP licensee, BSPC passes-through peaking flows received from the DRP as whitewater releases from the Fife Brook Dam at a minimum flow level of 700 cfs for a duration of at least three continuous hours. In accordance with Article 404, these releases can start anytime between 9:30 AM. and 12:00 PM, according to the following monthly schedule for 50 weekend days and 56 weekdays from April 1 to October 31 annually (a total of 106):

<b><u>Month</u></b>	<b><u>Allocation</u></b>
April	3 weeks of Wednesday through Sunday releases.
May	2 weeks of Wednesday through Sunday releases, plus 2 weeks of Saturday and Sunday releases.
June	2 weeks of Wednesday through Sunday releases, plus 2 weeks of Saturday and Sunday releases.

July	3 weeks of Wednesday through Sunday releases, plus 1 week of Saturday and Sunday releases.
August	4 weeks of Thursday through Sunday releases.
September	3 weeks of Wednesday through Sunday releases.
October	3 weeks of Wednesday through Sunday releases.
Holidays	May be substituted for weekend days upon agreement between the Licensee and the citizens groups before April 1 of each year.

The Whitewater Release Plan describes the measures utilized by BSPC to implement the flow releases for whitewater boating. The Whitewater Release Plan was approved by the Commission on December 10, 1997, and includes provisions for:

- Meeting with representative citizens groups, including New England FLOW and Massachusetts-Rhode Island Council of Trout Unlimited (MRCTU) to cooperatively develop whitewater release schedules;
- A means to provide river flow information to the public; and
- Reduction in whitewater flow releases due to certain conditions.

BSPC and TransCanada coordinate the annual meeting to develop the whitewater release schedule, and the approved Whitewater Release Plan requires this meeting to be held on or about November 1, annually, with the proposed schedule issued in January for that year's flow releases. In order to account for unforeseen maintenance periods or other special scheduling requests, the final annual schedule for the 106 flow releases is issued on or before April 1 for the current year.

In accordance with the Whitewater Release Plan, BSPC provides information to the public regarding estimated current and forecasted flow conditions downstream of the Fife Brook Dam. This information is available from the Waterline website at [www.h2online.com](http://www.h2online.com) or by calling the Waterline Flowcast<sup>®</sup> phone number at 1-800-452-1742 (Fishing Edition) or 1-800-452-1737 (Boater's Edition).

BSPC maintains kiosks at the Bear Swamp Visitor Center, Fife Brook Fishing and Boating Access Area, Zoar Picnic Area, and Zoar Whitewater Access Area that provide information on recreation activities along the Deerfield River, including the annual whitewater release schedule and how to obtain Deerfield River flow information. This information is also available as a downloadable file from the Waterline website.

## **9.5 Project Nexus**

The Bear Swamp Project currently offers and affords significant and varied recreational opportunities. The results of this study, in conjunction with existing information, will be used to inform resource discussions within the license application materials.

## **9.6 Methodology**

BSPC intends to conduct a Recreation Survey commensurate with the level of effort described in FERC's April 16, 2015, study request. Specific methods are described in this section.

### **9.6.1 Literature Review**

Prior to conducting field reconnaissance, BSPC will conduct desktop research and a literature review to identify and describe recreational uses in the Project area, including whitewater boating, fishing, kayaking, tubing, hiking, hunting, and winter activities. As a component of this research, BSPC will review existing recreational uses, management plans, limitations, and regulations applicable to the Project area, including:

- Annual use records available from whitewater rafting, tubing, and fishing outfitters;
- The Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP);
- Rules of conduct and operation governing commercial whitewater rafting on the Deerfield River (323 CMR 6.00), including requirements that relate to permits, safety, daily passenger quotas, and the role of the Whitewater Advisory Committee;
- The Deerfield River Impact Committee's (DRIC) 2003 study and recommendations to the Town of Charlemont regarding the impact of summer recreational river use on the town (DRIC 2003);
- Deerfield River Watershed 5-Year Action Plan (2004 – 2008) (MEOEEA 2004); and
- The Deerfield River Map and Guide (AMC 2007).

BSPC expects that relevant information will be incorporated into the DAIP to develop maps of recreation areas, trails, and other features within and adjacent to the Project boundary.

### 9.6.2 Field Inventory

A field inventory to document existing formal and informal recreation facilities at the Project will be conducted. In support of this inventory, BSPC will conduct informal interviews with recreationalists to identify informal recreation and access areas at the Project. BSPC will also map and document whitewater features (drops) identified by representatives from WGs, including those at the upstream end of the Lower Reservoir and downstream from Fife Brook Dam. BSPC will perform field reconnaissance of, and document reservoir levels in relation to access to (and relevant elevation information of) these features, as well as the timing and frequency of their exposure. As a component of the field inventory, BSPC will map and document popular fishing locations downstream from Fife Brook Dam, including the extent of the two catch-and-release trout fishing areas along the Deerfield River (from Fife Brook Dam to Hoosac Tunnel and From Pelham Brook to Mohawk Campground). Locations of recreational facilities will be recorded using GPS and integrated with the DAIP. BSPC will record other relevant and applicable information for each recreational facility including:

- A description of the type and location of existing recreation facilities;
- The type of recreation provided (boat access, angler access, picnicking, etc.);
- Existing amenities and sanitation;
- The type of vehicular access and parking (if any);
- Suitability of facilities to provide recreational opportunities and access for persons with disabilities (i.e., compliance with current Americans with Disabilities Act [ADA] standards for accessible design); and
- Photographic documentation of recreation facilities.

### 9.6.3 Collection of Visitor Use Data

BSPC will collect visitor use data at Project recreation facilities through a combination of surveys, personal interviews, field reconnaissance, interviews with industry professionals and law enforcement, and photo documentation. BSPC has reviewed the visitor use monitoring framework described in English et al. 2001, the U.S. Forest Service's (USFS) National Visitor

Use Monitoring Program (NVUM Program), and the survey questionnaire developed by the National Park Service for Ebey's Landing National Historical Reserve Visitor Study (NPS 2007). It is BSPC's conclusion that the NVUM Program is intended for use at National Forests and Grasslands and includes a random stratified sampling approach that takes into account both remote locations (e.g., wilderness areas) as well as heavily used campsites and roadways on USFS property. These conditions are not reflected in the recreation sites at the Project. Further, as AMC notes in their comments on the PAD and SD1, recreation use along the Fife Brook section of the Deerfield River does not necessarily occur randomly and is typically oriented around scheduled whitewater releases. A random sampling approach as employed by the NVUM Program may not be the most appropriate survey approach for the Deerfield River. For these reasons, BSPC's study methods include general and relevant concepts from the NVUM Program but are designed to better facilitate data collection at the Bear Swamp Project.

#### 9.6.3.1 Personal Interviews and Field Reconnaissance

BSPC will conduct field reconnaissance and interviews with respondents at the following Project recreation facilities during the prime recreational season from the end of May 2016 through the beginning of October 2016:

- Bear Swamp Visitor Center;
- Fife Brook Fish and Boating Access Area;
- Zoar Whitewater Access Area;
- Zoar Picnic Area; and
- Select informal recreation access areas within the FERC Project boundary downstream of Fife Brook.

Surveys will begin at 8:00 AM and continue until 6:00 PM to capture whitewater flows releases as well as periods of minimum flow of low water that are more popular with anglers. BSPC intends to conduct surveys pursuant to the schedule presented in Table 9.6-1

**TABLE 9.6-1**  
**VISITOR USE SURVEY SCHEDULE**

Month	Survey and Reconnaissance
May	<ul style="list-style-type: none"> <li>▪ One day within Memorial Day Weekend that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>
June	<ul style="list-style-type: none"> <li>▪ One weekend day that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>
July	<ul style="list-style-type: none"> <li>▪ One day within July 4th Weekend that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>
August	<ul style="list-style-type: none"> <li>▪ One weekend day that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>
September	<ul style="list-style-type: none"> <li>▪ One day within Labor Day Weekend that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>
October	<ul style="list-style-type: none"> <li>▪ One weekend day that includes a scheduled whitewater release below Fife Brook</li> <li>▪ One randomly selected weekday</li> </ul>

BSPC expects that one team of two technicians will rotate between each of the recreation sites listed above and will spend approximately one hour at each site conducting interviews. BSPC anticipates providing respondents with the option to complete the interview digitally (e.g. on an iPad/tablet) or to answer interview questions verbally. Before rotating to the next site, technicians will record relevant conditions, including observed recreational activities, estimated number of vehicles, and number of recreational users. General information regarding date, time, and weather conditions will also be recorded by technicians. Interviews at informal recreation areas will be conducted if recreational users are observed at those locations.

BSPC expects to develop an interview/survey instrument that draws from general concepts and guidance from the *National Visitor Use Monitoring Handbook* (USFS 2007) as well as from other germane relicensings, addressing topics such as (but not necessarily limited to):

- General user information;
- Age group, resident/visitor;
- Purpose and duration of visit;
- Distance traveled;
- Day use/overnight lodging;
- History of visiting the site or area;
- Types of recreational activities respondents participated in or plan to participate in during their visit, including primary and secondary recreation activities;
- Reasons for choosing the site or area;
- Other recreational sites that respondents visited or intend to visit during their trip;
- General satisfaction with recreational opportunities, flow conditions, facilities, and the respondents overall visit and/or areas that need improvement;
- Accessibility of facilities or areas for the disabled; and
- Economic aspects, including dollars spent on recreation and lodging during the visit.

BSPC expects to provide additional details on the survey/interview instrument in the Revised Study Plan, recognizing that finalization may occur in early 2016.

#### 9.6.3.2 Online Survey

In addition to the personal interviews, BSPC will develop an online version of the interview questions that will allow respondents to provide survey responses electronically. The online survey will allow respondents who do not wish to complete an interview or survey in the field to complete an online version of the survey at a later time or upon returning home from their visit. The online survey will also provide a means to capture data from recreationalists who do not frequent the Deerfield River.

BSPC will post a brief description of the purpose and intent of the survey, as well as the website address, at all formal Project recreation locations and at randomly selected informal recreation access areas at the Project. Additionally, notice of the survey will be posted on the Project's relicensing website, and BSPC will provide handouts to recreationalists with the relevant information on how to complete the online survey.



#### 9.6.3.3 Industry and Law Enforcement Interviews

BSPC will conduct interviews with leading local recreation industry professionals and law enforcement officials to gather additional information about existing recreation facilities, demand, current use patterns (seasonally, monthly weekend/weekday), safety issues, overcrowding, traffic, and other germane issues to characterize existing recreational use in the Project area. The interviews are intended to focus on local law enforcement as well as outfitters and guides that offer services on the Deerfield River.

BSPC recognizes that the whitewater and fishing guides, tubing companies, other local outfitters, and law enforcement professionals have extensive experience with recreational use on the Deerfield River. Interviews with industry and law enforcement professionals are intended to capture perspectives that could not be discerned from visitor surveys, traffic counters, or observations. For example, interview questions may focus on identifying if whitewater transport busses and trailers experience traffic congestion or significant wait times at Project recreation facilities during summer weekends and if such congestion occurs at certain times of the day. Additional questions may focus on identifying areas along the Deerfield River where tubers, boaters, and rafters congregate and identified safety issues at these locations.

BSPC expects to conduct interviews with leading representatives from law enforcement, commercial whitewater, commercial tubers, and commercial angling guides.

#### 9.6.3.4 Photo Documentation

BSPC anticipates placing trail cameras to record time- and date-stamped photos at two remote formal recreation areas and at three high-use recreation areas at the Project. The cameras will capture recreational use of the Bear Swamp Public Hunting Area and the Fife Brook Overlook Hiking Trail, including use during the fall and winter months (e.g., hunting, snowshoeing, and cross-country skiing). Trail cameras are an effective means of documenting recreational use along trails and at remote areas, particularly during winter months when user interviews are likely to be impractical or ineffective.

Cameras placed at the Fife Brook Fish and Boating Access Area, Zoar Whitewater Access Area, and Zoar Picnic Area will supplement field survey and reconnaissance data and provide

additional information on daily use patterns, number, and type of vehicles that use these locations during the recreation season. BSPC believes that this approach to documenting vehicle use is more appropriate than car counters (as discussed in the NVUM Program), inasmuch as photos allow for an analysis of the types of vehicles that access recreation areas. Car count equipment and associated data lacks the ability to distinguish between two- and three-axle vehicles, trailers, and other types of vehicles that are commonly used by whitewater and fishing guides. As such, car count equipment may instead be employed on an as-needed basis in the event photo documentation proves problematic (e.g. vandalism, malfunction, etc.). Capturing photos of high-use parking areas informs both the demand for parking and the types of vehicles that require parking and/or access. Additional details regarding the trail cameras are presented in Table 9.6-2.

**TABLE 9.6-2  
TRAIL CAMERA DEPLOYMENT**

<b>Recreation Site</b>	<b>Number of Cameras</b>	<b>Placement</b>	<b>Type</b>	<b>Deployment Period</b>
Bear Swamp Public Hunting Area	Two trail cameras	Placed along the main access roads to capture vehicle or foot traffic	Motion activated	April 2016 – April 2017
Fife Brook Overlook Hiking Trail	One trail camera	Placed at the trailhead to capture foot traffic	Motion activated	April 2016 – April 2017
Fife Brook Fish and Boating Access Area	One trail camera	One placed to capture photos of the parking and river access area	Timed at 1 hour intervals between 6:00 AM and 6:00 PM, daily	May 2016 – October 2016
Zoar Whitewater Access Area	One trail camera	One placed to capture parking area	Timed at 1 hour intervals between 6:00 AM and 6:00 PM, daily	May 2016 – October 2016
Zoar Picnic Area	One trail cameras	Placed to capture general view of the recreation area	Timed at 1 hour intervals between 6:00 AM and 6:00 PM, daily	May 2016 – October 2016

#### 9.6.4 Data Analysis and Reporting

BSPC will prepare a report summarizing the results of the Recreation Survey to include information presenting the results of the literature review, field inventory, personal interviews

and field reconnaissance, online surveys, and an analysis of and representative photos from the trail cameras. BSPC expects that the DAIP will be used in conjunction with the data collected to support data analysis and to develop detailed recreation maps for the Project. BSPC anticipates that the Recreation Survey Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

The results of the Recreation Survey will be used to evaluate the potential effects of continued operation of the Project on recreation resources and activities in the Project area; identify a range of PM&E measures that could be implemented to enhance recreation or mitigate project effects on recreation; and identify any need for improvement at existing recreation facilities in the DLA and FLA, as appropriate.

## **9.7 Schedule and Level of Effort**

At this time, BSPC intends to conduct the Recreation Survey beginning in May 2016 with photo collection and data analysis continuing until Q2 of 2017. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **9.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally

accepted methods for recreation studies and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP.

As discussed above, the NVUM Program is adapted for data collection across a variety of stratified site types and is not designed for river corridors that receive a high volume of recreational users. As such, BSPC believes that the methods and blended approach proposed for this Recreation Survey are more appropriate to collect data that will inform analyses and potential licensing conditions. No alternative approaches to this study are necessary.

## Section 10

# Rare, Threatened, and Endangered Species Study

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### 10.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified Terrestrial, Wildlife, and Vegetation Cover Type Mapping and Aquatic Habitat Survey/Mapping which would include identification and documentation of federal and state-listed rare, threatened, and endangered (RTE) species. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation and maintenance on the federally endangered northeastern bulrush, federally threatened bog turtle, and federally proposed endangered northern long-eared bat.

The MADFW and USFWS subsequently submitted formal requests for studies related to RTE species as shown in Table 10.1-1 (see Appendix B).

**TABLE 10.1-1**  
**STUDY REQUESTS RELATED TO RARE, THREATENED**  
**AND ENDANGERED SPECIES**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
MADFW	State-Listed Rare Plants, Baseline Data Collection, and Assessment of Operational Impacts	April 16, 2015
MADFW	Northern Long-Eared Bat Acoustic Survey	April 16, 2015
MADFW	Massachusetts State-Listed Odonates Baseline Data Collection and Assessment of Operational Impacts	April 16, 2015
USFWS	Northern Long-Eared Acoustic Bat Survey	April 17, 2016

## 10.2 Goals and Objectives

The goal of this study is to document and map federal- and state-listed RTE species and bald eagles observed within the Project boundary. The specific objectives of the study are to:

- Compile existing information from the MADFW regarding state-listed odonates and state- and watch-listed plant species that inhabit the Deerfield River in the reach of the Project;
- Compile life-histories and habitat requirements of federal- and state-listed terrestrial and botanical species and odonates that may be located within the FERC Project boundary and along the river corridor extending from the Lower Reservoir downstream to the confluence of the Deerfield and Cold Rivers; and
- In the course of field studies, document and record the location of observed specimens of federal-listed bog turtle, NLEB, and northeastern bulrush and suitable habitat for these species.

## 10.3 Study Area

The study area includes the Lower Reservoir downstream to a point just upstream of the confluence of the Deerfield and Cold Rivers. The Cold River Subwatershed is one of twelve major subwatersheds that comprise the Deerfield River Watershed, and the Cold River joins the Deerfield at the Route 2 Bridge in Charlemont (MEOEEA 2004). This is an appropriate study area as it encompasses the Project boundary and extends beyond the Project boundary to the confluence with a major tributary to the Deerfield River. The proposed study area is shown in Figure 1.2-1.

## 10.4 Background and Existing Information

Relevant information regarding federal- and state-listed RTE species is summarized in Sections 5.7 and 5.8 of the PAD. The USFWS Environmental Conservation Online System identifies Endangered Species Act (ESA)-listed species known or believed to occur by county. Based on a search of the USFWS database for ESA-listed species, there is one ESA-listed endangered species and two ESA-listed threatened species that may occur in terrestrial habitats in Franklin or

Berkshire counties. These species are presented in Table 10.4-1. In addition to these three species, the bald eagle (*Haliaeetus leucocephalus*) may occur in the Project vicinity; this species is protected under the federal Bald and Golden Eagle Protection Act (and is separately listed by the Commonwealth of Massachusetts).

**TABLE 10.4-1**  
**ESA-LISTED THREATENED, ENDANGERED, AND CANDIDATE SPECIES**

Common Name	Scientific Name	Status
Northeastern bulrush	<i>Scirpus ancistrochaetus</i>	Endangered
Bog turtle	<i>Clemmys muhlenbergii</i>	Threatened
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened

In addition to the USFWS's database of federal-listed species, the MEOEEA maintains a list of endangered, threatened, and special concern species as defined in Section 10.60 of Chapter 321 of the CMR. The Massachusetts Endangered Species Act (MESA) List is prepared under the authority of the MESA and its implementing regulations (321 CMR 10.00).

The MESA List identifies 219 species that are endangered, 104 species that are threatened, and 109 species that are species of special concern throughout the Commonwealth. Unlike the USFWS database that identifies federal-listed species by county, the MADFW's NHESP database identifies state-listed species by town and includes all documented MESA-listed species observations in the Commonwealth (by town). Based on a search of the NHESP database for the towns of Monroe, Rowe, Florida, and Charlemont (towns through which the Deerfield River flows in the vicinity of the Project), 27 state-listed species may occur in the vicinity of the Project.

Priority and estimated habitats have been delineated by the NHESP and are used for screening projects and activities that may impact state-listed rare species and their habitats. These priority areas have been delineated based on the Best Scientific Evidence Available, as defined by 321 CMR 10.02:

*Best Scientific Evidence Available means species occurrence records, population estimates, habitat descriptions, assessments, peer reviewed scientific literature, documented consultation with experts and information contained in the records of the NHESP or other creditable scientific reports or species sighting information reasonable available to the Director [of the MADFW].*

Priority areas within the vicinity of the Project are shown in Figure 10.4-1

## **10.5 Project Nexus**

Federal- and state-listed RTE species have been documented near or may occur within the Project boundary and along the river corridor extending from the Lower Reservoir downstream to the confluence of the Deerfield and Cold Rivers. This information has been documented by the USFWS and the MADFW using the Best Scientific Evidence Available. This study, in conjunction with existing information, will result in an up-to-date set of information, which will be used to inform resource discussions within the license application materials.

## **10.6 Methodology**

### **10.6.1 Literature Review**

The MADFW indicated in its April 16, 2015, study request that “*it is generally known which state- and watch-listed plant species inhabit the Deerfield River in the reach of the Project*” (MADFW 2015). These species have been documented to the NHESP’s satisfaction by professional and volunteer botanists using the Best Scientific Evidence Available (MADFW 2015). The NHESP Priority habitat maps have been prepared based on this evidence, including the geographic extent of habitat for state-listed species as delineated by the MADFW based on records of state-listed species observed within the 25 years prior to delineation and contained in the NHESP database. Available literature from the NHESP further indicates that the location and habitat of these species relative to the study area are generally known. For example, the NHESP has documented the state-listed Mountain alder as occurring in several habitat types, but most commonly on exposed ledges, boulders, and cobble bars on the edges of the Connecticut





and Deerfield Rivers. The NHESP notes that *“most of the populations occur along the Deerfield River, which is subject to periodic releases from the Bear Swamp pump storage station.”*<sup>14</sup> The Deerfield River populations do not appear to be affected by the fluctuating water levels; in fact, the flooding is likely beneficial in that physical disturbance of the flooding (and ice scour) halts succession at these sites” (NHESP 2012). BSPC will consult with the MADFW to identify these species and existing information regarding their reported locations within the study area.

Similarly, the MADFW has identified state-listed odonates and suitable habitat within and adjacent to the Deerfield River. Odonates have been observed and reported as adults, exuviae, and nymphs at locations upstream and downstream from Fife Brook Dam.

The Best Scientific Evidence Available has been compiled by the NHESP and used to delineate priority habitats in the Project’s vicinity. BSPC will review and compile habitat requirements and life histories of federal- and state-listed RTE species previously reported in, or that may potentially occur within, the study area. BSPC will consult with the NHESP regarding details associated with the mapped priority habitats within the study area. Combined, this existing information will provide baseline information on known and reported RTE species within the Project’s vicinity.

### 10.6.2 Field Observations

The MADFW has indicated that state- and watch-listed species inhabiting the study area are already known, and available literature from the NHESP indicates that the location and habitat of these species relative to the study area are generally well defined. Therefore, additional field studies to reconfirm the presence of these species or their habits are unnecessary. However, the presence of federal-listed species has not been documented. Therefore, BSPC will collect additional information regarding these species in the course of field studies conducted in support of relicensing.

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<sup>14</sup> The Bear Swamp PSD does not create or cause peaking releases downstream of Fife Brook. As discussed elsewhere in this document, the downstream releases are not the result of operations of the Bear Swamp PSD, but are rather the result of the flow regime established by the Settlement for the DRP which is passed through the Fife Brook Development.

BSPC has proposed to conduct a number of ecological studies related to terrestrial and aquatic resources within the study area in support of Project relicensing. These studies will involve a substantial field effort over the course of 2016 including:

- Water Quality Study;
- Fish Assemblage Assessment Study;
- Baseline Study of Terrestrial Wildlife and Botanical Resources;
- Aquatic Mesohabitat Assessment and Mapping; and
- Wetland, Riparian, and Littoral Habitat Study.

Prior to the start of these field studies, BSPC biologists will review life history and habitat requirements of federal-listed species. In the course of field activities, BSPC biologists will document observed occurrences of federal-listed species or bald eagles, as well as suitable habitat for these species including roosting habitat, nests, or hibernacula (as applicable). All observed locations will be recorded using GPS, and relevant information including the time of observation and observed status (e.g., healthy, diseased) will be documented.

### 10.6.3 Data Analysis and Reporting

BSPC will prepare a report compiling the results of the RTE Species Study to include a summary of federal- and state-listed RTE species, their life histories, habitat requirements, observed or reported locations within the study area, and the results of incidental field observations. BSPC expects that the DAIP will be used in conjunction with the data compiled to support analysis and to develop maps of observed and reported RTE species within the study area. BSPC anticipates that the RTE Species Study Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

The results of the RTE Species Study will be used to inform discussions on RTE species through the relicensing process, including the development of the DLA, FLA, and the Commission's EA. Consideration of potential impacts to these species as a result of intensive recreational use of the Deerfield River may also be contemplated through this process. The results of this study may be used towards measures such as an RTE Species Management Plan that could be implemented under any new license issued by the Commission to enhance or protect these species, which among other things can call for local, detailed surveys at the time of, and commensurate with, ground-disturbing or developmental activities.

### **10.7 Schedule and Level of Effort**

At this time, BSPC intends to conduct the RTE Species Study between May and October of 2016. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

### **10.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for identifying RTE species and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.

## Section 11

# Cultural Resources Survey

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### 11.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a Cultural Resources Study to identify historic properties within the Project's area of potential effects (APE), assess ongoing and potential Project-related effects (if any) on historic properties, and develop appropriate management measures. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on historic properties and archaeological resources.

By letter dated March 30, 2015, the Massachusetts Historical Commission (MHC) commented in support of a cultural resources study. FERC submitted a formal request for a Cultural Resources Survey at the Project on April 16, 2015, as shown in Table 11.1-1 (see Appendix B).

**TABLE 11.1-1**  
**CULTURAL RESOURCES STUDY REQUESTS**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
FERC	Cultural Resources Survey	April 16, 2015

### 11.2 Goals and Objectives

The goal of this study is to determine the effects (if any) of Project operations on archaeological and historic resources within the Project's APE. The specific objectives of the study are to:

- Recommend an appropriate APE for Project relicensing;
- Identify known resources through the available literature;
- Identify locations that have the potential to contain archaeological resources (e.g., archaeologically sensitive areas);

- Locate any archeological sites that may exist in areas exhibiting effects from project operation and in areas where ground-disturbing enhancements are proposed;
- Assess the National Register of Historic Places (NRHP) eligibility of Project facilities and other historic resources within the APE, including considering whether they may contribute to a larger district;
- Evaluate the potential for effects on historic and archaeological resources from operation of the Project; and
- If necessary, prepare a draft historic properties management plan (HPMP) that describes how the licensee will consider and manage historic properties within the Project's APE throughout the term of any new license issued by the Commission.

### **11.3 Study Area**

The study area includes the APE. FERC has tentatively defined the APE as the lands enclosed by the Project's boundary as delineated in the PAD for the project, and lands or properties outside the Project's boundary where Project 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. The APE for Bear Swamp Project includes the Hoosac Tunnel Loop Hiking Trail and any associated lands.

Since the APE encompass all lands that are necessary for Project purposes, BSPC believes that this proposed APE is consistent with the 36 CFR § 800.16(d) and the manner in which the FERC has defined the APE for similar hydroelectric projects. The study area and proposed APE (including the Project boundary) are shown on Figure 1.2-1. As discussed below, BSPC will refine the APE in consultation with the MHC, Stockbridge-Munsee Community, Band of Mohican Indians (Stockbridge-Munsee), the Narragansett Indian Tribe (NIT), and other parties, as appropriate.

### **11.4 Background and Existing Information**

Section 5.11 of the PAD describes the historic uses of the lands within and adjacent to the Project Area. A review of publicly available sources identified five previously reported archaeological sites within the Project's vicinity. These sites include the Fife Brook Site Cluster



identified by Fitzhugh (Fitzhugh 1970), as well as the Fife Brook 5 locality identified by the Public Archaeology Laboratory (PAL) in 2001 (Heitert et al. 2001). Fife Brook 5 was formally evaluated in 2001, and the MHC determined that the locality did not meet the criteria for listing in the NRHP (MHC 2001). The NRHP-eligibility of the Fife Brook Site Cluster has not been formally evaluated.

BSPC conducted a review of the Massachusetts Cultural Resource Information System (MACRIS) to identify historic properties within the Project's vicinity, including buildings, structures, objects, and districts listed in or eligible for inclusion in the NRHP. Other historic resources include those inventoried by the MHC as part of the Inventory of Historic Assets of the Commonwealth (IHAC). The IHAC records basic information such as building descriptions, brief histories, and location information. Most resources recorded by IHAC contributors have been inventoried, but have not been formally evaluated for inclusion in the NRHP. Others have been previously recommended as eligible for the NRHP (i.e., they appear to meet one or more of the National Register Criteria), but there is currently no record available from MACRIS regarding a formal determination of eligibility. A summary of these resources is presented in the PAD.

The Project boundary includes historic and archaeological resources that are listed in or may be eligible for inclusion in the NRHP. In addition, there may be unknown historic properties or archeological sites within the APE. This proposed Cultural Resources Survey will identify historic and archaeological resources within the Project's APE that may be affected by relicensing the Project.

## **11.5 Project Nexus**

In considering a new license for the Project, FERC has the lead responsibility for compliance with applicable federal laws, regulations, and policies pertaining to historic properties, including the National Historic Preservation Act of 1966, as amended (NHPA).<sup>15</sup> Section 106 of the NHPA (Section 106) directs federal agencies to take into account the effects of their

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<sup>15</sup> 16U.S.C. 470 *et seq.*

undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment.

At present, there is no evidence that archaeological or historic resources are being adversely affected by Project operations. However, the continued operation and maintenance of Project has the potential to directly or indirectly affect historic properties listed in or eligible for inclusion in the NRHP during the term of any new license issued by the Commission. This study, in conjunction with existing information, would provide information on historic and archeological sites located within the APE and to inform resource discussions within the license application materials. The subsequent report would provide information on which sites are potentially eligible for the NRHP and any potential effects of the Project on these resources. BSPC has proposed to develop an HPMP based on the results of the Cultural Resources Survey and in consultation with the Commission, the MHC, Indian tribes, and other interested parties that would describe how the licensee will consider and manage historic properties under any new license.

## **11.6 Methodology**

### **11.6.1 Area of Potential Effects**

By notice dated February 18, 2015, the Commission designated BSPC as its non-federal representative for purposes of carrying out informal consultation pursuant to Section 106. Pursuant to the implementing regulations of Section 106 at 36 CFR § 800.4(a), BSPC will consult with the MHC, NIT Tribal Historic Preservation Officer (THPO), Stockbridge-Munsee THPO (collectively, “the THPOs”), and other parties, as appropriate, to determine and document the APE for as defined in 36 CFR § 800.16(d).

### **11.6.2 Reconnaissance Survey**

Consistent with the MHC’s Standards for Field Investigation (950 CMR 70.13), BSPC will conduct a Reconnaissance Survey of the Project’s APE. The Reconnaissance Survey will be



conducted by a qualified cultural resources professional<sup>16</sup> retained by BSPC and will be in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Federal Register [FR] 44716, Sept. 1983), and the Massachusetts General Laws, Chapter 9, Sections 26A and 27C (950 CMR 70). The Reconnaissance Survey will consist of a combination of background research and fieldwork designed to develop appropriate contexts and obtain background information on archaeological and historic resources within the Project's APE. The Reconnaissance Survey will assist BSPC in meeting specific goals for this study, including:

- Identify known resources through the available literature;
- Identify locations that have the potential to contain archaeological resources (e.g., archaeologically sensitive areas); and
- Locate any archeological sites that may exist in areas exhibiting effects from Project operation and in areas where ground-disturbing enhancements are proposed.

#### 11.6.2.1 Background and Archival Research

As an initial component of this study, BSPC will conduct background and archival research at the MHC and other local repositories, as appropriate. The objective of the background research is to identify known archaeological site locations and develop historical contexts that will assist in identifying patterns of land use through the Precontact and historic periods. This will inform the predictability of the location of previously unrecorded archaeological resources potentially in the Project's APE and the types of sites that might be expected. At minimum, BSPC anticipates that background research will include a review of the following sources of information:

- The MHC's online MACRIS database;
- Archaeological site files on file with the MHC;
- Relevant NRHP nomination forms;
- Historical maps of the Project vicinities;
- Relevant historical accounts of the Project areas;

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<sup>16</sup> For this study, a "qualified cultural resources professional" is defined as an individual who meets the Secretary of the Interior's Professional Qualification Standards (48 Federal Register [FR] 44738-44739, Sept. 1983) and the standards established by the MHC.

- Environmental information, including mapped soils, bedrock geology, physiography, and hydrology in the vicinity of the Projects; and
- Reports on previous archaeological studies conducted within the Project vicinity.

#### 11.6.2.2 Field Reconnaissance

Following completion of the background research and data review, BSPC will conduct field reconnaissance of the Project's APE. Many areas of the Project's APE are remote upland areas that are not likely to be impacted by Project operations or activities during the term of the new license. Therefore, field reconnaissance activities will focus on those areas of the Project's APE that are in the within and in the vicinity of (a) previously reported archaeological sites or map-documented structures; (b) formal recreation facilities and informal recreation access area (including the Hoosac Tunnel Loop Hiking Trail); (c) Project facilities, including the Bear Swamp PSD powerhouse, Fife Brook powerhouse, access roadways, transmission lines, and the shorelines of the Upper and Lower reservoirs; and (d) the river corridor extending from the Lower Reservoir to the downstream extent of the Project boundary. The purpose of the field reconnaissance is to observe and document existing field conditions to inform the development of preliminary assessments of archaeological sensitivity. Survey teams will access these areas on foot or by boat to examine and visually inspect landforms, and record general attributes such as vegetation type, depositional setting, presence or absence of erosion, and evidence of disturbance from recreation or other activities. BSPC expects that the information collected will be combined with the DAIP and results of the background and archival research to develop an archaeological sensitivity model for the APE.

#### 11.6.2.3 Traditional Cultural Properties

A traditional cultural property (TCP) is a cultural resource that is eligible for inclusion in the NRHP because of the role the property plays in a community's historically rooted beliefs, customs, and practices. TCPs may be eligible for inclusion in the NRHP because of their association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community.

BSPC recognizes the special expertise that Indian tribes have in identifying properties that have traditional and religious significance to their community. As such, BSPC will consult with the THPOs and the MHC to identify any TCPs within the Project's APE.

### 11.6.3 Data Analysis and Reporting

BSPC will prepare a Reconnaissance Survey Report that presents the results of the background and archival research, field reconnaissance, and evaluation of historic architectural resources within the APE. The report will also provide the findings of the archaeological sensitivity model and will include any recommendations for additional field investigations (as defined in 950 CMR 70.04) at archaeologically sensitive areas exhibiting effects from Project operation or activities and in areas where ground-disturbing enhancements are proposed. The Reconnaissance Survey Report will be prepared in accordance with the requirements of 950 CMR 70.14: Standards for Summary Reports.

As appropriate, the BSPC will prepare a separate report that describes the results of consultation regarding TCPs, including any recommendations for additional investigations of identified or potential TCPs within the APE.

BSPC anticipates that the Reconnaissance Survey Report and TCP Report will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Study Results
- Discussion and Analysis
- Location maps, GIS analysis, and photos
- Any agency correspondence and or consultation
- Literature cited

#### 11.6.4 Historic Properties Management Plan

Pursuant to 36 CFR Part 800.14(b), BSPC anticipates that FERC will enter into a Programmatic Agreement (PA) with the MHC and ACHP for managing historic properties that may be affected by Project operations or activities during the term of the new license. The PA will provide a cooperative mechanism for ensuring that historic properties are managed in an appropriate manner throughout the term of the new license(s). The PA will be developed in consultation with the MHC, THPOs, and other stakeholders to specify the tasks that will be addressed in the HPMP.

The measures provided in the HPMP will direct BSPC's management of historic properties within the Project's APE throughout the term of the license. As appropriate, BSPC will develop an HPMP in consultation with the MHC, THPOs, and other stakeholders. Through this consultation, BSPC will specifically develop PM&E measures to be incorporated into the HPMP.

BSPC has outlined the following three goals for managing historic resources within the Project's APE:

- Ensure continued normal operation of the Project while maintaining and preserving the integrity of historic properties within the Project boundaries;
- To the fullest extent possible, avoid, minimize, or mitigate adverse effects on historic properties within the APE; and
- Ensure historic properties are managed in a way that does not impede BSPC's ability to comply with the terms of its operating license(s) and other applicable federal, state, and local statutes.

To address these goals, BSPC will develop an HPMP in accordance with the *Guidelines for the Development of Historic Properties Management Plans for FERC Hydroelectric Projects*, promulgated by the FERC and the ACHP on May 20, 2002. At a minimum, BSPC anticipates that the HPMP will address the following items (ACHP and FERC 2002):

- Any additional studies necessary to assist in the identification or management of historic properties within the APE;
- Potential effects on historic properties resulting from the continued operation and maintenance of the Projects;
- Management and treatment measures for historic properties;
- Protection of historic properties threatened by potential ground-disturbing or land-clearing activities;
- Protection of historic properties threatened by other direct or indirect Project-related activities, including routine Project maintenance and vandalism;
- The resolution of unavoidable adverse effects on historic properties;
- Treatment and disposition of any human remains that are discovered, taking into account any applicable state laws, the ACHP's *Policy Statement Regarding Treatment of Burial Sites, Human Remains and Funerary Objects* (ACHP 2007), and the Native American Graves Protection and Repatriation Act (NAGPRA) (P.L. 101-601; 25 U.S.C. 3001 *et seq.*)<sup>17</sup>;
- Provisions for unanticipated discoveries of previously unidentified cultural resources within the APE;
- A dispute resolution process;
- Categorical exclusions from further review of effects;
- Public interpretation of the historic and archaeological values of the Projects, if any;
- Specific measures and a schedule for implementing the HPMP;
- Roles and responsibilities of BSPC, the MHC, THPOs, and other individuals and organizations in regards to implementation of the HPMP; and
- Coordination with the MHC, THPOs, and other appropriate parties during implementation of the HPMP.

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<sup>17</sup> Pursuant to 43 CFR Part 10, NAGPRA applies to human remains, sacred objects, and items of cultural patrimony (described as "cultural items" in the statute) located on federal or tribal lands or in the possession and control of federal agencies or certain museums. There are no federal or tribal lands within the Project boundary. Nonetheless, the principles described in NAGPRA's implementing regulations will serve as guidance for BSPC's actions should the remains or associated artifacts be identified as Native American and to the extent such principles and procedures are consistent with any other applicable requirements.

## **11.7 Schedule and Level of Effort**

At this time, BSPC intends to conduct the Cultural Resources Study beginning in Q3 of 2016, and will also initiate consultation with the THPOs regarding TCPs at that time. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

BSPC anticipates that a draft HPMP will be distributed to consulting parties concurrent with the filing of the DLA. BSPC intends to file a final HPMP with the Commission with the FLA.

## **11.8 Discussion of Alternative Approaches**

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for cultural resources studies and analytical techniques used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.

## Section 12

# Operations Model

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### 12.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a potential Water Quantity and Operations study to characterize Project operations, including flow fluctuations and attenuation downstream of Fife Brook Dam. The Commission's February 18, 2015, SD1 identified the following environmental resource issues to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.
- Effects of continued project operation on recreational use in the project area, including the adequacy of existing recreational access, the adequacy and capacity of existing recreational facilities, and the adequacy of existing whitewater flows

The MADFW, USFWS, CRWC, and WGs submitted formal requests for studies related to operations modeling as presented in Table 12.1-1 (see Appendix B).

**TABLE 12.1-1**  
**STUDY REQUESTS RELATED TO PROJECT OPERATIONS MODELING**

Requestor	Requested Study	Date
MADFW	Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations	April 17, 2015
USFWS	Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations	April 16, 2015
CRWC	Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations	April 16, 2015
WGs	Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations	April 16, 2015

## 12.2 Goals and Objectives

The purpose of this study is to (a) assemble and review pertinent historical operations data for the Bear Swamp Project since acquisition by BSPC, and (b) develop an operations water budget model specific to the BSP facilities with emphasis on flow management within the Fife Brook impoundment. The goal of this study is to simulate existing BSP operations and operations that may be proposed during the relicensing process to aid in evaluating the potential effects of various operating scenarios on power and non-power resources associated with the BSP. As part of this, BSPC expects to:

- Demonstrate the operations (and limits) of the Bear Swamp PSD and Fife Brook Development within the context of inflow as provided by the Deerfield No. 5 station and outflow as constrained and required by the Settlement;
- Examine the extent to which today's management of the Fife Brook impoundment can be potentially modified (i.e. managing a disconnect different from today's incoming 73 cfs minimum flow and the outgoing 125 cfs minimum flow) so long as and assuming replenishing water is made available from the DRP;
- Examine the extent to which BSPC can influence change on or improve upon the timing and magnitude of Fife Brook outflow (e.g. relative to timing of whitewater releases, timing of minimum flow releases, alternate ramping, effects at the upstream end of the Fife Brook impoundment), without running out of water, adversely affecting the Bear Swamp PSD from serving its intended purpose, or adversely affecting public safety; and
- Establish a Flow Regime Working Group to serve as a forum by which BSPC and relicensing participants can exchange ideas and examine potential improvements within the context and requirements of the existing Settlement.

## 12.3 Study Area

The proposed model will encompass inflow into the Fife Brook impoundment, the Fife Brook impoundment itself as well as pertinent aspects of the Bear Swamp PSD, and Fife Brook Development powerhouses and water conveyance structures.



## 12.4 Background and Existing Information

This study will demonstrate and inform the limits or extent to which BSPC can affect change on water levels within the Fife Brook impoundment and outflow from the Fife Brook Development within the constraints and requirements of the Settlement. BSPC understands the interest in examining BSP operations and the degree to which variables or “levers” which under BSPC’s direct control can be potentially modified without adversely affecting the Bear Swamp PSD from serving its intended purpose (which is also in the public interest).

Based on a review of the DRP docket, BSPC understands that the DRP licensee has developed its Deerfield River Watershed Model (DRWM) pursuant to Article 416 of its license, inclusive of its Decision Support System (DSS) as described in FERC’s February 10, 2000, *Order Approving and Modifying Plan to Revise the Deerfield Watershed Model*. However, it is unclear the extent to which the BSP is represented in that model, and even if it is, such a representation would not be BSPC’s representation of the BSP as current owner and licensee. Accordingly, BSPC proposes to develop an operations water budget model specific to the BSP facilities and to the management of incoming and outgoing water within the Fife Brook impoundment. Additionally, and because a model already exists for the DRP facilities, BSPC does not envision the need for nor proposes to model facilities it is not the licensee of and does not own or control.

## 12.5 Project Nexus

Agencies and non-governmental agencies (NGOs) have raised a broad array of issues with respect to the management of water into and out of the Fife Brook impoundment – some aspects which BSPC may be able to potentially affect direct change upon, and others it cannot. The research and analysis to be performed under this study have their nexus to those specific aspects of water management within the Fife Brook impoundment that BSPC can directly influence. Accordingly, this study will be limited to examining the practical limits to which variables or “levers” under BSPC’s direct control can be moved or modified in a manner that does not contravene the Settlement, does not impair the DRP licensee’s ability to meet its current license requirements, and does not adversely affect the Bear Swamp PSD from serving its intended purpose. For example, stakeholders have cited BSPC’s management of the 52 cfs disconnect

between the incoming 73 cfs minimum flow and the outgoing 125 cfs minimum flow as proof that wholesale re-regulation is possible. However, BSPC's modest use of storage within the Fife Brook impoundment to manage this disconnect (as allowed under Article 401) is not re-regulation in its true sense and is only made possible through the provision of replenishing water from the DRP - which is administered through the March 2005 agreement between the DRP and BSP licensees. If the replenishing water were not ultimately provided, even this modest 52 cfs disconnect would result in the inevitable draining of available storage within the Fife Brook impoundment. As such, since the BSP cannot create or make water, BSPC does not envision examining imbalanced scenarios (where the volume of water released below Fife Brook dam is substantially and regularly greater than the volume of water coming in from the DRP) since they are not sustainable. Similarly, BSPC does not envision modeling "what if" scenarios that rely upon change to the existing Settlement and DRP license.

## **12.6 Methodology**

BSPC proposes to develop an operations water budget model using its relicensing consultant's (HDR) CHEOPS™ model (Computer Hydro Electric Operations and Planning Software). CHEOPS™ is a flexible, reliable, and easy-to-use tool created by HDR more than a decade ago specifically to evaluate the effects on hydropower projects resulting from a wide range of influences and variables in FERC relicensing. One of the many strengths of CHEOPS™ is the degree to which the model architecture provides a customized platform to investigate the site-specific operating characteristics, demands, and constraints of the particular plant/system being evaluated.

CHEOPS™ has been widely employed to evaluate physical and operational changes considered during FERC relicensing of well over 75 individual hydropower developments. CHEOPS™ has been used in all areas of the country to assist owners with assessing, optimizing, and managing their hydropower operations. Accordingly, it has proven applicable to a broad range of sites and operating conditions (and particularly those of pumped-storage projects) with notable projects including, but not limited to:

- AmerenUE - 450 MW Taum Sauk Pumped Storage Project,
- Duke Energy - 1,065 MW Bad Creek Pumped Storage Project,
- Duke Energy – 710 MW Jocassee Pumped Storage Project,
- USACE – 600 MW Richard B. Russell Pumped Storage Project,
- SMUD – 400 MW Iowa Hill Pumped Storage Project (proposed),
- Duke Energy - 2,700 MW Catawba-Wateree Hydroelectric System,
- Grant County PUD No. 2 - 1,900 MW Priest Rapids Hydroelectric Project, and
- Brookfield - 100 MW Upper Raquette River Hydroelectric System.

CHEOPS™ utilizes daily flows, plant generating characteristics, and reservoir/plant operating criteria to simulate project operation. CHEOPS™ simulates operations of a plant to meet user-specified goals (e.g. maximize energy production while meeting all regulatory constraints). The model is fully capable of determining impoundment elevation, headlosses, net head, turbine discharge and spill, power generation, and other user-specified variables in 15-minute increments. The proposed model will encompass an inflow dataset into the Fife Brook impoundment, the Fife Brook impoundment itself, as well as the Bear Swamp PSD and Fife Brook Development powerhouses and water conveyance structures. This model will allow for the evaluation of variables and constraints including inflows into the Fife Brook impoundment, inflow/outflow related to Bear Swamp PSD operations, Fife Brook Development outflows, reservoir operations, unit performance and generation capacity, operating characteristics and constraints, time-of-day generation, minimum flows, water level fluctuation constraints, and other user-specified variables. Major activities under this study will include:

- Assembly and compilation of historical operational data (data prior to acquisition by BSPC in 2005 will be included to the extent it is readily available).
- Assembly of system information pertaining to the physical and operational characteristics of the Bear Swamp PSD and Fife Brook Development.
- Development of inflow dataset (expected to be derived from information in BSPC's possession since acquisition in 2005, with earlier data incorporated as available). Because the scope of the model is to examine potential water management options only

within the Fife Brook impoundment, the need for an extensive period of record is not critical.

- Initial model development using physical data such as reservoir storage curves, dam spillway capacity, headwater curves, tailwater curves, turbine performance curves, generator performance curves, as well as operational data including minimum flows, whitewater peaking flows, operation/dispatch routines and operating/elevation limits.
- Model verification and establishment of a baseline scenario.
- Development of scenario runs.
- Report development.

BSPC will establish a Flow Regime Working Group to serve as a forum to discuss model findings, on-going efforts by BSPC, and to examine the viability of potential operational or other improvements that can benefit or support interests of relicensing participants and BSPC. BSPC envisions establishing this working group in early 2016 with meetings expected on a generally quarterly basis over the course of 2016 at a convenient location in Franklin County (exact schedule TDB). BSPC expects this working group to examine aspects under BSPC's direct control and not a forum by which to examine "what if" scenarios that rely upon change to the existing Settlement or DRP license. This working group will not serve as a decision-making or controlling body, nor will it serve as a forum for additional study requests or revision to, or expansion of, this or any study beyond that ultimately approved by FERC.

## **12.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to assemble historical operational data and to perform model development over the course of 2016 following FERC's issuance of the final SPD. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## 12.8 Discussion of Alternative Approaches

BSPC recognizes that study requestors have cited HEC ResSim as an alternate tool or method to evaluate BSPC's operations. As compared to HEC ResSim, the CHEOPS™ model is capable of more detailed modeling of turbine and pumped-storage operations, and can simulate dispatch based on a wider array of variables and constraints, including load curve shapes based on economic energy value information, all of which are important aspects of this relicensing. The proposed methods for this study are consistent with standard, accepted practices. Similarly, the overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for developing and modeling various operating scenarios. In addition, CHEOPS™ has been used in numerous FERC relicensing proceedings for more than 75 hydroelectric facilities with its results accepted and used by FERC, including modeling of pumped-storage operations. Accordingly, to inform decisions specific to the BSP, BSPC intends to utilize CHEOPS™ as it allows for a much better representation of BSPC's facilities, operations, and variables over which BSPC has direct control. With respect to study requests seeking a model that extends downstream, BSPC refers the reader to the Fife Brook Flow Attenuation Study.

## Section 13

# Instream Flow Assessment

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### 13.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. While the PAD did not include a proposal to conduct an instream flow assessment, BSPC identified several studies in the PAD to characterize flow fluctuations, attenuation, and to develop baseline data regarding aquatic mesohabitat and fisheries downstream from Fife Brook Dam. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.

The MADFW, USFWS, and CRWC submitted formal requests for an instream flow assessment as presented in Table 13.1-1 (see Appendix B).

**TABLE 13.1-1**  
**INSTREAM FLOW ASSESSMENT STUDY REQUESTS**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
MADFW	Instream Flow Habitat Assessment Downstream from Fife Brook Dam	April 17, 2015
USFWS	Instream Flow Habitat Assessment Downstream from Fife Brook Dam	April 16, 2015
CRWC	Instream Flow Habitat Assessment Downstream from Fife Brook Dam	April 16, 2015

### 13.2 Goals and Objectives

The purpose and goal of this study is to research and review available documentation and information pertaining to the means, methods, basis, and rationale for the Settlement parties' identification and establishment of the 125 cfs minimum flow regime below Fife Brook. Today, many stakeholder and agency study requests point to the absence of an Instream Flow Incremental Methodology (IFIM) study and that such is needed before "an appropriate flow

regime” can be identified. Yet it is clear these same stakeholders and agencies were able to do precisely that - identify and establish an appropriate flow regime downstream of Fife Brook without an IFIM study (which FERC approved). Accordingly, the objectives of this study are to:

- Identify the manner by which the 125 cfs minimum flow was identified and established within the 1994 Settlement,
- Review information which formed the basis for including the 125 cfs minimum flow within the Recommended Alternative identified in the August 1996 FEIS for the DRP, and which led to FERC then amending the BSP license in 1997 to assure the 125 cfs minimum flow regime was recognized and commemorated in the BSP license, and
- Perform select field work at representative locations to collect germane information at the 125 cfs minimum flow.

### **13.3 Study Area**

The study area includes the Deerfield River between Fife Brook Dam to a point just upstream of the confluence of the Deerfield and Cold Rivers. The Cold River Subwatershed is one of twelve major subwatersheds that comprise the Deerfield River Watershed, and the Cold River joins the Deerfield at the Route 2 Bridge in Charlemont (MEOEEA 2004). This is an appropriate study area as it encompasses the Project boundary and extends beyond the project boundary to the confluence with a major tributary to the Deerfield River. The proposed study area is shown in Figure 1.2-1.

### **13.4 Background and Existing Information**

A minimum flow has been present below Fife Brook Dam since its construction. Pursuant to Article 45 of the original 1970 FPC license for the BSP, the original minimum flow below Fife Brook was designated as 120 cfs during July and August, 100 cfs during the “*remainder of fishing season,*” and 50 cfs during the remainder of the year (all as measured at the Charlemont gage).

As described within the MADFW's *Final Report, Bear Swamp Pumped Storage Hydroelectric Project Fishery Study January 1972 - December 1976*, the MADFW notes that an interim adjustment to the magnitude (and location of measurement) of the minimum flow occurred when it states; "*Massachusetts imposed stricter and more detailed regulations. The 100 cfs and 50 cfs minimum flows were to be release at the Fife Brook Dam and monitored by construction of a new USGS gaging station just below the Fife Brook Dam (Rowe gage)*". The report further states that; "*Since Massachusetts has recently extended the fishing season to the entire year, the power company has agreed to extend the 100 cfs minimum flow to the entire year.*" This agreement is subsequently reflected as a formal recommendation in the reports' September 28, 1977, cover letter which states; "*This study indicates that the Bear Swamp reservoirs have improved downstream trout habitat by diluting wastewater and stabilizing water temperatures and recommends that at least 100 cfs should be released regardless of lower reservoir elevations as specified by state licensing requirements*".

It is unclear if, or how long, the continuous 100 cfs was in place by NEP following this 1970 recommendation since FERC's August 1996 FEIS for the DRP indicates an alternate release in existence (at least at the time of the FEIS) when it states; "*Presently, NEP releases a minimum flow of 125 cfs or inflow from Fife Brook into the Deerfield River from July 1 to August 31, and 75 cfs for the rest of the year. There is no bypassed reach. Under the Settlement, NEP would release a continuous year round minimum flow of 125 cfs at the dam.*"

Regardless, it was the 1994 Settlement which identified and established today's 125 cfs year-round minimum flow (Settlement Section III). Recognizing that the Settlement (and parties to the Settlement) were the drivers of this decision (which FERC analyzed in its' August 1996 FEIS for the DRP), and that administration of this Settlement provision needed to reside within a project under its jurisdiction, FERC subsequently issued its 1997 Amendment to the BSP requiring the 125 cfs minimum flow *for the protection and enhancement of fishery resources of the Deerfield River*. Since acquiring the BSP in 2005, BSPC has complied with Article 401 which is rooted-in, and made necessary by the Settlement. Today, BSPC provides the continuous 125 cfs minimum flow as described in BSPC's May 18, 2012, updated plan for releasing and measuring the minimum flow (made necessary by Hurricane Irene which destroyed



the gage immediately downstream of Fife Brook) and FERC's July 26, 2013, Order amending Article 401 to reflect and incorporate BSPC's plan.

Existing information that is germane to this study is represented by the Settlement itself and the record associated with the Settlement which collectively demonstrates clear and substantial support for today's Fife Brook minimum flow and FERC's proper treatment and analysis of same. Embodied within this support is the notion that the Settlement provisions are indeed the correct provisions that were subject to careful consideration and deliberation by the Settlement parties (and FERC). That is, the Fife Brook minimum flow was not arbitrarily selected, it was identified by the Settlement parties as being appropriately consistent with approaches, methodologies, and principles expressly provided for in the Settlement.

That is, according to Section II. C. of the Settlement; *"Parties agree that this Settlement fairly and appropriately balances the environment, recreational, fishery, energy and other uses and interests served by the Deerfield River. The Parties further agree that this balance is specific to the Deerfield River Project. No Party shall be deemed, by virtue of participation in this Settlement, to have established precedent, or admitted or consented to any approach, methodology, or principle **except as expressly provided for herein**"* [emphasis added]. Given that the Fife Brook minimum flow is expressly provided for in the Settlement, it is clear that the Parties consented to the approach, methodology, and principles associated with its inclusion in the Settlement. If this were not the case, the Fife Brook minimum flow simply would not have been included. BSPC also notes this section continues; *"In the event this Settlement is approved by the FERC, such approval shall not be deemed precedential or controlling regarding any particular issue or contention in any other proceeding."* This is an important distinction in that it relates only to FERC's approval of the Settlement, not the provisions of the Settlement itself.

Inasmuch as the parties agree to agree that the *"balance is specific to the Deerfield River Project,"* this balance is as appropriately framed by the preceding statement of Section II. C. which notes that the Settlement applies to the entire Deerfield River – if nothing else, by virtue of the fact that the Settlement contains provisions directly affecting and controlling FERC projects outside of the DRP (namely the BSP).

This basin-wide, balanced notion of the Settlement and FERC's treatment of the Settlement is reflected in the CLF April 18, 1996, letter (representing American Rivers, AW, AMC, CLF, Deerfield River Compact, DRWA, and New England Flow) commenting on FERC's February 1996 DEIS for the DRP which states; *"The Deerfield DEIS is truly a comprehensive environmental review. It considers the combined, cumulative impacts of all of the hydroelectric projects in the Deerfield River Basin. It ignores individual project boundaries and treats the river as an ecosystem, not as a series of isolated dams. It recognizes the importance of analyzing the cumulative impacts of multiple projects in the same river basin. It properly identifies the ecosystem boundaries to include the entire affected watershed – from the East Branch of the Deerfield to the mainstem river to its confluence with the Connecticut River. It also considers the cumulative impact of land use practices occurring on adjacent watershed lands."* The letter further states; *"Furthermore, the Commission's treatment of NEP's Bear Swamp project illustrates that the Commission intends to use information generated by its cumulative impact analysis to improve management throughout the watershed. The DEIS properly considers the impacts and needed enhancements at NEP's Bear Swamp project, even though its license does not expire for many years. Based on the cumulative impact analysis, FERC correctly directs NEP to file an amendment application for the existing Bear Swamp license in order to mitigate all cumulative impacts at all projects in the basin."* Finally, the letter closes with; *"We now urge the Commission to issue new licenses as soon as possible that implement all the terms of the Settlement, including license amendment of the Bear Swamp project, so that the river can be restored and improved in the public interest"*.

Given this resounding endorsement of the Settlement and the improvements and benefits it affords and the fact that FERC did as requested (namely issue a new license for the DRP and amend the BSP license consistent with the Settlement), there appears to be no evidence of a problem with the Fife Brook minimum flow that needs to be solved. This notion is supported by *City of Centralia vs. FERC* (D.C. Circuit Court of Appeals) where the Court held that an applicant does not have *"a duty to determine if a problem exists"* and that it is not enough to speculate that a problem may exist with *"evidence"* of a problem based on a *"prediction based on opinions."*

As such, BSPC does not envision a need to perform the IFIM study as has been requested and instead believes an equally informative (yet far more cost effective) effort lies in gaining a better understanding and documentation of the historical record as to how today's Fife Brook minimum flow was derived including exploration of the valid question of how a higher minimum flow could even be provided by the BSP absent changes to the Settlement and/or DRP license.

### **13.5 Project Nexus**

The support for today's Fife Brook minimum flow (as well as all provisions of the Settlement) is clearly on the record and today's Fife Brook minimum flow has its roots and nexus with the Settlement. However, this study, in conjunction with existing information, will be used to inform resource discussions within the license application materials.

### **13.6 Methodology**

Today's Fife Brook minimum flow was successfully determined by the Settlement parties absent an IFIM study. Accordingly, and consistent with that approach, BSPC's Instream Flow Assessment is proposed primarily as a research-based effort examining existing and historical information and which will also apply information gathered in the field under this study and as part of other studies proposed in this PSP. Under this study BSPC will:

- Examine the FERC record and other pertinent information pertaining to the evolution and performance of historical Fife Brook minimum flows.
- Examine the FERC record and other pertinent information pertaining to the selection of, and benefits provided by, today's 125 cfs Fife Brook minimum flow.
- Document conditions present at the 125 cfs minimum flow, with species/habitat and response/availability observations, wetted perimeter measurements, and stage-discharge-velocity data collection at representative mesohabitat locations (limited to approximately 1-per-mile) within the river reach between Fife Brook Dam and a point just upstream of the confluence with the Cold River..
- Apply germane findings of the field work, Operations Water Budget Model, Fife Brook Flow Attenuation Study, DAIP, existing biological information, as well as that of other

studies proposed in this PSP to examine the benefits and value of today's Fife Brook minimum flow.

- Examine means by which an alternate Fife Brook minimum flow could be provided as well as a thorough examination of external factors on which any Fife Brook minimum flow (that is greater than the incoming 73 cfs minimum flow) must rely upon in order to be sustainable.

### **13.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to conduct this study over the course of 2016 following FERC's issuance of the final SPD. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

### **13.8 Discussion of Alternative Approaches**

BSPC notes that study requestors have cited IFIM as seemingly the only tool or method to evaluate the Fife Brook minimum flow. BSPC would disagree and notes that an IFIM was not necessary or required for the Settlement parties to determine today's 125 cfs minimum flow. This flow was identified by the Settlement parties, included as part of the Settlement, and subject to prior environmental analysis.

BSPC notes that many FERC relicensings have successfully evaluated instream flows absent an IFIM and that an IFIM study (costing vastly more than requestors' estimates) has already proven not to be necessary (nor would it be cost effective) in evaluating today's minimum flow downstream from Fife Brook. Accordingly, BSPC intends to move forward with the research-based, flow demonstration approach outlined in this PSP which will allow for a cost-effective, workable set of information on which to inform options and decisions relative to BSPC's facilities, operations, and variables over which BSPC has direct control.

## Section 14

# Fife Brook Flow Attenuation Study

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### 14.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. In Section 6 of the PAD, BSPC identified a potential Water Quantity and Operations study to characterize Project operations, including flow fluctuations and attenuation downstream of Fife Brook Dam. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on recreational use in the project area, including the adequacy of existing recreational access, the adequacy and capacity of existing recreational facilities, and the adequacy of existing whitewater flows.

TU submitted a formal request for a study related to flow attenuation downstream from Fife Brook Dam as presented in Table 14.1-1 (see Appendix B).

**TABLE 14.1-1**  
**FIFE BROOK FLOW ATTENUATION STUDY REQUESTS**

<b>Requestor</b>	<b>Requested Study</b>	<b>Date</b>
TU	Deerfield River Angling Access, Flow, and Safety Study	April 17, 2015

### 14.2 Goals and Objectives

As described in the PAD and reflected in nearly every comment and study request letter, the facilities of the DRP, both upstream and downstream of the BSP, are fully authorized to operate in a peaking mode of operation pursuant to the Settlement, DRP license, and 401 WQC for the DRP. Since the DRP is authorized to operate in this manner and the BSP is located in the middle of the DRP, the BSP is relegated to passing the incoming DRP peaking signal through the Fife Brook Development in a manner consistent with the Settlement, DRP license, and the BSP license. Additionally, the BSP is operated consistent with the March 2005 agreement between

the BSP and DRP licensees so as to enable the downstream DRP facilities to operate in their authorized peaking fashion and meet their license requirements.

As documented and borne out in Figures 4.4-2 and 4.4-3 of the PAD, the Bear Swamp PSD does not cause or create the peaking signal that exists downstream of Fife Brook dam. Instead, the reason a peaking signal even exists downstream of Fife Brook dam is because it has to in order to be consistent with the Settlement. Accordingly, the Fife Brook Development is set to follow the Deerfield No. 5 station whitewater, peaking signal and to manage provision of the 125 cfs Fife Brook minimum flow even when Deerfield No. 5 station is not generating and only passing its 73 cfs minimum flow. As a result, flows downstream of Fife Brook have little choice but to oscillate as well which results in the peaking whitewater flow signal moving downstream.

The goal of this study is to document the flow attenuation characteristics of the Deerfield River within the BSP Project boundary and to apply this information to inform safety, minimum flow, and aquatic/terrestrial considerations. This study will demonstrate the flow attenuation characteristics of the Deerfield River within the BSP Project boundary downstream of Fife Brook, and will inform the limits or extent to which BSPC can affect change on such flow attenuation characteristics without violating the Settlement and seek to improve upon the substantial existing public safety considerations already in place.

### **14.3 Study Area**

The area covered by this study includes that reach of the Deerfield River within the BSP Project boundary downstream of the Fife Brook Development. The study will also bring in USGS Charlemont gage data allowing for representation of flow attenuation conditions to that downstream location. The proposed study area is shown in Figure 1.2-1.

### **14.4 Background and Existing Information**

Certain information pertaining to the flow attenuation characteristics of, and safety considerations within, the Deerfield River downstream of Fife Brook presently exists. For example, the “Release Dates” page of the *“Walt Geyrk’s Spey Casting & Fly Fishing School”*

provides informative flow time and safety information on its website; <http://www.speydoctor.com/releasedates.html>. Additional flow time information is also available on the Zoar Outdoor website at; <http://www.zoaroutdoor.com/schedule.htm>.

Relative to TU's public safety interests, TU's April 17, 2015, letter on the present BSP relicensing are conceptually similar to those echoed in their February 25, 1992, letter to the prior licensee regarding the DRP relicensing. Despite the inaccuracies of TU's letter of April 15, 2015, BSPC, as well as the angling and whitewater community, all take public safety very seriously. For example, both the whitewater and angling communities routinely post river safety and flow information on their websites and various angling resources (e.g. Gilmore 2014) have published safety-related information such as; *"The best water on the river is from Fife Brook Dam 8.5 miles downstream to the Route 2 bridge by the Mohawk Campground. This section has good biomass of insect life, and it supports the highest concentration of wild browns on the river... Releases from Fife Brook Dam can add two feet to the water level in a matter of minutes. When wading, study your surroundings carefully so that you can tell if the water starts to rise. If it does, leave the river immediately. For up-to-date release schedules call 888-356-3663 or go on line at [www.h2online.com](http://www.h2online.com)."* In conjunction with BSPC's FERC-approved public safety plan, BSPC has, and will continue to work closely and cooperatively with, Deerfield River Fisheries Interest Group and Deerfield River Forum to improve public safety with notable activities including but not limited to:

- Implementation of the ramp or hold point at Fife Brook, which BSPC has regularly expressed willingness to examine further;
- Informational kiosks with safety information installed downstream of Fife Brook;
- Improved, formal access at the Zoar Whitewater Access Area ("Last Chance Eddy") with safety signage;
- Installation of stone stairs at the Zoar Picnic Area;
- Installation of additional cameras at, and looking downstream of, Fife Brook to assist in determining that the public is out of immediate harms way when operation changes occur;

- Augmentation of operational procedures whereby a local operator goes to Fife Brook and visually observes that no one is in immediate harms ways prior to starting the Fife Brook unit or opening the tainter gates;
- Addition of a second set of boat barriers downstream of Fife Brook for added redundancy and protection;
- Provision of matching funds for law enforcement overtime to provide police presence during peak use times;
- Re-establishment of the original construction road extending upstream and to the river from the Fife Brook Fishing and Boating Access Area allowing for safe access for pedestrians and emergency service vehicles and equipment;
- Maintain focused communications with the DRP licensee regarding operations;
- Ongoing review of public safety including improvements to flow notification procedures, review of signage, access conditions, and additional warning devices; and
- Initiation of planning relative to installation of kiosks with commercial-grade Wi-Fi and interactive displays with the goal of having real-time flow and operation information available on-site.

This also includes BSPC's 2014 effort (performed based on, and with, TU input), in which BSPC installed continuous water level loggers (HOBO<sup>®</sup> Model U20L-01 Water Level Loggers) at eight locations within the project boundary downstream of Fife Brook Dam. This type of effort (a quantification of flow attenuation) was requested by TU, and BSPC elected to perform a robust data collection effort to quantify travel times and relative change in water depth at 15-minute intervals over a two-month period spanning August 1, 2014 through September 30, 2014. During this period, water levels resulting from the typical Settlement/DRP peaking conditions, as passed through BSPC's Fife Brook Development, were recorded (as was discrete velocity data). Additionally, the Charlemont USGS gage itself provides ample stage data, which when related to BSPC's 2014 level logger effort can provide the full flow attenuation characteristics from Fife Brook Dam to the Charlemont gage. Lastly, a HEC-RAS model exists for the Deerfield River downstream of the Fife Brook Dam. This model was developed as part of the FERC-approved Emergency Action Plan (EAP) for the BSP and can be examined, where appropriate, to supplement the actual flow attenuation information; which represents the most reliable data.



## 14.5 Project Nexus

Agencies and NGOs have raised a broad array of issues with respect to the management of water into and out of the Fife Brook impoundment – some aspects which BSPC may be able to potentially affect direct change upon, and others it cannot. The research and analysis to be performed under this study have their nexus to those specific aspects of water management within the Fife Brook impoundment that BSPC can directly influence. Accordingly, this study will be limited to examining the practical limits to which variables or “levers” under BSPC’s direct control can be moved or modified in a manner that does not contravene the Settlement, does not impair the DRP licensee’s ability to meet its current license requirements, and does not adversely affecting the Bear Swamp PSD from serving its intended purpose. For example, ramp rates are certainly an important aspect worth further examination (as BSPC has already noted throughout the PAD). However, since the BSP cannot create or make water, BSPC does not envision examining imbalanced scenarios (where the volume of water released below Fife Brook dam is substantially and regularly greater than the volume of water coming in from the DRP) since they are not sustainable.

## 14.6 Methodology

Under this study, BSPC will:

- Complete the data analysis and report development associated with BSPC’s 2014 field effort in which continuous water level loggers (HOBO® Model U20L-01 Water Level Loggers) were installed at eight locations within the project boundary downstream of Fife Brook Dam. These level loggers quantified travel times and relative change in water depth at 15-minute intervals at each location over a two-month period spanning August 1, 2014 through September 30, 2014 (during which discrete velocity data was collected as well). This report will document:
  - Background of the flow attenuation issue,
  - Methodology associated with the 2014 field effort, and
  - Findings and results.

- Develop a public safety assessment building upon prior work, existing data, representative photos, existing measures already in-place, and discussion of measures currently proposed by BSPC or which can be considered by BSPC. BSPC expects this assessment to:
  - Summarize the findings of the flow attenuation field effort in terms of overall stage changes as part of the requirement to pass through peaking, whitewater flows,
  - Examine in-water safety considerations for various users and improved notification of flow changes (e.g. additional sirens),
  - Examine current and potential ramp/hold points, effectiveness of ramping in general (does generation flow catch up to the ramp regardless of its duration and dilute or mask its’ “signaling” intent), and the methods by which the ramp is provided (e.g. it is presently keyed to a 3MW unit set-point and alternate methods can be examined),
  - Examine improvements to the public Waterline website and provision of on-site web access to the website, and
  - Address relevant findings of the water budget operations model, recreation studies, and other information to further inform and develop public safety improvements, including public safety awareness.

## **14.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to conduct this study over the course of 2016 following FERC’s issuance of the final SPD. BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **14.8 Discussion of Alternative Approaches**

This study will use a variety of existing information sources and/or models (including the existing 15-minute data which details actual flow attenuation) to provide information to inform the development of potential PME measures that can be addressed either under the existing license and or addressed within DLA or FLA materials. Since actual flow attenuation data already exists (as does a HEC-RAS model), these field efforts and tools do not need to be recreated and alternate methods can not improve upon the actual flow attenuation data already collected by BSPC and are not necessary.

## Section 15

# Entrainment Evaluation

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### 15.1 Study Requests

BSPC filed a PAD with the Commission on December 19, 2014. The Commission's February 18, 2015, SD1 identified the following environmental resource issue to be analyzed in the EA for the Project relicensing:

- Effects of continued project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.

The MADFW, USFWS, and CRWC submitted formal requests for studies related to fish entrainment, as presented in Table 15.1-1 (see Appendix B).

**TABLE 15.1-1**  
**STUDY REQUESTS RELATED TO FISH ENTRAINMENT**

Requestor	Requested Study	Date
MADFW	Entrainment of Riverine Fish from the Deerfield River into the Bear Swamp Pump Storage Facility	April 17, 2015
USFWS	Entrainment of Riverine Fish from the Deerfield River into the Bear Swamp Pump Storage Facility	April 16, 2015
CRWC	Entrainment of Riverine Fish from the Deerfield River into the Bear Swamp Pump Storage Facility and Fife Brook Dam	April 16, 2015

### 15.2 Goals and Objectives

BSPC proposes to conduct a desktop evaluation of potential entrainment within the Fife Brook impoundment to inform the discussion and analysis of entrainment potential within the DLA and FLA materials. BSPC understands the interest in examining potential entrainment without adversely affecting the Bear Swamp PSD and Fife Brook Development from serving their intended purpose (which is also in the public interest).

This study will seek to verify or update certain aspects pertaining to the pumping cycle of the Bear Swamp PSD and examination of entrainment potential at the Fife Brook Development. The goals and purpose of this study are to:

- Obtain updated information regarding pumping velocities at, and near, the Bear Swamp PSD intake/outlet structure located within the Fife Brook impoundment.
- Perform updated desktop review of entrainment potential at the Bear Swamp PSD during the pumping cycle.
- Perform desktop review of entrainment potential at the Fife Brook Development.

### **15.3 Study Area**

The area of this study will be limited to the Fife Brook impoundment. The proposed study area is shown in Figure 1.2-1.

### **15.4 Background and Existing Information**

The issue of entrainment at the Bear Swamp PSD was evaluated by BSPC in its 2008 amendment application materials relative to the upgrade of the Bear Swamp PSD turbines. FERC also analyzed the issue within its August 13, 2008, *Order Amending License and Approving Revised Exhibit A* and its associated Environmental Assessment included as part of that Order. Based on this collective body of information, BSPC maintains that there is essentially no evidence of a known entrainment problem, which is especially true considering MADEP's February 20, 2008, letter stating; *"MassDEP has received confirmation from the Massachusetts Division of Fisheries and Wildlife that there are no fisheries issues with the proposed upgrade project... The Bear Swamp Hydroelectric facility has received five (5) Water Quality Certifications for various elements of its construction and operation... The Bear Swamp Project, including the resulting changes to the pumping cycle and discharge rate, is consistent with the terms of those existing Water Quality Certificates. As a result, no amendment to the existing Water Quality Certificates will be required for the Bear Swamp Project"*.

This is further reinforced in FERC's August 13, 2008, Order which states; *"The EA evaluates the environmental effects of the proposed runner replacement and generator rewinds and identifies environmental issues in relation to aquatic resources, recreation, and cultural resources. The proposed action would allow the licensee to enhance the efficiency of the project, while increasing the installed capacity by 66 MW, at the least cost to area environmental resources. Most area resources will not be affected by the proposed action, although there has been concern for an attendant increase in entrainment of impoundment fishes. We have concluded that any increased entrainment of rainbow and brown trout would not be significant and recommend the proposed action be approved. Therefore, we conclude that issuance of this order does not constitute a major federal action significantly affecting the quality of the human environment"*.

However, BSPC recognizes that a desktop evaluation of entrainment potential has not been similarly performed for the Fife Brook Development, and that certain aspects of the prior evaluations of entrainment potential at the Bear Swamp PSD intake/outlet structure within the Fife Brook impoundment during pumping can be reexamined and updated. Given the absence of a direct, known problem, BSPC does not envision conducting an extensive netting or field program (as has been requested) or believe that such level of study is necessary. Instead, BSPC believes the issue of potential entrainment can be appropriated addressed with the desktop study, coupled with certain field investigations proposed as part of this PSP.

## **15.5 Project Nexus**

On balance, hydroelectric facilities have the potential for some level of entrainment. However, efforts to examine such should be commensurate with the degree to which a known, documented problem exists. Because a direct, known problem does not exist, BSPC believes the desktop study proposed in this PSP is appropriate and commensurate to inform development of license application materials. This study, in conjunction with existing information, will be used to inform resource discussions within the license application materials.

## 15.6 Methodology

The desktop approach to examining entrainment potential proposed in this PSP is consistent with proposals approved in other relicensing proceedings and will serve to adequately inform development of license application materials and subsequent analysis; particularly in cases such as this where a known problem does not exist. Under this study BSPC will:

- Confirm pumping velocities (as presented in amendment application materials) at and near the Bear Swamp PSD intake/outlet structure located within the Fife Brook impoundment (which may include certain field data collection).
- Confirm the qualitative review of entrainment potential (as presented in amendment application materials and approved by FERC) at the Bear Swamp PSD during the pumping cycle based upon:
  - The physical location and characteristics of the Bear Swamp PSD intake/outlet structure,
  - The physical parameters of the Bear Swamp PSD equipment when in pump mode (existing and as authorized under the upgrade amendment), and
  - Integration and consideration of historical information as well as information gained from the Aquatic Species Composition and Relative Abundance Study proposed as part of this PSP.
- Perform a qualitative desktop review of entrainment potential at the Fife Brook Development based upon:
  - The physical location and characteristics of the Fife Brook intake,
  - The physical parameters of the Fife Brook generating equipment, and
  - Integration and consideration of historical information as well as information gained from the Fish Assemblage Assessment proposed as part of this PSP – including recognition of the absence of fish protection or passage at upstream facilities.

**Describe the Key Physical and Water Quality Characteristics that may Influence Fish-related Entrainment**

Physical and operational data including pool surface area, volume, depth, and retention time will be obtained. Maps and available drawings of the dams and powerhouses will be reviewed to gather information related to total head, intake depth and size, the number, type, orientation, trashrack clear spacing, and other relevant powerhouse/turbine information. Many of these physical and operational data are summarized in the PAD, although further review of Project design drawings may be necessary. Existing water quality data, or that being collected as part of the Water Quality Study Plan, will also be examined relative to potential influence on fish entrainment.

**Velocity Data Confirmation**

BSPC will examine velocity information provided in the amendment application materials and augment this review with select velocity field data collection. As applicable, longitudinal and transverse velocity profiles will be taken immediately upstream of, and for a select distance from, the Fife Brook intake structure and the Bear Swamp PSD intake/outlet structure within the Fife Brook impoundment to aid in the refinement of approach velocities and potential for entrainment or fish avoidance. Acoustic Doppler Current Profiler (ADCP) instrumentation or other similar technology will be applied to measure three-dimensional (3-D) velocity vectors. At least one parallel transverse transect for the velocity measurements will be positioned immediately upstream of each structure, as close to the trashrack surface as the instrumentation will allow. Attempts will be made to measure velocities during typical Fife Brook generation operations and Bear Swamp PSD pumping operations when the Fife Brook impoundment is at elevation 870 and 830 feet. Full water column velocity measurements will be collected. Both the longitudinal and transverse transects will be located using GPS and positioned to optimize full water column velocity profiles between the reservoir surface and bottom. Efforts will be made to position velocity transects as close to the intake as possible; however, signal interference from the dam, shoreline, or intake structure may limit the transect proximity to the intake. Also, safety concerns may preempt successful data collection. In such a case, it may be necessary to calculate intake velocities based on design/operational parameters.



### **Describe the Species Composition of the Existing Fish Community and Relation to Entrainment Risk**

Results of the Fish Assemblage Assessment, other existing fisheries information, and the previous evaluations will be used to describe the fish community that may be susceptible to potential entrainment. This is expected to include information related to spatial and temporal characteristics, life histories, swimming speeds, and avoidance behavior of target fish species which will be compiled to include those species of management concern (game; forage; RTE), as well as other “non-game” species to appropriately represent germane guilds and life histories within the Fife Brook impoundment. The susceptibility of these species to entrainment based on varying life stage periodicities and abundance within the Fife Brook impoundment will be discussed.

### **Literature Review**

A literature review of turbine entrainment field studies conducted at other hydroelectric projects will be performed to compile and incorporate germane entrainment information. The primary sources of turbine entrainment information is expected to include the comprehensive Turbine Entrainment and Survival Database Field Tests prepared by the Electric Power Research Institute (EPRI) (EPRI 1997). The EPRI database includes test data from 43 hydroelectric sites that used full-flow tailrace netting techniques to estimate the number, species, and sizes of fish entrained. Other principal sources of entrainment data include Stone & Webster Environmental Services (1992) and FERC (1995).

### **Data Analysis and Report Writing**

A draft (initial) and updated (final) technical report on the results of this study will be prepared for this study and will include the following elements:

- Project Introduction and Background
- Study Area
- Methodology
- Discussion and Analysis
- Results
- Location maps, GIS analysis, and photos (if applicable)
- Literature Citations

## **15.7 Schedule and Level of Effort**

BSPC intends to conduct this study consistent with the following milestone schedule. BSPC expects to conduct this study over the course of 2016 following FERC's issuance of the final SPD). BSPC expects to report on the progress and results of this study within the framework afforded by the ISR and associated ISR Meeting as well as the USR and associated USR Meeting. Based on exact timing of completion of work under this study, BSPC may issue draft products between the ISR and USR to the extent practicable.

## **15.8 Discussion of Alternative Approaches**

After considering alternative methods and approaches, including the extensive netting study requested, BSPC is confident that the proposed methodology and level of effort reflects the most efficient and cost-effective means for obtaining the information necessary to support development of license application materials; particularly in light of the absence of a known problem.

The proposed methods for this study are consistent with accepted professional practices. The overall approach is commonly used in relicensing proceedings and is consistent with generally accepted methods for fish entrainment evaluation used by federal and state agencies. In addition, the proposed methods for this study are consistent with FERC study requirements under the ILP. No alternative approaches to this study are necessary.

## Section 16

# Literature Cited

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**APPENDIX A**  
**PROJECT DISTRIBUTION LIST**



## **Bear Swamp Project (FERC No. 2669) Distribution List**

Charlene Dwin Vaughn, Assistant Director  
Advisory Council on Historic Preservation  
Old Post Office Building  
1100 Pennsylvania Ave NW Suite 803  
Washington, DC 20004

John Seebach  
American Rivers  
1104 14th St NW, Suite 1400  
Washington, DC 20005

Kevin Richard Colburn  
National Stewardship Director  
American Whitewater  
PO Box 1540  
Cullowhee, NC 28779

Robert Nasdor, NE Stewardship Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776

Kenneth Kimball, PhD, Director of Research  
Appalachian Mountain Club  
PO Box 296  
Gorham, NH 03581-0296

Norman Sims, PhD  
Appalachian Mountain Club  
77 Back Ashuelot Road  
Winchester, NH 03470

Patrick S Moriarty, Operations Manager  
Bear Swamp Pumped Storage Station  
Brookfield Renewable Energy Group  
PO Box 461  
Rowe, MA 01367

Marshall L Olson, Compliance Manager  
Brookfield Renewable Energy Group  
314 Growdon Blvd  
Tallassee, TN 37878

Randy Garletts, Compliance Specialist  
Brookfield Renewable Energy Group  
14 Riverview Terrace  
Oakland, MD 21550

Steven P Murphy, Licensing Manager  
Brookfield Renewable Energy Group  
33 West 1st Street South  
Fulton, NY 13069

Franklin Keel  
Bureau of Indian Affairs  
545 Marriott Dr, Suite 700  
Nashville, TN 37214

Simeon Bruner  
Cambridge Development Corporation  
130 Propect Street  
Cambridge, MA 02139

Andrew Fisk, Executive Director  
Connecticut River Watershed Council  
15 Bank Row  
Greenfield, MA 01301

Andrea Donlon, MA River Steward  
Connecticut River Watershed Council  
15 Bank Row  
Greenfield, MA 01301

CrabApple Whitewater, Inc.  
3 Lake Moxie Road  
The Forks, ME 04985

Frank Mooney, River Manager  
CrabApple Whitewater, Inc.  
PO Box 295  
Charlemont, MA 01339

Deerfield River Portage  
617 Hoosac Road  
Conway, MA 01341

Brian Yellen, President  
Deerfield River Watershed Association  
15 Bank Row Suite A  
Greenfield, MA 01301

Robert May  
Deerfield River Watershed Association  
PO Box 431  
Montague, MA 01351

Kim Marsili  
Chief Environmental Health and Safety Officer  
Essential Power  
15 Agawam Avenue  
West Springfield, MA 01089

Kimberly Bose, Secretary  
Federal Energy Regulatory Commission  
888 1st St NE  
Washington, DC 20426

FEMA Region 1  
99 High Street  
Boston, MA 02110

Commander  
First Coast Guard District  
408 Atlantic Avenue  
Boston, MA 02110

## **Bear Swamp Project (FERC No. 2669) Distribution List**

John Howard, FERC Hydro Compliance Director  
FirstLight Hydro Generating Co.  
Northfield Mountain Station  
99 Millers Fall Road  
Northfield, MA 01360

Kimberly Noake MacPhee  
Land Use & Natural Resources  
Planning Program Manager  
Franklin Regional Council of Governments  
12 Olive Street, Suite 2  
Greenfield, MA 01301

Peggy Sloan  
Franklin Regional Council of Governments  
12 Olive Street, Suite 2  
Greenfield, MA 01301

Hyytinen Hollow Tubes  
7 Tea Street Ext  
Charlemont, MA 01338

Massachusetts Department of  
Conservation and Recreation  
251 Causeway Street, Suite 900  
Boston, MA 02114-2104

Office of Dam Safety  
Massachusetts Department of  
Conservation and Recreation  
John Augustas Hall  
180 Beaman Street  
West Boylston, MA 01583-1109

Paul Jahnige, Director  
Greenways and Trails  
Massachusetts Department of  
Conservation and Recreation  
136 Damon Road  
Northampton, MA 01060

Hydro Section  
Massachusetts Department of Energy Resources  
100 Cambridge Street, Suite 1020  
Boston, MA 02114-2533

Massachusetts Department of  
Environmental Protection  
One Winter Street  
Boston, MA 02108-4747

Michael Gorski, Regional Director  
Western Regional Office  
Massachusetts Department of  
Environmental Protection  
436 Dwight Street  
Springfield, MA 01103

Robert David Kubit  
Environmental Engineer  
Massachusetts Department of  
Environmental Protection  
627 Main Street  
Worcester, MA 01608

Massachusetts Department of Fish and Game  
251 Causeway Street, Suite 400  
Boston, MA 02114

Massachusetts Department of Public Utilities  
One South Station  
Boston, MA 02110

Brian Harrington  
Massachusetts Dept of Environmental Protection  
436 Dwight Street  
Springfield, MA 01103

Director  
Massachusetts Division of Fisheries & Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Caleb Slater, Ph.D.  
Andromous Fish Project Leader  
Massachusetts Division of Fisheries & Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Paul J Diodati, Director  
Massachusetts Division of Marine Fisheries  
251 Causeway Street  
Suite 400  
Boston, MA 02114-2512

Massachusetts Executive Office of Energy &  
Environmental Affairs  
100 Cambridge Street  
Suite 900  
Boston, MA 02114

Jonathan Patton  
Preservation Planner  
Massachusetts Historical Commission  
220 Morrissey Blvd  
Boston, MA 02125-3314

Secretary of the Commonwealth  
Massachusetts Historical Commission  
220 Morrissey Blvd  
Boston, MA 02125-3314

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Gailanne M Cariddi  
Massachusetts House of Representatives  
MA State House  
Room 155  
Boston, MA 02133

Paul W Mark  
Massachusetts House of Representatives  
PO Box 114  
Dalton, MA 01227

Valerie Gingrich  
Massachusetts Office of Coastal Zone Management  
251 Causeway Street  
Suite 800  
Boston, MA 02114-2136

Massachusetts Office of the Attorney General  
One Ashburton Place  
Boston, MA 02108-1518

Russel Cohen  
Rivers Advocate  
Massachusetts Riverways Program  
251 Causeway Street, Suite 400  
Boston, MA 02114-2119

Benjamin B Downing  
Massachusetts Senate  
7 North Street Suite 307  
Pittsfield, MA 01201

Charles Olchowski  
Massachusetts-Rhode Island Council of Trout  
Unlimited  
28 Smith Street  
Greenfield, MA 01301-2018

Moxie Outdoor Adventures  
1609 US Route 201  
The Forks, ME 04985

Doug Harris  
Narragansett Indian Tribal Historic Preservation  
Office  
PO Box 268  
Charlestown, RI 02813

Misty Anne Marold  
Senior Review Biologist  
Natural Heritage Endangered Species Program  
Division of Fish and Wildlife  
1 Rabbit Hill Road  
Westborough, MA 01581

Tom Christopher  
New England FLOW  
252 Fort Pond Inn Road  
Lancaster, MA 01523

John Bullard, Regional Administrator  
NOAA Fisheries Service  
Greater Atlantic Regional Fisheries Office  
55 Great Republic Drive  
Gloucester, MA 01930-2276

Harvey Scudder, President  
Northeast Center for Social Issue Studies  
PO Box 158  
Brattleboro, VT 05302-0158

Michael Hornstein, Partner  
Orrick, Herrington & Sutcliffe, LLP  
500 8th St NW  
Washington, DC 20004

Roger Hunt, Director  
Quinebaug Associates, LLC  
370 Main Street  
Suite 800  
Worcester, MA 01608-1741

Steven Frias, Legal Counsel  
Rhode Island Public Utilities Commission  
89 Jefferson Boulevard  
Warwick, RI 02888

Wallace A Miller, Acting President  
Stockbridge Munsee Community, Wisconsin  
N8476 Mo He Con Nuck Road  
Bowler, WI 54416

The Berkshire Visitors Bureau  
66 Allen Street  
Pittsfield, MA 01201

Department of Geosciences  
The Massachusetts Geological Survey  
University of Massachusetts  
269 Morrill Science Center  
611 North Pleasant Street  
Amherst, MA 01003-9297

Kathy Reynolds, Town Clerk  
Town of Charlemont Town Hall  
157 Main Street  
Charlemont, MA 01339

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Michael Walsh  
Director Emergency Management  
Town of Charlemont  
PO Box 325  
Charlemont, MA 01339

Town Clerk  
Town of Florida  
379 Mohawk Trail  
Drury, MA 01343

Doreen Aldrich  
Town Clerk  
Town of Rockingham  
PO Box 370  
Bellows Falls, VT 05101-0370

Jennifer Morse  
Town Clerk  
Town of Rowe  
321 Zoar Road  
Rowe, MA 01367

Matthew Cole  
TransCanada Hydro  
3A School Street  
PO Box 9  
Monroe Bridge, MA 01350

Ann Birch, Regulatory Analyst  
TransCanada Pipelines Ltd  
450 1st St SW  
Calgary, Alberta T2P 5H1  
CANADA

John Ragonese  
FERC License Manager  
TransCanada Power Mktg Ltd  
One Harbour Place, Suite 330  
Portsmouth, NH 03801

Michael Hachey  
Eastern Commercial Director  
TransCanada Power Mktg Ltd  
110 Turnpike Road, Suite 203  
Westborough, MA 01581

Leon Szeptycki  
Environmental Council  
Trout Unlimited  
1300 17th Street N, Suite 500  
Arlington, VA 22209

Donald Pugh  
Trout Unlimited  
10 Old Stage Road  
Wendell, MA 01379

Kevin Parsons  
Deerfield River Watershed Chapter  
Trout Unlimited  
PO Box 133  
Shelburne Falls, MA 01370

Karen Adams  
New England District  
US Army Corps of Engineers  
696 Virginia Road  
Concord, MA 01742-2751

North Atlantic Division  
US Army Corps of Engineers  
302 General Lee Avenue  
Brooklyn, NY 11252

Greenfield Field Office  
US Department of Agriculture  
Natural Resources Cons Service  
55 Federal Street  
Greenfield, MA 01301

Pittsfield Field Office  
US Department of Agriculture  
Natural Resources Cons Service  
78 Center Street Suite 206  
Pittsfield, MA 01201

Office of the Solicitor  
US Department of the Interior  
1849 C Street Northwest MS 6557  
Washington, DC 20240

Andrew Tittler  
US Department of the Interior  
1 Gateway Center  
Suite 612  
Newton, MA 02458-2881

Andrew L Raddant  
Off of Envir Policy & Comp  
US Department of the Interior Northeast Region  
15 State Street, Suite 400  
Boston, MA 02109

David Turin  
US Environmental Protection Agency  
5 Post Office Square, Suite 100  
Boston, MA 02109-3946

New England Headquarters  
US Environmental Protection Agency  
5 Post Office Square, Suite 100  
Boston, MA 02109-3912

## **Bear Swamp Project (FERC No. 2669) Distribution List**

Wendy Weber  
NE Regional Director  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01036-9589

Curt Orvis, Fisheries Program  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01036-9589

Tom Chapman, Supervisor  
US Fish and Wildlife Service  
New England Field Office  
70 Commercial Street Suite 300  
Concord, NH 03301-5094

Brett Towler, CT River Coordinator  
US Fish and Wildlife Service  
300 Westgate Center Drive  
Hadley, MA 01035-9589

Kenneth Sprankle, CN River Coordinator  
US Fish and Wildlife Service  
103 East Plumtree Rd  
Sunderland, MA 01375

Massachusetts Office  
US Geological Survey  
New England Water Science Center  
10 Bearfoot Road  
Northborough, MA 01532

Richard E Neal  
US House of Representatives  
78 Center Street  
Pittsfield, MA 01201

Kevin Mendik, NPS Hydro Program Coordinator  
US National Park Service  
15 State Street, 10th Floor  
Boston, MA 02109

Duncan Hay  
Northeast Region  
US National Park Service  
15 State Street  
Boston, MA 02109

Edward Markey  
US Senate  
218 Russell Senate Office Building  
Washington, DC 20510

Elizabeth Warren  
US Senate  
317 Hart Senant Office Building  
Washington, DC 20510

Secretary's Office  
Vermont Agency of Natural Resources  
1 National Life Drive Davis 2  
Montpelier, VT 05620-3901

Vermont Public Service Department  
112 State Street 3rd Floor  
Montpelier, VT 05620-2601

Richard Roos-Collins  
Legal Services Director  
Water & Power Law Group  
2140 Shattuck Ave Suite 801  
Berkeley, CA 94704-1229

Bruce Lessels  
Zoar Outdoor  
PO Box 245  
Charlemont, MA 01339

Kevin D Parsons  
PO Box 133  
Shelburne Falls, MA 01370

Karl Meyer  
85 School Street No 3  
Greenfield, MA 01301

Jon Elmer  
Director of Operations  
Brookfield Renewable Energy Group  
800 Starbucks Avenue  
Suite 802  
Watertown, NY 13601

John Baummer  
Project Manager  
FERC - Office of Energy Projects  
888 1st St NE  
Washington, DC 20426

**APPENDIX B**  
**STUDY REQUEST AND COMMENT LETTERS**



**US Northeast Hydro Region**

Concord Hydro Office  
4 Park Street, Suite 402  
Concord NH 03301-6373

**tel** 603.225..5528

**fax** 603.225.3260

**web** [www.transcanada.com](http://www.transcanada.com)

April 19, 2015

Honorable Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, D.C. 20426

**Re: Bear Swamp Power Company, LLC; Bear Swamp Hydroelectric  
Project, FERC No. 2669 Deerfield River; COMMENTS ON PRE-  
APPLICATION DOCUMENT AND SCOPING DOCUMENT 1**

Dear Secretary Bose:

TransCanada Hydro Northeast Inc. (“TransCanada”), licensee for the Deerfield River Project No. 2323 (DRP) wishes to submit comments on Bear Swamp Power Company’s (BSPC) Pre-Application Document (PAD) for the Bear Swamp Hydroelectric Project No. 2669 (BSHP) filed on December 19, 2014. By this letter we also are filing comments and on the Federal Energy Regulatory Commission’s (FERC) Scoping Document 1 (SD1) issued on February 18, 2015. The DRP has Project Developments both upstream and downstream of the BSHP. The DRP currently operates under a 40-year License issued on April 4, 1997 through an Order Approving Offer of Settlement and Issuing New License.

**Background**

New England Power (NEP) and twelve parties to the proceeding, including federal and state resource agencies and citizens groups representing various environmental and recreational interests, negotiated an Offer of Settlement (Settlement), to resolve the issues in this proceeding. On October 6, 1994, NEP filed the Settlement with the Commission. Terms of the Settlement included resource protection and enhancements within both the DRP and the BSHP, which at the time was owned by NEP. By Commission Order Amending License dated April 4, 1997, several operational, recreation and land-protection enhancements were added to the BSHP License. In particular, under Article 401, the [BSHP] “*Licensee shall release from the Fife Brook Dam into*

*the Deerfield River a minimum flow of 125 cubic feet per second (cfs) as measured below the dam, for the protection and enhancement of fishery resources of the Deerfield River. The Licensee shall release water from reservoir storage, if necessary, to ensure that the minimum flow of 125 cfs is met.” Additionally, under Article 403, the [BSHP] Licensee “shall provide for whitewater releases from the dam at a minimum flow level of 700 cubic feet per second, for a duration of at least three continuous hours starting any time between the hours of 9:30 a.m. and 12:00 p.m., accordingly to the following monthly schedule, for 50 weekend days and 56 weekdays from April 1 to October 31 annually...”*

By Order Approving Transfer of License dated March 3, 1998 the BSHP was transferred from NEP to USGen New England (USGen). Subsequently, by Order Approving the Transfer of License to BSPC dated March 11, 2005, BSPC, assumed all License responsibilities, including “*all the terms and conditions of the license, and to be bound by the license as if it were the original licensee.*”

### **Comments on PAD**

TransCanada understands that the purpose for the PAD is to describe the project and to the extent the applicant wishes, propose operational and physical changes under a renewed License. In its PAD, BSPC emphasizes repeatedly that TransCanada’s operation of the DRP is solely responsible for peaking flows, and therefore any and all resource impacts in the Deerfield River below the BSHP. At least thirteen statements (shown below in Table 1) to that effect can be found in the PAD. Our primary comment on the BSHP PAD is that we disagree completely with that premise.

We dispute BSPC’s contention that they have no flexibility or opportunity to operate the project independent from our DRP inflow. TransCanada suggests with equal emphasis that **while the DRP does operate in a hydro-peaking mode in various locations, it is not responsible for the hydro-peaking operation of the BSHP which is the focus of this relicensing.** By simply repeating it over and over in the PAD does not alter the fact that the BSPC holds the BSHP License which currently: 1.) Operates using significant storage potential; 2.) Operates significant daily reservoir fluctuation; 3.) Has minimum flow requirements guaranteed from reservoir storage and; 4.) Has whitewater boating release requirements that require “peaking-type” releases of water from its Fife Brook dam and reservoir solely independent of TransCanada’s DRP License.

BSPC is not proposing operational or physical changes to the BSHP as part of this relicensing proceeding. But does not mean operational or physical alternatives within the BSHP itself cannot or should be excluded from consideration under the proceeding. There are seemingly a number of alternatives that the BSHP could potentially operate within that are not limited by the DRP License or our current operation. We would encourage the BSPC to acknowledge that before determining they are infeasible and citing TransCanada and the DRP as the reason for such.

TABLE 1

<b><u>PAD references to DRP causal relationship to BSHP operation</u></b>	<b><u>Page(s)</u></b>
<i>“The overall flow regime of the Deerfield River can be generally characterized as having regular flow and stage fluctuations driven by the peaking operation of the Deerfield River Project.”</i>	4-10



<i>“The single largest driver of, and influence on daily flow and stage fluctuations realized throughout the Deerfield River is <b>TransCanada's eight-development, peaking Deerfield River Project (P-2323)</b>”</i>	4-13
<i>“TransCanada continues to manage and operate the <b>Deerfield River Project</b> such that each of its hydroelectric facilities operate in a peaking mode; and it is this which is the source and cause of diurnal flow fluctuations throughout the Deerfield River both upstream and downstream ofBSPC's Bear Swamp Project.”</i>	4-13
<i>“BSPC's Bear Swamp PSD and Fife Brook Development are not the source or cause of diurnal peaking flows and flow/stage fluctuations on the Deerfield River”</i>	4-13
<i>“BSPC's Bear Swamp PSD and Fife Brook Development do not have the ability to reregulate TransCanada's operations”</i>	4-13
<i>“BSPC's Fife Brook Development is limited to operating in a run-of-release mode reacting to, and passing inflows from TransCanada”</i>	4-14
<i>“<b>TransCanada's peaking flow regime</b> of the Deerfield River are established and authorized by its Deerfield River Project license and settlement and are <b>separate and apart from BSPC's Bear Swamp Project</b>”</i>	4-16
<i>“Given its location immediately downstream of Deerfield River Project Deerfield No. 5 station, BSPC's <b>Fife Brook Development</b> is <b>limited</b> to operating in a run-of-release mode reacting to and effectively passing <b>peaking flows provided by the Deerfield No. 5 station.</b>”</i>	5-28
<i>“To the extent that any net loss is occurring as suggested by Yellen, BSPC notes that flow fluctuations that result in artificially elevated river levels downstream from Fife Brook are the result of the <b>Deerfield River Project's diurnal peaking operations and associated flow/stage fluctuations on the Deerfield River.</b>”</i>	5-30, 5-31
<i>“Cole (2007) notes “the patterns observed in this unreplicated study, although spatially related to proximity to the Fife Brook dam, cannot be inferred to be directly or exclusively related to the <b>current hydropeaking regime</b>” [that are established under the <b>Deerfield River Project's license</b>].”</i>	5-41
<i>“The strongest gradients in community conditions were observed between Fife Brook Dam and the town of Charlemont, which was attributed to impacts associated with thermal alterations and flow regimes as a result of <b>hydropeaking operations [that are established by the Deerfield River Project]</b>.”</i>	5-43
<i>BSPC notes that the single largest driver or influence on flows realized throughout the Deerfield River is the operation of the eight-development Deerfield River Project, which spans more than 50 RM of the Deerfield River in Vermont and Massachusetts. The <b>Deerfield River Project</b> is managed and operated such that each of its facilities operate in a peaking mode which <b>results in diurnal flow fluctuations throughout the Deerfield River both upstream and downstream of BSPC's Bear Swamp Project. Neither the Bear Swamp PSD nor the Fife Brook Development “governs” hydropeaking operations</b> along the Deerfield River as suggested by Cole (2014).</i>	5-45, 5-46
<i>The Bear Swamp PSD and Fife Brook Development neither create nor exacerbate <b>flow fluctuations already established</b> upstream and downstream of the Bear Swamp Project by operation of the <b>Deerfield River Project</b>.</i>	5-46

Table 5.3.1 in the PAD, which states minimum flow requirements at Deerfield River, Bear Swamp and Gardner Falls Project is ambiguous relative to whether or not the requirements are “or inflow is less” or “guaranteed from reservoir storage”. We note that Somerset, Harriman, Fife Brook and Deerfield No. 2 have minimum flows “guaranteed from reservoir storage”. The remaining dams have “minimum flows or inflow if less” requirements.

### **Comments on Scoping Document 1**

TransCanada’s comments on the SD1 generally fall under two categories: 1.) Consideration for reasonable alternatives and 2.) Cumulative effects analysis and scope.

**3.1.2 No-action alternative; existing operations description:** We appreciate the Commission’s rather simplistic but accurate statement of current operations and nothing more: *“The [existing] Fife Brook Hydroelectric Development operates in a run-of-river mode where releases from Fife Brook dam generally match the inflow from the upstream Deerfield No. 5 Development.”*

**3.2 Applicant’s Proposal:** We note that on August 13, 2008, the Commission authorized Bear Swamp Project to replace the Bear Swamp Development’s turbine runners and rewind the generators. These project modifications must be completed by August 13, 2019. This proposed and authorized action will require substantial expenditures and result in a significant change in total generation hydraulic capacity will increase from 10,860 cfs to 12,400 cfs.

As it is not identified as a 3.1 No-action alternative, we assume that Commission considers this to be distinct from that alternative. In other words, there are two alternatives thus far identified in SD1. We believe this is an important consideration in that proposed operating alternatives examined in the relicensing proceeding should be weighed against the existing project configuration (Baseline) not a yet-to-be constructed but approved configuration. Similarly, the Commission should examine whether the proposed, approved but yet unconstructed capacity as a true alternative - one that would be examined like all others within the context of this proceeding. Whether or not BSPC can or should proceed with such an investment during relicensing, when it in itself is an alternative under consideration under NEPA is worth clarification in SD2.

**3.4 Alternatives to the Proposed Action:** TransCanada, at this time, is not proposing a specific alternative but reiterates its position that Alternatives to the Proposed Action take into account the flexible nature of the project which can potentially: 1.) operate independently of the DRP inflow; 2.) operate both BSHP Developments independent of each other, or 3.) Potentially synergistically such as a hybrid where storage currently allocated to the Bear Swamp Pumped Storage Development can be allocated to the Fife Brook Development during critical resource periods. We stress the importance of considering in-Project alternatives without restriction but with consideration for how the DRP currently operates and will continue to operate and how the alternatives would affect the DRP from a hydrologic, operational and economic perspective.

**4.1.2. Cumulative Effects; Geographic Scope:** We disagree that the geographic scope for Water Quality include those portions of the basin that extend upstream of the BSHP on the basis that *“the operation and maintenance of the Bear Swamp Project, in combination with other hydroelectric projects in the Deerfield River Basin may affect water quality of the Deerfield River”*. While that statement may be true in a broad sense of Deerfield River Basin, the BSHP

cannot affect water quality in anyway upstream of its location. Further to the point, under the DRP relicensing extensive water quality studies, analysis and enhancement was evaluated and resulted in significant increases in minimum flows. Those studies should be on file with the Commission. The cold water fishery that exists on the Deerfield River in large part is a direct result of seasonal storage, minimum flows and peaking flows associated with Somerset, Harriman and Sherman Developments. It makes more sense to evaluate the BSHP's effect on downstream water quality from the point where inflow enters Project downstream to the confluence of the Connecticut River.

**4.2.7. Cumulative Effects; Developmental Resources:** Alternatives to the Proposed Action should not be limited to BSPC's assertion that there are few reasonable alternatives given the fact that the BSHP lies downstream and upstream of DRP Developments and therefore has little if any flexibility. We support analysis of any reasonable alternatives; however that analysis must include consideration of the direct economic impact as well as the effects of any recommended environmental measures on the DRP economics.

**5.0 Proposed Studies:** TransCanada does not have specific, distinct studies to request BSPC to perform. However, we do agree with several requests by agencies and NGO's for a hydraulic and operational model to examine reasonable alternatives as described above under 3.4. [comments] from a hydrologic, operational and project effects on resources perspectives. Any such model should be capable of exporting a time series of hourly discharge from Fife Brook Dam which would be available to TransCanada and the Commission in order to evaluate effects on the DRP as stated above in 4.2.7 [comments].

**6.0 Request for Information and Studies:** To the extent that it provides meaningful information on Deerfield River resources we suggest the Commission and the Applicant examine any or all of the extensive material, studies, and data provided to the Commission during and subsequent to the relicensing of the Deerfield River Project.

**10.0 Mailing List:**

Please remove Mike Kline, General Manager US Generating New England, Inc. The person is no longer associated in any way with the project, nor does the Company exist or reside at the address indicated. The correct spelling for John **Ragonese** requires correcting the spelling of his last name. In addition, his office mailing address is One Harbour Place; Suite 330, Portsmouth NH 03801.

If there are further questions regarding this matter, please contact me at 603-498-2851 to discuss things further. Thank you for your consideration.

Sincerely,



John L. Ragonese  
FERC License Manager



## United States Department of the Interior

NATIONAL PARK SERVICE  
NORTHEAST REGION  
15 State Street  
Boston, Massachusetts 02109-3572

IN REPLY REFER TO:

April 17, 2015

Filed Electronically

Kimberly Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, NE  
Washington, DC 20426

Review of Notice of Intent to File License Application, Pre-Application Document (PAD); Commencement of Pre-filing Process; Scoping; Soliciting Comments on the PAD and SD1; Study Requests; **Bear Swamp Project**; FERC No. 2669-085; Berkshire and Franklin Counties, Massachusetts Bear Swamp Power Company (**ER 15/0100**)<sup>1</sup>

Dear Secretary Bose:

The National Park Service (NPS) files these comments in order to facilitate the relicensing process for the applicant, Bear Swamp Power Company (BSPC), and offers this agency's technical expertise on public recreational access, land conservation and preservation and our understanding of the values placed by the general public on river related resources.

During the current relicensing cycle, the NPS seeks to address issues of current concern, mitigate for continuing adverse impacts and improve recreational use and land protection opportunities available on and around the Deerfield River in the areas associated with the subject project.

### Comments on the PAD and SD1

#### SD1 Section 5.9 Land Protection

The NPS was a signatory to the Deerfield River Settlement Agreement of October 5, 1994 which included a provision for a term conservation easement on the lands around the Bear Swamp Project until its March 31, 2020, license expiration date. This term CR was partial mitigation for continued lack of public access to the 2.5 mile long Fife Brook impoundment and the upper impoundment.

In the PAD, BSPC notes that Conservation Restrictions (CR) for certain lands within the project boundary have been conveyed to the Massachusetts Department of Environmental Management (MDEM). The lands subject to the CR include 1,257 acres comprised of 1.056 acres at the upper and lower reservoirs and 207 acres or "River Corridor" downstream from the Fife Brook Dam. The applicant states in the PAD that it will be exploring land management options through the term of any license issued. The NPS requests that the applicant enter into a new CR, commencing upon the

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<sup>1</sup> The deadline for filing comments in FERC's February 18, 2015 Notice is listed as April 18, 2015. That date fell on a Saturday, allowing for timely receipt of comments by COB on April 20, 2015.

current license expiration date that would provide permanent protection for all lands currently covered, not to simply run with the FERC license, but to run with the land subject to standard reservations for current and future hydro operations. A new permanent CR should be part of the applicant's licensing proposal. This would ensure permanent protection of these critical resources, avoid repetition of the current situation involving multiple landowners associated with completion of License Article 402 (see Section 3.1.1) from the existing license issued almost 20 years ago.<sup>2</sup>

#### **SD1 Section 4.2.5 Recreational Resources**

The 1994 Settlement Agreement (FERC 2323) between New England Power and a dozen NGOs and resource agencies including the NPS, has had a profound impact on the recreational opportunities on the Deerfield River. The 106 scheduled whitewater releases from the Fife Brook Dam, along with the 32 scheduled releases upstream from Dam #5 operated by TransCanada, has brought tens of thousands of rafters, many thousands of private whitewater boaters, and large numbers of tubers to the region. Each year in July, the success of the whitewater releases on the Deerfield River and their economic impact on the local community is celebrated at the annual Deerfield Fest in Charlemont, a festival started by New England FLOW and American Whitewater two decades ago to commemorate the historic settlement agreement that brought scheduled and consistent whitewater boating to the Deerfield River.

The whitewater releases have stimulated an outdoor industry that has expanded multi-sport recreation opportunities for fishing, mountain biking, and zip lining, and has helped support the local economy through jobs and spending on food and lodging in the region. A study of the expected economic benefits of whitewater releases conducted at the time of the prior relicensing showed that the benefits of whitewater releases far outweigh the benefits from power generation. In the years since that relicensing, the anticipated economic benefits for the region have been met and regularly exceeded.

Given such a clear increase in recreational use, the PAD and any studies to be conducted should take into account those changes, current facility conditions and describe how the licensee proposes to accommodate recreational use during the term of any new license for the project. The NPS concurs with the April 16, 2015 Comments on the PAD filed by the FERC.

*“Section 5.9.6.1 of the PAD discusses the 2012 Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP). However, the PAD does not contain any information, from the SCORP or other sources, regarding anticipated changes in demand for outdoor recreation in the project area or how project recreation facilities would be able to accommodate these changes. Therefore, as required by §5.6(d)(3)(viii)(D) of the Commission's regulations, please provide information on anticipated changes in outdoor recreation needs in the project area and, to the extent possible, describe how project recreation facilities would be able to accommodate these changes.”*

Although FERC's Form 80 is done every 6 years by the licensee, there is no requirement to do any evaluation other than user identification through on site surveys; therefore, considerable use is missed depending upon numerous factors such as survey dates, weather and conditions. There is also no requirement to survey or reach out to known user groups. BSPC's most recent Form 80 filing included the licensee's Report Methodology filed on March 15, 2015. In it, they note that they surveyed users on 40 days at random times and locations, plus the 3 holiday weekends. Due to the nature of recreational use at Fife Brook being focused in association with scheduled releases, the surveys likely missed altogether, the vast majority of recreational use at the project. Neither river flows, nor recreational use in this area, is random. White water boaters and tubers use the river during the scheduled releases, while recreational

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<sup>2</sup> See FERC Order Modifying and Approving Comprehensive Plan and Schedule to Install Hiking Trail, dated April 1, 2015.

anglers are concentrated on the river mainly before and after those releases. There are over 100 scheduled white water releases each year with numerous festivals and special events, none of which were attempted to be captured during the recent Form 80 process. There was no evaluation of the need for portages, additional sanitary facilities, ADA compliance access and viewing locations, among other missing information. These and other critical omissions justifies the need for a thorough assessment of recreational use and needs and set out in several study requests recently filed and hereby endorsed by the NPS.

The standard recreational use studies identify current users captured during the study period on specific days; they do not attempt to identify users and more important, user groups/organizations that regularly (or for events) utilize project resources and adjacent lands. Annual records of commercial rafting, tubing and fishing outfitters on the Deerfield show that in excess of 50,000 people use the Fife Brook section of the river. In addition, records kept by commercial outfitters do not include private use, which is also considerable. Therefore, basing future recreational needs on an incomplete Form 80 with an improper methodology will lead to a gross underestimate of actual and future recreational needs associated with the project.

In order to develop a complete picture of user needs and goals, the applicant needs to identify local, state and regional user groups (through their mailing/membership lists/web sites info) and reach out to those people through mails and/or online surveys to identify user preferences and concerns. An on-site survey also does not address why certain users do not utilize any given area, which may be due to overcrowding or lack of desired facilities. In this case, a long section of the river is literally fenced off, preventing any use.

Among the user groups that could be so utilized are the Connecticut River Watershed Council, the Appalachian Mountain Club (AMC), American Rivers, American Whitewater and New England FLOW, to name just a few, along with the commercial outfitters and facilities on the river. Any organization that attended the scoping meetings or which provides comments or study requests should be so utilized for this purpose.

Conducting the necessary studies and implementing the measures needed to ensure the public has access to quality outdoor recreational resources are in the public interest. It is widely accepted that outdoor recreation offers significant benefits to the public. Outdoor recreation also has proven economic benefits for communities located near recreational resources. The long term economic benefits resulting from scheduled white water flows on the Deerfield River, has reverberated throughout the regional economy and continues to do so.

Studies to evaluate the adequacy of public resources and recreational uses and needs are standard throughout the hydro relicensing process. Methodologies can be selected from among the recognized and accepted standards of the resource and public planning fields. Surveys of people who do NOT use the river or are displaced can employ randomized samples from several databases associated with various local, regional and national user groups. Once a consultant is selected and approved, the information should be gathered and analyzed in a timely manner. The study would require spring, summer and fall seasons in order to locate river users and develop a statistically adequate sample. A consultant with experience in similar projects should be selected, in part to create relevant comparisons to other hydropower projects around the country.

Because there is no comprehensive text or guide that provides current information regarding carrying capacity of river-based recreational facilities associated with both individuals and groups of paddlers, this type of study (and those referenced below) will serve to bridge this information gap as well as to identify

needed reconstruction or expansion of existing facilities or the development of new facilities. Any field research would need to be correlated with future use projections and standard requirements for water based access, campsites, sanitary and picnicking facilities and portages.

### **SD1 Section 3.1.1 Existing Project Facilities**

The PAD and SD1 should clarify that the Fife Brook Overlook Hiking Trail is an uncompleted and outstanding requirement of the previous license Article 402. See fn.1 above.

### **SD1 Section 3.6.3 Project Decommissioning**

FERC staff has proposed to eliminate this alternative from study in their environmental analysis due to the lack of any party's suggestion that such an alternative would be appropriate. Up to this point in the ILP, there has yet to be any formal opportunity to provide a recommendation for a decommissioning study. SD1 states that there has been no data provided during the ILP process to suggest such a recommendation; however, comments already received to date by multiple parties, do in fact, recommend that a decommissioning study be conducted.

FERC staff cites to the likelihood that significant costs would be associated with decommissioning, including lost energy production. However, FERC has offered no supporting documentation regarding costs potentially associated with decommissioning. When combined with the increase in other types of renewable energy projects (solar, wind, geothermal), plus the fact that the project is actually a net user of energy instead of a generator of energy, support the need to evaluate the future use of the project in perpetuity. There have also been significant improvements in large scale stationary batteries, all of which has not been considered in SD1 or the PAD.

The NPS believes a study of the financial production of each individual facility that is being relicensed is appropriate. The analysis and/or NEPA document to be prepared should evaluate creating an escrowed decommissioning or trust fund for the dam and pumped storage project. The licensees, not the public, should not be burdened with potential costs associated with decommissioning. FERC license conditions often address additional mitigation such as trust funds, dam decommissioning funds, and public committees to oversee license implementation.

New England's rivers are littered with abandoned dams. Over the centuries, companies have failed, and weather events or human error have crippled dams that were then simply left behind. Although the owners of these facilities are presently in good financial health and can meet the requirements over the life of a new license, times and circumstances can change. Unforeseen events might cause either business or physical failure. A number of extraordinary storm events (such as Hurricane Irene and several extreme drought, rain and snow events) have occurred in New England in recent years, thereby increasing the need to fully evaluate a potential dam failure and the associated costs. The economic security of federally licensed hydropower dams is clearly in the public interest. Many hydropower projects support robust recreation economies and produce a public good by generating renewable forms of electricity. The historical record demonstrates—by the thousands of abandoned dams on New England's rivers—that the public should not accept the burden of industrial failure, especially associated with dams. It has become common to create decommissioning funds at such federally licensed facilities as a way of insuring the public interest against having to pay for removal of a damaged facility or to take over from a failed corporation. Therefore, the American public should be insured against the burden of decommissioning costs. A study could examine the health of the facilities and their owner and recommend the terms of a license requirement for decommissioning.

There is a direct nexus between Project operations and the economic viability of each individual dam. Study results could lead to a license requirement setting up an escrowed decommissioning or trust fund to protect the public interest. The financial viability portion of the study would follow normal procedures in accounting and financial management. The study itself would be relatively inexpensive; however, adequately funding the trust would more challenging. The NPS is unaware of alternative means of securing the public from risks that the corporations or the physical assets might fail during the course of the federal license.

#### **SD1 Section 4.2.6 Cultural Resources**

SD1 at Section 4.2.6 states only that the effects of continued project operation on historic properties and archaeological resources should be studied. The study should be expanded to determine a variety of options for educating the public about the construction of the Fife Brook Dam and the Bear Swamp Pumped Storage Project. Records associated with the construction of the projects (engineering studies, drawings, and photographs taken during construction) are of historical importance and should be identified, catalogued and a plan developed for their preservation and display where appropriate. This information would also provide documents, photographs and descriptions of the river in its pre dam condition. The existing Visitor Center could be used to accommodate such an exhibit or potentially expanded.

#### **NPS Study Requests**

The NPS is a Federal Resource Agency with expertise and responsibilities associated with public recreational use and access, land management and protection of historical, cultural and archaeological resources. The NPS hereby endorses, supports the request for and incorporates by reference, the following study requests and methodologies filed with the FERC on April 15, 2015 by the Appalachian Mountain Club et al. (AMC), the corresponding filing made by the Connecticut River Watershed Council (CRWC) on April 16, 2015 and the corresponding filing made by Trout Unlimited (TU) on April 17, 2015:

Controlled-Flow Whitewater Studies (AMC #1)<sup>3</sup>

Public Access Adequacy for Whitewater Boating, Rafting, and Canoeing, Navigation, and Other Non-Motorized Recreational Uses on Project Lands (AMC #2)

Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boating (AMC #3)

Economic Analysis of Project Operations and Recreation (AMC #4)

Controlled-flow Recreation Study (CRWC #11)

Recreation Site Inventory, Use, and Needs Assessment (CRWC #12)

Economic Analysis of Project Operations and Recreation (CRWC #13)

Deerfield River Angling Access, Flow and Safety Study (TU)

#### **Conclusion**

The National Park Service appreciates the opportunity to comment on the PAD and SD1 and to present study requests we believe to be in the public interest. NPS Hydro Program staff will remain available

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<sup>3</sup> The use of a controlled-flow analysis has been described in Doug Whittaker, Bo Shelby, and John Gangemi, *Flows and Recreation: A guide to studies for river professionals* (2005), p. 26-29, is available from the National Park Service website at: [www.nps.gov/hydro/flowrec.pdf](http://www.nps.gov/hydro/flowrec.pdf).



throughout the course of these proceedings to assist the applicant, other resource agencies and non-governmental organization in the development, conduct and evaluations of the studies requested.

Questions or comments on this submittal should be addressed to Kevin Mendik at [kevin\\_mendik@nps.gov](mailto:kevin_mendik@nps.gov) or by phone at 617-223-5299.

Respectfully submitted,

A handwritten signature in blue ink, appearing to read "K. Mendik", is positioned above the typed name and title.

Kevin R. Mendik  
NPS Hydro Program Manager  
Northeast Region

Robert May, Montague, MA.

Bear Swamp Project (P-2669-085)

#### Comments on Bear Swamp Relicensing

The Deerfield River Watershed Association is a roughly hundred member volunteer organization dedicated to the protection and wise use of the river's resources. We were signatories to the Settlement Agreement in 1994. Our membership includes the full range of users of the watershed: boaters, hikers, fishermen, those concerned with land use, and the like. For many years we were the only group monitoring water quality on the mainstem of the river. We have continued to be involved in issues concerning the flow regime and its effects on the biological health and the recreational possibilities of the river. Our comments here will focus on areas where there is more work to be done, particularly in protecting the biological health of the river and promoting environmentally sensitive recreation.

P-2669-

1. Knowing the river better.

A start has been made in studying the upper Deerfield (e.g. Cole, 2014, "Deerfield River Ecological Assessment," for the Mass Environmental Trust). We know enough already to say that hydro-peaking at Fife Brook Dam has a negative effect on the bug population in the reach from Fife Brook Dam to the #4 impoundment, and that in summer there are temperature peaks that could be lethal to trout in the Charlemont stretch of the river. The Fife Brook reach has been classified by the DEP as a cold water fishery which is currently impaired by hydro-peaking.

In order to better understand these problems, we support the studies recommended by Mass DEP and Mass Fish and Wildlife.

2. Improving a unique fishery.

The combination of bottom release of cooler water from the Fife Brook impoundment and an unmatched (for Massachusetts) scenic beauty, has produced a fishery which has the potential to be the best in the state. Mass Fish and Wildlife recognizes this by way of major and repeated stocking and by having establishing catch and release regulations for most of the river from Fife Brook to the Mohawk Bridge. The minimum flows established in the current license also contribute greatly to trout survival.

Wading remains the most popular (and financially accessible) mode of fishing the river below Fife Brook. It is most productive, and safest, at flows below 200cfs. At the time of the Settlement Agreement (1994) the typical flow pattern was high water mid-day and again sometime at night. That left morning and evening windows for fishing. But utility deregulation in the late 90's changed that pattern radically. We now often see high water all day long, sometimes for a week or more. To be more specific, we asked Brookfield to compile the data for the summer of 2013, to evaluate how often there were fishing windows (5-11 am or 4pm til dark). For June, July and August the river

was fishable in the evening 20% of the time and 36-68 percent of the time in the morning.

In addition to access, we are concerned about safety for wading anglers in the river when the flows increase from minimum flow to generation flow. Because the posted flows are frequently inaccurate, we would prefer to have a partial ramp up, held for fifteen minutes, as a warning for anglers out of sight or hearing of the dam. Brookfield has said that all they can do with their current equipment is run the generator up to 3MW and hold. This would, depending on the head in the reservoir, be as much as 600cfs. This is a high flow on the upper, narrow river and could endanger or strand waders.

There are certainly other issues that will come up regarding the fishery. We are concerned that there is no agreed-upon forum in which to discuss and negotiate these matters. Two years ago DRWA took the initiative to convene a small working group, consisting of representatives from Brookfield, Transcanada, TU and DRWA. We met for about ten times over a year and a half. But the results were not encouraging. Repeated turnover in Brookfield's representatives (six different people over a year and a half) militated against making significant progress. And more recently Brookfield has carried out a study of the effects of rising flows but is holding back the results as proprietary. It may be that a useful oversight group can only happen if it is seen as part of the license. Therefore we recommend that an ongoing fisheries consultation group be established as part of the license renewal.

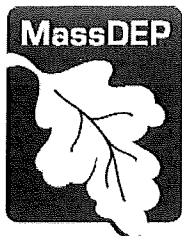
### 3. Improve hiking access.

It is our recollection that the current license called for a ten-mile Hoosac Loop Trail, which has not been completed. Now in the PAD it has been reduced to a bit over a mile. What with the large amount of land around Bear Swamp closed off to the public, and the proximity of the Mohawk State Forest (Old growth trees are reachable from the Zoar bridge), there are many recreation possibilities. We have found Transcanada (the Deerfield Project) to be energetically involved in developing and maintaining hiking trails. The same cannot be said for Brookfield. We recommend a survey of hiking resources and the development of a project work list with stated completion goals.

DRWA  
c/o Robert May  
15 Bank Row  
Greenfield, MA 01301

Document Content(s)

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Commonwealth of Massachusetts  
Executive Office of Energy & Environmental Affairs

## Department of Environmental Protection

Central Regional Office • 8 New Bond Street, Worcester MA 01606 • 508-792-7650

Charles D. Baker  
Governor

Karyn E. Polito  
Lieutenant Governor

Matthew A. Beaton  
Secretary

Martin Suuberg  
Commissioner

Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E., Room 1A  
Washington, D.C. 20426

April 17, 2015

RE: Study Request for FERC Bear Swamp Project P-2669

Dear Secretary Bose,

The Massachusetts Department of Environmental Protection (the Department) is the state resource agency responsible for issuing Section 401 Water Quality Certificates. The Department has reviewed the Preliminary Application Document (PAD) for the Bear Swamp Hydroelectric Project (P-2669) prepared by Bear Swamp Power Company and appreciates this opportunity to comment on the PAD and to request a study.

The Department has four comments to offer:

1. The MassDEP relies on the recommendations by the Massachusetts Division of Fisheries and Wildlife (the Division includes the Natural Heritage Endangered Species Program) regarding requirements needed to support the Deerfield River's designation as a habitat for fish, other aquatic life, and wildlife including for their reproduction, migration, growth and other critical functions. The Department concurs with the recommendations made by the Division to the Federal Energy Regulatory Commission.
2. As of February 2015, after staff review and concurrence, the MassDEP changed the aquatic life use designation from support to impaired for the upper Deerfield River (segment MA33-01 including the Project area) because of hydropower modifications to

the natural stream flow. This decision is based on a benthic macroinvertebrate study conducted by Mike Cole for the Deerfield River Watershed Association as part of the Deerfield River update for the 2016 Integrated Report cycle.

3. The Project area for the Bear Swamp Project should extend downstream to the highest pool elevation behind Deerfield No. 4 station.
4. The PAD needs to reference the Total Maximum Daily Load Analysis to Achieve Water Quality Standards for Dissolved Oxygen in Long Island Sound prepared by the New York State Department of Environmental Conservation and the Connecticut Department of Environmental Protection (December 2000). Nutrients associated with sediment transport contribute to low dissolved oxygen in Long Island Sound.

The Department requests one study to be conducted:

1. Water Quality Study. Results of water quality testing will provide a more complete understanding of the seasonal conditions occurring in this section of the Deerfield River, useful from both a Water Quality Standards and fisheries perspective.

Thank you for this opportunity to comment.

Sincerely,

A handwritten signature in black ink, appearing to read 'Robert Kubit', with a stylized flourish at the end.

Robert Kubit, P.E.

# **Bear Swamp Power Company Study Request: Water Quality Monitoring P-2669**

## ***Goals and Objectives***

Determine the current water quality of the Deerfield River within the Project area. The results of the study should provide information sufficient to enable staff to understand water quality conditions at the project. The study plan should be developed in consultation with the U.S. Fish and Wildlife Service (FWS) and the Massachusetts Department of Environmental Protection (MassDEP).

The specific objectives of this study are as follows:

- Characterize water quality upstream of the Project to the highest pool elevation of Fife Brook impoundment and downstream to the boundary of the highest pool elevation behind Deerfield No. 4 station.
- Evaluate the potential effects of project operation on water quality parameters such as temperature and dissolved oxygen in conjunction with various other water uses.
- Collect dissolved oxygen and temperature data during the spring through fall period and under various hydropower operating conditions at the Bear Swamp Project.

## ***Resource Management Goals***

The Massachusetts Department of Environmental Protection (MassDEP) is the state agency that grants federal Clean Water Act § 401 water quality certifications. The Massachusetts Clean Waters Act (State Act), G.L. c.21, §§ 26-53, delegates responsibility for enhancing the quality and value of water resources within the Commonwealth to MassDEP. The State Act directs MassDEP to take all action necessary or appropriate to secure to the Commonwealth the benefits of the Federal Clean Water Act, 33 U.S.C. §§1251-1387 (Federal Act). The main objectives of the Federal Act are to restore and maintain the chemical, physical and biological integrity of the nation's waters. To meet these objectives, MassDEP adopted the Massachusetts Surface Water Quality Standards, 314 CMR 4.00 (MA SWQS). The Standards classify each body of water within the Commonwealth; designate the most sensitive uses to be enhanced, maintained and protected for each class; prescribe minimum water quality criteria required to sustain the designated uses; and contain regulations necessary to achieve the designated uses and maintain existing water quality including, where appropriate, the prohibition of discharges into waters of the Commonwealth. Note the MassDEP relies upon the Massachusetts Division of Fisheries & Wildlife (including the Natural Heritage and Endangered Species Program) for recommendations related to aquatic habitat.

In the area of the Bear Swamp Project, the MA SWQS designate the Deerfield River as a Class B river, cold water fishery for its length (mile point 42.9 – 18.2) from the Vermont – Massachusetts state line to the confluence with the North River, 314 CMR 4.06(5). Class B waters are designated as a habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth and other critical functions, and for primary and secondary contact recreation, 314 CMR 4.05(3)(b). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value. The MA SWQS (314 CMR 4.02) defines cold water fisheries as waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68° Fahrenheit (20° Celsius) and, when other ecological factors are favorable

(such as habitat), are capable of supporting a year-round population of cold water stenothermal aquatic life such as trout (salmonidae). Waters with a cold water designation have a 6.0 mg/l dissolved oxygen standard.

### ***Public Interest***

The requestor is a state natural resource agency.

### ***Existing Information***

The PAD provides a summary of existing water quality data. While a number of monitoring efforts have taken place and include sample sites within the project boundary, none of those studies were designed to comprehensively investigate whether all relevant project areas currently meet Class B standards. The Massachusetts DEP's Deerfield River watershed assessment monitoring occurred in 2000 and only had three sampling events just downstream of Fife Brook Dam. An earlier effort in 1995/1996 produced 9 sampling events collected from two sampling locations. A volunteer monitoring program by the Deerfield River Watershed Association produced two sampling events in 2001/2002. Toxicity testing results taken for the Monroe Wastewater Treatment Facility in 1999/2001 did not include dissolved oxygen. Frost and Easte (1977) provide a historic comparison of water temperature and dissolved oxygen readings measured just before and just after the Bear Swamp facility was installed. River fluctuation happened in a weekly pattern that does not exist now, and minimum flow requirements have been increased since the 1970's.

No directed, site-specific surveys have been conducted to determine whether waters within the Project area meet State standards. This information gap needs to be filled so that resource agencies can evaluate properly the potential impact of project operations on water quality.

It is important to note that as of February 2015, after staff review and concurrence, the MassDEP changed the aquatic life use designation from support to impaired for the upper Deerfield River (segment MA33-01 including the Project area) because of hydropower modifications to the natural stream flow. This decision is based on a benthic macroinvertebrate study conducted by Mike Cole for the Deerfield River Watershed Association as part of the Deerfield River update for the 2016 Integrated Report cycle.

### ***Nexus to Project Operations and Effects***

The Fife Brook Dam is located 4.2 miles downstream from Deerfield Station No. 5. It creates an impoundment approximately 2.5-miles long of unknown depth where there would naturally be a free-flowing river. The dam currently operates in a run-of-release system, in response to regulated, peaking inflows from the immediately upstream Deerfield No. 5 station, which is owned and operated by TransCanada Hydro Northeast Inc. Allowable headpond fluctuations to use the Fife Brook impoundment as the lower reservoir for Bear Swamp pumped storage are up to 40 feet, with proposals to continue as such. The below-project flow requirement is equal to 125 cfs. It is unknown whether the impoundment exhibits stratification. Water quality can be affected by the operating regime of a hydropower project. Past studies have shown dissolved oxygen saturation as high as 99%.

The MassDEP requests that the applicant conduct a water quality survey beginning upstream of the Project to the highest pool elevation of the Fife Brook impoundment and downstream along the Deerfield River to the boundary of the highest pool elevation behind Deerfield No. 4 station in order to determine whether state water quality standards are being met under all currently-licensed operating conditions (i.e.,



during periods of generation and non-generation). Results of the survey would be used, in conjunction with other studies requested herein, to determine an appropriate below-Project flow prescription and to recommend an appropriate water level management protocol for controlling impoundment fluctuations.

#### ***Methodology Consistent with Accepted Practice***

Water temperature and DO measurements should be collected from a minimum of six locations: 1) at the highest pool elevation of Fife Brook impoundment, 2) at a deep location within the Fife Brook impoundment, 3) on the Deerfield River just downstream of Fife Brook dam, 4) in the Zoar area of the Deerfield River upstream of the confluence with the Cold River, 5) the Deerfield River approximately 1-2 miles downstream of the Chickley River but upstream of the Charlemont Wastewater Treatment Plant, and 6) just upstream of the boundary of the highest pool elevation behind Deerfield No. 4 station. In order to ensure that data are collected during a time of important biological thresholds and anticipated “worst case” conditions for dissolved oxygen (low flow, high temperature, antecedent of any significant rainfall event), we recommend deploying continuous data loggers at all locations, with biweekly vertical profiles taken at the deep impoundment location from May 1 through November 1. Results from all sampling stations should include date and time of sampling, sunrise time, GPS location, generation status (estimated flow through canal and bypass reach), precipitation data, pH, specific conductance, water temperature, DO concentration and percent saturation.

A proposed water quality sampling plan is to be submitted to MADEP for approval prior to sampling. A section on quality assurance and quality control must be included.

If river flow and temperature conditions are representative of an “average” or “low” water year, then one year of data collection should be sufficient to perform the study. If conditions are not representative (i.e., a “wet” or cool year) then a second year of data collection may be necessary.

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

When continuous data loggers are installed at all six locations and biweekly vertical profiles taken at the deep impoundment location from May 1 through November 1 then the estimated cost of the water quality study is moderate. It is expected to take two technicians approximately one day to deploy the loggers, portions of fourteen days to collect the vertical profiles, one day to remove the loggers, one day to download the data, and five days to write the report.

In the PAD, the applicant proposes to assess the effects of the Fife Brook Development and Bear Swamp Pump Storage Development operations on water quality by monitoring water temperature, dissolved oxygen, percent saturation, pH and specific conductance at locations within approximately 7.5 miles downstream of Fife Brook. We believe the effects of this Project extend to the Deerfield No. 4 station, some 17 miles downstream of Fife Brook.



# TROUT UNLIMITED

*Conserving, protecting and restoring North America's coldwater fisheries and their watersheds.*

## DEERFIELD RIVER WATERSHED CHAPTER

Mailing address:

PO BOX 133

SHELBURNE FALLS, MA. 01370

April 17, 2015

Honorable Kimberly D. Bose, Secretary

Federal Energy Regulatory Commission

888 First Street, N.E., Room 1 A

Washington, DC 20426

**RE: Bear Swamp Project, P-2669-085/Response to Scoping Document and Request for Studies**

Dear Sir/Madam,

Please accept this letter for purposes of responding to the Scoping Document 1 on behalf of our Chapter. Attached to this letter is our request. Our Chapter is the sole Trout Unlimited Chapter within the Deerfield River Watershed. Our Board of Directors has identified the following individuals to represent our Chapter at meetings: Kevin Parsons, Per Brandin, Chris Jackson, and Bob Anderson.

Over the last three years, representatives from our Chapter met with representatives from TransCanada and Brookfield Energy, the owner of above reference project. Our Chapter was invited by Brookfield to participate in meetings with the two energy companies that operate on the Deerfield River. According to Brookfield, their primary interest was to improve river safety and listen to our ideas on how they could improve river safety. In October, 2013 we sent Brookfield a letter, (attached) identifying our concerns with regards to safety. The concerns remain to this day. What we have come to learn is that Brookfield was interested in talking, however has not been interested in changing operations to improve safety. To this date we have not received a satisfactory written response to our concerns and requests.

Over the course of our conversations with the power companies we heard Brookfield maintaining its hands are tied as they are a “flow through” operation. Brookfield maintains it is restricted as to when and what volume of water they can release by up-river TransCanada operations. If in fact this is true, and if operations continue without significant modification, we believe the TransCanada license agreement may have to be reopened. The significant safety concerns as detailed in our October, 2013 letter remain. We believe it is only a matter of time before a tragic event will occur as a result of the continued un-safe operation of the Fife Dam facility. Sudden un-scheduled releases are going to kill or severely injure someone down-river of Fife Dam. There have been too many near misses every year. Whether this death or injury would be Brookfield’s fault, or TransCanada’s, would presumably be sorted out in a Courtroom. Would it not be better for the two power companies that control the Deerfield River flow regime work together to provide accurate, timely, reliable, flow information to river users?

In addition to safety concerns, we believe the current operations of Fife Dam are having a significant adverse impact on the river environment. We believe this impact can be mitigated without much effort and cost. We believe hydro-peaking must stop. We know for a fact, based upon anecdotal evidence from our members that since deregulation of the power industry, and changes in operations by the two power companies, mayfly hatches are down significantly. Some members report seeing small fish and sculpin stranded on rivers edges presumably as a result of sudden decrease in flows. We believe ramping up and ramping down releases are necessary. We believe TransCanada and Brookfield could, if they wanted to, work with interested parties to come up with a method for the Fife Dam operation to ramp up and down and still be compliant with existing license agreements. If TransCanada is un-willing to work with Brookfield and interested parties in this regard, then in that event, this may be another basis for re-opening the TransCanada Settlement Agreement.

Our members report significant decrease in wild trout being caught in the Deerfield River since de-regulation. We don’t know why that is. This needs to be examined.

The initial studies by Mike Cole reflect significant differences in the river ecology directly downstream of Fife Dam compared to the rest of the river. We are also aware the Massachusetts Department of Environmental Protection has classified the downstream area below Fife Dam as degraded. We believe the cause of this adverse effect needs to be examined.

Over the last two years our Chapter has worked with Mike Cole to analyze water temperature along the entire Deerfield River from Fife Dam to the termination point near the Connecticut River. The studies over the last two years have demonstrated significant temperature spiking in portions of the Deerfield River, particularly from the Route 2 Bridge near Mohawk Park and south past Charlemont Village. Data collected indicated water temperatures exceeding 80 degrees. This temperature is lethal to trout. We believe water temperature issues on the river down river of Fife Dam need to be monitored and studied over the course of the next 2-4 years.

We believe timely releases from Fife Dam earlier in the morning on hot days should be mandated. This past January our TU Chapter proposed mandatory recreational releases commence at 9:30 am. A release at 9:30 – 10:00 am would deliver ameliorative cool water to this targeted area during the heat of the day. (The Settlement Agreement for the TransCanada license affords a window of releases from 9:30am – 12:00 noon.) The temperature data collected over the last two years in this section of the river demonstrated significant improvement to water temperature issues on those days when releases were done earlier in the morning. The rafting companies and other entities supported the is request. This request was rebuffed by Brookfield and TransCanada. This is another situation in which we hope the two power companies could work together with interested parties to formulate a process to provide earlier morning releases within the confines of existing agreements. Otherwise, we believe this is just another reason for the re-opening of the TransCanada Settlement Agreement to compel this reasonable request.

We believe the following concerns should be addressed in the FERC re-licensing process for this project:

1. What latitude does Brookfield have with regards to water storage in the reservoir directly up river of the Fife Dam and also in the pump storage facility to allow for ramping up and ramping down from Fife Dam.
2. What latitude does Brookfield have with regards to water storage in the reservoir directly up river of the Fife Dam and also in the pump storage facility to allow for and on-demand ameliorative releases on hot weather days, despite what TransCanada may release to them up river?
3. Within the confines of existing license restrictions and agreements, what latitude does TransCanada have with regards to water storage up river of this Project, to allow for ramping up and ramping down from Fife Dam?
4. Within the confines of existing license restrictions and agreements, what latitude does TransCanada have with regards to water storage up river of this Project, to allow for on-demand ameliorative releases on hot weather days?
5. What are the environmental effects of current hydro-peaking operations down river of Fife Dam?
6. What are the fish populations in the river downstream of the Project?
7. What are the fish populations and conditions in the storage facility directly above Fife Dam, and in the pump storage pond above Bear Swamp facility?
8. What are acceptable ramped up releases and ramping down levels that could mitigate safety concerns and apparent adverse environmental effects of hydro-peaking.
9. What is the extent of fish spawning activities in the Main Stem, and how are current operations impacting this.

We also request that any future meetings for this Project be held in Franklin County. Having meetings in a County that is not even in the watershed, and at least an hour drive for most interested parties is less than ideal. Meetings should be held in Charlemont, Shelburne Falls, or Greenfield.

We are submitting a request for Angling Access and Flow Study request, which is submitted along with this letter.

**OUR CHAPTER ALSO JOINS IN THE STUDY REQUESTS AS SET FORTH BELOW. WE BELIEVE THESE STUDIES ARE NECESSARY TO PROPERLY ASSESS THE EFFECT OF THE PROJECT ON RIVER SAFETY, USE, ENJOYMENT, AND ENVIRONMENT:**

**Connecticut River Watershed Council (CRWC)**

CRWC Study Request #1. Water Quality Monitoring

CRWC Study Request #2. Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations

CRWC Study Request #3. Instream Flow Habitat Assessment Downstream of Fife Brook Dam

CRWC Study Request #4. Entrainment of Riverine Fish from the Deerfield River Into the Bear Swamp Pump Storage Facility

CRWC Study Request #5. Aquatic Mesohabitat Assessment and Mapping

CRWC Study Request #6. Fish Assemblage Assessment

CRWC Study Request #7. Abundance of naturally reproduced trout and distribution of spawning areas in the Deerfield River below Fife Brook Dam.

CRWC Study Request #8. Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and their Associated Habitats in the Fife Brook Impoundment and 17-Mile Reach Downstream of Fife Brook Dam

CRWC Study Request #9. Baseline Study of Terrestrial Wildlife and Botanical Resources

CRWC Study Request #10. Baseline Mussel Survey

CRWC Study Request #11. Controlled-flow Recreation Study

CRWC Study Request #12. Recreation Site Inventory, Use, and Needs Assessment

CRWC Study Request #13. Economic Analysis of Project Operations and Recreation`

**Massachusetts Fish & Wildlife (MFW)**

MFW, Odonates Study Request

MFW, Fish Spawning Study Request

MFW, Fish Assemblage Study Request

MFW, Aquatic Habitat Mapping Study Request

MFW, In Stream Habitat Assessment Study Request

**United States Fish & Wildlife (USFW)**

USFW Terrestrial Wildlife and Botanical Study Request

USFW Resource Study Request

USFW Wetlands, Riparian, and Littoral Study Request

**Massachusetts Department of Environmental Protection (MDEP)**

MDEP Water Quality Study Request

We look forward to the discussion and sharing of information over the course of the coming years, with the hope this will result in a license that will insure a much safer river, and healthier environment for decades to come.

Very truly yours,

(s) Kevin D. Parsons

Kevin D. Parsons

Vice- President

## **DEERFIELD RIVER ANGLING ACCESS, FLOW, AND SAFETY STUDY BEAR SWAMP PROJECT No. 2669**

Conduct a study to assess the angling experiences on the Deerfield River from the lower section of the “Dryway” (sometimes referred to as the “Dragons Tooth Section”), Lower Reservoir, pump storage upper reservoir, and for areas below Fife Dam to assess the impacts of proposed project operations. The study should include assessment of power company operations, relationships and level of cooperation and communication protocols by and between Brookfield/Bear Swamp and Transcanada, for the purpose of improving angler safety and experience.

### ***Goals and Objectives***

The goal of this study is to determine an appropriate flow regime and notice protocol that will enhance angler experience and safety within the project area. Specifically, the objective of the study is to:

- Identify and describe current angling access to the areas of concern;
- Identify and describe key angling areas that are currently inaccessible and that could be made accessible;
- Develop relationships between flow levels and quality and safety of the angling experience;
- Identify flows that are acceptable and safe for anglers;
- Identify ramping up/release levels that are acceptable and safe for anglers;
- Identify ramping down levels that are acceptable and safe for anglers;
- Identify impacts of hydro-peaking and flow fluctuations on angler access, enjoyment, and safety;
- Identify impacts on access, enjoyment, and safety of the angling experience as a result of the current notice protocol for releases;
- Examine Waterline posts by Brookfield over the last two years, and compare that to actual events/data;
- Assess communication processes and protocols by and between Brookfield/Bear Swamp and Transcanada with regard to un-anticipated/un-scheduled releases

The study should assess how current and proposed operations affect the angling experience and safety.

### ***Resource Management Goals***

Trout Unlimited seeks to accomplish a number of goals and objectives through the relicensing process for the Project. General goals include the following:

- To identify Project effects on the angling experience to help make the angling experience safer and more enjoyable.

### ***Public Interest***

The requestor is a non-profit Conservation organization whose mission is to protect and enhance cold water trout fisheries in the Deerfield River Watershed.

### ***Existing Information***

Available information in the PAD does not indicate how project operations affect angling experiences throughout the project area including up and down river of Fife Dam. Anglers are not allowed to access Lower Reservoir excepting the confluence of the Dry Way. No access at all is allowed in the pump storage upper reservoir. Various river access points on the river below Fife Dam are unsafe and need to be improved for easier angler access.

Current operations of Fife Dam are unsafe and unacceptable. Current operations are having a significant adverse impact on anglers. Unreliable, untimely, un-predictable, and outright incorrect flow information posted by Brookfield on Waterline has caused many anglers to become disillusioned with fishing on the Deerfield River.

Many anglers who fish the river rely on Waterline posts by Brookfield prior to coming to the river. Many people travel in excess of an hour expecting certain flow levels. Most anglers review Waterline posts prior to coming to the river. On far too many occasions anglers travel great distances to the river only to find flow conditions inconsistent with previous Waterline posts. Many times flow changes have occurred with merely minutes of notice. Those that are traveling to the river, and those on the river (an area which does not have cellular service) are oblivious to unscheduled last minute changes to the flow. The area up river of Charlemont, being approximately 8 miles of river does not have cellular phone service. Some fishermen, even those that have a wealth of experience, have been caught on the wrong side of the river when an unknown and un-expected 800-900 cfs release arrives at their location. This is causing some to run the risk of wading across or having to hike sometimes in excess of 1-2 miles to gain access to a bridge. This unsafe situation is a recurring problem. As a result many anglers have abandoned fishing the Deerfield River.

Brookfield Power posts the following notice in red on Waterline.

Note that a portion of the recreation flow release will start 10-15 minutes before the scheduled time, to warn users out of reach of the audible and visual warning systems that flow is increasing. For your safety, this smaller increase is an additional warning for users to exit the river before the release has ramped up to full flow.

Anglers and other users of the river access the Waterline site for information. Based on this information anglers and other river users should reasonably expect that even if there is an un-expected release, this initial smaller increase in flow would provide advance warning of an onslaught of the full release... 800-900cfs. In fact, despite Brookfield's assertions to the contrary, and despite the posting on Waterline referenced above, initial smaller releases (ramping up) have been rare until lately.



A complete analysis for the last two years of Brookfield postings on Waterline, the timing of those postings, and comparing that to actual releases must be studied and assessed. This analysis should include comparing Brookfield data to Waterline posts and flow projections upriver from Transcanada facilities. This analysis will provide useful information to assess ability of both operations to provide accurate, timely, and reliable flow information to those seeking to access the river.

Bear Swamp/Brookfield claims to be a flow-through operation in that they merely pass through water released from upriver Transcanada operations which they cannot control. As a result Bear Swamp/Brookfield claims they are limited as to their ability to provide accurate, timely, and reliable flow information for posting on Waterline. The relationship between the two entities including their legal obligations, protocols and procedures must be reviewed and assessed.

### ***Nexus to Project Operations and Effects***

Lack of access and current Project operations are having a significant adverse impact on angler safety, access and enjoyment of the river. The safety concerns are in part documented by emergency response episodes by the Charlemont Fire Department. In addition Trout Unlimited member anglers have experienced and observed many accounts of anglers being stranded on the wrong side of the river when confronted with unexpected sudden releases.

As a result of operations detailed above, this is also having a negative impact on the local economy. Disillusioned anglers who no longer fish on the Deerfield River are spending their money at other fishing destinations. Local restaurants, hospitality, and other businesses that service anglers are suffering loss of business. There are no less than six fly fishing guide professionals who regularly bring clients to the river from just below Fife Dam all the way to the confluence with the Connecticut River. Without accurate, timely, and reliable flow information these guides regularly have to make adjustments to client fishing locations.

Results of the study will be used to determine appropriate project operations/release levels and protocols that will protect and/or enhance angler safety, access, and enjoyment.

### ***Methodology Consistent with Accepted Practice***

Trout Unlimited requests a flow study of various release levels be conducted at the Project to evaluate angling at a range of flow conditions. A specified group of study participants should be invited to fish the river at minimum flow and at no less than three (3) additional flow/release levels, and then assess their experiences. The area of concern for this release study would be limited to the first 7.5 miles below Fife Dam, as this is the area of most concern for river safety issues. Trout Unlimited members would assist in identifying the appropriate more popular areas for angling, and would participate in the study.

The flow survey should elicit specific responses to: whether the level of the initial warning release/ramped up flow was sufficient to warn of impending danger from peak flow, how well suited the level of release was for different skill levels, whether a higher or lower flow was correlates to a better angling experience, and overall angling experience.

A survey of anglers should be done to determine their overall experience on the river, or in the case of anglers that have decided not to fish the river the reasons why. This survey should include a ranking of angling experience characteristics, ranking of flows in order of preference, overall evaluation of flows, and assessment of Waterline information sought and relied upon.

The data collected with this study should be sufficient to perform an analysis of angler experiences and compare that with existing and future operations.

The study of protocols and communications by and between Brookfield and Transcanada operations will determine how to improve flow release information in a more timely, accurate, and reliable way which will enhance angler experience and safety.

***Level of Effort/Cost, and Why Alternative Studies will not suffice***

Analysis of fishing access areas within the Project area can be determined and documented at little expense.

The flow study and analysis can be done in conjunction with other flow studies requested. The additional cost to Brookfield would be negligible in adjusting operations for the proposed release studies.

The angler survey, done in conjunction with TU, should be able to be completed in a small amount of time. Preparing, distributing, collecting, evaluating the survey results, and preparing report should be accomplished at minimal cost.

Evaluation of the applicants flow records and reporting processes, and comparing that information to the same data from upriver Transcanada's operations is essential to determine and develop appropriate communication protocols and procedures in this somewhat unique situation.

Document Content(s)

FERC Scoping Letter with Request for Study 4 16 15.DOCX.....1-5

FERC Angling Access Flow Study.DOCX.....6-9



**MassWildlife**

Commonwealth of Massachusetts

# Division of Fisheries & Wildlife

Jack Buckley, *Acting Director*

April 17, 2015

Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E., Room 1A  
Washington, DC 20426  
Bear Swamp Project  
FERC No. P-2669

## Comments, Study Requests

Dear Secretary Bose:

The Massachusetts Division of Fisheries and Wildlife (Division) is the agency responsible for the protection and management of the fish and wildlife resources of the Commonwealth. The Division is also responsible for the regulatory protection of imperiled species and their habitats as codified under the Massachusetts Endangered Species Act (M.G.L. c.131A). The Massachusetts Endangered Species Act (MESA) was enacted in December 1990. Implementing regulations (321 CMR 10.00) were promulgated in 1992 and recently revised and implemented as of November 2010. The MESA provides a framework for review of projects or activities that occur within mapped areas of the state, called *Priority Habitat*, and published in the Natural Heritage Atlas. As such, we monitor operations at hydroelectric projects within the Commonwealth, as well as comment on proposed hydroelectric facilities. The Division has received the notice dated 02/18/2015, 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 etc re Bear Swamp Power Company, LLC's Bear Swamp Project under P-2669 and offers the following comments and request for studies.

## PROJECT DESCRIPTION

The Project consists of Bear Swamp Pumped Storage Development (BSPS) and the Fife Brook Development. The BSPS consists of an Upper Reservoir retained by four dikes and an emergency spillway, a submerged inlet/outlet structure and associated tunnel which bifurcates into two penstocks, an underground powerhouse containing two reversible Francis-type pump-turbine units and motor-generator units with a combined capacity of 600 MW, two tailrace tunnels leading to a single inlet/outlet structure in the Lower Reservoir, and the Lower Reservoir (Fife Brook Impoundment) formed by the Fife Brook Dam on the Deerfield River. The Fife Brook Development consists of the

[www.mass.gov/masswildlife](http://www.mass.gov/masswildlife)

Division of Fisheries and Wildlife

Field Headquarters, One Rabbit Hill Road, Westborough, MA 01581 (508) 389-6300 Fax (508) 389-7890

*An Agency of the Department of Fish and Game*

Fife Brook Dam and impoundment which is common to both developments, a tainter gate spillway structure, a concrete intake structure, and a single penstock leading to a concrete powerhouse containing one conventional Francis turbine-generator unit with a capacity of 10 MW.

The project operates in run-of-release mode where the daily peaking flow into the project from the upstream Deerfield River Project (P-2323) is passed downstream on an instantaneous basis while BSPS operates in an independent mode- generally pumping at night and generating during the day- which does not alter the flow of the Deerfield River. The movement of water between the Upper and lower Reservoirs causes a maximum change in water surface elevation of 44.5 feet in the Upper Reservoir and 40 feet in the Lower Reservoir.

The Fife Brook Development is required to release a minimum flow of 125 cfs to the Deerfield River at all times.

## **PROPOSAL**

The project owner proposes to continue to operate the project in the same manner as under the previous license. The project is scheduled for rehabilitation whereby the pump-turbine runners will be replaced, the motor-generators will be rewound, and runner seals, wicket gates and bushings, and shaft seals will be replaced. Once complete the capacity of the BSPS will be 66 MW. According to the Project owner, the upgrades will not change the operating elevations of the upper or lower reservoirs. However, information contained in the FERC's environmental assessment for the upgrade (issued August 13, 2008) indicates that the upgrade will increase the Project's hydraulic capacity from 5,430 cfs to 6,200 cfs and increase the intake velocities at the trashracks from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps at low tailwater.

The Project owner has proposed no additional protection, mitigation or enhancement measures.

## **COMMENTS**

The Division requests that any studies include the entire "area of project effects" which is the upstream extent of the Fife Brook Impoundment at maximum pool to the upstream extent of the Deerfield River Project Development #4 Impoundment (approximately 17 river miles downstream).

## **RECOMMENDED STUDIES**


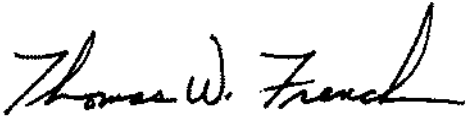
The pages below contain the studies requested by the Division. They are presented in the format required pursuant to CFR §4.38(b)(5) and therefore each contain the rationale for the request which will not be repeated here.

### Massachusetts Division of Fisheries and Wildlife list of requested studies under P-2669

1. Project Operations Model
2. Aquatic Mesohabitat Mapping
3. Fish Assemblage Assessment
4. In-stream Flow Habitat Assessment
5. Entrainment of Riverine Fish
6. Wild Trout Spawning and Abundance

7. State-Listed Rare Plants, Baseline Data Collection and Assessment of Operational Impacts
8. Freshwater Mussel Species of Greatest Conservation Need, Baseline Data Collection and Assessment of Operational Impacts
9. State-Listed Odonates, Baseline Data Collection and Assessment of Operational Impacts
10. Northern Long-Eared Bat Acoustic Survey
11. Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation
12. Baseline Study of Terrestrial Wildlife and Botanical Resources
13. Water Quality Study

Thank you for this opportunity to comment.

<p>Sincerely,</p>  <p>Caleb Slater, Ph.D. Anadromous Fish Project Leader</p>	<p>Sincerely,</p>  <p>Thomas W. French, Ph.D. Assistant Director for the Natural Heritage &amp; Endangered Species Program</p>
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cc: Melissa Grader, USFWS  
Robert Kubit, MA DEP

### **Study Request #1**

#### **Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations**

Develop a river flow and operations model designed to evaluate the hydrologic changes to the Deerfield River caused by the physical presence and operation of the Fife Brook and Bear Swamp Pumped Storage (BSPS) developments, and the interrelationships between the operation of Fife Brook/BSPS and the Deerfield River Project (FERC No. 2323) facilities upstream and downstream. The flow study should assess the following topics:

1. Conduct quantitative hydrologic modeling of the hydrologic influences and interactions that exist between the water surface elevations of the Fife Brook impoundment (lower reservoir) and discharges from the Fife Brook and BSPS generating facilities and the upstream and downstream hydroelectric facilities. Data inputs to and outputs from the model(s) should include:
  - a) discharges into the Fife Brook impoundment from the Deerfield River Project's Deerfield No. 5 development;
  - b) withdrawals from the Fife Brook impoundment by BSPS;
  - c) discharges to the Fife Brook impoundment by BSPS;
  - d) existing and potential discharges from the Fife Brook development (generation, recreational releases, and spill flows);
  - e) existing and potential water level fluctuation restrictions (maximum and minimum pond levels) of the Fife Brook impoundment and flows downstream of Fife Brook dam; and
  - f) existing and potential required minimum flows and/or other operation requirements at each of the upstream projects.
2. Document how the existing outflow characteristics from the Deerfield No. 5 facility affect the operation of the Bear Swamp Project, including downstream flow releases and Fife Brook impoundment levels.
3. Document how the existing Fife Brook and Bear Swamp operations affect the Deerfield River from Fife Brook dam downstream to the upstream extent of the Deerfield River Project's Deerfield No. 4 impoundment.

#### ***Goals and Objectives***

Determine the extent of alteration of river hydrology caused by operation of the project and the interactions between upstream project operations, Bear Swamp Project operations, and downstream operations at Deerfield No. 4. The models will provide necessary information on what changes can be made to flow releases and/or water levels restrictions at the Fife Brook and BSPS developments, and how those changes affect downstream resources.

As other specific operational modifications at the Fife Brook and/or BSPS developments are identified based on results of other requested studies, these desired conditions will need to be input into the models to assess how each potential change at one development affects the operations of the other development and the implications of those changes on other resources and/or the ability to achieve desired operational changes at each development.

#### ***Relevant Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to aquatic resources, the Division's goals are:

1. Protect, enhance, or restore, diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Provide an instream flow regime that meets the life history requirements of resident fish and wildlife (including invertebrates such as freshwater mussels) throughout the area impacted by project operations.
3. Minimize current and potential negative project operation effects on water quality and aquatic habitat.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

### ***Existing Information and Need for Additional Information***

Available information in the PAD does not indicate how project operations have altered downstream hydrology, which may affect riverine fish, macroinvertebrates, rare, threatened, and endangered species, aquatic plants and other biota and natural processes in the Deerfield River from below the Fife Brook Dam downstream to the Deerfield No. 4 facility.

In the PAD, BSPC indicates that Fife Brook operates in a run-of-release mode, reacting to and passing inflows from TransCanada's upstream hydropower facilities and that Bear Swamp operations have no effect on Deerfield River flows upstream and downstream of the BSPS and Fife Brook developments. No information on the frequency, timing or duration of reservoir fluctuations is provided, nor is the extent of upstream backwatering during pumping and generating. Likewise, the PAD contains no data on the extent of water surface elevation fluctuations downstream of Fife Brook Station. Figure 4.4-2 indicates that outflow peaks from Fife Brook may be lower than inflow peaks from TransCanada, but only two months from a single year of data are shown. Figure 4.4-3 from the PAD re-enforces this observation, showing inflow and outflow at Fife Brook (for two years only), however the scale of this figure makes it hard to see much detail.

Article 401 in the 1997 Order Amending Bear Swamp's Project License requires a minimum flow of 125 cfs as measured below the dam for the protection and enhancement of fishery resources in the Deerfield River. Article 404 requires whitewater boating releases from Fife Brook of 700 cfs for 3 continuous hours on 50 weekend days and 56 weekdays between April 1 and October 31. After complaints about minimum flows, a gage was installed below Fife Brook but that gage was ruined in Tropical Storm Irene. Anglers complain that releases strand anglers on one side of the river. BSPC states that it increases flows and holds them for 15 minutes for safety, yet no supporting data are provided to validate this statement.

Operations, water surface elevation and flow information is needed to better understand the impact of operations on recreational uses of the river and whether or not modifications can be made to improve river habitat and river uses. The PAD provides no information regarding how project operations affect fisheries resources or recreational use. The requested hydraulic and operations models will allow for testing different scenarios that will aid in understanding if, and to what extent, the Bear Swamp Project has the ability to re-regulate to benefit fish and wildlife resources within the project-affected area.

### ***Nexus to Project Operations and Effects***

The Bear Swamp Project is currently operated with a continuous minimum flow of 125 cfs. The project operates as a daily peaking project, often with large, rapid, daily flow fluctuations between the minimum and project capacity (1,400 cfs). In addition, the Fife Brook Dam headpond (also known as the lower



reservoir) elevation fluctuates 40 feet (830 feet msl to 870 feet msl) as does the upper reservoir of the Bear Swamp Pumped Storage (BSPS) development (from 1,600 feet msl down to 1,550 feet msl). These changes affect fish, wildlife and their habitats within the project-affected reach. Project operations and potential changes to operations to mitigate impacts are influenced by inflows and operations of upstream peaking projects and the Bear Swamp Project operations. Results of river flow and project operations analyses will be used to develop flow-related license requirements and/or other mitigation measures (e.g. angler safety).

#### ***Methodology Consistent with Accepted Practice***

The Division proposes that the study methodology be similar to that used in studies 3.2.2 and 3.8.1 in the Turners Falls and Northfield Mountain relicensing effort currently underway on the Connecticut River in Massachusetts.<sup>1</sup> Both of those studies were approved, with modifications, by the Commission in its September 13, 2013 Study Plan Determination letter; therefore, the methodology is consistent with accepted practice.

The purpose of the hydraulic model is to determine, for a given flow, the corresponding water surface elevation at a given location within the river, as well as water depth and mean channel velocity. The one-dimensional HEC-RAS can be run in both a steady state mode and an unsteady state mode.

River level loggers will need to be placed within the study area (from the upstream extent of the lower reservoir downstream to the head of the Deerfield No. 4 headpond). Past project operations (at a sub-hourly time step) for 2005 through 2014 should be used in the model. Any proposed modifications should be identified and modeled.

The simulation model (HEC-ResSim) will be used to evaluate the impacts of current and potential alternative modes of operation in the project area on the timing and magnitude of river flows. Output from the model will be used in other studies to evaluate the impact of current and potential alternative modes of operation on water surface elevations and aquatic habitat.

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

Level of effort and cost of model development are expected to be moderate but to be valuable in developing license conditions, the model(s) will need to be run under various scenarios throughout the relicensing process to assess the implications of any changes to the operations. Therefore, ongoing consultation and re-running of the model(s) are likely to be needed throughout the relicensing process. The modeling exercise will also require coordination and cooperation between BSPC and the upstream licensee to assure that the model inputs and outputs can be accurately related.

FirstLight has said that their study 3.2.2 will cost \$100,000-120,000 and study 3.8.1 will cost \$100,000-125,000. Because the Deerfield River is smaller than the Connecticut River, flows coming from upstream are more straightforward, and Fife Brook does not have a canal system, we would expect the costs for this study to be significantly lower than the studies at Turners Falls and Northfield Mountain. The Division estimates that the requested study would cost \$150,000 to \$200,000.

The applicant has proposed no studies to address this resource concern. The water quantity and operations study that BSPC proposes will only characterize flow fluctuation, attenuation and travel time patterns in the 7.5 mile long reach downstream of Fife Brook Station under existing operations. It would not provide the ability to model different operational scenarios.

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<sup>1</sup> Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources.

## **Study Request #2**

### **Aquatic Mesohabitat Assessment and Mapping**

Aquatic mesohabitat characterization and mapping will provide the information necessary to choose sample sites for the requested *Fish Assemblage Study* and *Instream Flow Study* and the will provide information to help define whether, or to what degree, Project operations are impacting aquatic resources. To the Division's knowledge, no comparable aquatic habitat mapping has been conducted in the study area. This study plan outlines a proposed approach to collect data and map mesohabitat, provides a timeline to conduct the mapping, and details expected in the products.

The data collected in the mesohabitat assessment will quantify the type and extent of aquatic mesohabitat available in the Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment and in the Bear Swamp Pumped Storage Project's upper and lower reservoirs. Further, the information collected during the mesohabitat assessment will support a variety of other potential studies in subsequent years.

#### ***Study Area***

The study area is divided into three distinct sections as follows:

- The Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment
- The Bear Swamp Pumped Storage Project's upper reservoir
- The Bear Swamp Pumped Storage Project's lower reservoir

#### ***Goals and Objectives***

The goal of this study request is to quantify the type and extent of aquatic mesohabitat available in the areas affected by the Bear Swamp Pumped Storage Project. The objective of the aquatic mesohabitat assessment is to gain a preliminary understanding of the aquatic mesohabitat resources in the three areas described above. To reach this objective, aquatic mesohabitat will be delineated and mapped in each of these areas. The assessment will provide data that will support and focus other relicensing activities needed to assess Project effects on riverine resources.

#### ***Resource Management Goals***

The mission of the Massachusetts Division of Fisheries and Wildlife (Division) is to protect and conserve fish, wildlife and their habitats. Riverine fish species are an important component of the river's ecology and are the basis for the sport fishery. Furthermore SGCN have been documented in the Project-affected area (Longnose Sucker).

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information***

To the Division's knowledge, no comparable aquatic habitat mapping has been conducted in the study area.

#### ***Nexus to Project Operations and Effects***

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. For example, headpond and tailwater water level fluctuations could dewater important spawning areas, thus limiting productivity of important game fish species by direct impacts to their spawning success or indirectly by limiting the spawning success of forage fish species. Furthermore, SGCN have been documented in the Project-affected area. Accordingly, a thorough understanding of the current fish assemblage structure and associated metrics are needed in order to examine any potential Project-related impacts.

#### ***Methodology Consistent with Accepted Practice***

Mesohabitat delineation will follow the method of Ball (1982) also see FirstLight (2012).

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

This study will require sampling of the Project-affected areas of during the summer. The cost of the study would be moderate as the project affected area is extensive.

#### ***Specific Methodology***

The Project owner will conduct a field survey to identify the mesohabitat present in the study areas and to delineate the relative quantity and spatial distribution of each habitat type. Each mesohabitat type of interest will be assigned specific attributes to be used for field delineation. The exact classification criteria for each mesohabitat type will be developed in consultation with the state and federal agencies but will generally include:

**Riffle:** shallow, moderate velocity, turbulent, high gradient, moderate to large substrates (cobble/gravel)

**Rapid:** shallow, moderate to high velocity, turbulent, chutes and eddies present, high gradient, large substrates or bedrock

**Run:** moderately deep to deep, well defined non-turbulent laminar flow, low to moderate velocity, well defined thalweg, typically concave stream geometry, varying substrates, gentle slope

**Glide:** moderately shallow, well defined non-turbulent laminar flow, low velocity, well defined thalweg, typically flat stream geometry, typically finer substrates, transitional from pool

**Pool:** deep, low velocity, well defined hydraulic control at outlet

**Backwater:** varying depth, minimal or no velocity, long backwatered reaches

Delineation of Deerfield river reach will be conducted by boat or on foot, where too shallow, and will occur during a period of relatively low flow so that breaks in mesohabitat, substrate, object cover, and hydraulics, can be readily observed.

Habitat mapping below Fife Brook dam will require days to complete and flows during this period may vary due to operations of the Deerfield River Hydroelectric Project. To quantify the flow at which the mesohabitat mapping is conducted, records of discharge from Fife Brook dam will be used.

Aerial imagery will be uploaded to a laptop computer enabled with a Geographic Information System (GIS) to permit mesohabitat mapping directly in the field. The upstream and downstream boundary of each mesohabitat unit within the study area will be delineated and georeferenced.

Additional features relevant to differentiation of mesohabitats, such as biological and geomorphic, characteristics, will also be collected where appropriate including; readily observable aquatic fauna, predominate substrate types<sup>2</sup>, relative embeddedness<sup>3</sup>, wetted width, channel geometry, thalweg depth, and

<sup>2</sup> If substrate cannot be observed through the water, probing of the substrate and underwater pictures will be obtained to approximate the substrate type.

<sup>3</sup> Refers to the extent to which rocks (gravel, cobble, and boulders) and snags are covered or sunken into the silt, sand, or mud of the river bottom. Generally, classifications are: optimal – 0-25% surrounded by fine sediment; suboptimal – 25-50% surrounded by fine sediment; marginal – 50-75% surrounded by fine sediment; and poor – more than 75% surrounded by fine sediment (Ball, 1982).

cover. The data will be recorded on data sheets, a dedicated field book, or via a laptop computer. Upon completion of the survey, all data will be rechecked for quality control and archived.

### ***Analysis***

Geospatial mesohabitat data will be transferred to a GIS format and used to develop both visual maps depicting distribution as well as quantitative tabular information regarding the abundance of mesohabitat types in the study area. A summary report will be developed. The report will include survey methods, GIS maps showing the mesohabitat spatial distribution in the reservoirs and the river reach below Fife Brook dam, and a discussion of observations.

### **Baseline for Future Studies**

The mesohabitat mapping and accompanying characterization of aquatic mesohabitat will provide essential information regarding the character and extent of aquatic habitat that may be affected by Project operation. The quantified spatial data generated by this survey will help to provide a framework for upcoming data collection efforts.

### ***Literature Cited***

Ball, J. (1982). *Stream classification guidelines for Wisconsin* (Technical Bulletin). Madison, WI: Wisconsin Department of Natural Resources.

FirstLight (2012). Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889) AQUATIC MESOHABITAT ASSESSMENT AND MAPPING REPORT  
[http://www.northfieldrelicensing.com/Lists/Document/Attachments/9/785 Turners%20Falls%20Aquatic%20Habitat%20Assessment%20Report.pdf](http://www.northfieldrelicensing.com/Lists/Document/Attachments/9/785%20Turners%20Falls%20Aquatic%20Habitat%20Assessment%20Report.pdf)

## **Study Request #4**

### **In-stream Flow Habitat Assessment Downstream of Fife Brook Station**

Conduct an instream flow habitat study to assess the impacts of the range of the proposed project discharges on the wetted area and optimal habitat for key species. The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target fish species include: brook trout, brown trout, rainbow trout, longnose sucker, fallfish, and white sucker.

#### ***Goals and Objectives***

The goal of this study is to determine an appropriate flow regime that will protect and enhance the aquatic resources from the Fife Brook tailrace downstream to upper end of the Dam #4 impoundment. Specifically, the objective of the study is to conduct an instream flow habitat study to assess the impacts of a range of flows on the wetted area and optimal habitat for key species, including the impacts of hydropeaking flow fluctuations on the quantity and location of suitable aquatic habitat.

The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target fish species include: brook trout, brown trout, rainbow trout, longnose sucker, fallfish, and white sucker and benthic macroinvertebrates.

#### ***Resource Management Goals***

The Division seeks to accomplish a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

- Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
- Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to aquatic resources, the Division's goals are:

- Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
- Provide an instream flow regime that meets the life history requirements of resident and migratory fish and wildlife (including invertebrates such as freshwater mussels) throughout the area impacted by Project operations.
- Minimize current and potential negative project operation effects on water quality and aquatic habitat.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

### ***Existing Information***

In the PAD, BSPC provides no information on the fish assemblage in the riverine reach downstream of Fife Brook Dam other than stating that the Massachusetts Division of Fisheries and Wildlife (MADFW) stocks adult brown and rainbow trout in the reach to support its management as a catch-and-release fishery. Limited information exists on the adequacy of the existing minimum flow regime to protect water quality and aquatic life. Further, the PAD contains no information regarding how project operations have altered downstream habitat quantity and quality important to fish, macroinvertebrates, aquatic plants and other biota and natural processes in the 17-mile-long stretch of the Deerfield River from below the Fife Brook Dam downstream to the impoundment of the Deerfield No. 4 development.

Surveys of macroinvertebrates in the Deerfield River below the Fife Brook dam (Cole 2007 and 2014) have shown a change in that community with distance downstream of the dam. Mayfly and stonefly taxa that were located in the lower sampled reaches were not present below the dam or approximately 2.5 miles below the dam.

### ***Nexus to Project Operations and Effects***

The Project is currently operated with a minimum flow release that was not based on biological criteria or field study. Further, the project generates power in a peaking mode, resulting in significant within-day flow fluctuations between the minimum and project capacity on an hourly or daily basis. The large and rapid changes in flow releases from hydropower dams are known to cause adverse effects on habitat and biota downstream of a project (Cushman 1985; Bain *et al.* 1988; Blinn *et al.* 1995; Freeman *et al.* 2001; Layzer *et al.* 1989). There are more than 17 miles of lotic habitat below the project's discharge that are impacted by peaking operations at the Fife Brook Station. This section of the Deerfield River contains habitat that supports native riverine species. While the existing license does require a continuous flow of 125 cfs below the dam, this flow has yet to be shown to be sufficiently protective of the aquatic resources in this substantial reach of river, especially in the context of the magnitude, frequency, and duration of changes in habitat that likely occur between minimum and generation flows.

Results of the study will be used by the Division to determine an appropriate flow recommendation that will protect and/or enhance the aquatic resources below the Project.

### ***Methodology Consistent with Accepted Practice***

In-stream flow habitat assessments are commonly employed in developing plant operational regimes that will reduce impacts or enhance habitat conditions downstream of hydroelectric projects.

The Division requests a flow study be conducted at the project. Given the length of the river reach (17 miles) impacted by project operations, we believe a study methodology that utilizes an IFIM approach is appropriate for this site. This same protocol was used during the relicensing of the Housatonic River Project (FERC No. 2576),<sup>4</sup> and currently is being used in the relicensing proceedings for the Connecticut River hydropower projects (FERC Nos. 1889, 1892, 1855 and 1904).<sup>5</sup> The Commission's Study Plan Determination letters to FirstLight and TransCanada dated February 21, 2014 accepted the proposed studies (FirstLight's with modifications); therefore the methodology is consistent with accepted practice.

Habitat in the study area first must be mapped at a sufficient level of detail to spatially delineate different mesohabitat types for the purposes of transect selection. At a minimum, the study design should involve

<sup>4</sup> Housatonic River Project License Application, Volume 4, Appendix F. Connecticut Light and Power Company, August 1999.

<sup>5</sup> Study 3.3.1 of the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources; Study 9 of the Revised Study Plan for the Wilder Hydroelectric Project (FERC No. 1892-026), Bellows Falls Hydroelectric Project (FERC No. 1855-045) and Vernon Hydroelectric Project (FERC No. 1904-073). August 14, 2013.

collecting wetted perimeter, depth, velocity, and substrate data along transects located in the reach of river below Fife Brook Station. The measurements should be taken over a range of test flows. This information then should be synthesized to quantify habitat suitability (using mutually agreed upon HSI curves) of each test flow for target species and life stages identified by the fisheries agencies. Habitat modeling using standard PHABSIM 1 dimensional modeling is acceptable for the river channel downstream from the Route 2 Bridge. The area from the Fife Brook Station discharge to the Rt. 2 Bridge should be modeled using 2 dimensional (2D) modeling to better characterize flows and velocities in this high quality area.

The types of data collected with this study should be sufficient to perform a dual-flow analysis and habitat time series or similar approaches that will permit assessment of how quantity, quality and location of habitat for target species changes over a range of flows between existing minimum flow and maximum project generation flows.

***Level of Effort/Cost, and Why Alternative Studies will not suffice***

Field work for instream flow studies can be relatively extensive but will depend on consultation with the applicant on study methodology and on-site decisions on locations for data collection and the number of collection locations. Post-fieldwork data analysis would be of moderate cost and effort. Based on cost estimates for similar studies (e.g., Turners Falls Project, FERC No. 1889), we anticipate that conducting the requested flow study would cost between \$100,000 and \$150,000.

The applicant has proposed no studies to address this resource concern. The aquatic habitat mapping that BSPC proposes will only characterize habitat in a portion of the project-affected reach. While habitat mapping is necessary, it alone will not allow for an evaluation of project operation impacts to the quantity, quality and location of suitable habitat for specific species of fish and aquatic invertebrates.

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## **Study Request #5**

### **Entrainment of Riverine Fish from the Deerfield River Into the Bear Swamp Pump Storage Facility**

#### ***Goals and Objectives***

The goal of the study is to determine the impact of the Bear Swamp Pump Storage (BSPS) facility during the pumping cycle on entrainment of riverine fish, including early life stages.

The objective of the study is to quantify the number of riverine fishes entrained at the BSPS station intake on an annual basis in order to evaluate potential impacts to fish populations in the lower reservoir (Fife Brook impoundment) and Deerfield River Project's Deerfield No. 5 bypass reach. This will be accomplished through netting using various gear types to quantify and identify species of different life stages.

#### ***Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to riverine fish entrainment, the Division's goals are:

1. Minimize current and potential negative project operation effects such as turbine entrainment that could hinder management goals and objectives.
2. Minimize project-related sources of mortality to riverine fishes in order to restore natural food web interactions and ecosystem functions and values.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information***

Limited project specific information exists regarding entrainment of fish and aquatic organisms at the BSPS facility. Under Article 44 of the Bear Swamp Project license, fisheries surveys were undertaken in the Fife Brook impoundment (lower reservoir) and Bear Swamp Pump Storage (BSPS) upper reservoir: two years of pre-operational surveys were conducted (1972 to 1973), one survey during a transitional year (1974), and two years of post-operational surveys (1975 to 1976). Those surveys collected fish in the newly created upper reservoir, indicating that fish were being entrained at the BSPS intake (Frost and Easte 1977). No further studies have been undertaken in the ensuing years.

BSPC evaluated the potential impact of increasing the hydraulic capacities of the two pump-turbines in 2008 as part of an amendment of license proceeding. In a March 8, 2008 letter responding to comments from Trout Unlimited on the proposed upgrade, BSPC stated that once the turbine upgrades are completed, the intake velocities at the BSPS trashracks will increase from 6.68 fps to 7.54 fps in pumping mode and



from 7.79 fps to 8.88 fps in generation mode (13 percent and 14 percent increases, respectively).<sup>6</sup> However, in a supplementary filing to its amendment application that included an analysis of the potential risk of entrainment due to the proposed upgrade, the increase in intake velocity was calculated as being from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps under low tailwater.<sup>7</sup> The Division assumes that those velocities represent the incremental increase (i.e., in excess of the 7.79/8.88 fps) as a result of the upgrade.

Table E-2 of the July 3, 2008 supplementary filing identified 11 species of fish as occurring in the bypass of the Deerfield River Project's Deerfield No. 5 development (and therefore, conceivably present in the lower reservoir). Of those 11 species, BSPC only selected adult brown and rainbow trout to analyze for risk of entrainment (by comparing target species' burst swim speeds to the calculated intake velocities). As these two species have the highest sustained and burst swim speeds of any fish within the vicinity of the project, they are least likely to be at risk of entrainment. Only analyzing adult salmonids leaves a large data gap with respect to understanding the relative risk of entrainment for other species and/or life stages. In addition, Table E-2 omitted the documented presence of longnose sucker in both the lower and upper reservoirs. As a state species of special concern, it should have been evaluated. Clearly, the fact that it was caught in the upper reservoir documents that it is at risk of entrainment.

As the 2008 entrainment evaluation was a desktop exercise, no empirical data exist on the timing, magnitude and duration of entrainment of riverine fishes in the BSPS area. Riverine species occurrence and susceptibility relative to space and time exposure windows to BSPS pumping are undocumented. This lack of information leaves questions unanswered on the types and extent of impacts to these populations that may be linked to the near daily cycling of river water up and down through the BSPS operations system. Therefore, it is necessary to obtain baseline data on project operation impacts for species potentially impacted by BSPS. An additional study request seeks to obtain an up-to-date, accurate documentation of fish species within the project-affected area.

### *Nexus to Project Operations and Effects*

The Bear Swamp Pump Storage Facility (BSPS) consists of an intake located along the banks of the Deerfield River (which acts as the lower reservoir), a powerhouse, a pressure shaft, and a 118-acre upper reservoir. The powerhouse contains two reversible Francis-type pump turbines that have a total nameplate capacity of 600 MW. The BSPS pumps at a maximum hydraulic capacity of 4,520 cfs and generates at a capacity of 5,430 cfs. The intake to the lower reservoir is covered with trashracks that have 6-inch-clear spacing.

BSPS operates as a peaking facility, typically pumping at night when power prices are low and generating during peak power periods during the day. The upper reservoir is allowed to fluctuate 50 feet (from elevation 1,600 feet mean sea level [msl] down to elevation 1,550 feet msl). However, the lowermost 5.5 feet of storage are held for emergency/reserve conditions, resulting in a usable storage capacity of 4,900 acre-feet. Within a 24-hour period, the facility will generate at full discharge off of the usable storage for 5.9 hours, and then pump for 7 hours to refill the upper reservoir.

The intake velocity at the BSPS lower reservoir trashracks has been calculated to be 6.68 fps in pumping mode and would increase to 7.54 fps once the approved upgrade has been completed. What remains unclear is what lower reservoir elevation these velocities are based on (i.e., if they are for "full pool" then the velocities could be higher when the lower reservoir is at minimum pool). Regardless, velocities ranging from nearly 7 fps (currently) to possibly over 8 fps (post-upgrade) exceed the swimming ability of many riverine species, particularly early life stages that may be moving past the intake.

Entrainment of fish and aquatic organisms associated with water withdrawal and hydroelectric operations has been documented to result in injury or death of entrained organisms. The Massachusetts Division of Fisheries and Wildlife (MADFW) documented the presence of brown and brook trout, longnose and blacknose dace, and white suckers in the No. 5 bypass reach. Frost and Easte (1977) collected 11 species of fish from the lower reservoir, including the state species of special concern longnose sucker. Eight of those 11 species also were sampled from the upper reservoir.

<sup>6</sup> Appendix A of Brookfield Power's March 27, 2008 Non-Capacity Amendment Application to FERC.

<sup>7</sup> BSPC letter to FERC dated July 3, 2008; Accession No. 20080703-4006.

Some of these fish likely spend the majority of time in the lower reservoir (e.g., bluegill, rock bass, pumpkinseed and yellow perch), whereas other species would be expected to move between the lotic environment of the reservoir and the lentic environment of the No. 5 bypass (e.g., white sucker, fallfish, smallmouth bass). Regardless, while inhabiting the lower reservoir, these fish may pass within the vicinity of the BSPS intakes and would be at risk of entrainment and thus exposed to passage through the project pumps and reservoir supply tubes. Regardless of whether fish survive the pumping process, they are lost to the Deerfield River system. Depending on the species, life stages, and numbers entrained, this loss could impact the ecosystem productivity of the stretch of the Deerfield River between the No. 5 dam and the Fife Brook dam and may hinder management and/or restoration goals for fishes.

#### ***Methodology Consistent with Accepted Practice***

The Frost and Easte (1977) study used a combination of sampling methods (boat shocking, gill nets, and rotenone) to document fish assemblages in the upper and lower reservoirs. In order to quantify entrainment of various life stages, it is likely that a combination of methods would provide the most reliable results. As part of the relicensing of the Northfield Mountain Pump Storage Project (NMPS, FERC No. 2485) on the Connecticut River, FirstLight will use a combination of methodologies, including hydroacoustic monitoring, radiotelemetry, and ichthyoplankton netting to assess entrainment.

At BSPS, the Division recommends ichthyoplankton netting either at the intake or off of the water conveyance system to quantify entrainment of early life stages (eggs and larva) and either sampling at the upper reservoir outlet or in the reservoir itself using boat shocking and gill or trap netting to collect older life stages (juveniles and adults). Sampling for planktonic fish larvae should capture early spring spawning species (white suckers) through later season centrarchid species (bass and sunfish). Plankton sampling should utilize a sampling design that adequately captures temporal and spatial changes in water pumping cycle.

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

We know of no other tool that will provide for this type of assessment for all fish species and organisms that may pass through the project. Cost and effort are expected to be moderate to high. At NMPS, the ichthyoplankton sampling component of the entrainment analysis was estimated to cost \$60,000 to \$70,000. Based on this information, the Division estimates it would cost the Applicant \$75,000 to \$100,000 to conduct the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

In conclusion, the Division deems the 2008 entrainment evaluation to be insufficient in the context of the current relicense proceeding. BSPC has not proposed any studies to address this deficiency; therefore the Division is submitting a request for a rigorous, empirical entrainment study.

#### ***Literature Cited***

Frost, J.N. and W.E. Easte. 1977. Bear Swamp Pumped Storage Hydroelectric Project Fishery Study, January 1972 – December 1976. New England Power Company and Massachusetts Division of Fisheries and Wildlife. 73 pp.

## **Study Request #6**

### **Abundance of naturally reproduced trout and distribution of spawning areas in the Deerfield River below Fife Brook Dam.**

#### ***Goals and Objectives***

- Characterize the population of naturally spawning trout in the Deerfield River below the Fife Brook dam.
- Document suitable spawning habitat.
- Estimate the abundance of naturally produced trout in the project area.
- Conduct spawning ground surveys to produce a map of spawning areas, characterize the habitat, and determine the distribution of spawning relative to river flows.

#### ***Resource Management Goals***

The mission of the Massachusetts Division of Fisheries and Wildlife (Division) is to protect and conserve fish, wildlife and their habitats. Trout angling below the Fife Brook dam is a popular and regionally important recreational resource. The Project area includes the Lower Deerfield River Catch and Release Area (Pelham Brook junction to Mohawk Campground in Charlemont).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information***

The original fisheries studies of the Bear Swamp Project (MADFW, 1977) estimated that between 10% and 16% of the trout harvested in the Project area were naturally produced (wild). It was estimated that few stocked trout carried over to the following year, however increases in minimum flows required in the Deerfield River Project Settlement Agreement may now allow stocked trout to survive the summer months. Wild Brook, Brown, and Rainbow Trout were documented in the project area in the 1977 study report. Based on growth rates, the authors surmised that the Brook and Rainbow Trout were spawning in the tributaries and the Brown Trout were spawning in the Deerfield River.

#### ***Nexus to Project Operations and Effects***

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. The project generates power in a peaking mode, resulting in significant within-day flow fluctuations between the minimum and project capacity on an hourly or daily basis. The large and rapid changes in flow releases from hydropower dams are known to cause adverse effects on habitat and biota downstream of a project (Cushman 1985; Bain *et al.* 1988; Blinn *et al.* 1995; Freeman *et al.* 2001; Layzer *et al.* 1989). There are more than 17 miles of lotic habitat below the project's discharge that are impacted by peaking operations at the Fife Brook Station. Peaking operations have been shown to be detrimental to trout spawning and rearing (Person, 2013; NAI, 1998). Bain (1988) found that small fish (like trout fry) that are restricted to shallow depth and slow current habitats (stream margins) were reduced in abundance in regulated rivers and absent at sites with the greatest flow fluctuation. Peaking operations could dewater important spawning or rearing areas, thus limiting productivity of wild trout by direct impacts to their spawning or rearing success or indirectly by limiting the spawning or rearing success of forage fish species. Accordingly, a thorough understanding of the current wild trout population in the project area is needed in order to examine any potential Project-related impacts.

#### ***Methodology Consistent with Accepted Practice***

Fish sampling, measuring length and weight, determining age and origin by reading scales, and calculating associated metrics are commonly used methods to determine fish assemblages and assess fish populations (Bonar *et al.* 2009). Redd counts are commonly used to identify trout and salmon spawning.

### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

This study will require sampling of the Project-affected areas of during spring, summer, and fall. The cost of the study would be moderate to high as seasonal sampling with several types of gear would be required. Based on first year study results, a second year of sampling or specific studies examining impacts of Project Operations may be requested.

### ***Specific Methodology***

#### ***Abundance estimate***

*Fish Sampling* – Trout will captured by electrofishing using a boat mounted with an electrofishing unit with the capacity to adjust the pulse rates between 30 - 120 pulses/second and vary voltage to accommodate ambient conductivity. A barge capable of negotiating riffles and shoals, similarly rigged with an electrofishing unit may be deployed for sampling in the shallower riverine habitats.

Electrofishing will be conducted in a downstream manner, following standardized methods developed specifically for large river quantitative electrofishing surveys (MBI, 2002, Yoder and Kulik, 2003). The start point, end point, and boat track for each sampling station will be geo-referenced using a handheld GPS and transposed to corresponding topographic mapping software program to produce maps of areas sampled.

All captured fish will be measured for fork length (FL; mm), weighed (g), and recorded. Trout will be examined for and passive integrated transponder (PIT) tags. Scales will be removed from trout for age and origin (wild/hatchery) determination. Untagged trout will be tagged with a PIT tag. The PIT tags will be injected into the coelomic cavity, just posterior to the pectoral fins (CBFWA 1999). Data will be recorded on standardized waterproof data sheets.

*Abundance Estimation* – Trout abundance estimates within the study area will be calculated using the closed models *Mt*-Darroch and *Mt*-Chao, provided in the computer program CAPTURE (Otis et al. 1978; White et al. 1982; Chao 1989; Rexstad and Burnham 1991) or equivalent. The model *Mt*-Darroch will be used when capture probabilities of trout are 10% or greater. Model *Mt*-Chao will be used when the data were <10%, because it performs better when data are sparse (Chao 1989). The standard error and 95% confidence intervals for the abundance estimates will also be calculated in CAPTURE. Precision of the estimates will be measured by calculating a coefficient of variation (CV), which is the ratio of the standard error of the estimate to the estimate (Hightower and Gilbert 1984).

*Age and Origin Determination and Analysis* – Scales are to be sampled from each fish from a position above the lateral line and posterior to the dorsal fin with a knife and stored dry within individually labeled scale envelopes. A subsample of scales from each individual will be wet mounted on glass slides then viewed under a microscope. Regenerated scales will be discarded, and annuli and spawning checks identified. Ages will be determined by counting annuli. Ages will be assigned to trout from which scales were not analyzed by constructing an age-length key for each year (Iserman and Knight 2005). Origin (stocked or natural) will be qualitatively determined by examining multiple scales for the presence of annuli within areas of the scale corresponding to its juvenile life stages. In general, naturally produced trout will be exposed to colder water temperatures and limited food availability in winter, which results in areas of constricted or overlapping circuli (annuli). In contrast, hatchery fish are reared in controlled environments and therefore display little to no variability in circuli spacing throughout the year. Therefore the presence of annuli near the center of the scale will indicate the fish is of natural origin while the lack of such annuli or the general appearance of constant circuli spacing throughout the interior of the scale will suggest that the fish was stocked. Areas of the scale corresponding to periods after an individual was stocked (age >2) will however display annuli, and should be ignored for the purposes of origin determination. However, individuals displaying constant scale growth within central areas of the scale (stocked fish) and displaying distinct annuli along scale margins could be classified as holdover fish.

#### ***Trout Spawning Ground Surveys***

The primary purpose of this study is to verify the overall distribution and extent of trout spawning in the project affected area of the Deerfield River below Fife Brook Dam. A secondary purpose is to determine the extent to which spawning redds are subject to de-watering (stranding), relative to the current project operation procedures. Two surveys of the entire project affected area should be conducted, one during the peak fall spawning period (as flow and turbidity conditions allow) and spring-season survey that roughly corresponds to the timing of fry emergence (and possible Rainbow Trout spawning). The determination of

the exact timing of the surveys will be based on water flow and turbidity conditions in the river, which will be assessed weekly. Surveys should be conducted from a small boat, as well as on foot along the river's edge documenting the numbers of fish and redds observed. Shoreline surveying will ensure that redds prone to dewatering by decreasing water levels are located. Redds that are identified at the river's edge will be revisited at minimum flow conditions to identify if they are dewatered at that flow. If the initial survey is at minimum flow redds that are located 'in the dry' will be so identified. Efforts will be made to locate all areas of spawning within free-flowing reach. The approach for identifying spawning areas includes a combination of identifying redds as described above and investigation of channel margins for young-of-year trout when fry are expected to emerge (second survey). Although the intent is to cover as much of the study area as possible, the survey areas will depend on access to the river and safety.

The numbers of fish and redds will be summed over ¼ mile reaches of the river to characterize the magnitude of spawning activity relative to river reach location, and redd locations will be marked on maps of the river. The location of spawning activity will also be recorded with a hand-held GPS unit, either as individual redds (in areas of pocket spawning) or by recording GPS points around areas of extensive spawning activity. The number of redds within these larger areas will be enumerated for density estimates. At each spawning location, whether it contains a single or multiple redds the following information will be recorded:

- Date and time
- Habitat type
- Substrate
- Water velocity
- Width, length of redd
- Water depth
- Water temperature

In addition, as many visible redds as possible will be marked (e.g. with fluorescent painted rocks, or flagging markers) for subsequent identification. When possible, marking of redds will be conducted from a boat to minimize the physical disturbance of spawning areas. These sites should be resurveyed shortly afterward at minimum flow. The intent of this method is to determine the number of redds that are dewatered as water levels decline.

A final report will be developed describing the results of the mark recapture study, summarizing the analysis of the age and origin analysis, and of the spawning surveys, including the total number of redds (and fish) observed, and the numbers in each 1/4, mile survey reach. The spatial distribution of redds in the river will also be documented on GIS maps and the habitat characteristics described. The number of redds that are located 'in the dry' or are dewatered at minimum flow will be detailed. A summary of the proportion of redds marked during the spawning season survey, and still detectable during the post season survey, will also be provided.

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### Study Request #7

#### Massachusetts State-Listed Rare Plants, Baseline Data Collection and Assessment of Operational Impacts

##### *Issue*

Determine the effect of the Project operation and associated infrastructure and recreational elements on state-listed rare plants and natural communities within and adjacent to the Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment, Lower Reservoir, Upper Reservoir, and in all abutting properties owned by the Applicant.

##### *Background*

Rare vascular plants are protected as a resource under the Massachusetts Endangered Species Act through the regulatory listing of these species as Endangered, Threatened, or Special Concern. This stretch of the river includes occurrences and habitat of ten of these species, as well as additional plants that are tracked by the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife (the "Division"). In addition, several uncommon natural plant communities occur here. This study plan includes a method and protocol to collect accurate and sufficient data on all these above-listed types, as part of an overall effort to assess whether, and to what degree, the Project operations may affect rare and protected natural resources. These collected data will provide a baseline of information to which to compare future duplicate studies as a method to document changes that are occurring along the river. To the Division's knowledge, no comparable surveys have been conducted in the study area.

##### *Goals and Objectives*

Locate, describe and quantify populations of state- and watch-listed rare plants and suitable habitat for these rare species, as well as natural plant communities, within and adjacent to the Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment, Lower Reservoir, Upper Reservoir, and in all abutting properties owned by the Applicant. Conduct a literature review to assess the impacts of water level fluctuations on the above natural entities.

The specific objectives of this study are to:

- A. Obtain baseline information, through field surveys, on the locations, suitable habitat (occupied and unoccupied), and population parameters of Massachusetts state-listed rare plant species and other important plant species and communities tracked by the Division..
- B. Assess how current and proposed Project operations affect suitable habitat ,occupied and unoccupied, for state-listed, and important plants (watch-listed) tracked by the Division, and the ecological health of natural communities inhabiting the Project Area. Operational effects may impact the growth rate, stature, density, abundance, vigor, survival, pollination, seed set, seed dispersal and recruitment of, including (but not limited to) the following:

Scientific Name	Common Name	MESA Status
<i>Alnus viridis</i> ssp. <i>crispa</i>	Mountain Alder	Threatened
<i>Carex deflexa</i>	Mountain Sedge	Watch List
<i>Carex lenticularis</i>	Shore Sedge	Threatened
<i>Coeloglossum viride</i>	Frog-orchis	Watch List
<i>Equisetum variegatum</i> ssp. <i>variegatum</i>	Variegated Scouring Rush	Watch List
Data sensitive plant	Data sensitive plant	Special Concern
<i>Platanthera flava</i> var. <i>herbiola</i>	Pale Green Orchis	Threatened
<i>Podostemum ceratophyllum</i>	Threadfoot	Watch List

Prunus pumila var. depressa	Sandbar Cherry	Threatened
Ribes lacustre	Bristly Black Currant	Special Concern
Stellaria borealis ssp. borealis	Northern Starwort	Watch List
Streptopus amplexifolius	Clasping-leaf Twisted-stalk	Watch List
Symphyotrichum tradescantii	Tradescant's Aster	Threatened

- C. Assess how current and proposed placement and enhancement of recreational resources associated with the Project including, but not limited to foot trails, hiking trails, boat launches, picnic areas, and angler access points, will affect the above natural entities.
- D. Inform analysis of invasive plants, to be identified in the “Invasive Plant Study” and other relevant studies, and potential management and control.
- E. Inform the Project regarding any necessary protection, mitigation and enhancement measures, as appropriate.
- F. Compare projected and proposed and the Project Operations Model (requested study #1) outputs to determine the potential negative effects on rare plant species and plant communities.
- G. Establish a series of long-term, repeated measurement plots

#### ***Relevant Resource Management Goals***

The conservation and protection of populations and habitats for the 256 species of plants state-listed as Endangered, Threatened, or of Special Concern under the Massachusetts Endangered Species Act is an important objective of the Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife. State-listed species and their habitats are protected pursuant to the MESA and its implementing regulations (321 CMR 10.00), and the Division seeks to accomplish the resource goals and regulatory requirements of the MESA in order to:

- A. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and meet MESA requirements for the Project.
- B. Conserve, protect, and enhance the habitats for state-listed species that will be affected by Project operations.

All state-listed plants are proposed to be Species of Greatest Conservation Need (SGCN) in the forthcoming 2015 Massachusetts State Wildlife Action Plan. This study request is intended to facilitate the collection of information necessary to conduct impact analyses and develop reasonable conservation, protection, and mitigation measures pursuant to the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), the Federal Power Act (16 U.S.C. §791a, *et seq.*), the Clean Water Act (33 U.S.C. §1251 *et seq.*), and the MESA.

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information***

It is generally known which state- and watch-listed plant species inhabit the Deerfield River in the reach of the Project. The PAD provides a list of plant and wildlife species whose native ranges overlap with the Project-affected area, but it does not provide baseline information on known occurrences of state-listed plant species. Several surveys along this stretch of the River by professional and volunteer botanists have shown that many of these species are dynamic; local populations often display meta-population dynamics, changing in size and location from year to year. This is particularly true of plants species inhabiting sand



bars and high energy shore and cobble islands, including (but not limited to) the state-listed Mountain Alder, Mountain Sedge, Shore Sedge, Sandbar Cherry, Northern Starwort, and Tradescant's Aster.

To the Division's knowledge, no comparable vegetation and rare species habitat mapping has been conducted in the study area.

### ***Nexus to Project Operations and Effects***

Project operations have the potential to directly impact state-listed plants. Changes in the magnitude and timing of water elevation and/or flow dynamics may cause adverse effects to existing and potential habitat for and occurrences of state- and watch-listed plants. Project operations may also adversely affect the growth rate, stature, density, abundance, survival, pollination, seed set, seed dispersal and recruitment of species, especially those inhabiting high energy and high scour areas (e.g., mudflats, sand bars and cobble islands). However, these effects are poorly understood and the Division is not aware of any studies that have evaluated these effects relevant to this Project site.

The timing, rate, and magnitude of releases from the Bear Swamp Project, and the water level fluctuations in the Upper and Lower Reservoirs, may have direct, adverse effects on rare plant populations and their habitats. In order to fill this important information gap, an empirical study is needed to provide information on the relationship between the Project operations and the quantity and quality of state- and watch-listed plant habitat in the Deerfield River. Results will be used by the Division to determine appropriate operational recommendations to protect and/or enhance state- and watch-listed plants and their habitats.

### ***Proposed Methodology***

Field surveys for state- and watch-listed , should involve visual surveys during appropriate phenological windows via intensive meander survey in all suitable habitats. In addition, the rate and height of water level changes resulting from Project operations during the field season will need to be cataloged. Surveys should collect information regarding location, elevation, and population size, extent and condition, in order to assess the effects of seasonal flow dynamics on documented individuals and populations. Data collected should be of sufficient resolution to use the Project Operations Model (Study Request #1) to look at effects over several timescales (e.g., seasonal, monthly, daily during growing season, etc). To determine the potential of Project operations to affect the life-cycle of rare plant populations, botanists will need to determine when rare plants start growth and assess how long it takes for maturation and seed dispersal to occur. In addition to formal surveys, any state-listed rare plant species occurrences identified during other Studies can enhance the data collected during this formal study.

River hydrology statistics and modeling are commonly employed at hydroelectric projects to assess the effects of project operations on the river environment and have been requested for this project in the Instream Flow Study (study request #4) Habitat assessments are also a common tool in developing operational regimes that will reduce impacts or enhance habitat conditions up- and down-stream of hydroelectric projects. Field assessments should involve collecting flood depth, timing, duration, frequency and changes to substrate characteristics along the main-stem of the Deerfield River. Data collected should be sufficient to permit assessment of how the quality, extent, and location of existing and potentially suitable habitat for known populations – and for species exhibiting meta-population dynamics, as described above - changes over the range of flows and synthesized to quantify habitat suitability under each release level.

### ***Survey of State-Listed, Watch-listed, and Natural-Communities***

Field identification of many state-listed species requires considerable expertise and field experience. Therefore, all study plans requiring field surveys and identification of state-listed species need to include the following requirements:

1. Field surveys must be conducted by a qualified biologist in appropriate quality habitats throughout the project area (or a portion thereof, as appropriate), using methodologies consistent with the "NHESP's Endangered Species Habitat Assessment & Survey Guidelines" guidelines.
2. The Division requires pre-approval of the candidate biologist(s) in advance of conduct surveys. We can provide contact information for approved biologists on a species or taxa specific basis, or

we can review the qualifications of other proposed biologists (in which case a copy of the biologist's resume and qualifications should be sent to the Division for prior review).

3. The approved biologists shall submit written survey protocols for Division approval prior to initiation of field work. Survey protocols shall list the specific taxonomic characteristics for definitive identification as well as the characteristics of similar or easily confused species. Please ensure that the biologist contacts our office to discuss these species and their photo-documentation requirements.
4. Collection or handling of state-listed species requires the selected biologist submit a Scientific Collection Permit Application for Division review and approval prior to initiation of field work.

#### ***Baseline Vegetation Survey and Mapping Methodology for Long-term Plots***

In addition to the intensive meadow field survey for state- and watch-listed species, we seek to quantify and map plant communities in which these rare species occur and provide baseline data that can be replicated over time. For this we propose to use a modified version of the EPA's National Wetland Conditions Assessment Vegetation protocols using the "Wetland Boundary" layout each time for the Assessment Area (the "AA"), redefining the "Plot" to a 10 square meter "plot" (not the 100 square meter plot) with one square meter quadrats in each of the SW and NE corners, and using the same data collection sheets defining the "large" bubble as a 2 meters boundary area outside the 10 square meter plot. Geolocating one defined corner of each plot to an accuracy of one meter will allow for the plots to be resurveyed in future years. See <http://water.epa.gov/type/wetlands/assessment/survey/upload/FOM-with-Errata.pdf>

Chapter 5. Vegetation.

#### ***Vegetation quantification for rare species finds***

When a rare species is located, using square meter quadrats, take vegetation data as above and using the same data sheets, including tree cover, for three meters outward in the cardinal directions from all rare species found. Define the edge of the rare plant occurrence as an imaginary vertical drip line from the outermost leaves.

#### ***Mapping Methodology***

As a means to assess and determine levels of change over time that may result from the management and operations of the dam, we propose that to map all riverside rare plants listed above, and all invasive species, plant communities, forest types, and all above water terrain such as rocks, sandbars, and un-vegetated riverbank. The mapping should be at a resolution of 1 meter and cover the river, river bank and riparian area within 5 meters of the upper bank. Mapping should be conducted over a stretch of four summer time periods near June 15, July 15, August 15 and September 15. Maps must be georeferenced precisely so as to be repeatable, as a means to compare change over time to a resolution of 1 meter.

#### ***Methodology Consistent with Accepted Practice***

Rare plant surveys consistent with FERC approved methods in the Turner's Falls FERC 2323. This approach, using the EPA standard, will be comparable to and consistent with the quality of vegetation data collection by federal agencies such as the NPS and BLM.

#### ***Level of Effort and Cost, and Why Alternative Studies will not suffice***

In the PAD, Bearswamp Project identified impacts of the Project operations on wetlands, riparian and littoral zone habitat as a potential issue to be addressed in relicensing. However, additional analyses are needed to understand the impacts of the Project on rare plants and their habitats more broadly. The study proposed here will be moderately time- and cost-intensive. However, the cost is entirely dependent on the number of sample replicates that will be surveyed and measured, all of which should be determined in consultation with the Division.

***Literature Cited:***

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## **Requested Study #8**

### **Massachusetts Freshwater Mussel Species of Greatest Conservation Need, Baseline Data Collection and Assessment of Operational Impacts**

#### ***Issue***

Determine the effect of Project Operation and associated infrastructure and recreational elements on freshwater mussel Species of Greatest Conservation Need and their habitat within the Deerfield River from the Fife Brook Dam (FBD) to the upstream extent of the Deerfield Project # 4 impoundment, and the upper portion of the Lower Reservoir.

#### ***Background***

Freshwater mussel in the order Unionoida (families Unionidae and Margaritiferidae) are protected as a resource under the Massachusetts Endangered Species Act (MESA) through the regulatory listing of these species as Endangered, Threatened, or Special Concern. Further, species not listed under MESA may be identified as a Species of Greatest Conservation Need (SGCN) if threats, population trends, or limitations in distribution necessitate management and conservation actions identified in the State Wildlife Action Plan (SWAP).

In the PAD, BSPC cited two species of mussels present in the Deerfield River Watershed that are currently proposed as SGCN in the forthcoming 2015 Massachusetts SWAP: Eastern Pearlshell (*Margaritifera margaritifera*) and Alewife Floater (*Anodonta imbecilis*). No site specific surveys have been proposed in the PAD, and the last surveys within the project area were conducted in 1996 (McLain 1996), prior to the 1996 Commission order, and 1997 amended license for increased minimum flow releases from the FBD.

#### ***Goals and Objectives***

The goal of this study is to characterize the distribution, abundance and species composition of the freshwater mussel community in the upper end of the lower reservoir and in the 17-mile reach of river downstream to the upstream end of the Deerfield #4 impoundment in order to evaluate potential project impacts from current or future operations and maintenance activities.

The specific objective of the field study is to conduct surveys for freshwater mussels in the upper Fife Brook impoundment and downstream-affected reach to determine presence/absence of mussels, relative abundance, location and habitat preference.

#### ***Relevant Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

- Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
- Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the project.

All state-listed freshwater mussels, and others identified as needing conservation or management in Massachusetts are listed as SGCN in the forthcoming 2015 Massachusetts State Wildlife Action Plan. Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*), the Clean Water Act (33 U.S.C. §1251 *et seq.*), and the MESA.

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate,

defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

### ***Existing Information***

In the PAD, BSPC states that four species of freshwater mussels are known to occur within the Deerfield River watershed: eastern elliptio (*Elliptio complanata*), eastern pearlshell (*Margaritifera margaritifera*, SGCN proposed), eastern floater (*Pyganodon cataracta*), and alewife floater (*Anodonta implicata*, SGCN proposed). The PAD also states that the depauperate mussel assemblage in the Deerfield River is likely related to its characteristic Small Upland River habitat (SUR; Nedeau 2008). The Division agrees with Nedeau's (2008) assessment that SUR habitats, which are dominated by high gradients, confined channels, rocky substrates, cool water temperatures, low nutrient levels, and higher acidity typically reflect habitat used by fewer species. However, other rivers that fit these descriptions do provide habitat for MESA listed and SGCN mussels (i.e. Millers River, Westfield River).

No site-specific surveys have been conducted to determine whether any mussel species are present within the area impacted by project operations since prior to the amended minimum flows in 1997. In 1996, a survey of the Cold River and portions of the Deerfield mainstem were surveyed and no mussels were present. It is currently unclear whether the absence of mussels in 1996 is indicative of the greater habitat and biogeographic constraints in the Deerfield, as suggested in the PAD, or whether previous minimum flows were too low for native mussels. Further, it is unclear if the increased flows instituted in 1997 are sufficient for mussels. This information is needed in order to determine whether project operations are impacting the diversity, distribution and/or abundance of the mussel community in the upper portions of the Fife Brook impoundment and the 17-mile-long riverine reach below the dam. BSPC has not proposed any studies to address this deficiency; therefore, the Division is submitting a request for such a study.

### ***Nexus to Project Operations and Effects***

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam. The Project also releases flows sufficient to generate white-water conditions during specific dates in the summer, strictly for recreational purposes.

Outside of a two month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. Freshwater mussels, if present, could be negatively impacted by project operations. If mussels occur in the lower reservoir, routine drawdowns associated with peaking operations could strand them, leaving them vulnerable to desiccation or predation. Likewise, rapidly changing habitat conditions between base flows and generation flows below the project could restrict mussels from otherwise suitable habitat, limiting and/or stressing these sensitive populations.

The Division requests that BSPC conduct a survey of the upper portion of the Fife Brook impoundment and the reach downstream of Fife Brook Dam in order to determine the diversity, abundance, and distribution of freshwater mussels. Results of the survey would be used, in conjunction with the Instream Flow Study (# ) and the Project Operations Study (# ), to determine an appropriate below-project flow prescription, as well as to recommend an appropriate water level management protocol for the Lower Reservoir (e.g., limiting impoundment fluctuations to protect mussel populations).

### ***Proposed Methodology***

The Division requests a mussel survey be conducted at the project. Because field identification of freshwater mussels can be quite difficult, the Applicant must hire a freshwater mussel expert to perform the assessment. The methodology should be similar to that used in recent licensing proceedings.<sup>8</sup> In brief,

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<sup>8</sup> Letter from Indian River Power Supply to FERC, dated September 17, 2004. Indian River Project, FERC No. 12462; Glendale Project (FERC No. 2801) Mussel Survey in Glendale Hydroelectric Project Application for Subsequent License (FERC No. 2801), Volume 2, Appendix C, page 209, October 2007; Freshwater Mussel Survey in the Nashua River in the Bypass Reach, Tailrace, and Impoundment of the

unconstrained surveys, transects or quadrat based surveys are conducted in all suitable habitats, or a predefined subsample thereof, using a combination of snorkel and SCUBA (in depths > 3ft.). Sub-surface excavation may be necessary to improve detection probability and abundance estimates. The extent of all habitat surveyed is geographically recorded. The location and biometrics of each mussel found are recorded. Each mussel is identified to species and photographic or specimen vouchers should be collected for each species. Results should include the number of each mussel species observed, relative abundance (catch per unit effort) by species, the location and condition of each mussel, and a habitat description where it was found. For the Lower Reservoir, the survey should occur along the uppermost 1,300 feet of the Lower Reservoir. Given the length of the downstream reach, a subsampling procedure may be appropriate; however, particular attention should be given to the island complexes and temporary flow refugia from downed woody debris in the development of a subsampling procedure.

***Methodology Consistent with Accepted Practice***

The survey should follow standard protocols developed by the Massachusetts Natural Heritage Endangered Species Program (NHESP), similar to those applied during recent Massachusetts hydro re-licensings<sup>9</sup>. The Division and NHESP will work with BSPC to develop and refine the mussel survey protocol.

***Level of Effort and Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take 2 to 3 weeks to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls Project (FERC No. 1889) was estimated to cost \$20,000 to \$30,000. The United States Fish & Wildlife Service and Division estimate that it will cost BSPC \$20,000 to complete the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

***Literature Cited:***

- McLain, D. 1996. 1996 Survey of Freshwater Mussels in the Connecticut River Valley in Massachusetts. Report prepared for the Massachusetts Natural Heritage and Endangered Species Program.
- Nedean, E.J. 2008. *Freshwater Mussels and the Connecticut River Watershed*. Connecticut River Watershed Council, Greenfield, MA.

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East Pepperell Dam (Pepperell, MA) in Pepperell Hydroelectric Project Application for Original License, Volume 2, Appendix C, October 2013.

<sup>9</sup> Freshwater Mussel Survey in the Connecticut River for the Turners Falls and Northfield Mountain Hydroelectric Projects: FERC Project No. 1889, 2485. Prepared by Biodiversity, LLC. for FirstLight Power Resources. March 2012; Freshwater Mussel Survey in the Nashua River in the Bypass Reach, Tailrace, and Impoundment of the East Pepperell Dam (Pepperell, MA) in Pepperell Hydroelectric Project Application for Original License, Volume 2, Appendix C, October 2013.

### Requested Study #9

#### Massachusetts State-Listed Odonates, Baseline Data Collection and Assessment of Operational Impacts

##### *Issue*

Determine the effect of the Project operation and associated infrastructure and recreational elements on state-listed Odonata within and adjacent to the Deerfield River from the upstream extent of the Fife Brook reservoir to the upstream extent of the Deerfield Project #4 impoundment, and in all abutting properties owned by the Applicant.

##### *Background*

Odonates (dragonflies and damselflies) are protected as a resource under the Massachusetts Endangered Species Act (MESA) through the regulatory listing of these species as Endangered, Threatened, or Special Concern. This stretch of the river includes occurrences and habitat of the listed Ocellated Darner (*Boyeria grafiana*). Other listed species have been documented in the Deerfield River up or downstream of the project area, or are known from similar habitats in nearby rivers. Species listed under MESA are under the management and regulatory authority of the Natural Heritage and Endangered Species Program (NHESP) of the Massachusetts Division of Fisheries and Wildlife (Division).

A thorough survey of the odonate fauna in the project area has not been conducted to date. This study plan includes a method and protocol to collect qualitative data on species presence within the project area downstream of the Fife Brook Dam (FBD), and a quantitative assessment of emergence habitat within the lower reservoir to determine if, and to what degree Project operations may affect rare and protected natural resources. These data will provide a baseline of information to which to compare future duplicate studies as a method to document changes that are occurring along the river, and to assess alternative water management strategies on listed odonates. To the Division's knowledge, no comparable studies have been conducted in the study area.

##### *Goals and Objectives*

Locate occurrences of state-listed odonates and suitable habitat within and adjacent to the Deerfield River from the upstream extent of the FBD impoundment to the upstream extent of the Deerfield Project #4 impoundment, and to assess lower impoundment elevation changes on emergence habitat and success of odonates.

The specific objectives of this study are to:

- A. To obtain baseline information on which state-listed odonates inhabit and are emerging within the Bear Swamp Lower Impoundment, and the riverine habitat below the Fife Brook Dam.
- B. To determine if current water level fluctuations permitted under the project licenses affect the abundance, composition, and distribution of state-listed rare odonate populations, and whether these populations can be protected and/or enhanced through modifications to Project operations or other mitigation measures.

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Table 1: MESA listed odonates known from project area or similar habitats.

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Scientific Name	Common Name	Status
<i>Boyeria grafiana</i>	Ocellated Darner	Special Concern
<i>Gomphus abbreviatus</i>	Spine-Crowned Clubtail	Special Concern

<i>Gomphus descriptus</i>	Harpoon Clubtail	Endangered
<i>Gomphus quadricolor</i>	Rapids Clubtail	Endangered
<i>Ophiogomphus carolus</i>	Riffle Snaketail	Threatened

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### **Relevant Resource Management Goals**

The conservation and protection of populations and habitats for the 25 species of Odonates listed as Endangered, Threatened, or of Special Concern under the Massachusetts Endangered Species Act is an important objective of the Natural Heritage & Endangered Species Program of the Massachusetts Division of Fisheries and Wildlife. State-listed species and their habitats are protected pursuant to the MESA and its implementing regulations (321 CMR 10.00), and the Division seeks to accomplish the resource goals and regulatory requirements of the MESA in order to:

- A. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and meet MESA requirements for the Project.
- B. Conserve, protect, and enhance the habitats for state-listed species that will be affected by Project operations.

All state-listed odonates are proposed to be Species of Greatest Conservation Need (SGCN) in the forthcoming 2015 Massachusetts State Wildlife Action Plan. This study request is intended to facilitate the collection of information necessary to conduct impact analyses and develop reasonable conservation, protection, and mitigation measures pursuant to the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), the Federal Power Act (16 U.S.C. §791a, *et seq.*), the Clean Water Act (33 U.S.C. §1251 *et seq.*), and the MESA.

The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

### **Public Interest**

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources..

### **Existing Information**

In the PAD, BSPC identified two MESA listed odonate species that may occur within or adjacent to the project area including *Boyeria grafiana* and *Somatochlora elongata*, but the PAD did not discuss any known or potential adverse effects for these species. While *S. elongata* is known to occur in the towns of Florida and Savoy, this species is associated with low gradient and slow moving streams and vegetated ponds. The adults can, however, be located a great distance from the breeding water bodies (Nikula et al. 2007, NHESP 2008a). The Division does not foresee any conflicts with hydropower operations with this species within the Bear Swamp and FBD Project Area.

*Boyeria grafiana* prefers rocky cool water streams and mid-sized rivers in western Massachusetts (Nikula et al. 2007, NHESP 2008b). The species has been observed as adults in the Deerfield River immediately upstream of the Lower Impoundment, as exuviae within the project area downstream of the FBD (NHESP Data), and as nymphs below the FBD (Michael Cole, Cole Ecological, Inc., personal communication). Other species of MESA listed dragonfly have been observed in reaches of the Deerfield River in Vermont (*Gomphus descriptus*, Michael Blust, Green Mountain College, personal communication), and downstream of the Shelburne Falls Dam (*Gomphus abbreviatus*, *Ophiogomphus carolus*, NHESP Data). All three species inhabit clear cool water rivers with rocky to sandy substrates (NHESP 2008 c,d,e).



Diversion from reference macroinvertebrate communities has been reported in the reaches immediately downstream of the FBD (Cole 2013). Reduced biological condition at sites closest to the FBD suggest that hydrologic regime, ramping rate and hypolimnetic releases likely affect habitat quality for native aquatic invertebrates compared to downstream and reference streams (Cole 2006, 2013). Effects of these project operations on listed odonates in the Deerfield River is not currently known, but water level variation, rates and timing of that variation, and water temperature are likely to reduce habitat suitability for dragonfly nymphs and potentially cause mortality during emergence and eclosure behavior. There are no known surveys of odonates within the Lower Reservoir.

#### ***Nexus to Project Operations and Effects***

Project operations have the potential to directly impact state-listed odonates. Changes in the magnitude and timing of water elevation and/or flow dynamics may cause adverse effects to existing and potential habitat for and occurrences of state-listed odonates in the lower reservoir and the Deerfield River downstream of the FBD. Project operations may adversely affect the life cycle of state-listed odonates, as reduced stream temperatures may reduce the growth and development of aquatic larval nymphs, and water level fluctuations from project operations may interfere with emergence and eclosure of nymphs into the adult stage.

The timing, rate, and magnitude of releases from the Bear Swamp Project, and the water level fluctuations in the Impoundment, may have direct, adverse effects on rare odonate populations and their habitats, but these effects are not well understood. In order to fill this important information gap, an empirical study is needed to provide information on the relationship between the Project operations and the quantity and quality of state-listed plant habitat in the Deerfield River. Results will be used by the Division to determine appropriate operational recommendations to protect and/or enhance state-listed odonates and their habitats.

#### ***Proposed Methodology***

In the Lower Reservoir and downstream of the FBD on the river, these surveys will concentrate on exuviae collection and dredging for nymphs. In the Lower Reservoir, surveys will also include visual searches for recently emerged odonates, especially damselflies, near the water's edge. Field surveys, within appropriate habitat types, should involve visual surveys during appropriate phenological windows via transects, unconstrained bank surveys, and/or fixed plots. In addition, the rate and height of water level changes resulting from Project operations during the field season will need to be cataloged.

Field identification of many state-listed species requires considerable expertise and field experience. Therefore, all study plans requiring field surveys and identification of state-listed species should be amended to include the following requirements:

1. Field surveys should be conducted by a qualified biologist in appropriate quality habitats throughout the project area (or a portion thereof, as appropriate), using methodologies consistent with the "NHESP's Endangered Species Habitat Assessment & Survey Guidelines" guidelines.
2. The Division requires pre-approval of the biologist prior to conducting surveys. We can provide contact information for pre-approved biologists on a species or taxa specific basis, or we can review the qualifications of other proposed biologists (in which case a copy of the biologist's resume and qualifications should be sent to the Division for prior review).
3. The selected biologists shall submit written survey protocols for Division approval prior to initiation of field work. Please ensure that the biologist contacts our office to discuss these species and their photo-documentation requirements.
4. Field identification of odonate nymphs and exuviae is difficult, if not impossible. Therefore survey methods should include the collection, identification and reporting of all odonate species present in a sample.
5. Collection or handling of state-listed species requires the selected biologist submit a Scientific Collection Permit Application for Division review and approval prior to initiation of field work.

Surveying for exuviae involves methodical visual searches of appropriate substrates near (typically, within 10 feet) the river's edge. Appropriate substrates vary by species, and because there is some degree of within-species variability, these may include sand, silt, rocks, trees, coarse woody debris, undercut banks, tree / plant roots, and anthropogenic structures such as bridge abutments or walls. Visual surveys should be carried out starting at dawn. Most odonates emerge at night, and wind, rain or water level changes can remove exuviae quickly if they're not located in protected sites. Variation in the timing of exuviae surveys may be necessary in the Lower Reservoir depending on the timing of water changes. Exuviae surveys in the Lower Reservoir will also necessitate transects placed perpendicular to the low water line, and extending vertically along the bank slope to a point 10m above the high water line of the reservoir (Martin 2010).

Surveying for nymphs via dredging also depends on the species. Sand/silt/cobble dwellers can be adequately sampled for presence/absence by kick-netting. Species that cling to coarse woody debris or to rocks/concrete need to be sampled by visual inspection (which might involve snorkeling or SCUBA diving).

Phenological differences exist within and between the family Gomphidae (Clubtails, Genera: *Gomphus* and *Ophiogomphus*) and the family Aeshnidae (Darners: *Boyeria grafiana*), and will necessitate repeated site visits for nymphal and exuvial surveys throughout a sampling season (April – September). Qualified biologists will need to survey for odonates at a suite of sites up- and downstream of the FBD at several times during the field season to catch the emergence peaks of state-listed odonate species. Because odonate species may differentially emerge within different habitat types, surveys should assess emergence across a range of depths, substrates, water velocities, and other factors. Finally, to make the connection (if any exists) between Project operations and odonate emergence, the study will need to determine the elevation of nymphs relative to the water surface when they initiate emergence, how long emergence takes, and both the magnitude and rate of water level fluctuations.

The height of water levels will need to be cataloged during the field season, but the magnitude and rate of water level change will likely need to be addressed through the development of river hydrology statistics and modeling, which are commonly employed at hydroelectric projects to assess the effects of project operations on the river environment. Field survey results, as described above, should be combined with the results of a river flow model(s) that evaluate hydrologic changes in the Connecticut River due to existing and proposed Project operations, as requested in related studies by the Division. Modeling should enable the quantitative assessment of how water surface elevations within the Lower Reservoir and the reaches downstream of the FBD are affected by discharges from the FBD, pumping into the Upper Reservoir, and their associated generating facilities. Field assessments may be required to collect flood depth, timing, duration, frequency and changes to substrate to inform the model. Such measurements should be taken over a range of test flows, between existing minimum flows and maximum project generation flows, and should be synthesized to quantify how water surface elevations change.

#### ***Methodology Consistent with Accepted Practice***

Surveys of larval odonates via exuviae collection, dredging, and visual surveys are standard methodologies for studying odonate populations. Methodologies requested are consistent with surveys in other regulated rivers in Massachusetts (Morrison et al. 2002 & 2004, McLain et al. 2004 & 2006, Martin 2010, Biodrawversity 2013), and those associated with other Federal Energy Hydroelectric Relicensing Study Determinations (Biodrawversity 2015).

#### ***Level of Effort and Cost, and Why Alternative Studies will not suffice***

The field assessment portions of this study will be moderately time- and cost-intensive; the cost is entirely dependent on the number of sites, number of sample replicates, and the extent of the covariate data that are measured, all of which may be flexible and determined through consultation with the Division.

Level of effort and cost for model development are expected to be moderate, and running of various scenarios through the model(s) may be needed throughout the relicensing process to assess the implications of changes to Project operations. However, because similar models have been requested as part of other study requests, the modeling portion of this study may not represent a significant increase in effort.

***Literature Cited:***

- Biodrawversity. 2013. Comparison of Larval Dragonfly (Odonata: Anisoptera) Species Composition and Density in Rural and Urban Reaches of the Connecticut River in Massachusetts. Report prepared for FirstLight Power Resources, Northfield, MA. January 2013. 14pp.
- Biodrawversity. 2015. Relicensing Study 3.3.10: Assess Operational Impacts on Emergence of State-Listed Odonates in the Connecticut River Interim Study Report. Northfield Mountain Pumped Storage Project (No. 2485) and Turners Falls Hydroelectric Project (No. 1889). Prepared for FirstLight Power Resources, Northfield, MA. April 2015. 26pp.
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- Morrison, F., D. McLain, L. Sanders. 2002. A Post-Construction Survey of Dragonfly Species at the "Urgiel-Upstream" Site, Gill, Massachusetts. Report prepared for New England Environmental, Inc. Amherst, MA. August 26, 2002. 14pp.
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- NHESP. 2008a. Species Factsheet: Ski-tipped Emerald Dragonfly *Somatochlora elongata*. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA. August 2008. Available online: <http://www.mass.gov/eea/docs/dfg/nhesp/species-and-conservation/nhfacts/somatochlora-elongata.pdf>
- NHESP. 2008b. Species Factsheet: Ocellated Darner *Boyeria grafiana*. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA. August 2008. Available online: <http://www.mass.gov/eea/docs/dfg/nhesp/species-and-conservation/nhfacts/boyeria-grafiana.pdf>
- NHESP. 2008c. Species Factsheet: Harpoon Clubtail *Gomphus descriptus*. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA.

- August 2008. Available online: <http://www.mass.gov/eea/docs/dfg/nhosp/species-and-conservation/nhfacts/gomphus-descriptus.pdf>
- NHESP. 2008d. Species Factsheet: Spine-Crowned Clubtail *Gomphus abbreviatus*. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA. August 2008. Available online: <http://www.mass.gov/eea/docs/dfg/nhosp/species-and-conservation/nhfacts/gomphus-abbreviatus.pdf>
- NHESP. 2008e. Species Factsheet: Riffle Snaketail *Ophiogomphus carolus*. Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program, Westborough, MA. August 2008. Available online: <http://www.mass.gov/eea/docs/dfg/nhosp/species-and-conservation/nhfacts/ophiogomphus-carolus.pdf>

## **Study Request # 10**

### **Northern Long-Eared Bat Acoustic Survey**

#### ***Goals and Objectives***

The goal of this study is to determine whether the federally threatened northern long-eared bat, *Myotis septentrionalis*, (NLEB) is present within the project boundary.

The specific objective of the field study is to conduct an acoustic survey for NLEB during the summer period to document presence/absence of the species.

#### ***Relevant Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the project.

Specific to NLEB, the Division's goals are:

1. Protect, enhance, or restore, diverse foraging and roosting habitat (maternity and non-maternity) for NLEB.
2. Avoid NLEB mortality by conducting tree removal outside the time of year NLEBs are utilizing summer habitat (April 15 through August 15).

NLEB is a federally threatened species. As such, this study request is intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures for the species pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*).

It is the goal of the U.S. Fish and Wildlife Division to recover the NLEB so that it can be removed from the list of threatened species in the future.

#### ***Background and Existing Information***

According to this office's online endangered species consultation system, which provides known occurrences at the town level, the northern long-eared bat (NLEB) potentially occurs in the project area. While the PAD provides no site-specific information on the botanical resources within the project area, it does give descriptions of the dominant vegetative communities found within the watershed. Based on those vegetative community descriptions, the project area likely contains habitat suitable for NLEB. Baseline information regarding the presence/absence and distribution of NLEB within the project area is lacking. These data are needed in order to meet the goal of evaluating project effects. If NLEB are present within the project area they may benefit from protection, mitigation and enhancement (PMEs) measures, given the potential effects of current and future operations and maintenance activities.

#### ***Nexus to Project Operations and Effects***

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing, frequency or duration of those fluctuations (though typically they occur on a daily basis).

The majority of lands associated with the project currently are protected through a conservation restriction (CR) conveyed to the Massachusetts Department of Environmental Management (MADEM). The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of "river corridor" downstream from Fife Brook dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and

electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license.

Based on vegetative community descriptions provided in the PAD, the project area likely contains habitat suitable for NLEB. While BSPC acknowledges that NLEB may exist in the project vicinity, it maintains that continued operation of the project is unlikely to have any effect on NLEB populations. Even though BSPC is not proposing any new construction land management activities that could impact bat habitat or hibernacula, that could change during the relicensing process. For example, additional recreational trails could be a requirement of any new license issued for the project. Those trails could require that trees be cut, which could result in bat mortality if the removal occurs during a time when bats are unable or unwilling to flee a tree that is felled when they are inside. Without knowing if and where NLEB occur within the project area, the Division cannot determine if existing operations (e.g., maintenance activities on project lands) or future activities could result in adverse effects to NLEB populations.

#### ***Methodology Consistent with Accepted Practice***

The Division requests that the Applicant conduct a bat survey following the U.S. Fish and Wildlife Service's 2014 Revised Range-Wide Indiana Bat Summer Survey Guidelines issued on January 13, 2014 (USFWS 2014a), per the Northern Long-Eared Bat Interim Conference and Planning Guidance (USFWS 2014b).

In general, survey methodology should consist of having a qualified acoustic surveyor conduct acoustic surveys during the summer period (May 15 through August 15). Per Service guidance, non-linear projects should have a minimum of 4 detector nights per 123 acres of suitable summer habitat, with 2 detector locations per 123 acre "site" being sampled until at least 4 detector nights have been completed over the course of at least 2 calendar nights.

To maximize the quality of recorded echolocation calls, detectors should be positioned at least 1 meter off of the ground, at an angle  $\geq 45$  degrees and with PVC tube weatherproofing. The acoustic sampling period for each site must begin at sunset and end at sunrise each night of sampling.

Data analysis should consist of using currently available acoustic bat identification programs to determine if positive detections of NLEB calls were recorded.

A report of the acoustic survey results should include:

- An explanation of any modifications from the original survey plan;
- Description of acoustic monitoring sites, survey dates, duration of survey, weather conditions, and a summary of findings;
- Map identifying acoustic monitoring locations and a corresponding table including the GPS coordinates;
- Table with information on acoustic monitoring and resulting data, including detector GPS coordinates, survey dates, survey hours;
- Detailed analysis and results of any qualitative acoustic analysis conducted where a program(s) considered NLEB presence likely, including justification for rejecting any program MLE results (if applicable); and
- Photographs of each acoustic site documenting the location of the detector, the orientation of the detector, and the detection cone.

A similar study was undertaken in 2014 by Grande Prairie Wind, LLC as part of a wind power development project proposed in Holt County, Nebraska; therefore the methodology is consistent with accepted practice.

#### ***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study should take one field season to complete. The level of effort required is moderate. Given the amount of potentially suitable habitat, the project area may contain 10 or more survey sites with 40 or more detector nights. The Division estimates it will cost BSPC \$20,000 to \$40,000 to complete the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

***Literature Cited***

U.S. Fish and Wildlife Service. 2014a. Range-Wide Indiana Bat Summer Survey Guidelines. 41 pp.

U.S. Fish and Wildlife Service. 2014b. Northern Long-Eared Bat Interim Conference and Planning Guidance for Regions 2, 3, 4, 5, & 6. 67 pp.

### Study Request #11

#### **Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and their Associated Habitats in the Fife Brook Impoundment and 17-Mile Reach Downstream of Fife Brook Dam**

Conduct a study to quantify impacts of reservoir fluctuation on riparian, wetland, emergent aquatic vegetation (EAV), submerged aquatic vegetation (SAV), littoral zone and shallow water aquatic habitats in the Fife Brook impoundment (lower reservoir).

#### ***Goals and Objectives***

The goal of this study is to obtain baseline information on riparian, wetland, emergent and submerged aquatic vegetation, and associated shallow water aquatic habitats (subject to operational inundation and exposure to near exposure) known to occur in the project area. Information would be used to determine whether riparian, wetland, EAV and SAV, littoral, and shall water (e.g., mid-river bars and shoals) habitats are impacted by current water level fluctuations permitted under the Bear Swamp Project license and whether these vegetation types and shallow water habitats can be protected and restored by modifications to project operations or other mitigation measures. This information is needed to determine whether the project operations affect plants, habitat, and wildlife in the project area, whether aquatic vegetation and its habitats can be enhanced by modifications to project operations or other mitigative measures, and whether there is any unique or important shoreline or aquatic habitats that should be protected.

The specific objectives of the field study, at a minimum, include:

1. quantitatively describe and map wetland types within 200 feet of the shoreline, and describe associated wildlife;
2. delineate, quantitatively describe, and map all wetland types, including invasive species and wildlife observed (e.g., bald eagle nesting, water fowl nesting) within 200 feet of the shoreline, and the extent of this habitat if it extends beyond 200 feet; and
3. quantitatively describe (e.g., substrate composition, vegetation type and abundance) and map shallow water aquatic habitat types subject to project operation inundation and exposure, noting and describing additional areas where water depths at lowest operational range are wetted to a depth of less than one foot (flats, near shore areas, gravel bars, with very slight bathymetric change).

A second year of study may be required should river discharge in the first year prove to be atypical (outside of 25<sup>th</sup> to 75<sup>th</sup> percentile of average weekly flow values) during the study period.

The field study should produce a habitat inventory report that includes:

1. the results of the field study in the form of maps and descriptions;
2. an assessment of project effects on wetland, riparian, littoral zone vegetation and shallow water habitats, invasive plant species, and wildlife habitat at the project;
3. recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures; and
4. recommendations for plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection and protection of key nest and roost trees for bald eagles.

#### ***Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to plant communities and wildlife, the Division's goals are:



1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Minimize current and potential negative project operation effects on riparian, wetland and aquatic vegetation.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

### ***Existing Information***

In the PAD, BSPC states that no formal delineation of wetland, riparian, or littoral habitats has been conducted with the project boundary. Based on the Service's National Wetland Inventory (NWI) mapping, three wetland types occur within the project area: lacustrine, palustrine, and riverine wetlands. Of the 425 acres of wetlands mapped by NWI, 95 percent are lacustrine (the upper reservoir) or riverine (lower reservoir and river channel downstream of Fife Brook dam). The nearly 24 acres of palustrine habitat are located within the river channel or immediate floodplain of the river. In addition, the Massachusetts Natural Heritage and Endangered Species Program (NHESP) has identified four potential vernal pools within the project boundary. According to BSPC, no site-specific lists of plant or animal species known to occur in wetland, riparian, and littoral habitats are available.

While the PAD provides lists of plant and wildlife species whose native ranges overlap with the project area, it does not provide any baseline information on known occurrences of these species in the wetlands, riparian, littoral and shallow water habitats, within or adjacent to the project area. Plants and wildlife occurring in these habitats may benefit from protection, mitigation and enhancement (PMEs) measures, given the potential effects of continuing the current peaking operating regime.

Baseline information on the wetlands, riparian, and littoral resources within the project area is needed.

### ***Nexus to Project Operations and Effects***

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam. In the PAD, BSPC states that the shoreline of the lower reservoir and the reach of the Deerfield River immediately below Fife Brook Dam are lined with rip rap. While this likely limits the amount of natural vegetation that can persist, the exact geographic extent of the artificial armoring is unclear.

Outside of a two month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. The PAD contains no information on the timing, frequency and magnitude of reservoir fluctuations over the course of a year and how that relates to aquatic plant species establishment, growth, survival, littoral zone or other shallow water habitat fish spawning periods and their effects on these fishes (reproduction success and subsequent recruitment) in available and utilized habitat, and how the quantity and quality of these shallow water habitats are effected by project operational manipulation/alteration, as currently permitted or proposed.

Water level fluctuations due to project operations could affect EAV and SAV habitat as well as the quantity and quality of littoral and shallow water habitat. These operational water level fluctuation effects (in both of the reservoirs and the riverine reach downstream of the dam) are expected to impact fish species' use of these habitats and may affect spawning fishes reproductive success and subsequent population recruitment, including to fallfish and the state listed special concern longnose sucker.

The current operating mode may affect wetland, riparian, littoral and other shallow water habitats, and promote the introduction and expansion of invasive plant species through fluctuating water levels. A study that explains the relationship between the proposed mode of operation and the type and quantity of wetland, riparian, littoral, shallow water habitats, and invasive species affected would help inform a decision on the need for protection and/or control of these resources in the license.

Riparian buffers provide for river bank stability, reduction in nutrient and sediment from runoff, shading and reduced solar heating of river waters and wildlife habitat (including eagle nesting and roosting habitat) and movement corridors. Management of the project's shorelines are within the scope of project review and a Shoreline Management Plan is likely to be required. Incorporation of riparian resource protection and enhancement into this plan will require baseline information on existing conditions.

#### ***Methodology Consistent with Accepted Practice***

The PAD currently contains maps portraying general wetland types from the upper end of the lower reservoir to a point 7.5 miles downstream of the Fife Brook Dam. The proposed study should utilize existing information in conjunction with field surveys designed to describe the characteristics of each mapped wetland, riparian, littoral and shallow water habitat, including plant species composition, relative abundance/density, habitat quality, and land use. These surveys should be conducted to describe these habitats under low water level conditions (i.e., minimum reservoir elevations and minimum flows below Fife Brook Dam). Information collected should include:

1. Plant species composition, and their relative abundance/density and condition/structure (e.g., seedlings);
2. Structured data, including estimates of average heights and aerial cover of each vegetation layer (specifically denoting invasive species);
3. Aquatic habitat substrate composition, quantity (i.e., percent types and area), wood structure (relative abundance measure applied by area), water depths (inundated, exposed, and water less than one foot);
4. Predominant land use(s) associated with each cover type;
5. Wildlife sightings should be noted and any active nest or roost trees utilized by bald eagles should be identified and geo-referenced; and
6. Field-verified wetland, riparian, and littoral and shallow water habitats and invasive species occurrences should be geo-referenced as polygons and overlain on orthophotos at a suitable scale.

#### ***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, the Division estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified wetland, riparian and littoral habitat mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on select or critical areas within the project boundary, without providing guidance on what criteria it would use to determine whether an area was critical or not. As outlined in the expected framework (Table 6.3-1 of the PAD), the Division does not believe BSPC's proposed study would achieve the objectives identified herein.

## **Study Request # 12**

### **Baseline Study of Terrestrial Wildlife and Botanical Resources**

Conduct a study to obtain baseline information on terrestrial wildlife and botanical resources within the project boundary.

#### ***Goals and Objectives***

The goal of this study is to characterize and describe the terrestrial wildlife and botanical resources that use representative upland habitats within and adjacent to the project boundary in order to evaluate potential project impacts from current or future operations and maintenance activities.

The specific objectives of the field study, at a minimum, include:

1. Survey and inventory overall existing upland wildlife habitats;
2. Note the occurrence of wildlife sighting during the course of the surveys;
3. Survey and inventory vegetation cover classes and land use;
4. Survey and evaluate the presence of targeted RTE species or associated habitats; and
5. Survey and inventory the nature and extent of upland invasive and exotic vegetation species.

#### ***Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to terrestrial wildlife and their habitats, the Division's goals are:

1. Protect, enhance, or restore diverse high quality terrestrial habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Minimize current and potential negative project effects of ongoing operation and/or maintenance activities on terrestrial wildlife and vegetation.
3. Protect habitat important to the persistence of the federally threatened northern long-eared bat (NLEB) within the project boundary.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information***

The PAD provides no specific information on the botanical resources within the project area, only descriptions of the dominant vegetative communities found within the watershed. While Table 5.5-1 provides a list of invasive plants found within the Deerfield River watershed, none are explicitly identified as occurring within the project area. Likewise, the lists of mammals, birds, amphibians and reptiles are only those that potentially may occur within the project area.

Baseline information on terrestrial and wildlife resources within the project area is needed in order to meet the goal of evaluating project effects. Plants and wildlife occurring in these habitats may benefit from protection, mitigation and enhancement (PMEs) measures, given the potential effects of current and future operations and maintenance activities.

### ***Nexus to Project Operations and Effects***

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing, frequency or duration of those fluctuations (though typically they occur on a daily basis).

The majority of lands associated with the project currently are protected through a conservation restrictions (CR) conveyed to the Massachusetts Department of Environmental Management (MADEM). The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of “river corridor” downstream from Fife Brook dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license.

The project area contains habitat suitable for NLEB. In addition, according to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) database, 27 state-listed species may occur in the vicinity of the project.

BSPC states it is not proposing any new construction, changes to current land management practices, or new land management activities as part of this licensing proceeding. However, the PAD provides no description of the types of land management practices that BSPC currently employs. Without knowing what terrestrial resources and wildlife occur in the project area, or what types of land management and/or maintenance activities BSPC routinely undertakes, the Division is unable to determine if impacts are occurring currently or if they may occur under any new conditions that could be imposed on a new license (e.g., additional recreational amenities such as trails).

### ***Methodology Consistent with Accepted Practice***

The Division recommends that BSPC follow the methodology detailed in FirstLight’s Study Plan 3.4.1, as described in the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485) filed with FERC on August 14, 2013. Pursuant to the Study Plan Determination issued on September 13, 2013, FERC approved FirstLight’s proposed methodology; therefore, we assume it is consistent with accepted practice.

In general, the study consists of two tasks. The first task is a literature review to collect information needed to develop vegetation type maps and calculate percent acres of each vegetation type present in the study area. The second task is to conduct field surveys to document wildlife habitat and occurrence, vegetative cover types and invasive plant species in the project area.

There are anecdotal accounts of bald eagles nesting and roosting along the Deerfield River in the vicinity of the project. During the field surveys, biologists should document the occurrence of any bald eagle nesting and roosting sites and provide an assessment of the status (healthy, diseased, etc.) and level of protection (e.g., within a right-of-way, on protected conservation land) of each site. Where encountered, bald eagle nests and roosting trees should be GPS located and photo-documented.

The study report should include:

1. Maps of the project area showing locations and extent of habitats, vegetative cover, locations of invasive species, and known eagle roosting and nesting trees (as both polygons and point locations, as appropriate);
2. Tabular summaries of the data;
3. An assessment of project effects (operations, maintenance activities, potential future recreational amenities, etc.) on terrestrial habitat and wildlife at the project;

4. Recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection of key nest and roost trees for bald eagles.

***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, the Division estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified terrestrial wildlife and vegetation cover type mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on the 7.5 miles reach downstream of Fife Brook Dam. This would omit the majority of upland project lands. As outlined in the expected framework (Table 6.3-1 of the PAD), the Division does not believe BSPC's proposed study would achieve the objectives identified herein.

## **Study Request #13**

### **Water Quality Monitoring Study**

#### ***Goals and Objectives***

Determine the current water quality of the Deerfield River within the area affected by Project operations. The results of the study should provide information sufficient for stakeholders to understand water quality conditions at the project. The study plan should be developed in consultation with the U.S. Fish and Wildlife Service (FWS), the Massachusetts Department of Environmental Protection (MassDEP), and the Division.

The specific objectives of this study are as follows:

- Characterize water quality upstream of the Project to the highest pool elevation of Fife Brook impoundment and downstream to the boundary of the highest pool elevation behind Deerfield No. 4 station.
- Evaluate the potential effects of project operation on water quality parameters such as temperature and dissolved oxygen in conjunction with various other water uses.
- Collect dissolved oxygen (DO) and temperature data during the spring through fall period and under various hydropower operating conditions at the Bear Swamp Project.

#### ***Relevant Resource Management Goals***

The Division seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the project. General goals include the following:

- Ensure that protection, mitigation and enhancement measures are commensurate with project effects and help meet regional fish and wildlife objectives for the basin.
- Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Public Interest***

The requester is a state natural resource agency, with regulatory authority under the MESA. The Massachusetts Department of Environmental Protection, who will issue the 401 Water Quality Certificate, defers to and relies upon the Massachusetts Division of Fisheries and Wildlife on matters related to native biodiversity, fish and wildlife resources.

#### ***Existing Information and Need for Additional Information***

The PAD provides a summary of existing water quality data. While a number of monitoring efforts have taken place and include sample sites within the project boundary, none of those studies were designed to comprehensively investigate whether all relevant project areas currently meet Class B standards. The Massachusetts DEP's Deerfield River watershed assessment monitoring occurred in 2000 and only had three sampling events just downstream of Fife Brook Dam. An earlier effort in 1995/1996 produced 9 sampling events collected from two sampling locations. A volunteer monitoring program by the Deerfield River Watershed Association produced two sampling events in 2001/2002. Toxicity testing results taken for the Monroe Wastewater Treatment Facility in 1999/2001 did not include dissolved oxygen. Frost and Easte (1977) provide a historic comparison of water temperature and dissolved oxygen readings measured just before and just after the Bear Swamp facility was installed. River fluctuation happened in a weekly pattern that does not exist now, and minimum flow requirements have been increased since the 1970's.

No directed, site-specific surveys have been conducted to determine whether waters within the Project area meet State standards. This information gap needs to be filled so that resource agencies can evaluate properly the potential impact of project operations on water quality.

### ***Nexus to Project Operations and Effects***

The Fife Brook Dam is located 4.2 miles downstream from Deerfield Station No. 5. It creates an impoundment of unknown length and depth where there would naturally be a free-flowing river. The dam operates in a run-of-release system, in response to regulated, peaking inflows from the immediately upstream Deerfield No. 5 station, which is owned and operated by TransCanada Hydro Northeast Inc. Allowable headpond fluctuations to use the Fife Brook impoundment as the lower reservoir for Bear Swamp pumped storage are up to 40 feet, with proposals to continue as such. The below-project flow requirement is equal to 125 cfs. It is unknown whether the impoundment exhibits stratification. Water quality can be affected by the operating regime of a hydropower project. Past studies have shown dissolved oxygen saturation as high as 99%.

The Division requests that the applicant conduct a water quality survey upstream of the Project to the highest pool elevation of the Fife Brook impoundment and downstream along the Deerfield River to the boundary of the highest pool elevation behind Deerfield No. 4 station in order to determine whether state water quality standards are being met under all currently-licensed operating conditions (i.e., during periods of generation and non-generation). Results of the survey would be used, in conjunction with other studies requested, to determine an appropriate below-Project flow prescription and to recommend an appropriate water level management protocol for controlling impoundment fluctuations.

### ***Proposed Methodology***

Water temperature and DO measurements (concentration and percent saturation) should be collected from a minimum of six locations: 1) at the highest pool elevation of Fife Brook impoundment, 2) at a deep location within the Fife Brook impoundment, 3) on the Deerfield River just downstream of Fife Brook dam, 4) in the Zoar area of the Deerfield River upstream of the confluence with the Cold River, 5) the Deerfield River approximately 1-2 miles downstream of the confluence with the Chickley River (near the USGS Charlemont gage would be a site to consider), and 6) just upstream of the boundary of the highest pool elevation behind Deerfield No. 4 station and one halfway between the last two. In order to ensure that data are collected during a time of important biological thresholds and anticipated “worst case” conditions for dissolved oxygen (low flow, high temperature, antecedent of any significant rainfall event), we recommend deploying continuous data loggers at all locations, with biweekly vertical profiles taken at the deep impoundment location from April 1 through November 15. Loggers should be placed in a consistent manner at all sites. Biweekly pH and specific conductance readings should be taken at all locations. Results should include date, time of sampling, sunrise time, GPS location, pumping/generation status at Bear Swamp and Fife Brook, and precipitation data should be provided with the data.

The study plan must include a section on quality assurance and quality control.

If river flow and temperature conditions are representative of an “average” or “low” water year, then one year of data collection should be sufficient to perform the study. If conditions are not representative (i.e., a “wet” or cool year) then a second year of data collection may be necessary.

### ***Level of Effort and Cost***

The Division estimates that the cost of conducting this study from May 1 through November 1 will be \$30,000-50,000.

In the PAD, the applicant proposes to assess the effects of the Fife Brook Development and Bear Swamp Pump Storage Development operations on water quality by monitoring water temperature, dissolved oxygen, percent saturation, pH and specific conductance at locations within approximately 7.5 miles downstream of Fife Brook. We believe the effects of this Project extend to the Deerfield No. 4 station, some 17 miles downstream of Fife Brook.

Document Content(s)

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# United States Department of the Interior

## FISH AND WILDLIFE SERVICE



New England Field Office  
70 Commercial Street, Suite 300  
Concord, NH 03301-5087  
<http://www.fws.gov/newengland>

In Reply Refer To: Bear Swamp Power Company, LLC  
Bear Swamp Hydroelectric Project, FERC No. 2669  
Deerfield River  
COMMENTS ON PRE-APPLICATION DOCUMENT  
STUDY REQUESTS  
SCOPING DOCUMENT 1

April 16, 2015

Kimberly D. Bose, Secretary  
Federal Energy Regulatory Commission  
888 First Street, N.E., Room 1A  
Washington, DC 20426

Dear Secretary Bose:

This responds to the Pre-Application Document (PAD) for the Bear Swamp Hydroelectric Project, located on the Deerfield River in Berkshire and Franklin counties, Massachusetts. The PAD is being provided in preparation of an application for a new Federal license for the Project. We offer the following comments based on the PAD (submitted to us by Bear Swamp Power Company, LLC [BSPC] on December 19, 2014) and information we obtained at the Federal Energy Regulatory Commission (Commission) scoping meeting held on March 18, 2015.

### *PRE-APPLICATION DOCUMENT*

#### PROPOSAL

The Bear Swamp Project consists of two developments:

#### Bear Swamp Pumped Storage Development

The Bear Swamp Pump Storage Facility (BSPS) consists of an intake located along the banks of the Deerfield River (which acts as the lower reservoir), a powerhouse, a pressure shaft, and a 118-acre upper reservoir. The powerhouse contains two reversible Francis-type pump turbines that have a total nameplate capacity of 600 MW. The BSPS pumps at a maximum hydraulic capacity of 4,520 cfs and generates at a capacity of 5,430 cfs. The intake to the lower reservoir is covered with trashracks that have 6-inch-clear spacing.

BSPS operates as a peaking facility, typically pumping at night when power prices are low and generating during peak power demand periods during the day. The upper reservoir is allowed to fluctuate 50 feet (from elevation 1,600 feet mean sea level [msl] down to elevation 1,550 feet msl). However, the lowermost 5.5 feet of storage are held for emergency/reserve conditions. Within a 24-hour period, the facility will generate at full discharge off of the usable storage for 5.9 hours, and then pump for 7 hours to refill the upper reservoir.

BSPC states that BSPS operates independent of, and with no effect on Deerfield River flows upstream or downstream of the Fife Brook or BSPS developments.

#### Fife Brook Development

The Fife Brook development consists of an 890-foot-long, 130-foot-high dam with a crest elevation of 880 feet msl that impounds 152 acres of the Deerfield River for a distance of nearly 2.5 miles upstream. Integral with the dam is an intake equipped with trashracks that have a clear spacing of 3 inches. Behind the racks, a 200-foot-long penstock directs water to a powerhouse containing a single Francis-type turbine rated at 10.0 MW that has a maximum hydraulic capacity of 1,540 cfs.

The headpond (which is also the lower reservoir of the BSPS development) fluctuates up to 40 feet, from elevation 870 feet msl down to 830 feet msl. The turbine's minimum discharge is 3 MW, which corresponds to 270 cfs when the headpond is at full pool and 650 cfs when the headpond is at minimum pool.

By Commission order dated April 4, 1997, the Licensee was directed to increase the minimum flow release downstream of the Fife Brook Dam to 125 cfs. During periods of non-generation, this flow is provided via a 30-inch-diameter pipe that bifurcates into a 20-inch-diameter pipe and a 24-inch-diameter pipe. The pipes are sized to provide the 125 cfs at the minimum headpond elevation of 830 feet msl.

BSPS characterizes the Fife Brook operations as "run-of-release," essentially reacting to, and passing inflows from the upstream Deerfield River Project's Deerfield No. 5 development (FERC No. 2323), which operates as a peaking facility.

For the period 2009 through 2013, average annual generation was 403,072 megawatt hours (MWh) for the BSPS development and 32,772 MWh for the Fife Brook development.<sup>1</sup>

While BSPC is not proposing any operational or physical changes to the two developments as part of the relicensing process, it does intend to complete an authorized upgrade to the two pump-turbine units at the BSPS facility. The upgrade is expected to increase the Project's installed capacity by 66 MW. According to BSPC, the upgrade will not change the elevation limits in the upper and lower reservoirs. However, information contained in the Commission's environmental assessment for the upgrade (issued concurrently with the August 13, 2008 Order Amending License) indicates that the upgrade will increase the maximum hydraulic capacity

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<sup>1</sup> According to the PAD, the BSPS development consumed 551,104 MWh of energy during that same time period, for a net loss of 148,032 MWh of power.

from 5,430 cfs to 6,200 cfs and increase the intake velocities at the trashracks from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps under low tailwater.

In the PAD, BSPC has proposed no additional protection, mitigation and enhancement (PME) measures.

## COMMENTS

### 4.4 Project Operation

BSPC states that its Fife Brook facility operates as “run-of-release,” meaning that it reacts to and passes whatever flows it receives from the upstream Deerfield No. 5 hydropower facility. Further, BSPC states that neither the BSPS nor Fife Brook developments have the ability to re-regulate flows from upstream hydropower projects.

The U.S. Fish and Wildlife Service (Service) does not dispute that, given the large operating ranges of both the upper and lower reservoirs, BSPS likely can operate in a manner that does not influence flows upstream or downstream of the lower reservoir. However, BSPC has provided no background information or operational data to support the contention that it does not have the ability to re-regulate Deerfield River flows. Although BSPC states that it passes whatever flows it receives from upstream, in fact, BSPC supplements those flows in order to meet the requirements of Article 401 of the Commission’s Order Amending Bear Swamp Project License, dated April 4, 1997.<sup>2</sup> This is a clear indication that BSPC does have the ability to re-regulate Deerfield River flows, to some extent. The Service herein submits a request that BSPC undertake a Hydraulic and Operations modeling study to, in part, determine the extent to which the two facilities are able to re-regulate Deerfield River flows, in order to reduce the flow fluctuations in the 17-mile River reach downstream from Fife Brook Dam that is influenced by Project releases.

### 4.5.2 Project Generation and Outflow Records

Table 4.5-3 provides average monthly outflow from the Fife Brook development for the period 2009 through 2013. From an ecological perspective, tabulating average monthly flows provides little insight into how habitat in the reservoirs and downstream of Fife Brook Dam changes based on operations of the Fife Brook and BSPS facilities. The Service hereby requests that BSPC make available to stakeholders hourly pumping and outflow data from 2009 through 2014 for the two facilities.

### 5.3.6 Federally Approved Water Quality Standards

The Deerfield River in the vicinity of the Project is designated Class B Cold Water. There are specific numeric criteria for Class B Cold Waters that are detailed in Table 5.3-5. In addition, five tributaries that enter the Deerfield River downstream of Fife Brook Dam have been classified as Class B Cold Waters. Three other tributaries (one that discharges into the lower reservoir and two others that join the Deerfield River downstream of Fife Brook Dam) do not

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<sup>2</sup> Article 401 requires the Licensee to release 125 cfs below the Fife Brook Dam, using water from reservoir storage, if necessary.

have the Cold Water qualifier but are considered by the Massachusetts Division of Fisheries and Wildlife (MADFW) to be Coldwater Fisheries Resources (CFR), as they contain habitat that supports a cold water fish population. As designated CFRs, the Massachusetts Department of Environmental Protection (MADEP) is required to protect the existing cold water fish population and its habitat as an existing designated use.

CFRs exist within the Project area and those CFRs are protected as designated uses.

### **5.3.7 Existing Water Quality Data**

In the PAD, BSPC summarizes data from water quality sampling that has occurred along the Deerfield River since 1995. In general, samples collected within the Project-affected area indicate that dissolved oxygen (DO) levels meet or exceed Class B Cold Water standards. Studies conducted more recently that have focused on macroinvertebrates and water temperature (Cole 2007; Cole 2013) indicate that mayfly density and richness increase with increasing distance from the Fife Brook Dam. A similar gradient in daily temperature differential was also seen (Table 5.3-9), where immediately below the Dam, the diurnal temperature difference was only 0.8°C, but increased to over 5°C 12 miles downstream.

Based on the referenced data, BSPC states that “These combined results reflect a consistent, high-quality cold water fishery with high DO and low water temperatures extending along the Deerfield River...including the entirety of the Bear Swamp Project.” While the information contained in the PAD indicates that the DO criterion is being met downstream of Fife Brook Dam, no numeric data for the upper or lower reservoir have been provided; therefore, we see no basis for the assertion that water quality standards at the Project currently are meeting applicable standards for designated uses.

No directed, site-specific surveys have been conducted to determine whether waters within the Project area meet State standards. This information gap needs to be filled so that resource agencies can properly evaluate the potential impact of Project operations on water quality. Table 6.3-1 of the PAD identifies “potential” studies, including one to develop baseline water quality information and characterization. The Service supports BSPC conducting water quality monitoring to verify compliance with State standards, as detailed in the study request submitted by the MADEP.

### **5.4 Fish and Aquatic Resources**

#### Riverine Fishes

Based on surveys conducted as part of the relicensing process for the Deerfield River Project, fish assemblages of the Deerfield No. 5 and No. 4 development reservoirs include rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieu*), rock bass (*Ambloplites rupestris*), pumpkinseed (*Lepomis gibbosus*), white sucker (*Catostomus commersonii*), fallfish (*Semotilus corporalis*) and spottail shiner (*Notropis hudsonius*). MADFW surveys of the Deerfield No. 5 bypass reach collected brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), and

white suckers. Both age 0+ and age 1+ trout were collected, which documents that natural reproduction is occurring in that reach. MADFW stocks adult brown and rainbow trout in the River reach downstream of Fife Brook Dam, which is managed as a catch-and-release fishery.

The only site-specific information on the fish community within the Project boundary provided in the PAD dates from the 1970s (Frost and Easte 1977). Those surveys, conducted by the previous Licensee (New England Power) and MADFW, collected white sucker, smallmouth bass, yellow perch (*Perca flavescens*), rock bass, golden shiner (*Notemigonus crysoleucas*), chain pickerel (*Esox niger*), pumpkinseed, bluegill (*Lepomis macrochirus*), and the state-listed longnose sucker (*Catostomus catostomus*) from the lower reservoir over a 3-year period (1974 to 1976).

Upon review of the Frost and Easte (1977) report, we note that BSPC failed to identify that the survey also encompassed the upper reservoir. Eight species of fish were collected from the upper reservoir, including white sucker, rock bass, pumpkinseed, golden shiner, fallfish, brown bullhead (*Ameiurus nebulosus*), yellow perch, and longnose sucker.

#### Diadromous Fishes

As noted in the PAD, there are no anadromous fish in the vicinity of the Project. Upstream migrants can only access the base of the Deerfield River Project's Deerfield No. 2 development at River mile 13.2. Downstream passage facilities are in place at the Deerfield River Project's Deerfield No. 2, No. 3, and No. 4 developments and the Gardners Falls Project. These facilities were designed primarily to provide safe, timely and effective passage for Atlantic salmon (*Salmo salar*) smolts migrating downstream from tributaries where they had been stocked as fry. Stocking salmon fry was a component of the Atlantic salmon restoration program, which has been discontinued.

According to Table 5.4-2, the catadromous American eel (*Anguilla rostrata*) has been documented in the mainstem Deerfield River and a number of tributaries, including Chickley River, Mill Brook and Clesson Brook. Those three tributaries enter the Deerfield River in the riverine stretch downstream of Fife Brook Dam. Given that eels have been found in nearby tributaries, it is likely that they also reside in the mainstem downstream of the Project. However, it is unlikely that eels are able to ascend Fife Brook Dam, due to its height.

BSPC states that continued operation of the Project is not expected to adversely affect fish or aquatic resources in the Deerfield River and that the Deerfield River downstream of Fife Brook Dam supports a diverse fishery. Both of these assertions are not supported by information contained in the PAD. The only Project-specific data provided in the PAD are nearly 40 years old. Table 5.4-3 lists three species for the known fishery in the downstream reach below Fife Brook Dam. The Service would not characterize the fishery as diverse based on these data.

There is a significant information gap relative to the fish assemblages within the Project-affected area (upper reservoir, lower reservoir, and downstream riverine reach). Site-specific data are old and gear restricted (boat shocking, gill netting and rotenone). This information is needed in order to determine whether Project operations (at BSPS and Fife Brook) are impacting the health of the

fish community within the Project-affected area. Table 6.3-1 of the PAD identifies “potential” studies, including one to characterize the fisheries in the lower reservoir and the downstream reach below Fife Brook Dam. The Service supports BSPP conducting a fish assemblage assessment and herein submits a request for such a study.

### Entrainment and Impingement

BSPP states that the potential impact of increasing the hydraulic capacities of the two pump-turbines was evaluated in 2008 as part of the amendment of license proceeding. In reviewing the administrative record of that proceeding, it appears that BSPP provided conflicting information regarding intake velocities at the BSPP facility.

In a March 8, 2008 letter responding to comments from Trout Unlimited on the proposed upgrade, BSPP stated that once the turbine upgrades are completed, the intake velocities at the BSPP trashracks will increase from 6.68 fps to 7.54 fps in pumping mode and from 7.79 fps to 8.88 fps in generation mode (13 percent and 14 percent increases, respectively).<sup>3</sup> However, in a supplementary filing to its amendment application that included an analysis of the potential risk of entrainment due to the proposed upgrade, the increase in intake velocity was calculated as being from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps under low tailwater.<sup>4</sup> In future documents, BSPP should clarify what the actual current and post-upgrade intake velocities are under both high and low tailwater.

Table E-2 of the July 3, 2008 supplementary filing identified 11 species of fish as occurring in the bypass of the Deerfield River Project’s Deerfield No. 5 development (and therefore, conceivably present in the lower reservoir). Of those 11 species, BSPP only selected adult brown and rainbow trout to analyze for risk of entrainment (by comparing target species’ burst swim speeds to the calculated intake velocities). As these two species have the highest sustained and burst swim speeds of any fish within the vicinity of the Project, they are the species least likely to be at risk of entrainment. Only analyzing adult salmonids leaves a large data gap with respect to understanding the relative risk of entrainment for the other species and/or life stages that inhabit the lower reservoir. In addition, Table E-2 omitted the documented presence of longnose sucker in both the lower and upper reservoirs. As a State species of special concern, it should have been evaluated. Clearly, the fact that it was caught in the upper reservoir documents that it is at risk of entrainment.

In conclusion, the Service deems the 2008 entrainment evaluation to be insufficient in the context of the current relicensing proceeding. BSPP has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for a rigorous, empirical entrainment study.

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<sup>3</sup> Appendix A of Brookfield Power’s March 27, 2008 Non-Capacity Amendment Application to the Commission.

<sup>4</sup> BSPP letter to the Commission dated July 3, 2008; Accession No. 20080703-4006.

### Freshwater Mussels

BSPC states that four species of freshwater mussels are known to occur within the Deerfield River watershed: eastern elliptio (*Elliptio complanata*), eastern pearlshell (*Margaritifera margaritifera*), eastern floater (*Pyganodon cataracta*), and alewife floater (*Anodonta implicata*). The PAD provides no information on the distribution or abundance of mussels in the River.

There is a significant data gap relative to the freshwater mussel assemblage within the Project-affected area downstream of Fife Brook Dam. This information is needed in order to determine whether Project operations are impacting the diversity, distribution and/or abundance of the mussel community in the 17-mile-long riverine reach below the Dam. BSPC has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for such a study.

## **5.5 Wildlife and Botanical Resources**

This section of the PAD provides no specific information on the botanical resources within the Project area, only descriptions of the dominant vegetative communities found within the watershed. While Table 5.5-1 provides a list of invasive plants found within the Deerfield River watershed, none are explicitly identified as occurring within the Project area. Likewise, the lists of mammals, birds, amphibians and reptiles are only those that may potentially occur within the Project area.

Baseline information on the terrestrial and wildlife resources within the Project area is needed. Table 6.3-1 of the PAD identifies “potential” studies, including one to map and characterize existing terrestrial wildlife, and vegetation in the Project boundary. The Service supports BSPC conducting vegetation and wildlife surveys and herein submits a request for such a study.

## **5.6 Wetlands, Riparian, and Littoral Habitats**

BSPC states that no formal delineation of wetland, riparian, or littoral habitats has been conducted with the Project boundary. Based on the Service’s National Wetland Inventory (NWI) mapping, three wetland types occur within the Project area: lacustrine, palustrine, and riverine wetlands. Of the 425 acres of wetlands mapped by NWI, 95 percent are lacustrine (the upper reservoir) or riverine (lower reservoir and River channel downstream of Fife Brook Dam). The nearly 24 acres of palustrine habitat are located within the River channel or immediate floodplain of the River. In addition, the Massachusetts Natural Heritage and Endangered Species Program (NHESP) has identified four potential vernal pools within the Project boundary. According to BSPC, no site-specific lists of plant or animal species known to occur in wetland, riparian, and littoral habitats are available.

Baseline information on the wetlands, riparian, and littoral resources within the Project area is needed. Table 6.3-1 of the PAD identifies “potential” studies, including one to map and characterize floodplain, wetland, and riparian habitat in select or critical areas within the Project boundary. The Service supports BSPC conducting these surveys and herein submits a request for such a study.

### 5.7 Rare, Threatened, and Endangered Aquatic Species

In the PAD, BSPC identifies four State-listed species as potentially occurring in the vicinity of the Project: longnose sucker, bridge shiner (*Notropis bifrenatus*), ocellated darter (*Boyeria graefiana*), and ski-tipped emerald (*Somatochlora elongate*). Based on Deerfield River-specific information, the bridge shiner has only been found at a single site in the headwaters of a tributary. While the longnose sucker is characterized as being common in portions of the watershed, in reviewing the referenced document (MAEOEEA 2004), the Service notes that it was only collected from three tributaries and was typically the sixth or seventh species listed in order of abundance. In addition, the species listed for different reaches of the mainstem in Table 5.4-3 indicate that longnose sucker has only been collected from Sherman Reservoir (Deerfield River Project) and the Bear Swamp Project. Based on information provided in the PAD, the Service would not characterize the species as being common in the Deerfield watershed.

In the PAD, BSPC states that continued operation of the Project is not expected to have a material or incremental adverse effect on longnose sucker. However, the Frost and East (1977) report cited in the PAD a number of times documents that longnose sucker was collected from the upper reservoir, which could only happen if it had been entrained at the BSPS intake. Therefore, a state-listed species has been documented within the Project boundary and that species has been shown to be susceptible to entrainment at the pump storage facility.

No recent fisheries surveys have been conducted in the Project-affected area. Updated information on the distribution and abundance of longnose sucker within the upper and lower reservoirs, as well as in the 17-mile-long riverine reach downstream of Fife Brook Dam, is needed in order to adequately assess potential Project impacts. BSPC has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for such a study.

### 5.8 Rare, Threatened, and Endangered Terrestrial Species

The PAD identifies three federally listed terrestrial species as potentially occurring within the Project area, based on the Service's Environmental Conservation Online System, which provides known occurrences by county: northeastern bulrush (*Scirpus ancistrochaetus*), bog turtle (*Clemmys muhlenbergii*), and Northern long-eared bat (*Myotis septentrionalis*). BSPC may not be aware that the Service's New England Field Office also maintains an online endangered species consultation system.<sup>5</sup> According to that system, which provides known occurrences at the town level, only the northern long-eared bat (NLEB) potentially occurs in the Project area.

While BSPC acknowledges that NLEB may exist in the Project vicinity, it maintains that continued operation of the Project is unlikely to have any effect on NLEB populations. Even though BSPC is not proposing any new construction land management activities that could impact bat habitat or hibernacula, that could change during the relicensing process. For example, additional recreational trails could be a requirement of any new license issued for the Project. Those trails could require that trees be cut. Without knowing if and where NLEBs occur within

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<sup>5</sup> [http://www.fws.gov/newengland/EndangeredSpec-Consultation\\_Project\\_Review.htm](http://www.fws.gov/newengland/EndangeredSpec-Consultation_Project_Review.htm) (accessed April 2015).



the Project area, the Service cannot determine if existing operations (including maintenance activities on Project lands) or future activities could result in adverse effects to NLEB populations. BSPC has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for such a study.

If NLEBs are documented to occur within the Project area, the Commission should be aware that, pursuant to the final listing and interim 4(d) rule published on April 2, 2015, a biological opinion would be required as part of section 7 consultation for the relicensing proceeding unless the Applicant agrees to conduct forest management activities outside the period April 15 through August 15.

## **5.9 Recreation and Land Management**

In the PAD, BSPC states that conservation restrictions (CR) have been conveyed to the Massachusetts Department of Environmental Management for certain lands within the Project boundary. The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of "River corridor" downstream from Fife Brook Dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license.

BSPC proposes to explore appropriate avenues for managing Project lands through the term of any new license issued. The Service supports this proposal. If the bat survey requested by the Service documents NLEBs within the Project area, developing a new CR that specifically provides restrictions on certain land management activities could be an important mechanism for preventing adverse effects to NLEBs.

## **Comprehensive Plans**

In the PAD, BSPC identifies 14 Federal plans and 10 State/regional plans recognized by the Commission as Comprehensive Waterway Development Plans. In addition to those plans, the Service hereby submits the following plan to the Commission for consideration in determining whether it qualifies as a comprehensive plan pursuant to Section 10(a)(2)(A) of the Federal Power Act (Attachment A):

1. Addendum II to the Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Approved October 23, 2008. 8 pp.

If the Commission determines that the plan identified above does not qualify as a comprehensive plan, we request that it be considered as a relevant resource management plan.

## **ADDITIONAL INFORMATION**

The following information is needed:

- the minimum hydraulic capacity of the pump-turbines at the BPS facility;

- the approach velocities at both the Fife Brook and BSPS intakes under low and high lower reservoir levels; and
- hourly operations data (reservoir water surface elevations, station generation, etc.) for both the Fife Brook and BSPS developments in spreadsheet format for the past five years.

## RECOMMENDED STUDIES

The Applicant has identified a number of potential studies, including water quality monitoring, a fisheries survey, an aquatic habitat survey, and mapping and characterizing terrestrial and aquatic vegetation resources and wildlife; however, it has committed to none at this point in time. Enclosed please find our formal study requests (Attachment B), in the format required pursuant to 18 CFR §4.38(b)(5).

### *SCOPING DOCUMENT 1*

#### **3.1.2 Existing Project Operations**

Commission staff characterizes the operation of the Fife Brook development as run-of-river, where releases from Fife Brook Dam generally match the inflow from the upstream Deerfield No. 5 development. BSPC characterizes the Fife Brook mode of operation as “run-of-release.” The existing license for the Project contains no stipulations on how it can operate other than requiring a minimum flow release of 125 cfs (per the 1997 amendment to license). There is no requirement that BSPC operate to pass flows it receives from upstream. Since the Deerfield River Project predates the Bear Swamp Project, it is reasonable to assume that Bear Swamp was developed in a manner that would maximize generation based on the flow conditions that existed at the time of licensing. Therefore, because the Deerfield River Project operates as a peaking project, the Fife Brook development was designed to operate as a peaking project (the hydraulic capacities of Fife Brook and Deerfield No. 5 are nearly identical: 1,400 cfs for Fife Brook and 1,250 cfs for Deerfield No. 5). As such, while passing inflow, the Fife Brook development is not a run-of-river project, but is in effect a peaking project.

#### **3.6.3 Project Decommissioning**

Commission staff proposes to eliminate this alternative from detailed study in the environmental analysis, because no party has suggested Project decommissioning would be appropriate in this case. Commission staff asserts that there would be significant costs involved with decommissioning the Project, including lost energy production.

We recommend that Commission staff include Project decommissioning in the environmental analysis. No party has suggested this alternative because, up to this point in the Integrated Licensing Process, there has been no formal opportunity to provide such a recommendation. Further, Commission staff have supplied no supporting information to justify the contention of significant decommissioning costs (which could run the gamut from “locking the door” to full Dam removal at the Fife Brook facility and from sealing the intake to draining and filling the upper reservoir at BSPS). Given the substantial increase in proposed renewable and other energy

projects, it is possible that there may be no net loss of energy production when viewed on a regional basis.

#### **4.1.1 Resources that could be Cumulatively Affected**

Commission staff has identified water quality as a resource that could be cumulatively affected by the proposed continued operation and maintenance of the Bear Swamp Project, in combination with other hydropower projects and activities in the Deerfield River basin. In addition to water quality, the Service recommends that Commission staff evaluate cumulative impacts to water quantity and fishery resources.

#### **4.1.2 Geographic Scope**

The Service supports the geographic scope identified for analysis of cumulatively affected resources. The Service requests that this same geographic scope (from the headwaters in southern Vermont to the Deerfield River's confluence with the Connecticut River) be used to analyze water quantity and fishery resources in addition to water quality.

#### **4.2.2 Aquatic Resources**

The Service recommends that Commission staff analyze the impact of entrainment of fishes at BSPS in the environmental assessment (EA).

#### **4.2.4 Threatened and Endangered Species**

The Service does not believe the EA needs to analyze the effects of Project operation and maintenance on the federally endangered northeastern bulrush or the federally threatened bog turtle, but supports analyzing effects to the federally threatened northern long-eared bat.

### **5.0 Proposed Studies**

The Service is submitting a number of study requests to supplement those "potentially" proposed by BSPC. With respect to the geographic extent of the studies identified in Table 1, the Service recommends increasing the distance of the study area downstream of Fife Brook Dam from 7.5 miles (representing the downstream extent of the Project boundary) to encompass the entire 17-mile-long stretch of River affected by releases at the Fife Brook development.

Kimberly D. Bose, Secretary  
April 16, 2015

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Thank you for this opportunity to comment. If you have any questions regarding these comments, please contact Melissa Grader of this office at (413) 548-8002, extension 124.

Sincerely yours,



Thomas R. Chapman  
Supervisor  
New England Field Office

Attachments

#### LITERATURE CITED

- Cole, M.B. 2007. Assessment of Benthic Macroinvertebrate Communities in Relation to Regulated Flows in the Deerfield River, Massachusetts. Prepared for the Deerfield River Watershed Association, Greenfield, MA.
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- Massachusetts Executive Office of Energy and Environmental Affairs. 2004. Deerfield River Watershed Assessment Report 2004-2008. Massachusetts Executive Office of Energy and Environmental Affairs, Boston, MA.

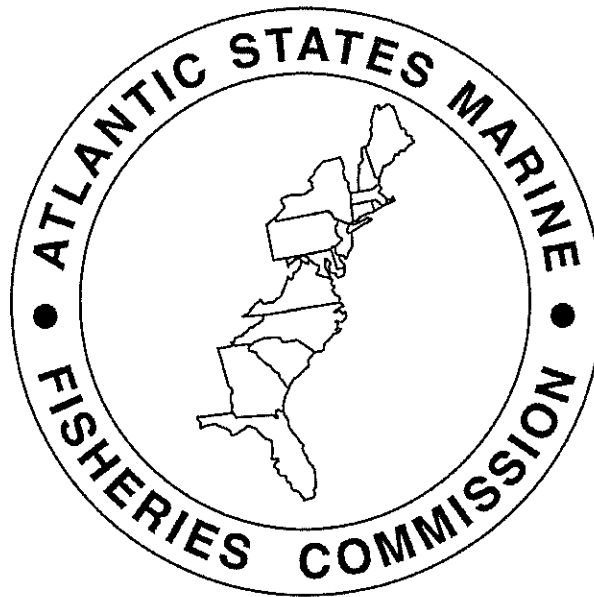
Kimberly D. Bose, Secretary  
April 16, 2015

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cc: FERC, Secretary (w/att)  
Steven P. Murphy (w/att)  
Brookfield Renewable Energy Group  
33 West 1<sup>st</sup> Street South  
Fulton, New York 13069  
NPS, Kevin Mendik (w/att)  
CRC, Ken Sprankle (w/att)  
MA NHESP (w/att)  
MA DFW, Caleb Slater (w/att)  
MA DEP, Bob Kubit (w/att)  
CRWC, Andrea Donlon  
Trout Unlimited, Don Pugh  
Kevin Parsons  
Deerfield River Watershed Chapter, Trout Unlimited  
P.O. Box 133  
Shelburne Falls, MA 01370  
Brian Yellen  
Deerfield River Watershed Association  
15 Bank Row Suite A  
Greenfield, MA 01301  
Reading file  
ES: MGrader:4-16-15:603-223-2541

# *Atlantic States Marine Fisheries Commission*

## **ADDENDUM II TO THE FISHERY MANAGEMENT PLAN FOR AMERICAN EEL**



*ASMFC Vision Statement:*

*Healthy, self-sustaining populations for all Atlantic coast fish species or successful restoration well in progress by the year 2015.*

**Approved October 23, 2008**

## INTRODUCTION

The Atlantic States Marine Fisheries Commission's American Eel Management Board initiated the development of Addendum II in January 2007 to propose measures that would facilitate escapement of silver eels during or just prior to their spawning migration as a means to improve American eel recruitment and abundance. Although the available data for American eel in the U.S. have not been sufficient to perform a reliable quantitative assessment of the population size or fishing mortality rates (ASMFC 2001, 2006), there has been evidence that the stock has declined and is at or near low levels (ASMFC 2000, 2001, 2006; USFWS 2007). The Management Board asked the Technical Committee (TC) and Advisory Panel (AP) to consider closed seasons, gear restrictions, size limits or a combination of these measures to reduce the harvest of emigrating eels. The public comment draft of Addendum II proposed these management measures, as well as recommendations for increased protection of American eels during their upstream and downstream migration.

This Addendum recommends stronger regulatory language to improve upstream and downstream passage of American eel to state and federal regulatory agencies. As such, there is no implementation schedule and there are no new compliance requirements. Member states are still required to submit annual compliance reports by September 1. This Addendum does not alter any other provisions from the Interstate Fishery Management Plan (FMP) and makes no changes to Addendum I to the FMP.

### Background

The American eel occupies fresh, brackish, and coastal waters along the Atlantic from the southern tip of Greenland to northeastern South America. The species is catadromous, spending the majority of life in freshwater, but migrating to the Sargasso Sea to spawn. Newly hatched eels drift on oceans currents, eventually entering nearshore areas where they migrate up-river. Therefore, a comprehensive eel management plan and comprehensive set of regulations must consider the various unique life stages and the diverse habitats used, in addition to society's interest and use of this resource.

American eel (*Anguilla rostrata*) occupy a significant and unique niche in the Atlantic coastal reaches and its tributaries. Historically, American eel were very abundant in East Coast streams, comprising more than 25 percent of the total fish biomass. Eel abundance declined from historic levels but remained relatively stable until the 1970s. More recently, fishermen, resource managers, and scientists postulated a further decline in abundance based on harvest information and limited assessment data. This resulted in the development of the Atlantic States Marine Fisheries Commission FMP for American Eel. The goals of the FMP are:

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, subsistence, and recreational fisheries by preventing overharvest of any eel life stage.



In support of these goals, the following objectives were included in the FMP:

- Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers, and enhanced recreational fisheries monitoring.
- Increase understanding of factors affecting eel population dynamics and life history through increased research and monitoring.
- Protect and enhance American eel abundance in all watersheds where eel now occur.
- Where practical, restore American eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.
- Investigate the abundance level of eel at the various life stages, necessary to provide adequate forage for natural predators and support ecosystem health and food chain structure.

### **Status of the Stock**

Current stock status (i.e., overfished or not overfished) for American eel is poorly understood due to limited and non-uniform stock assessment efforts and protocols across the species' range. No range-wide estimate of abundance exists and reliable indices of abundance of this species are scarce. Information on demographic structure is lacking and difficult to determine because the American eel is a single population (termed *panmixia*) with individuals randomly spread over an extremely large and diverse geographic range, with growth rates and sex ratios environmentally dependent. At present, limited data (fishery-dependent and independent) from indirect measurements (harvest by various gear types and locations) and localized direct stock assessment information are collected.

In 2003, declarations from the International Eel Symposium (AFS 2003, Quebec City, Quebec, Canada) and the Great Lakes Fishery Commission (GLFC) highlighted concerns regarding the health of American eel stock. Canada has recently applied the "Special Concern" designation to American eel. Available data attributes the population drop to decreasing recruitment combined with localized declines in abundance. This information is cause for concern and represents an opportunity for cooperation with other entities such as the GLFC to preserve the American eel stock.

The most recent peer reviewed stock assessment was presented to the Commission's American Eel Management Board in February 2006. The stock assessment did not meet some of the terms of reference according to the Terms of Reference and Advisory Report to the American Eel Stock Assessment Peer Review (ASMFC 2006). In May 2006, the Board tasked the American Eel Stock Assessment Subcommittee (SASC) with following up on specific recommendations in the peer review report to improve the 2005 stock assessment. The SASC follow-up to the Terms of Reference and Advisory Report to the American Eel Stock Assessment Peer Review was presented to the Board in October 2006. This report was inconclusive regarding the status of the stock. In their follow-up report, the SASC created a coastwide index for American eel using yellow eel indices that are monitored along the Atlantic Coast, both in the United States and Canada, and combining them with General Linear

Modeling (GLM). The SASC's report included a suggestion that the coastwide yellow eel GLM index could be used as a management trigger and would be a means to monitor coastwide, yet act locally.

In reaction to the extreme declines in eel abundance the Saint Lawrence River-Lake Ontario portion of the species' range, the Commission requested in 2004 that the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) conduct a status review of American eel. In February 2007, the USFWS announced the completion of a Status Review for American eel. The report concluded that protecting eel as an endangered or threatened species is not warranted. The USFWS did note that while the species' overall population is not in danger of extinction or likely to become so in the foreseeable future, the eel population has "been extirpated from some portions of its historical freshwater habitat over the last 100 years... [and the species abundance has declined] likely as a result of harvest or turbine mortality, or a combination of factors" (50 CFR Part 17).

Following the 2005 stock assessment, Terms of Reference and Advisory Report to the American Eel Stock Assessment Peer Review, and Stock Assessment Subcommittee's 2006 report, the Board initiated this Addendum to consider management options to halt the current decline in yellow eel abundance.

### **Status of the Fishery**

American eel currently support important commercial fisheries throughout their range. Fisheries are executed in rivers, estuaries, and ocean. Commercial glass eel harvest is legal in Maine and South Carolina, although reported landings are minimal in South Carolina. Yellow and silver eel fisheries exist in all states and jurisdictions with the exception of Pennsylvania and the District of Columbia. South Carolina and Georgia recorded no commercial yellow or silver eel landings in 2007.

### *Commercial*

Commercial landings decreased from a high of 1.8 million pounds in 1985 to a low of 641,000 pounds in 2002. Landings of yellow and silver eel in 2007 totaled 834,500 pounds.<sup>1</sup> New Jersey and Delaware each reported landings over 100,000 pounds of eel and Maryland reported landings over 300,000 pounds in 2007. Combined, these three states accounted for 73% of the coastwide commercial landings. Massachusetts, Pennsylvania, Georgia, Florida, and the District of Columbia were granted *de minimis* status for the 2007 commercial fishing year. *De minimis* is approved if a member states' commercial landings of yellow and silver eel for the previous year is less than 1% of the coastwide landings for the same year. Additionally, member states must request *de minimis* status.

### *Recreational*

Few recreational anglers directly target eel and most landings are incidental when anglers are fishing for other species. Eel are often purchased by recreational fishermen for use as bait for larger sport fish such as striped bass, and some recreational fishermen may catch their own eel to utilize as bait. The NMFS Marine Recreational Fisheries Statistics Survey (MRFSS)

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<sup>1</sup> Harvest data for 2007 comes from the 2008 State Compliance Reports. The landings are preliminary and some are incomplete.

shows a declining trend in the catch of eel during the latter part of the 1990s. According to MRFSS<sup>2</sup>, 2007 recreational total catch was 140,372 fish, which represents a 63% increase in number of fish from 2006 (86,024 fish). About 59% of the eel caught were released alive by the anglers. MRFSS 2007 total recreational harvest was 57,986 fish.

For current commercial and recreational regulations for American eel by state, please see Appendix I.

## **STATEMENT OF THE PROBLEM**

While the status of the American eel stock is uncertain, the latest stock assessment information indicates that the abundance of yellow eel (a juvenile life stage) has declined in the last two decades and the stock is at or near low levels. Further, relative abundance is likely to continue to decline unless mortality decreases and recruitment increases. The American Eel Management Board directed the American Eel Plan Development Team (PDT) to develop potential management measures for American eel that would facilitate an increase in the number of adult American eel (also known as silver eel) that are able to move from fresh and estuarine water to the ocean—also known as out-migrate—and spawn. The recommended management measures included gear and size restrictions, seasonal closures, and a recommendation to protect the upstream and downstream migration of American eel.

The Board initiated this Addendum based on a concern for the American eel population and sought public comment on measures that would facilitate escapement of silver eel on their spawning migration with the intent of halting any further declines in juvenile recruitment and eel abundance. The Board chose not to implement any additional restrictions on the fishery at this time and requested that a new stock assessment be initiated to better understand the stock status. The primary objective of this document is to recommend stronger regulatory language to improve upstream and downstream passage of American eel to state and federal regulatory agencies.

## **PROPOSED MANAGEMENT OPTIONS from the PUBLIC COMMENT DRAFT of ADDENDUM II**

Gear restrictions, size limits, and seasonal closures employed individually or in combination can protect out-migrating silver eels by allowing more silver eel to reach the Sargasso Sea and spawn. American eel larvae and glass eel recruit to estuaries and freshwater at random; it is predicted that increased escapement from any part of the species' range has the potential to benefit the species throughout the entire range. While operating under the theory that allowing more silver eel to escape will result in increased juvenile recruitment, the PDT recognizes that several factors can influence the amount of silver eels that are allowed to out-migrate, including:

1. The time duration in which silver eel out-migrate;

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<sup>2</sup> MRFSS Data for American Eel are unreliable. 2007 Proportional Standard Error (PSE) values for recreational harvest in Massachusetts, Rhode Island, New Jersey, Delaware, Virginia, and South Carolina are 100, 84.3, 70.2, 100.4, 100 and 100 respectively.

2. The portion of the out-migration period that is covered by the closed season;
3. The maximum size eel that gear can catch;
4. The maximum size eel that harvesters are allowed to possess.

The Board chose to delay action on commercial fishery management measures in order to incorporate the results of the upcoming stock assessment, which will present new and updated information on American eel stock status, including the long-term young-of-the-year index being conducted by the states. In addition, the Board received substantial public comment and advice from its Advisory Panel that further restrictions on American eel harvest would significantly impact fishermen. The states will revisit management measures upon completion of the American eel stock assessment.

## **RECOMMENDATIONS FOR IMPROVING UPSTREAM AND DOWN STREAM PASSAGE OF AMERICAN EEL**

There are multiple factors that influence the American eel population across its range, as well as factors that influence their local abundance. Such factors include barriers to upstream and downstream migration, loss of habitat, and natural oceanographic conditions. On the Atlantic and Gulf coasts, 33,663 dams potentially hinder American eel movement. Of these dams, 1,511 (4.5 percent) are for hydropower (50 CFR Part 17).

### **Recommendations for Federal Energy Regulatory Commission Relicensing**

The Commission recognizes that many factors influence the American eel population, including harvest, barriers to migration, habitat loss, and natural climatic variation. The Commission's authority, through its member states, is limited to controlling commercial and recreational fishing activity; however, to further promote the rebuilding of the American eel population, the Commission strongly encourages member states and jurisdictions, as well as the U.S. Fish and Wildlife Service, to consider and mitigate, if possible, other factors that limit eel survival. Specifically, the Commission requests that member states and jurisdictions request special consideration for American eel in the Federal Energy Regulatory Commission relicensing process. This consideration should include, but not be limited to, improving upstream passage and downstream passage, and collecting data on both means of passage.

### **Recommendations for Improving American Eel Passage at Non-Federally Licensed Dams**

Of the 33,663 dams located on the Atlantic and Gulf Coasts that potentially hinder American eel movement, 95% are not licensed by the federal government. Therefore, the states should strive to remove these obstructions where feasible. If removal is not feasible, then upstream and downstream passage should be improved to provide access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel consistent with the goal of the FMP.

## APPENDIX I

**Table A1. Commercial Regulations by State\***

State	Size Limit	License/Permit	Other
ME		<ul style="list-style-type: none"> <li>Harvester and dealer license</li> <li>Dealer reporting</li> </ul>	<ul style="list-style-type: none"> <li>Seasonal closures</li> <li>Gear restrictions</li> </ul>
NH	6"	<ul style="list-style-type: none"> <li>Commercial saltwater license</li> <li>Coastal harvest permit</li> <li>Monthly trip level catch &amp; effort reporting of harvest</li> </ul>	<ul style="list-style-type: none"> <li>50/day for bait</li> <li>Gear restrictions in freshwater</li> </ul>
MA	6"	<ul style="list-style-type: none"> <li>Commercial permit with annual catch report requirement</li> <li>Registration and reporting for all eel buyers</li> </ul>	<ul style="list-style-type: none"> <li>Nets, pots, spears, and angling only</li> <li>Mesh restrictions</li> <li>Coastal towns may have additional requirements</li> </ul>
RI	6"	<ul style="list-style-type: none"> <li>Commercial fishing license required for the sale of American eel</li> <li>Quarterly reporting</li> </ul>	
CT	6"	<ul style="list-style-type: none"> <li>Commercial license with dealer reporting</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions</li> </ul>
NY	6"	<ul style="list-style-type: none"> <li>Commercial harvester and dealer license and harvester reporting</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions</li> </ul>
NJ	6"	<ul style="list-style-type: none"> <li>License required</li> <li>Monthly reporting for eel pot license</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions</li> </ul>
PA		<ul style="list-style-type: none"> <li>No commercial fishery</li> </ul>	
DE	6"	<ul style="list-style-type: none"> <li>License required</li> <li>Monthly reporting with catch and effort</li> </ul>	<ul style="list-style-type: none"> <li>Commercial fishing in tidal waters only</li> </ul>
MD	6"	<ul style="list-style-type: none"> <li>Licensed required with monthly reporting.</li> </ul>	<ul style="list-style-type: none"> <li>Prohibited in non-tidal waters</li> <li>Gear restrictions</li> <li>Commercial crabbers 50 eel pots/day max no harvest limit</li> </ul>
DC		<ul style="list-style-type: none"> <li>No commercial fishery</li> </ul>	
PRFC	6"	<ul style="list-style-type: none"> <li>Eel license</li> <li>Harvester weekly reporting w/daily effort</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions</li> </ul>
VA	6"	<ul style="list-style-type: none"> <li>License with two-year delayed entry system</li> <li>Mandatory monthly reporting (at trip level)</li> </ul>	<ul style="list-style-type: none"> <li>Mesh size restrictions on eel pots</li> </ul>
NC	6"	<ul style="list-style-type: none"> <li>Standard Commercial Fishing License for all commercial fishing</li> </ul>	<ul style="list-style-type: none"> <li>Mesh size restrictions on eel pots</li> <li>Bait limit of 50 eels/day</li> </ul>
SC		<ul style="list-style-type: none"> <li>Permits by gear and area fished</li> <li>Mandatory monthly reporting</li> <li>License for all commercial fishing and sale</li> </ul>	<ul style="list-style-type: none"> <li>Various gear restrictions</li> </ul>
GA	6"	<ul style="list-style-type: none"> <li>Personal commercial fishing license and commercial fishing boat license</li> <li>Harvester/dealer reporting required</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions on traps and pots</li> </ul>
FL		<ul style="list-style-type: none"> <li>Commercial fishing license</li> <li>Mandatory permit for all commercial eel harvesters</li> <li>Mandatory trip and monthly sales summary reporting for permittees</li> </ul>	<ul style="list-style-type: none"> <li>Gear restrictions</li> </ul>

\* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

**Table A2. Recreational Regulations by State\***

State	Size Limit	Possession Limit	Other
ME	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Gear restrictions</li> <li>• License requirement and seasonal closures (inland waters only)</li> </ul>
NH	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Coastal harvest permit needed if taking eels other than by angling</li> <li>• Gear restrictions in freshwater.</li> </ul>
MA	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Nets, pots, spears, and angling only</li> <li>• Mesh restrictions</li> <li>• Coastal towns may have additional requirements</li> </ul>
RI	6"	50 eels/person/day	
CT	6"	50 eels/person/day	
NY	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Additional length restrictions in specific inland waters</li> </ul>
NJ	6"	50 eels/person/day	
PA	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Gear restrictions</li> </ul>
DE	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Two pot limit/person</li> </ul>
MD	6"	No possession limit in tidal areas (hook & line); 25/person/day w/10 eel pot max for rec. crabber in tidal; 25/person/day in non-tidal	<ul style="list-style-type: none"> <li>• Gear restrictions</li> </ul>
DC	6"	10 eels/person/day	<ul style="list-style-type: none"> <li>• Five trap limit</li> </ul>
PRFC	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Recreational license</li> </ul>
VA	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Recreational license, no reporting</li> <li>• Recreational commercial gear license, annual report required</li> <li>• Two eel pot limit (both licenses)</li> <li>• Mandatory annual catch report for eel pot license</li> <li>• Mesh size restrictions on eel pots</li> </ul>
NC	6"	50 eels/person/day	<ul style="list-style-type: none"> <li>• Gear restrictions</li> <li>• Noncommercial special device license, allowed two eel pots under Recreational Commercial Gear license</li> </ul>
SC	None	None	<ul style="list-style-type: none"> <li>• Gear restrictions</li> </ul>
GA	None	None	
FL	None	None	<ul style="list-style-type: none"> <li>• Mesh size and funnel opening restrictions on eel pots</li> </ul>

\* For specifics on licenses, gear restrictions, and area restrictions, please contact the individual state.

## **Study Request #1**

### **Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations**

Develop a river flow and operations model designed to evaluate the hydrologic changes to the Deerfield River caused by the physical presence and operation of the Fife Brook and Bear Swamp Pumped Storage (BSPS) developments, and the interrelationships between the operation of Fife Brook/BSPS and the Deerfield River Project (FERC No. 2323) facilities upstream and downstream. The flow study should assess the following topics:

1. Conduct quantitative hydrologic modeling of the hydrologic influences and interactions that exist between the water surface elevations of the Fife Brook impoundment (lower reservoir) and discharges from the Fife Brook and BSPS generating facilities and the upstream and downstream hydroelectric facilities. Data inputs to and outputs from the model(s) should include:
  - a) discharges into the Fife Brook impoundment from the Deerfield River Project's Deerfield No. 5 development;
  - b) withdrawals from the Fife Brook impoundment by BSPS;
  - c) discharges to the Fife Brook impoundment by BSPS;
  - d) existing and potential discharges from the Fife Brook development (generation, recreational releases, and spill flows);
  - e) existing and potential water level fluctuation restrictions (maximum and minimum pond levels) of the Fife Brook impoundment and flows downstream of Fife Brook Dam; and
  - f) existing and potential required minimum flows and/or other operation requirements at each of the upstream projects.
2. Document how the existing outflow characteristics from the Deerfield No. 5 facility affect the operation of the Bear Swamp Project, including downstream flow releases and Fife Brook impoundment levels.
3. Document how the existing Fife Brook and Bear Swamp operations affect the Deerfield River from Fife Brook Dam downstream to the upstream extent of the Deerfield River Project's Deerfield No. 4 impoundment.

### ***Goals and Objectives***

Determine the extent of alteration of River hydrology caused by operation of the Project and the interactions between upstream Project operations, Bear Swamp Project operations, and downstream operations at Deerfield No. 4. The models will provide necessary information on what changes can be made to flow releases and/or water levels restrictions at the Fife Brook and BSPS developments, and how those changes affect downstream resources.

As other specific operational modifications at the Fife Brook and/or BSPS developments are identified based on results of other requested studies, these desired conditions will need to be input into the models to assess how each potential change at one development affects the

operations of the other development, the ability to achieve desired operational changes at each development, and the implications of those changes on other resources.

### ***Relevant Resource Management Goals***

The U.S. Fish and Wildlife Service (Service) seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to aquatic resources, the Service's goals are:

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Provide an instream flow regime that meets the life history requirements of resident fish and wildlife (including invertebrates such as freshwater mussels) throughout the area impacted by Project operations.
3. Minimize existing and potential negative Project operation effects on water quality and aquatic habitat.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### ***Existing Information and Need for Additional Information***

Available information in the Pre-Application Document (PAD) does not indicate how Project operations have altered downstream hydrology, which may affect riverine fish, macroinvertebrates, rare, threatened, and endangered species, aquatic plants and other biota and natural processes in the Deerfield River from below the Fife Brook Dam downstream to the Deerfield No. 4 facility.

In the PAD, Bear Swamp Power Company, LLC (BSPC) indicates that Fife Brook operates in a run-of-release mode, reacting to and passing inflows from TransCanada's upstream hydropower



facilities, and that Bear Swamp operations have no effect on Deerfield River flows upstream and downstream of the BSPS and Fife Brook developments. No information on the frequency, timing or duration of reservoir fluctuations is provided, nor is the extent of upstream backwatering during pumping and generating. Likewise, the PAD contains no data on the extent of water surface elevation fluctuations downstream of Fife Brook Station. Figure 4.4-2 indicates that outflow peaks from Fife Brook may be lower than inflow peaks from TransCanada, but data for only 2 months from a single year are shown. Figure 4.4-3 from the PAD reinforces this observation, showing inflow and outflow at Fife Brook (for two years only), however the scale of this figure makes it difficult to discern much detail.

Article 401 in the 1997 Order Amending Bear Swamp's Project License requires a minimum flow of 125 cfs as measured below the Dam for the protection and enhancement of fishery resources in the Deerfield River. Article 404 requires whitewater boating releases from Fife Brook of 700 cfs for 3 continuous hours on 50 weekend days and 56 weekdays between April 1 and October 31. After complaints about minimum flow releases were received, a gage was installed below Fife Brook, but that gage was ruined in Tropical Storm Irene. Anglers complain that releases strand anglers on one side of the River. BSPC states that it incrementally increases flows and holds them for 15 minutes between changes for safety purposes, yet no supporting data are provided to validate this statement.

Operations, water surface elevation and flow information are needed to better understand the impact of operations on recreational uses of the River and whether or not modifications can be made to improve River habitat and River uses. The PAD provides no information regarding how Project operations affect fisheries resources or recreational use. The requested hydraulic and operations models will allow for testing different scenarios that will aid in understanding if, and to what extent, the Bear Swamp Project has the ability to re-regulate operations to benefit fish and wildlife resources within the Project-affected area.

### ***Nexus to Project Operations and Effects***

The Bear Swamp Project is currently operated with a continuous minimum flow of 125 cfs. The Project operates as a daily peaking project, often with large, rapid, daily flow fluctuations between the minimum and Project capacity (1,400 cfs). In addition, the Fife Brook Dam headpond (also known as the lower reservoir) elevation fluctuates 40 feet (830 feet msl to 870 feet msl) as does the upper reservoir of the Bear Swamp Pumped Storage (BSPS) development (from 1,600 feet msl down to 1,550 feet msl). These changes affect fish, wildlife and their habitats within the Project-affected reach. Project operations and potential changes to operations to mitigate impacts are influenced by inflows and operations of upstream peaking projects and the Bear Swamp Project's own operations. Results of River flow and Project operations analyses will be used to develop flow-related license requirements and/or other mitigation measures (e.g., angler safety).

### ***Methodology Consistent with Accepted Practice***

The Service proposes that the study methodology be similar to that used in studies 3.2.2 and 3.8.1 in the Turners Falls and Northfield Mountain (FERC Nos. 1889 and 2485, respectively)

relicensing effort currently underway on the Connecticut River in Massachusetts.<sup>1</sup> Both of those studies were approved, with modifications, by the Federal Energy Regulatory Commission (Commission) in its September 13, 2013 Study Plan Determination letter; therefore, the methodology is consistent with accepted practice.

The purpose of the hydraulic model is to determine, for a given flow, the corresponding water surface elevation at a given location within the River, as well as water depth and mean channel velocity. The one-dimensional HEC-RAS can be run in both a steady state mode and an unsteady state mode.

River level loggers will need to be placed within the study area (from the upstream extent of the lower reservoir downstream to the head of the Deerfield No. 4 headpond). Past Project operations (at a sub-hourly time step) for 2005 through 2014 should be used in the model. Any proposed modifications should be identified and modeled.

The simulation model (HEC-RcsSim) will be used to evaluate the impacts of current and potential alternative modes of operation in the Project area on the timing and magnitude of River flows. Output from the model will be used in other studies to evaluate the impact of current and potential alternative modes of operation on water surface elevations and aquatic habitat.

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

Level of effort and cost of model development are expected to be moderate, but to be valuable in developing license conditions, the model(s) will need to be run under various scenarios throughout the relicensing process to assess the implications of any potential or proposed changes to the operations. Therefore, ongoing consultation and re-running of the model(s) are likely to be needed throughout the relicensing process. The modeling exercise will also require coordination and cooperation between BSPC and the upstream licensee to assure that the model inputs and outputs can be accurately related.

FirstLight Power Resources (FirstLight) has said that their study 3.2.2 will cost \$100,000-120,000 and study 3.8.1 for the Turners Falls and Northfield Mountain projects will cost \$100,000-125,000. Because the Deerfield River drainage is smaller and less complex than the Connecticut River, flows coming from upstream are more straightforward, and Fife Brook does not have a canal system like Turners Falls, we would expect the costs for this study to be significantly lower than the studies at Turners Falls and Northfield Mountain. The Service estimates that the requested study would cost \$150,000 to \$200,000.

The Applicant has proposed no studies to address this resource concern. The water quantity and operations study that BSPC proposes will only characterize flow fluctuation, attenuation and travel time patterns in the first 7.5 miles downstream of Fife Brook Station under existing operations. It would not provide the ability to model different operational scenarios.

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<sup>1</sup> Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources.

## **Study Request #2**

### **Instream Flow Habitat Assessment Downstream of Fife Brook Dam**

Conduct an instream flow habitat study to assess the impacts of the range of the proposed Project discharges on the wetted area and optimal habitat for key species. The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target fish species potentially include: brook trout, brown trout, rainbow trout, longnose sucker, fallfish, white sucker, and macroinvertebrates.

#### ***Goals and Objectives***

The goal of this study is to determine an appropriate flow regime that will protect and enhance the aquatic resources from the Fife Brook Station tailrace downstream to upper end of the Deerfield River Project's Deerfield No. 4 impoundment. Specifically, the objective of the study is to conduct an instream flow habitat assessment of the impacts of a range of flows on the wetted area and optimal habitat for key species, including the impacts of hydropeaking flow fluctuations on the quantity and location of suitable habitat.

The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target species potentially include: brook trout, brown trout, rainbow trout, longnose sucker, fallfish, white sucker and benthic macroinvertebrates.

#### ***Resource Management Goals***

The Service seeks to accomplish a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to aquatic resources, the Service's goals are:

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Provide an instream flow regime that meets the life history requirements of riverine and migratory fish and wildlife (including invertebrates such as freshwater mussels) throughout the area impacted by Project operations.

3. Minimize existing and potential negative Project operation effects on water quality and aquatic habitat.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### ***Existing Information***

In the PAD, BSPC provides no information on the fish assemblage in the riverine reach downstream of Fife Brook Dam other than stating that the Massachusetts Division of Fisheries and Wildlife (MADFW) stocks adult brown and rainbow trout in the reach to support its management as a catch-and-release fishery. Limited information exists on the adequacy of the existing minimum flow regime to protect water quality and aquatic life. Further, the PAD contains no information regarding how Project operations have altered downstream habitat quantity and quality important to fish, macroinvertebrates, aquatic plants and other biota and natural processes in the 17-mile-long stretch of the Deerfield River from below the Fife Brook Dam downstream to the impoundment of the Deerfield No. 4 development.

Surveys of macroinvertebrates in the Deerfield River below the Fife Brook Dam (Cole 2007 and 2014) have shown a change in that community with distance downstream of the Dam. Mayfly and stonefly taxa that were located in the lower sampled reaches were not present below the Dam or approximately 2.5 miles below the Dam.

### ***Nexus to Project Operations and Effects***

The Project is currently operated with a minimum flow release that was not based on biological criteria or field study. Further, the Project generates power in a peaking mode, resulting in significant within day flow fluctuations between the minimum and Project capacity on an hourly or daily basis. The large and rapid changes in flow releases from hydropower dams are known to cause adverse effects on habitat and biota downstream of a project (Cushman 1985; Bain *et al.* 1988; Blinn *et al.* 1995; Freeman *et al.* 2001; Layzer *et al.* 1989). There are more than 17 miles of lotic habitat below the Project's discharge that are impacted by peaking operations at the Fife Brook Station. This section of the Deerfield River contains habitat that supports native riverine species. While the existing license does require a continuous flow of 125 cfs below the Dam, this flow has yet to be shown to be sufficiently protective of the aquatic resources in this substantial reach of River, especially in the context of the magnitude, frequency, and duration of changes in habitat that likely occur between minimum and generation flows.

Results of the study will be used by the Service to determine an appropriate flow recommendation that will protect and/or enhance the aquatic resources below the Project.

### *Methodology Consistent with Accepted Practice*

Instream flow habitat assessments are commonly employed in developing plant operational regimes that will reduce impacts or enhance habitat conditions downstream of hydroelectric projects.

The Service requests a flow study be conducted at the Project. Given the length of the River reach (17 miles) impacted by Project operations, we believe a study methodology that utilizes an IFIM approach is appropriate for this site. This same protocol was used during the relicensing of the Housatonic River Project (FERC No. 2576),<sup>2</sup> and currently is being used in the relicensing proceedings for the Connecticut River hydropower projects (FERC Nos. 1889, 1892, 1855 and 1904).<sup>3</sup> The Commission's Study Plan Determination letters on these projects, dated February 21, 2014, accepted the proposed studies; therefore, the methodology is consistent with accepted practice.

Habitat in the study area first must be mapped at a sufficient level of detail to spatially delineate different mesohabitat types for the purposes of transect selection. Following mapping, the study design should, at a minimum, involve collecting wetted perimeter, depth, velocity, and substrate data along transects of various mesohabitat types located in the reach of River below Fife Brook Station. The measurements should be taken over a range of test flows. This information then should be synthesized to quantify habitat suitability (using mutually agreed upon HSI curves) of each test flow for target species and life stages identified by the fisheries agencies. Habitat modeling using standard PHABSIM 1 dimensional modeling is acceptable for the River channel downstream from the Route 2 Bridge. The area from the Fife Brook Station discharge to the Route 2 Bridge should be modeled using two-dimensional (2D) modeling to better characterize flows and velocities in this high quality area.

The types of data collected with this study should be sufficient to perform a dual-flow analysis and habitat time series and/or similar approaches that will permit assessment of how quantity, quality and location of habitat for target species changes over a range of flows between existing minimum flow and maximum Project generation flows.

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<sup>2</sup> Housatonic River Project License Application, Volume 4, Appendix F. Connecticut Light and Power Company, August 1999.

<sup>3</sup> Study 3.3.1 of the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources; Study 9 of the Revised Study Plan for the Wilder Hydroelectric Project (FERC No. 1892-026), Bellows Falls Hydroelectric Project (FERC No. 1855-045) and Vernon Hydroelectric Project (FERC No. 1904-073). August 14, 2013.

### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

Field work for instream flow studies can be relatively extensive but will depend on consultation with the fisheries agencies on study methodology and on-site decisions on the number of sites and the locations for data collection. Post-field work data analysis would be of moderate cost and effort. Based on cost estimates for similar studies (e.g., Turners Falls Project, FERC No. 1889), we anticipate that conducting the requested flow study would cost between \$100,000 and \$150,000.

The Applicant has proposed no studies to address this resource concern. The aquatic habitat mapping that BSPC proposes will only characterize habitat in a portion of the Project-affected reach. While habitat mapping is necessary, it alone will not allow for an evaluation of Project operation impacts to the quantity, quality and location of suitable habitat for specific species of fish and aquatic invertebrates.

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### **Study Request #3**

#### **Entrainment of Riverine Fish from the Deerfield River Into the Bear Swamp Pump Storage Facility**

##### ***Goals and Objectives***

The goal of the study is to determine the impact of the Bear Swamp Pump Storage (BSPS) facility during the pumping cycle on entrainment of riverine fish, including early life stages.

The objective of the study is to quantify the number of riverine fishes entrained at the BSPS station intake on an annual basis in order to evaluate potential impacts to fish populations in the lower reservoir (Fife Brook impoundment) and Deerfield River Project's Deerfield No. 5 bypass reach. This will be accomplished through netting using various gear types to quantify and identify species of different life stages.

##### ***Resource Management Goals***

The Service seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to riverine fish entrainment, the Service's goals are:

1. Minimize existing and potential negative Project operation effects such as turbine entrainment that could hinder management goals and objectives.
2. Minimize Project-related sources of mortality to riverine fishes in order to restore natural food web interactions and ecosystem functions and values.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

##### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### *Existing Information*

Limited Project-specific information exists regarding entrainment of fish and aquatic organisms at the BSPS facility. Under Article 44 of the Bear Swamp Project license, fisheries surveys were undertaken in the Fife Brook impoundment (lower reservoir) and BSPS upper reservoir: 2 years of pre-operational surveys were conducted (1972 to 1973), one survey during a transitional year (1974), and 2 years of post-operational surveys (1975 to 1976). Those surveys collected fish in the newly created upper reservoir, indicating that fish were being entrained at the BSPS intake (Frost and Easte 1977). No further studies have been undertaken in the ensuing years.

BSPC evaluated the potential impact of increasing the hydraulic capacities of the two pump-turbines in 2008 as part of an amendment of license proceeding. In a March 8, 2008 letter responding to comments from Trout Unlimited on the proposed upgrade, BSPC stated that once the turbine upgrades are completed, the intake velocities at the BSPS trashracks will increase from 6.68 fps to 7.54 fps in pumping mode and from 7.79 fps to 8.88 fps in generation mode (13 percent and 14 percent increases, respectively).<sup>4</sup> However, in a supplementary filing to its amendment application that included an analysis of the potential risk of entrainment due to the proposed upgrade, the increase in intake velocity was calculated as being from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps under low tailwater.<sup>5</sup> The Service assumes that those velocities represent the incremental increase (i.e., in excess of the 7.79/8.88 fps) as a result of the upgrade.

Table E-2 of the July 3, 2008 supplementary filing identified 11 species of fish as occurring in the bypass of the Deerfield River Project's Deerfield No. 5 development (and therefore, conceivably present in the lower reservoir). Of those 11 species, BSPC only selected adult brown and rainbow trout to analyze for risk of entrainment (by comparing target species' burst swim speeds to the calculated intake velocities). As these two species have the highest sustained and burst swim speeds of any fish within the vicinity of the Project, they are least likely to be at risk of entrainment. Only analyzing adult salmonids leaves a large data gap with respect to understanding the relative risk of entrainment for other species and/or life stages. In addition, Table E-2 omitted the documented presence of longnose sucker in both the lower and upper reservoirs. As a State species of special concern, it should have been evaluated. Clearly, the fact that it was caught in the upper reservoir documents that it is at risk of entrainment.

As the 2008 entrainment evaluation was a desktop exercise, no empirical data exist on the timing, magnitude and duration of entrainment of riverine fishes in the BSPS area. Riverine species occurrence and susceptibility relative to space and time exposure windows to BSPS pumping are undocumented. This lack of information leaves questions unanswered on the types and extent of impacts to these populations that may be linked to the near daily cycling of River water up and down through the BSPS operations system. Therefore, it is necessary to obtain baseline data on Project operation impacts for species potentially impacted by BSPS. An additional study request seeks to obtain an up-to-date, accurate documentation of fish species within the Project-affected area.

<sup>4</sup> Appendix A of Brookfield Power's March 27, 2008 Non-Capacity Amendment Application to the Commission.

<sup>5</sup> BSPC letter to the Commission dated July 3, 2008; Accession No. 20080703-4006.



### *Nexus to Project Operations and Effects*

BSPS consists of an intake located along the banks of the Deerfield River (which acts as the lower reservoir), a powerhouse, a pressure shaft, and a 118-acre upper reservoir. The powerhouse contains two reversible Francis-type pump turbines that have a total nameplate capacity of 600 MW. The BSPS pumps at a maximum hydraulic capacity of 4,520 cfs and generates at a capacity of 5,430 cfs. The intake to the lower reservoir is covered with trashracks that have 6-inch-clear spacing.

BSPS operates as a peaking facility, typically pumping at night when power prices are low and generating during peak power periods during the day. The upper reservoir is allowed to fluctuate 50 feet (from elevation 1,600 feet mean sea level [msl] down to elevation 1,550 feet msl). However, the lowermost 5.5 feet of storage are held for emergency/reserve conditions, resulting in a usable storage capacity of 4,900 acre-feet. Within a 24-hour period, the facility will generate at full discharge off of the usable storage for 5.9 hours, and then pump for 7 hours to refill the upper reservoir.

The intake velocity at the BSPS lower reservoir trashracks has been calculated to be 6.68 fps in pumping mode and would increase to 7.54 fps once the approved upgrade has been completed. What remains unclear is what lower reservoir elevation these velocities are based on (i.e., if they are for “full pool,” the velocities could be higher when the lower reservoir is at minimum pool). Regardless, velocities ranging from nearly 7 fps (currently) to possibly over 8 fps (post-upgrade) exceed the swimming ability of many riverine species, particularly early life stages that may be moving past the intake.

Entrainment of fish and aquatic organisms associated with water withdrawal and hydroelectric operations has been documented to result in injury or death of entrained organisms. The MADFW documented the presence of brown and brook trout, longnose and blacknose dace, and white suckers in the No. 5 bypass reach. Frost and Easte (1977) collected 11 species of fish from the lower reservoir, including the State species of special concern longnose sucker. Eight of those 11 species also were sampled in the upper reservoir.

Some of these fish likely spend the majority of time in the lower reservoir (e.g., bluegill, rock bass, pumpkinseed and yellow perch), whereas other species would be expected to move between the lotic environment of the reservoir and the lentic environment of the No. 5 bypass (e.g., white sucker, fallfish, smallmouth bass). While inhabiting the lower reservoir, both these groups of fish may pass within the vicinity of the BSPS intakes and would be at risk of entrainment and thus exposed to passage through the Project pumps and reservoir supply tubes. Regardless of whether fish survive the pumping process, they are lost to the Deerfield River system. Depending on the species, life stages, and numbers entrained, this loss could impact the ecosystem productivity of the stretch of the Deerfield River between the No. 5 dam and the Fife Brook Dam and may hinder fisheries management and/or restoration goals.

### ***Methodology Consistent with Accepted Practice***

The Frost and Easte (1977) study used a combination of sampling methods (boat shocking, gill nets, and rotenone) to document fish assemblages in the upper and lower reservoirs. In order to quantify entrainment of various life stages, it is likely that a combination of methods would provide the most reliable results. As part of the relicensing of the Northfield Mountain Pump Storage Project (NMPS, FERC No. 2485) on the Connecticut River, FirstLight will use a combination of methodologies, including hydroacoustic monitoring, radiotelemetry, and ichthyoplankton netting to assess entrainment.

At BSPS, the Service recommends ichthyoplankton netting either at the intake or off of the water conveyance system to quantify entrainment of early life stages (eggs and larva) and either sampling at the upper reservoir outlet or in the reservoir itself using boat shocking and gill or trap netting to collect older life stages (juveniles and adults). Sampling for planktonic fish larvae should capture early spring spawning species (white suckers) through later season centrarchid species (bass and sunfish). Plankton sampling should utilize a sampling design that adequately captures temporal and spatial changes in the water pumping cycle.

### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

We know of no other tool that will provide for this type of assessment for all fish species and organisms that may pass through the Project. Cost and effort are expected to be moderate to high. At NMPS, the ichthyoplankton sampling component of the entrainment analysis was estimated to cost \$60,000 to \$70,000. Based on this information, the Service estimates it would cost the Applicant \$75,000 to \$100,000 to conduct the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

In conclusion, the Service deems the 2008 entrainment evaluation to be insufficient in the context of the current relicense proceeding. BSPC has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for a rigorous, empirical entrainment study.

### ***Literature***

Frost, J.N. and W.E. Easte. 1977. Bear Swamp Pumped Storage Hydroelectric Project Fishery Study, January 1972 – December 1976. New England Power Company and Massachusetts Division of Fisheries and Wildlife. 73 pp.

## **Study Request #4**

### **Fish Assemblage Assessment**

#### ***Goals and Objectives***

The goal of this study request is to determine the assemblage of fish species present in the areas affected by the Bear Swamp Project, which potentially includes Species of Greatest Conservation Need (SGCN) and/or State-listed species for Massachusetts.

Specific objectives include:

- 1) Describe fish assemblage structure, distribution and abundance within the Project-affected area along spatial and temporal gradients.
- 2) Compare historical records of fish species occurrence in the Project area to results of this study.

#### ***Resource Management Goals***

The mission of the Service and the MADFW is to conserve, protect and enhance fish, wildlife and their habitats. Riverine fish species are an important component of the River's ecology and are the basis for the sport fishery. Furthermore, State-listed species have been documented in the Project-affected area.

Determining species occurrence, distribution and abundance will better clarify what species occur in the Project area both spatially and temporally, relative to habitats that may be affected by Project operations of the Bear Swamp Pumped Storage (BSPS) and Fife Brook developments. This information will better inform results from other study requests that will be examining Project operation effects on various aquatic habitats, water quality and related concerns such as entrainment at BSPS. This information will be used to make recommendations and provide full consideration for all species, including those that might not otherwise be known to occur in the Project-affected area and impacts that may affect their population status through direct or indirect effects of the Project.

In addition, this study will augment research and monitoring needs for species whose populations are poorly known. For example, as outlined in Massachusetts' Wildlife Action Plan (MADFW 2006), research and monitoring needs for SGCN include monitoring and assessing populations and habitats for current conditions and future changes, and identifying and monitoring problems for species and their habitats.

A study that aims to provide a comprehensive investigation that documents which fish species are utilizing the Project-affected areas in relation to spatial, temporal and environmental gradients (e.g., temperature, dissolved oxygen, pH, turbidity) will allow for a fuller understanding and examination of potential impacts that the Bear Swamp Project's operations have on the species that reside there. As noted below, there is little current information concerning riverine fish in the Project areas.

### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### ***Existing Information***

Based on surveys conducted as part of the relicensing process for the Deerfield River Project, fish assemblages of the Deerfield No. 5 and No. 4 development reservoirs include rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieu*), rock bass (*Ambloplites rupestris*), pumpkinseed (*Lepomis gibbosus*), white sucker (*Catostomus commersoni*), fallfish (*Semotilus corporalis*) and spottail shiner (*Notropis hudsonius*). MADFW surveys of the Deerfield No. 5 bypass reach collected brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), and white suckers. Both age 0+ and age 1+ trout were collected, which documents that natural reproduction is occurring in that reach. The MADFW stocks adult brown and rainbow trout in the River reach downstream of Fife Brook Dam, which is managed as a catch-and-release fishery.

The only site-specific information on the fish community within the Project boundary provided in the PAD dates from the 1970s (Frost and Easte 1977). Those surveys, conducted by the previous Licensee (New England Power) and the MADFW, collected white sucker, smallmouth bass, yellow perch (*Perca flavescens*), rock bass, golden shiner (*Notemigonus crysoleucas*), chain pickerel (*Esox niger*), pumpkinseed, bluegill (*Lepomis macrochirus*), and the State-listed longnose sucker (*Catostomus catostomus*) from the lower reservoir over a 3-year period (1974 to 1976).

Upon review of the Frost and Easte (1977) report, we note that BSPC failed to identify that the survey also encompassed the upper reservoir. Eight species of fish were collected from the upper reservoir, including white sucker, rock bass, pumpkinseed, golden shiner, fallfish, brown bullhead (*Ameiurus nebulosus*), yellow perch, and longnose sucker.

### ***Nexus to Project Operations and Effects***

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. For example, headpond and tailwater water level fluctuations could dewater important spawning or rearing areas, or affect habitat availability, thus limiting productivity of fish species by direct impacts to their spawning or rearing success or indirectly by limiting the spawning or rearing success of forage fish species. Furthermore, SGCN have been documented in the Project-affected area. Accordingly, a thorough understanding of the current fish assemblage structure and associated metrics is needed in order to examine any potential Project-related impacts.

### ***Methodology Consistent with Accepted Practice***

An accepted and robust field sampling design (e.g., as described in Pollock *et al.* 2002 or MacKenzie *et al.* 2006) and accepted methods for collecting fish species likely to be present in the Project-affected areas (Bonar *et al.* 2009) should be used to conduct field surveys. Fish sampling, measuring length and weight, and calculating associated metrics are commonly used methods to determine fish assemblages and assess fish populations (Bonar *et al.* 2009). Randomly sampling multiple habitat types using a multi-gear approach will be required to ensure that all fish species present are sampled. The spatial scope of the study will be from the upstream extent of the Fife Brook impoundment (also called the lower reservoir) downstream to the head of the Deerfield River Project's (FERC No. 2323) Deerfield No. 4 development, including the BSPS upper reservoir. Sampling should occur at each selected site across multiple seasons (spring, summer, and fall). Digital photographs should be taken to avoid misidentification of certain species such as Cyprinids.

BSPC should ensure that at least one of the selected gear types is effective at collecting longnose sucker.

This will be a one-year study, provided River discharge conditions fall within the 25<sup>th</sup> to 75<sup>th</sup> percentile for weekly averages.

### **Specific Methodology**

The study will employ a stratified-random sampling design. The study area will be divided into strata based on mesohabitat type. Each mesohabitat type will be further stratified into two broad microhabitat types. Proposed sampling methods include daytime boat/barge electrofishing, nighttime boat electrofishing, gill nets, seine nets, and minnow traps. Sampling should be performed during in the spring, summer, and fall.

The stratified random sampling design will randomly assign sampling stations within particular mesohabitat types in proportion to their linear habitat distance. Multiple methods of fish capture will be used in each stratum, and both near-shore (shallow) and mid-channel (deep) habitats will be sampled to evaluate the potential differential effect of hydropeaking on the fish species and life stages that utilize these two habitat types (Bain 1985). Selected locations within each station will be sampled either by day and nighttime boat/barge electrofishing (shoreline and littoral habitat), gill nets (deeper, benthic areas), seine net (wadeable shoreline and littoral habitat), minnow traps, and eel pots. The exact number of sampling locations will be dependent on the weighted stratification of the study area by mesohabitat and sampling within each station will be further stratified by depth and proximity to shore.

In addition to biological data, supporting data also will be collected for each sample site including: location (GPS), sampling gear type, sampling effort, mesohabitat type, average depth, average velocity, river flow, water temperature, turbidity, predominant substrate, time of day, day of year, presence of cover, and proportion of vegetation cover. All data will be recorded on dedicated data sheets.

All data will be standardized by effort expended (seconds of electrofishing, net/trap-hours, and number of seine hauls). Catch per unit effort (CPUE) and standard errors will be calculated for each species, station, and sampling technique. Data will also be separated into groups by size and a CPUE per size group will be calculated. Values of CPUE for each segment and gear type will be calculated as the sum of catch from all samples within a station divided by the sum effort expended within that station. The Shannon-Weiner index of diversity, which is a function of species richness and evenness, will also be calculated.

Information collected during this study will be compiled and presented in a final report. The report will include tabular data summarizing length, weight, and size class of fish captured, a map of the study area to depict the location of sample stations, and overall results including occurrence, distribution and relative abundance. Comparisons will be made with historical records. Results will be described in relation to other studies. Raw data should be provided to stakeholders in digital format upon request.

This study design is similar to the one detailed in Study 3.3.11 of FirstLight Power Resources Revised Study Plan for the relicensing of its Turners Falls Project (FERC No. 1889),<sup>6</sup> which was approved by the Commission (with modifications) in its Study Plan Determination letter dated February 21, 2014; therefore, the methodology is consistent with accepted practice.

#### ***Level of Effort/Cost, and Why Alternative Studies will not suffice***

The level of effort for this study would be moderate to high as seasonal sampling with several types of gear would be required. The Service estimates the cost of this study to be \$50,000 to \$75,000, based on the estimated cost to conduct a similar study at the Turners Falls Project (FERC No. 1889).<sup>7</sup>

BSPC has identified a fisheries survey as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would focus only on select locations within the lower reservoir and the 7.5 mile reach downstream of Fife Brook Dam within the Project boundary. The level of specificity, limited geographical scope, and lack of firm commitment to conduct the study leads the Service to believe that it would not achieve the objectives identified herein. The study proposed by the Service will adequately address the objectives by documenting fish species occurrence, distribution and abundance within the Project area along spatial and temporal gradients.

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- Bonar, S.A., Hubert, W.A., and D.W. Willis, editors. 2009. Standard methods for sampling North American freshwater fishes. American Fisheries Society, August 2009.

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<sup>6</sup> Study 3.3.11 of the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources.

<sup>7</sup> Ibid.

- Frost, J.N. and W.E. Easte. 1977. Bear Swamp Pumped Storage Hydroelectric Project Fishery Study, January 1972 through December 1976. Final report to New England Power Co. 70 pp.
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## **Study Request #5**

### **Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and their Associated Habitats in the Fife Brook Impoundment and 17-Mile Reach Downstream of Fife Brook Dam**

Conduct a study to quantify impacts of water surface elevation and flow fluctuations on riparian, wetland, emergent aquatic vegetation (EAV), submerged aquatic vegetation (SAV), littoral zone and shallow water aquatic habitats in the impoundment (lower reservoir) of the Fife Brook Station and riverine reach below the Dam.

#### ***Goals and Objectives***

The goal of this study is to obtain baseline information on riparian, wetland, emergent and submerged aquatic vegetation, and associated shallow water aquatic habitats (subject to operational inundation and exposure to near exposure) known to occur in the Project area. Information would be used to determine whether riparian, wetland, EAV and SAV, littoral, and shall water (e.g., mid-river bars and shoals) habitats are impacted by current water level fluctuations permitted under the Bear Swamp Project license and whether these vegetation types and shallow water habitats can be protected and restored by modifications to Project operations or other mitigation measures. This information is needed to determine whether the Project operations affect plants, habitat, and wildlife in the Project area, whether aquatic vegetation and its habitats can be enhanced by modifications to Project operations or other mitigative measures, and whether there are any unique or important shoreline or aquatic habitats that should be protected.

The specific objectives of the field study, at a minimum, include:

1. quantitatively describe and map wetland types within 200 feet of the shoreline, and describe associated wildlife;
2. delineate, quantitatively describe, and map all wetland types, including invasive species and wildlife observed (e.g., bald eagle nesting, waterfowl nesting) within 200 feet of the shoreline, and the extent of this habitat if it extends beyond 200 feet; and
3. quantitatively describe (e.g., substrate composition, vegetation type and abundance) and map shallow water aquatic habitat types subject to Project operation inundation and exposure, noting and describing additional areas where water depths at lowest operational range are wetted to a depth of less than one foot (flats, near shore areas, gravel bars, with very slight bathymetric change).

A second year of study may be required should River discharge in the first year prove to be atypical (outside of 25<sup>th</sup> to 75<sup>th</sup> percentile of average weekly flow values) during the study period.

The field study should produce a habitat inventory report that includes:

1. the results of the field study in the form of maps and descriptions;



2. an assessment of Project effects on wetland, riparian, littoral zone vegetation and shallow water habitats, invasive plant species, and wildlife habitat at the Project;
3. recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures; and
4. recommendations for plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection of key nest and roost trees for bald eagles.

### ***Resource Management Goals***

The Service seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to plant communities and wildlife, the Service's goals are:

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Minimize existing and potential negative Project operation effects on riparian, wetland and aquatic vegetation.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### ***Existing Information***

In the PAD, BSPC states that no formal delineation of wetland, riparian, or littoral habitats has been conducted with the Project boundary. Based on the Service's National Wetland Inventory (NWI) mapping, three wetland types occur within the Project area: lacustrine, palustrine, and riverine wetlands. Of the 425 acres of wetlands mapped by NWI, 95 percent are lacustrine (the upper reservoir) or riverine (lower reservoir and river channel downstream of Fife Brook Dam). The nearly 24 acres of palustrine habitat are located within the River channel or immediate

floodplain of the River. In addition, the Massachusetts Natural Heritage and Endangered Species Program (NHESP) has identified four potential vernal pools within the Project boundary. According to BSPC, no site-specific lists of plant or animal species known to occur in wetland, riparian, and littoral habitats are available.

While the PAD provides lists of plant and wildlife species whose native ranges overlap with the Project area, it does not provide any baseline information on known occurrences of these species in the wetlands, riparian, littoral and shallow water habitats, within or adjacent to the Project area. Plants and wildlife occurring in these habitats may benefit from protection, mitigation and enhancement (PME) measures, given the potential effects of continuing the current peaking operating regime.

Baseline information on the wetlands, riparian, and littoral resources within the Project area is needed.

### ***Nexus to Project Operations and Effects***

The Project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam. In the PAD, BSPC states that the shoreline of the lower reservoir and the reach of the Deerfield River immediately below Fife Brook Dam are lined with riprap. While this likely limits the amount of natural vegetation that can persist, the exact geographic extent of the artificial armoring is unclear.

Outside of a 2-month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. The PAD contains no information on the timing, frequency and magnitude of reservoir fluctuations over the course of a year and how that relates to aquatic plant species establishment, growth, survival, littoral zone or other shallow water habitat fish spawning periods and their effects on these fishes (reproduction success and subsequent recruitment) in available and utilized habitat, and how the quantity and quality of these shallow water habitats are affected by Project operational manipulation/alteration, as currently permitted or proposed.

Water level fluctuations due to Project operations could affect EAV and SAV habitat as well as the quantity and quality of littoral and shallow water habitat. These operational water level fluctuation effects (in both of the reservoirs and the riverine reach downstream of the dam) are expected to impact fish species' use of these habitats and may affect spawning fishes reproductive success and subsequent population recruitment, including to fallfish and the State-listed special concern longnose sucker.

The current operating mode may affect wetland, riparian, littoral and other shallow water habitats, and promote the introduction and expansion of invasive plant species through

fluctuating water levels. A study that explains the relationship between the proposed mode of operation and the type and quantity of wetland, riparian, littoral, shallow water habitats, and invasive species affected would help inform a decision on the need for protection and/or control of these resources in the license.

Riparian buffers provide for River bank stability, reduction in nutrient and sediment from runoff, shading and reduced solar heating of River waters and wildlife habitat (including eagle nesting and roosting habitat) and movement corridors. Management of the Project's shorelines are within the scope of Project review and a Shoreline Management Plan is likely to be required. Incorporation of riparian resource protection and enhancement into this plan will require baseline information on existing conditions.

### ***Methodology Consistent with Accepted Practice***

The PAD currently contains maps portraying general wetland types from the upper end of the lower reservoir to a point 7.5 miles downstream of the Fife Brook Dam. The proposed study should utilize existing information in conjunction with field surveys designed to describe the characteristics of each mapped wetland, riparian, littoral and shallow water habitat, including plant species composition, relative abundance/density, habitat quality, and land use. These surveys should be conducted to describe these habitats under low water level conditions (i.e., minimum reservoir elevations and minimum flows below Fife Brook Dam). Information collected should include:

1. plant species composition, and their relative abundance/density and condition/structure (e.g., seedlings);
2. structured data, including estimates of average heights and aerial cover of each vegetation layer (specifically denoting invasive species);
3. aquatic habitat substrate composition, quantity (i.e., percent types and area), wood structure (relative abundance measure applied by area), water depths (inundated, exposed, and water less than one foot);
4. predominant land use(s) associated with each cover type;
5. wildlife sightings should be noted and any active nest or roost trees utilized by bald eagles should be identified and geo-referenced; and
6. field-verified wetland, riparian, and littoral and shallow water habitats and invasive species occurrences should be geo-referenced as polygons and overlain on orthophotos at a suitable scale.

### ***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, the Service estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified wetland, riparian and littoral habitat mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on select or critical areas within the Project boundary, without providing guidance on what criteria it would use to determine whether an area was critical or not. As outlined in the expected framework (Table 6.3-1 of the PAD), the Service does not believe BSPC's proposed study would achieve the objectives identified herein.

## **Study Request #6**

### **Baseline Study of Terrestrial Wildlife and Botanical Resources**

Conduct a study to obtain baseline information on terrestrial wildlife and botanical resources within the Project boundary.

#### ***Goals and Objectives***

The goal of this study is to characterize and describe the terrestrial wildlife and botanical resources that use representative upland habitats within and adjacent to the Project boundary in order to evaluate potential Project impacts from current or future operations and maintenance activities.

The specific objectives of the field study, at a minimum, include:

1. survey and inventory overall existing upland wildlife habitats;
2. note the occurrence of wildlife sightings during the course of the surveys;
3. survey and inventory vegetation cover classes and land use;
4. survey and evaluate the presence of targeted rare threatened or endangered species or associated habitats; and
5. survey and inventory the nature and extent of upland invasive and exotic vegetation species.

#### ***Resource Management Goals***

The Service seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to terrestrial wildlife and their habitats, the Service's goals are:

1. Protect, enhance, or restore diverse high quality terrestrial habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Minimize existing and potential negative Project effects of ongoing operation and/or maintenance activities on terrestrial wildlife and vegetation.
3. Protect habitat important to the persistence of the federally threatened northern long-eared bat (*Myotis septentrionalis*) (NLEB) within the Project boundary.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

### ***Public Interest***

The requestor is a fish and wildlife resource agency.

### ***Existing Information***

The PAD provides no specific information on the botanical resources within the Project area, only descriptions of the dominant vegetative communities found within the watershed. While Table 5.5-1 provides a list of invasive plants found within the Deerfield River watershed, none are explicitly identified as occurring within the Project area. Likewise, the lists of mammals, birds, amphibians and reptiles are only those that potentially may occur within the Project area.

Baseline information on terrestrial and wildlife resources within the Project area is needed in order to meet the goal of evaluating Project effects. Plants and wildlife occurring in these habitats may benefit from PME measures, given the potential effects of current and future operations and maintenance activities.

### ***Nexus to Project Operations and Effects***

The Project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing, frequency or duration of those fluctuations (though typically they occur on a daily basis).

The majority of lands associated with the Project currently are protected through a conservation restriction (CR) conveyed to the Massachusetts Department of Environmental Management (MADEM). The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of "River corridor" downstream from Fife Brook Dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license.

The Project area contains habitat suitable for the NLEB. In addition, according to the Massachusetts NHESP database, 27 State-listed species may occur in the vicinity of the Project.

BSPC states it is not proposing any new construction, changes to current land management practices, or new land management activities as part of this licensing proceeding. However, the PAD provides no description of the types of land management practices that BSPC currently employs. Without knowing what terrestrial resources and wildlife occur in the Project area, or

what types of land management and/or maintenance activities BSPC routinely undertakes, the Service is unable to determine if impacts are occurring currently or if they may occur under any new conditions that could be imposed on a new license (e.g., additional recreational amenities such as trails).

### ***Methodology Consistent with Accepted Practice***

The Service recommends that BSPC follow the methodology detailed in FirstLight's Study Plan 3.4.1, as described in the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485) filed with the Commission on August 14, 2013. Pursuant to the Study Plan Determination issued on September 13, 2013, the Commission approved FirstLight's proposed methodology; therefore, we assume it is consistent with accepted practice.

In general, the study consists of two tasks. The first task is a literature review to collect information needed to develop vegetation type maps and calculate the percentage of each vegetation type present in the study area. The second task is to conduct field surveys to document wildlife habitat and occurrence, vegetative cover types and invasive plant species in the Project area.

There are anecdotal accounts of bald eagles nesting and roosting along the Deerfield River in the vicinity of the Project. During the field surveys, biologists should document the occurrence of any bald eagle nesting and roosting sites and provide an assessment of the status (healthy, diseased, etc.) and level of protection (e.g., within a right-of-way, on protected conservation land) of each site. Where encountered, bald eagle nests and roosting trees should be GPS located and photo-documented.

The study report should include:

1. maps of the Project area showing locations and extent of habitats, vegetative cover, locations of invasive species, and known eagle roosting and nesting trees (as both polygons and point locations, as appropriate);
2. tabular summaries of the data;
3. an assessment of Project effects (operations, maintenance activities, potential future recreational amenities, etc.) on terrestrial habitat and wildlife at the Project;
4. recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection of key nest and roost trees for bald eagles.

### ***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, the Service estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified terrestrial wildlife and vegetation cover type mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on the 7.5 miles reach downstream of Fife Brook Dam. This would omit the majority of upland Project lands. As outlined in the expected framework (Table 6.3-1 of the PAD), the Service does not believe BSPC's proposed study would achieve the objectives identified herein.



## **Study Request #7**

### **Baseline Mussel Survey**

#### ***Goals and Objectives***

The goal of this study is to characterize the distribution, abundance and species composition of the freshwater mussel community in the upper end of the lower reservoir and in the 17-mile reach of river downstream of the Fife Brook Dam in order to evaluate potential Project impacts from current or future operations and maintenance activities.

The specific objective of the field study is to conduct surveys for freshwater mussels in the upper Fife Brook impoundment and downstream-affected reach to determine presence/absence of mussels, relative abundance, location and habitat preference.

#### ***Relevant Resource Management Goals***

The Service seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to aquatic resources, the Service's goals are:

1. Protect, enhance, or restore diverse high quality aquatic and riparian habitats for plants, animals, food webs, and communities in the watershed and mitigate for loss or degradation of these habitats.
2. Provide an instream flow regime that meets the life history requirements of resident fish and wildlife (including invertebrates such as freshwater mussels) throughout the area impacted by Project operations.
3. Minimize existing and potential negative Project operation effects on aquatic habitat, including habitat that does or could support freshwater mussels.

Our study requests are intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*), the Fish and Wildlife Coordination Act, as amended (16 U.S.C. §661 *et seq.*), and the Federal Power Act (16 U.S.C. §791a, *et seq.*).

#### ***Background and Existing Information***

In the PAD, BSPC states that four species of freshwater mussels are known to occur within the Deerfield River watershed: eastern elliptio (*Elliptio complanata*), eastern pearlshell

(*Margaritifera margaritifera*), eastern floater (*Pyganodon cataracta*), and alewife floater (*Anodonta imbecilis*). However, no site-specific surveys have been conducted to determine whether any mussel species are present within the area impacted by Project operations. This information is needed in order to determine whether Project operations are impacting the diversity, distribution and/or abundance of the mussel community in the upper portions of the Fife Brook impoundment and the 17-mile-long riverine reach below the Dam. BSPC has not proposed any studies to address this deficiency; therefore, the Service is submitting a request for such a study.

### ***Project Nexus***

The Project consists of the BSPS development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam.

Outside of a 2-month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. Freshwater mussels, if present, could be negatively impacted by Project operations. If mussels occur in the lower reservoir, routine drawdowns associated with peaking operations could strand them, leaving them vulnerable to desiccation or predation. Likewise, rapidly changing habitat conditions between base flows and generation flows below the Project could restrict mussels from otherwise suitable habitat, limiting and/or stressing these sensitive populations.

The Service requests that FirstLight conduct a survey of the Fife Brook impoundment and the reach downstream of Fife Brook Dam in order to determine the diversity, abundance, and distribution of freshwater mussels. Results of the survey would be used, in conjunction with the Instream Flow Study, to determine an appropriate below-Project flow prescription, as well as to recommend an appropriate water level management protocol for the headpond (e.g., limiting impoundment fluctuations to protect mussel populations).

### ***Methodology Consistent with Accepted Practice***

The Service requests a mussel survey be conducted at the Project. Because field identification of freshwater mussels can be quite difficult, we recommend that the Applicant hire a freshwater mussel expert to perform the assessment. The methodology should be similar to that used in recent licensing proceedings.<sup>8</sup>

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<sup>8</sup> Letter from Indian River Power Supply to the Commission, dated September 17, 2004. Indian River Project, FERC No. 12462; Glendale Project (FERC No. 2801) Mussel Survey in Glendale Hydroelectric Project Application for Subsequent License (FERC No. 2801), Volume 2, Appendix C, page 209, October 2007; Freshwater Mussel Survey in the Nashua River in the Bypass Reach, Tailrace, and Impoundment of the East Pepperell Dam (Pepperell, MA) in Pepperell Hydroelectric Project Application for Original License, Volume 2, Appendix C, October 2013.

In general, the survey should follow standard protocols developed by the Massachusetts NHESP. For the headpond, the survey should occur along the uppermost 1,300 feet of the lower reservoir. Given the length of the downstream reach, a subsampling procedure may be appropriate; however, particular attention should be given to the island complexes and temporary flow refugia from downed woody debris in the development of a subsampling procedure. Results should include the number of each mussel species observed, relative abundance (catch per unit effort) by species, the location and condition of each mussel, and a description of the habitat in which it was found.

***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study likely will take 2 to 3 weeks to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls Project (FERC No. 1889) was estimated to cost \$20,000 to \$30,000. As the scope of that study was broader than this one, the Service estimates it will cost BSPC \$20,000 to complete the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

## **Study Request #8**

### **Northern Long-Eared Bat Acoustic Survey**

#### ***Goals and Objectives***

The goal of this study is to determine whether the NLEB is present within the Project boundary.

The specific objective of the field study is to conduct an acoustic survey for the NLEB during the summer period to document presence/absence of the species.

#### ***Relevant Resource Management Goals***

The Service seeks the accomplishment of a number of resource goals and objectives through the relicensing process for the Project. General goals include the following:

1. Ensure that protection, mitigation and enhancement measures are commensurate with Project effects and help meet regional fish and wildlife objectives for the basin.
2. Conserve, protect, and enhance the habitats for fish, wildlife, and plants that continue to be affected by the Project.

Specific to the NLEB, the Service's goals are:

1. Protect, enhance, or restore diverse foraging and roosting habitat (maternity and non-maternity) for the NLEB.
2. Avoid NLEB mortality by conducting tree removal outside the time of year NLEBs are utilizing summer habitat (April 15 through August 15).

The NLEB is a federally threatened species. As such, this study request is intended to facilitate the collection of information necessary to conduct effects analyses and to develop reasonable and prudent conservation measures, and protection, mitigation, and enhancement measures for the species pursuant to the Endangered Species Act of 1973, as amended (16 U.S.C. §1531 *et seq.*).

It is the goal of the Service to recover the NLEB so that it can be removed from the list of threatened species in the future.

#### ***Background and Existing Information***

According to this office's online endangered species consultation system, which provides known occurrences at the town level, the NLEB potentially occurs in the Project area. While the PAD provides no site-specific information on the botanical resources within the Project area, it does give descriptions of the dominant vegetative communities found within the watershed. Based on those vegetative community descriptions, the Project area likely contains habitat suitable for the NLEB. However, baseline information regarding the presence/absence and distribution of the NLEB within the Project area is lacking. These data are needed in order to meet the goal of

evaluating Project effects. If NLEBs are present within the Project area, they may benefit from PME measures, given the potential effects of current and future operations and maintenance or enhancement activities on Project lands.

### ***Nexus to Project Operations and Effects***

The Project consists of the BSPS development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing, frequency or duration of those fluctuations (though typically they occur on a daily basis).

The majority of lands associated with the Project currently are protected through a CR conveyed to MADEM. The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of “River corridor” downstream from Fife Brook Dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license.

Based on vegetative community descriptions provided in the PAD, the Project area likely contains habitat suitable for the NLEB. While BSPC acknowledges that the NLEB may exist in the Project vicinity, it maintains that continued operation of the Project is unlikely to have any effect on NLEB populations. Even though BSPC is not proposing any new construction, land management activities that could impact bat habitat or hibernacula could change as a result of the relicensing process. For example, additional recreational trails could be a requirement of any new license issued for the Project. Those trails could require that trees be cut, which could result in bat mortality if the removal occurs during a time when bats are unable or unwilling to flee a tree that is felled when they are inside. Without knowing if and where NLEBs occur within the Project area, the Service cannot determine if existing operations (e.g., maintenance activities on Project lands) or future activities could result in adverse effects to NLEB populations.

### ***Methodology Consistent with Accepted Practice***

The Service requests that the Applicant conduct a bat survey following the Service’s 2014 Revised Range-Wide Indiana Bat Summer Survey Guidelines, issued on January 13, 2014 (USFWS 2014a), in accordance with the Northern Long-Eared Bat Interim Conference and Planning Guidance (USFWS 2014b).

In general, survey methodology should consist of having a qualified acoustic surveyor conduct acoustic surveys during the summer period (May 15 through August 15). In accordance with Service guidance, non-linear projects should have a minimum of 4 detector nights per 123 acres of suitable summer habitat, with two detector locations per 123-acre “site” being sampled until at least 4 detector nights have been completed over the course of at least 2 calendar nights.

To maximize the quality of recorded echolocation calls, detectors should be positioned at least 1 meter off of the ground, at an angle  $\geq 45$  degrees, and with PVC tube weatherproofing. The

acoustic sampling period for each site must begin at sunset and end at sunrise each night of sampling.

Data analysis should consist of using currently available acoustic bat identification programs to determine if positive detections of NLEB calls were recorded.

A report of the acoustic survey results should include:

- an explanation of any modifications from the original survey plan;
- a description of acoustic monitoring sites, survey dates, duration of survey, weather conditions, and a summary of findings;
- a map identifying acoustic monitoring locations and a corresponding table including the GPS coordinates;
- a table with information on acoustic monitoring and resulting data, including detector GPS coordinates, survey dates, survey hours;
- detailed analysis and results of any qualitative acoustic analysis conducted where a program(s) considered NLEB presence likely, including justification for rejecting any program MLE results (if applicable); and
- photographs of each acoustic site documenting the location of the detector, the orientation of the detector, and the detection cone.

A similar study was undertaken in 2014 by Grande Prairie Wind, LLC as part of a wind power development project proposed in Holt County, Nebraska; therefore, the methodology is consistent with accepted practice.

#### ***Level of Effort/Cost, and Why Alternative Studies Will Not Suffice***

The study should take one field season to complete. The level of effort required is moderate. Given the amount of potentially suitable habitat, the Project area may contain 10 or more survey sites with 40 or more detector nights. The Service estimates it will cost BSPC \$20,000 to \$40,000 to complete the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

#### ***Literature Cited***

- U.S. Fish and Wildlife Service. 2014a. Range-Wide Indiana Bat Summer Survey Guidelines. 41 pp.
- U.S. Fish and Wildlife Service. 2014b. Northern Long-Eared Bat Interim Conference and Planning Guidance for Regions 2, 3, 4, 5, & 6. 67 pp.

Document Content(s)

bear swamp pad study requests ltr.PDF.....1-54



## CONNECTICUT RIVER WATERSHED COUNCIL

*The River Connects Us*

15 Bank Row, Greenfield, MA 01301 [crwc@ctriver.org](mailto:crwc@ctriver.org) [www.ctriver.org](http://www.ctriver.org)

April 16, 2015

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

Re: Bear Swamp Project No. 2669  
**Comments on the Pre-Application Document, Scoping Document 1, and Study Requests**

Dear Secretary Bose,

The Connecticut River Watershed Council, Inc. (CRWC) is a nonprofit citizen group that was established in 1952 to advocate for the protection, restoration, and sustainable use of the Connecticut River and its four-state watershed. We love to celebrate the River and its tributaries. On December 19, 2014, Bear Swamp Power Company (BSPC) filed a Notice of Intent (NOI) and Pre-Application Document (PAD) for the relicensing of the Bear Swamp Project. On February 18, 2015, FERC issued Scoping Document 1 (SD1) along with a deadline for study requests.

The interests and goals represented by CRWC include, but are not limited to, improving water quality; enhancing habitat for fish and other aquatic biota; safeguarding and improving wildlife habitat; protecting threatened and endangered species; protecting wetlands; preserving undeveloped shore lands; enhancing public recreation and promoting recreational safety; protecting aesthetic values; protecting archeological, cultural, and historical resources; fostering sustainable economic development, energy production, and preserving the local tax base along the Connecticut River and its tributaries.

The Council's members use and are concerned about the area of the Deerfield River affected by the presence and operation of the Bear Swamp Pumped Storage Development (Bear Swamp PSD) and the Fife Brook Dam, owned jointly by Brookfield Renewable Energy Group (Brookfield) and Emera Inc., and operated by Bear Swamp Power Company (BSPC). Peaking flow at this facility as well as those all along the Deerfield River affect the aquatic habitat, water quality, and recreational use of the river. The whitewater releases have made the Deerfield River a very popular destination for whitewater paddlers and tubers. Anglers also regard the river as a resource, but the peaking flows have had impacts on the ability to fish along the river. Balancing the recreational uses, and managing the large numbers of users, is a challenge that we hope can be addressed better in the relicensing process.

CRWC is committed to working with FERC and other stakeholders to implement an Integrated Licensing Process for this projects that will positively affect the Deerfield River and its resources for present and future generations. CRWC is presently involved as a stakeholder in the relicensing of five hydropower

MASSACHUSETTS  
413-772-2020

LOWER VALLEY  
860-704-0057

UPPER VALLEY  
802-869-2792

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802-457-6114



facilities on the mainstem Connecticut River (Turners Falls Dam, Northfield Mountain Pumped Storage facility, Vernon Dam, Bellows Falls Dam, and Wilder Dam), and has intervened in relicensing proceedings and license amendments at the Holyoke Dam (FERC No. 2004), Canaan Dam (No. 7528), Fifteen Mile Falls (No. 2077), Vernon (No. 1904), and Northfield Mountain (P-2485).

We appreciate the opportunity to submit our comments on the Pre-application Document (PAD), Scoping Document 1, and we are also submitting multiple study requests. Our comments on the PAD and Scoping Document 1 are organized by the sections of each respective document. The full text of our study requests are located in an appendix to this letter.

### **CRWC comments on the Pre-Application Document (PAD)**

1. Section 4.3.1.1 (Page 4-5) of the PAD describes the conveyance structures associated with Bear Swamp. It is not clear the structure on the Deerfield River is like and how far it extends out into the river.
2. Section 4.3.1.2 (Page 4-6) of the PAD states that the Lower Reservoir (the portion of the Deerfield River impounded behind Fife Brook Dam) is partially fenced and public access is prohibited due to safety and security concerns. More details are needed about the location of fencing, the areas that are denied access, and the specific safety concerns other than the allowed 40-foot fluctuation range of the Lower Reservoir.
3. Section 4.4.1 in the PAD contains Figure 4.4-2 and Figure 4.4-3 showing inflow and outflow from Fife Brook. In order to understand current operations, we would need to see more years of data and viewable at a scale that we can really see how the facility is affecting flow. The graphs provided in the PAD are inadequate.
4. Section 4.4.2 (page 4-23) describes the procedure for transitioning from the 125 cfs minimum flow discharge to a higher scheduled discharge level. The PAD describes bringing the powerhouse up to 3MW and holding it at that level for 15 minutes. First, CRWC is interested in knowing what 3MW equates to in terms of flow at low and high pond levels. Second, we would like to see actual operations data over the previous seasons in which this practice has taken place.
5. Section 4.5.2 of the PAD provides data for pumping, generation, and outflow by month for the years 2009-2013. We request that all flow information of this kind include the years 2005-2015.
6. Section 4.5.6, future development. If the proposed rehabilitation and upgrade of the two 40-year old pump-turbine units would impact the Lower Reservoir fluctuation patterns at all, BSPC should describe effects.
7. Section 5.3.3 (page 5-31) describes flow duration curves for the Charlemont Gage included in Appendix H. Flow duration curves are needed for the section of river just downstream of the Fife Brook Dam and for the inflow coming into the impoundment from the next facility upstream.
8. Section 5.4.1 should provide any information on the presence or lack thereof of American eels in the project area.

9. Section 5.5.2.4. Bald eagle and wild turkey should be added to the list of avifauna present in the Deerfield River watershed.

## **CRWC comments on Scoping Document 1**

CRWC attended the daytime scoping meeting held in North Adams, MA on March 18, 2015. We hope that future meetings related to this relicensing process will take place in the Deerfield River watershed, either in the project vicinity, or in Charlemont, Shelburne Falls, or Greenfield.

Additionally, we were disappointed that FERC prepared no agenda for the scoping meeting and cut off discussion after two hours. The scoping meeting notice included only a start time, and previous FERC scoping meetings we have attended have lasted until comments were exhausted. There were several subject areas that were not discussed.

### 4.0 Scope of Cumulative Effects and Site-Specific Resource Issues

FERC has identified the scope of analysis for cumulatively affected resources is the headwaters of the Deerfield River in Vermont all the way down to the Deerfield River's confluence with the Connecticut River. This project sits in the middle of a highly regulated system of hydropower projects owned by other companies. It is unfortunate that these facilities are not on the same relicensing schedule. When the Deerfield project and Gardners Falls were relicensed in the 1990's, Bear Swamp's license was amended. Now we are relicensing Bear Swamp, but the other Deerfield projects are not up for modification. FERC needs to figure out how to synchronize all facilities on the Deerfield.

CRWC recommends that the following resources that could be cumulatively affected be added to the ones already identified by FERC:

- Effects of continued project operation on aquatic habitat for migratory and resident fish species, mussels, and benthic macroinvertebrates.
- Effects of continued project operation on recreational use in the Deerfield River.
- Water losses from hydropeaking as described by Yellen and Bout (2015)<sup>1</sup>.

Section 4.2.5 does not identify the aesthetic impact of rip-rapping two miles of the Deerfield River upstream of the Fife Brook dam.

### 5.0 Proposed studies

The geographic scope of studies should include the upstream extent of the Fife Brook impoundment when Bear Swamp is generating, and the downstream extent should go all the way down to the upstream limit of the Deerfield No. 4 impoundment.

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<sup>1</sup> B. Yellen and D. F. Boutt, 2015. Hydropeaking induces losses from a river reach: observations at multiple spatial scales. Hydrological Processes (2015).

## **Section 6.0 Request for information and studies**

Study requests submitted by CRWC are included as an attachment to this letter.

CRWC understands that there will be agency submittals for several studies that we are not as an organization proposing. CRWC supports the requests for the following studies: Northern Long-Eared bat acoustic survey; Massachusetts State-Listed Rare Plants, Baseline Data Collection and Assessment of Operational Impacts; and Massachusetts State-Listed Odonates, Baseline Data Collection and Assessment of Operational Impacts.

We appreciate the opportunity to provide comments on the PAD, Scoping Document 1, and the study requests. We look forward to our active participation in the relicensing of the Deerfield River projects.

Sincerely,

A handwritten signature in dark ink, appearing to read "Andrea F. Donlon". The signature is fluid and cursive, with the first name "Andrea" and last name "Donlon" clearly distinguishable.

Andrea Donlon  
River Steward

ATTACHMENT: CRWC Study Requests

## Appendix

### CRWC Study Requests

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## **CRWC Study Request #1. Water Quality Monitoring Study**

### **Goals and Objectives**

Determine the current water quality of the Deerfield River within the area affected by Project operations. The results of the study should provide information sufficient for stakeholders to understand water quality conditions at the project. The study plan should be developed in consultation with the U.S. Fish and Wildlife Service (FWS), the Massachusetts Department of Environmental Protection (MassDEP), and stakeholder groups.

The specific objectives of this study are as follows:

- Characterize water quality upstream of the Project to the highest pool elevation of Fife Brook impoundment and downstream to the boundary of the highest pool elevation behind Deerfield No. 4 station.
- Evaluate the potential effects of project operation on water quality parameters such as temperature and dissolved oxygen in conjunction with various other water uses.
- Collect dissolved oxygen (DO) and temperature data during the spring through fall period and under various hydropower operating conditions at the Bear Swamp Project.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting the water quality of the river water to maintain its status as a Class B cold water resource, as designated by Massachusetts Department of Environmental Protection, 314 CMR 4.06(5). Class B rivers are assigned the designated uses of habitat for fish, other aquatic life and wildlife, and for primary and secondary contact recreation, 314 CMR 4.05(3)(b). Class B waters must also have consistently good aesthetic value and meet minimum criteria for numerous water quality indicators to achieve compliance with the standards set forth in the regulations. The anti-degradation provisions of 314 CMR 4.04 require protection of all existing and designated uses of water bodies, and maintenance of the level of water quality needed to protect those uses. The Massachusetts Surface Water Quality Standards (314 CMR 4.02) defines cold water fisheries as waters in which the mean of the maximum daily temperature over a seven day period generally does not exceed 68° Fahrenheit (20° Celsius) and, when other ecological factors are favorable (such as habitat), are capable of supporting a year-round population of cold water stenothermal aquatic life such as trout (salmonidae). Waters with a cold water designation have a 6.0 mg/l dissolved oxygen standard. The information resulting from this study will help ensure that the operation of these projects does not degrade water quality in the Fife Brook impoundment and reaches downstream.

### **Existing Information and Need for Additional Information**

The PAD provides a summary of existing water quality data. While a number of monitoring efforts have taken place and include sample sites within the project boundary, none of those studies were designed to comprehensively investigate whether all relevant project areas currently meet Class B standards. The

Massachusetts DEP's Deerfield River watershed assessment monitoring occurred in 2000 and only had three sampling events just downstream of Fife Brook Dam. An earlier effort in 1995/1996 produced 9 sampling events collected from two sampling locations. A volunteer monitoring program by the Deerfield River Watershed Association produced two sampling events in 2001/2002. Toxicity testing results taken for the Monroe Wastewater Treatment Facility in 1999/2001 did not include dissolved oxygen. Frost and Easte (1977) provide a historic comparison of water temperature and dissolved oxygen readings measured just before and just after the Bear Swamp facility was installed. River fluctuation happened in a weekly pattern that does not exist now, and minimum flow requirements have been increased since the 1970's. No directed, site-specific surveys have been conducted to determine whether waters within the Project area meet State standards. This information gap needs to be filled so that resource agencies can evaluate properly the potential impact of project operations on water quality.

### **Nexus to Project Operations and Effects**

The Fife Brook Dam is located 4.2 miles downstream from Deerfield Station No. 5. It creates an impoundment of unknown length and depth where there would naturally be a free-flowing river. The dam operates in a run-of-release system, in response to regulated, peaking inflows from the immediately upstream Deerfield No. 5 station, which is owned and operated by TransCanada Hydro Northeast Inc. Allowable headpond fluctuations to use the Fife Brook impoundment as the lower reservoir for Bear Swamp pumped storage are up to 40 feet, with proposals to continue as such. The below-project flow requirement is equal to 125 cfs. It is unknown whether the impoundment exhibits stratification. Water quality can be affected by the operating regime of a hydropower project. Past studies have shown dissolved oxygen saturation as high as 99%.

CRWC requests that the applicant conduct a water quality survey upstream of the Project to the highest pool elevation of the Fife Brook impoundment and downstream along the Deerfield River to the boundary of the highest pool elevation behind Deerfield No. 4 station in order to determine whether state water quality standards are being met under all currently-licensed operating conditions (i.e., during periods of generation and non-generation). Results of the survey would be used, in conjunction with other studies requested, to determine an appropriate below-Project flow prescription and to recommend an appropriate water level management protocol for controlling impoundment fluctuations.

### **Proposed Methodology**

Water temperature and DO measurements (concentration and percent saturation) should be collected from a minimum of six locations: 1) at the highest pool elevation of Fife Brook impoundment, 2) at a deep location within the Fife Brook impoundment, 3) on the Deerfield River just downstream of Fife Brook dam, 4) in the Zoar area of the Deerfield River upstream of the confluence with the Cold River, 5) the Deerfield River approximately 1-2 miles downstream of the confluence with the Chickley River (near the USGS Charlemont gage would be a site to consider), and 6) just upstream of the boundary of the highest pool elevation behind Deerfield No. 4 station and one halfway between the last two. In order to ensure that data are collected during a time of important biological thresholds and anticipated "worst case" conditions for dissolved oxygen (low flow, high temperature, antecedent of any significant rainfall event), we recommend deploying continuous data loggers at all locations, with biweekly vertical profiles taken at the deep impoundment location from April 1 through November 15. Loggers should be placed in a consistent manner at all sites. Biweekly pH and specific conductance readings should be taken at all locations. Results should include date, time of sampling, sunrise time, GPS location, pumping/generation status at Bear Swamp and Fife Brook, and precipitation data should be provided with the data.

The study plan must include a section on quality assurance and quality control.

If river flow and temperature conditions are representative of an “average” or “low” water year, then one year of data collection should be sufficient to perform the study. If conditions are not representative (i.e., a “wet” or cool year) then a second year of data collection may be necessary.

#### **Level of Effort and Cost**

CRWC estimates that the cost of conducting this study from May 1 through November 1 will be \$30,000-50,000.

In the PAD, the applicant proposes to assess the effects of the Fife Brook Development and Bear Swamp Pump Storage Development operations on water quality by monitoring water temperature, dissolved oxygen, percent saturation, pH and specific conductance at locations within approximately 7.5 miles downstream of Fife Brook. We believe the effects of this Project extend to the Deerfield No. 4 station, some 17 miles downstream of Fife Brook.

## **CRWC Study Request #2. Model River Flows and Water Levels Upstream and Downstream from Fife Brook Dam and Integrate Project Modeling with Upstream and Downstream Project Operations**

Develop a river flow and operations model designed to evaluate the hydrologic changes to the Deerfield River caused by the physical presence and operation of the Fife Brook and Bear Swamp Pumped Storage (BSPS) developments, and the interrelationships between the operation of Fife Brook/BSPS and the Deerfield River Project (FERC No. 2323) facilities upstream and downstream. The flow study should assess the following topics:

1. Conduct quantitative hydrologic modeling of the hydrologic influences and interactions that exist between the water surface elevations of the Fife Brook impoundment (lower reservoir) and discharges from the Fife Brook and BSPS generating facilities and the upstream and downstream hydroelectric facilities. Data inputs to and outputs from the model(s) should include:
  - a) discharges into the Fife Brook impoundment from the Deerfield River Project's Deerfield No. 5 development;
  - b) withdrawals from the Fife Brook impoundment by BSPS;
  - c) discharges to the Fife Brook impoundment by BSPS;
  - d) existing and potential discharges from the Fife Brook development (generation, recreational releases, and spill flows);
  - e) existing and potential water level fluctuation restrictions (maximum and minimum pond levels) of the Fife Brook impoundment and flows downstream of Fife Brook dam; and
  - f) existing and potential required minimum flows and/or other operation requirements at each of the upstream projects.
2. Document how the existing outflow characteristics from the Deerfield No. 5 facility affect the operation of the Bear Swamp Project, including downstream flow releases and Fife Brook impoundment levels.
3. Document how the existing Fife Brook and Bear Swamp operations affect the Deerfield River from Fife Brook dam downstream to the upstream extent of the Deerfield River Project's Deerfield No. 4 impoundment.
4. Assess how recreational use of the Deerfield River (paddling, floating, angling) is impacted by flows under a range of conditions.

### **Goals and Objectives**

Determine the extent of alteration of river hydrology caused by operation of the project and the interactions between upstream project operations, Bear Swamp Project operations, and downstream operations at Deerfield No. 4. The models will provide necessary information on what changes can be made to flow releases and/or water levels restrictions at the Fife Brook and BSPS developments, and how those changes affect downstream resources.

As other specific operational modifications at the Fife Brook and/or BSPS developments are identified based on results of other requested studies, these desired conditions will need to be input into the models to assess how each potential change at one development affects the operations of the other development and the implications of those changes on other resources and/or the ability to achieve desired operational changes at each development.



## **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

## **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in balancing the protection of water quality, aquatic habitat, natural flows, and recreational use of the river with the use of the river for power generation.

## **Existing Information and Need for Additional Information**

Available information in the PAD does not indicate how project operations have altered downstream hydrology, which may affect riverine fish, macroinvertebrates, rare, threatened, and endangered species, aquatic plants and other biota and natural processes in the Deerfield River from below the Fife Brook Dam downstream to the Deerfield No. 4 facility.

In the PAD, BSPC indicates that Fife Brook operates in a run-of-release mode, reacting to and passing inflows from TransCanada's upstream hydropower facilities and that Bear Swamp operations have no effect on Deerfield River flows upstream and downstream of the BSPS and Fife Brook developments. No information on the frequency, timing or duration of reservoir fluctuations is provided, nor is the extent of upstream backwatering during pumping and generating. Likewise, the PAD contains no data on the extent of water surface elevation fluctuations downstream of Fife Brook Station. Figure 4.4-2 indicates that outflow peaks from Fife Brook may be lower than inflow peaks from TransCanada, but only two months from a single year of data are shown. Figure 4.4-3 from the PAD re-enforces this observation, showing inflow and outflow at Fife Brook (for two years only), however the scale of this figure makes it hard to see much detail.

Article 401 in the 1997 Order Amending Bear Swamp's Project License requires a minimum flow of 125 cfs as measured below the dam for the protection and enhancement of fishery resources in the Deerfield River. Article 404 requires whitewater boating releases from Fife Brook of 700 cfs for 3 continuous hours on 50 weekend days and 56 weekdays between April 1 and October 31. After complaints about minimum flows, a gage was installed below Fife Brook but that gage was ruined in Tropical Storm Irene. Anglers complain that releases strand anglers on one side of the river. BSPC states that it increases flows and holds them for 15 minutes for safety, yet no supporting data are provided to validate this statement.

Operations, water surface elevation and flow information is needed to better understand the impact of operations on recreational uses of the river and whether or not modifications can be made to improve river habitat and river uses. The PAD provides no information regarding how project operations affect fisheries resources or recreational use. The requested hydraulic and operations models will allow for testing different scenarios that will aid in understanding if, and to what extent, the Bear Swamp Project has the ability to re-regulate to benefit fish and wildlife resources within the project-affected area.

## **Nexus to Project Operations and Effects**

The Bear Swamp Project is currently operated with a continuous minimum flow of 125 cfs. The project operates as a daily peaking project, often with large, rapid, daily flow fluctuations between the minimum and project capacity (1,400 cfs). In addition, the Fife Brook Dam headpond (also known as the lower reservoir) elevation fluctuates 40 feet (830 feet msl to 870 feet msl) as does the upper reservoir of the Bear Swamp Pumped Storage (BSPS) development (from 1,600 feet msl down to 1,550 feet msl). These

changes affect fish, wildlife and their habitats within the project-affected reach. Project operations and potential changes to operations to mitigate impacts are influenced by inflows and operations of upstream peaking projects and the Bear Swamp Project operations. Results of river flow and project operations analyses will be used to develop flow-related license requirements and/or other mitigation measures (e.g. angler safety).

### **Proposed Methodology**

CRWC proposes that the study methodology be similar to that used in studies 3.2.2 and 3.8.1 in the Turners Falls and Northfield Mountain relicensing effort currently underway on the Connecticut River in Massachusetts.<sup>1</sup> Both of those studies were approved, with modifications, by the Commission in its September 13, 2013 Study Plan Determination letter; therefore, the methodology is consistent with accepted practice.

The purpose of the hydraulic model is to determine, for a given flow, the corresponding water surface elevation at a given location within the river, as well as water depth and mean channel velocity. The one-dimensional HEC-RAS can be run in both a steady state mode and an unsteady state mode.

River level loggers will need to be placed within the study area (from the upstream extent of the lower reservoir downstream to the head of the Deerfield No. 4 headpond). Past project operations (at a sub-hourly time step) for 2005 through 2014 should be used in the model. Past project operational data should also be provided and summarized to stakeholders as part of a report. Any proposed modifications to facility operations should be identified and modeled.

The simulation model (HEC-ResSim) will be used to evaluate the impacts of current and potential alternative modes of operation in the project area on the timing and magnitude of river flows. Output from the model will be used in other studies to evaluate the impact of current and potential alternative modes of operation on water surface elevations and aquatic habitat.

### **Level of Effort and Cost**

Level of effort and cost of model development are expected to be moderate but to be valuable in developing license conditions. The model(s) will need to be run under various scenarios throughout the relicensing process to assess the implications of any changes to the operations. Therefore, ongoing consultation and re-running of the model(s) are likely to be needed throughout the relicensing process. The modeling exercise will also require coordination and cooperation between BSPC and the upstream licensee to assure that the model inputs and outputs can be accurately related.

FirstLight has said that their study 3.2.2 will cost \$100,000-120,000 and study 3.8.1 will cost \$100,000-125,000. Because the Deerfield River is smaller than the Connecticut River, flows coming from upstream are more straightforward, and Fife Brook does not have a canal system, we would expect the costs for this study to be significantly lower than the studies at Turners Falls and Northfield Mountain. The U.S. Fish and Wildlife Service (USFWS) estimates that the requested study would cost \$150,000 to \$200,000.

The applicant has proposed no studies to address this resource concern. The water quantity and operations study that BSPC proposes will only characterize flow fluctuation, attenuation and travel time patterns in the 7.5 mile long reach downstream of Fife Brook Station under existing operations. It would not provide the ability to model different operational scenarios.

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<sup>1</sup> Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources.

### **CRWC Study Request #3. Instream Flow Habitat Assessment Downstream of Fife Brook Dam**

Conduct an instream flow habitat study to assess the impacts of the range of the proposed project discharges on the wetted area and optimal habitat for key species. The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target fish species potentially include brook trout, brown trout, rainbow trout, longnose sucker, fallfish, and white sucker.

#### **Goals and Objectives**

The goal of this study is to determine an appropriate flow regime that will protect and enhance the aquatic resources from the Fife Brook Station tailrace downstream to upper end of the Deerfield River Project's Deerfield No. 4 impoundment. Specifically, the objective of the study is to conduct an instream flow habitat assessment of the impacts of a range of flows on the wetted area and optimal habitat for key species, including the impacts of hydropeaking flow fluctuations on the quantity and location of suitable habitat.

The study should include non-steady flow approaches to assess effects of within-day flow fluctuations due to peaking power operations on target fish species and benthic invertebrate communities. Target species potentially include brook trout, brown trout, rainbow trout, longnose sucker, fallfish, white sucker and benthic macroinvertebrates including mussels.

#### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

#### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting aquatic habitat in waters in the Commonwealth of Massachusetts, particularly in coldwater rivers and streams.

#### **Existing Information**

In the PAD, BSPP provides no information on the fish assemblage in the riverine reach downstream of Fife Brook Dam other than stating that the Massachusetts Division of Fisheries and Wildlife (MADFW) stocks adult brown and rainbow trout in the reach to support its management as a catch-and-release fishery. Limited information exists on the adequacy of the existing minimum flow regime to protect water quality and aquatic life. Further, the PAD contains no information regarding how project operations have altered downstream habitat quantity and quality important to fish, macroinvertebrates, aquatic plants and other biota and natural processes in the 17-mile-long stretch of the Deerfield River from below the Fife Brook Dam downstream to the impoundment of the Deerfield No. 4 development.

Surveys of macroinvertebrates in the Deerfield River below the Fife Brook dam (Cole 2007 and 2014) have shown a change in that community with distance downstream of the dam. Mayfly and stonefly taxa

that were located in the lower sampled reaches were not present below the dam or approximately 2.5 miles below the dam.

### **Nexus to Project Operations and Effects**

The Project is currently operated with a minimum flow release that was not based on biological criteria or field study. Further, the project generates power in a peaking mode, resulting in significant within-day flow fluctuations between the minimum and project capacity on an hourly or daily basis. Large and rapid changes in flow releases from hydropower dams are known to cause adverse effects on habitat and biota downstream of a project (Cushman 1985; Bain *et al.* 1988; Blinn *et al.* 1995; Freeman *et al.* 2001; Layzer *et al.* 1989). There are more than 17 miles of lotic habitat below the project's discharge that are impacted by peaking operations at the Fife Brook Station. This section of the Deerfield River contains habitat that supports native riverine species. While the existing license does require a continuous flow of 125 cfs below the dam, this flow has yet to be shown to be sufficiently protective of the aquatic resources in this substantial reach of river, especially in the context of the magnitude, frequency, and duration of changes in habitat that likely occur between minimum and generation flows.

Results of the study will be used by agencies and stakeholders to determine an appropriate flow recommendation that will protect and/or enhance the aquatic resources below the Project.

### **Proposed Methodology**

In-stream flow habitat assessments are commonly employed in developing plant operational regimes that will reduce impacts or enhance habitat conditions downstream of hydroelectric projects.

Given the length of the river reach (17 miles) impacted by project operations, we believe a study methodology that utilizes an IFIM approach is appropriate for this site. This same protocol currently is being used in the relicensing proceedings for the Connecticut River hydropower projects (FERC Nos. 1889, 1892, 1855 and 1904).<sup>2</sup> The Commission's Study Plan Determination letters to FirstLight and TransCanada dated February 21, 2014 accepted the proposed studies (FirstLight's with modifications); therefore the methodology is consistent with accepted practice.

Habitat in the study area first must be mapped at a sufficient level of detail to spatially delineate different mesohabitat types for the purposes of transect selection. At a minimum, the study design should involve collecting wetted perimeter, depth, velocity, and substrate data along transects located in the reach of river below Fife Brook Station. The measurements should be taken over a range of test flows. This information then should be synthesized to quantify habitat suitability (using mutually agreed upon HSI curves) of each test flow for target species and life stages identified by the fisheries agencies. Habitat modeling using standard PHABSIM 1-dimensional modeling is acceptable for the river channel downstream from the Route 2 Bridge. The area from the Fife Brook Station discharge to the Rt. 2 Bridge should be modeled using 2-dimensional (2D) modeling to better characterize flows and velocities in this high quality area.

The types of data collected with this study should be sufficient to perform a dual-flow analysis and habitat time series or similar approaches that will permit assessment of how quantity, quality and location of

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<sup>2</sup> Study 3.3.1 of the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources; Study 9 of the Revised Study Plan for the Wilder Hydroelectric Project (FERC No. 1892-026), Bellows Falls Hydroelectric Project (FERC No. 1855-045) and Vernon Hydroelectric Project (FERC No. 1904-073). August 14, 2013.

habitat for target species changes over a range of flows between existing minimum flow and maximum project generation flows.

### **Level of Effort and Cost**

Field work for instream flow studies can be relatively extensive but will depend on consultation with the applicant on study methodology and on-site decisions on locations for data collection and the number of collection locations. Post-fieldwork data analysis would be of moderate cost and effort. Based on cost estimates for similar studies (e.g., Turners Falls Project, FERC No. 1889), we anticipate that conducting the requested flow study would cost between \$100,000 and \$150,000.

The applicant has proposed no studies to address this resource concern. The aquatic habitat mapping that BSPC proposes will only characterize habitat in a portion of the project-affected reach. While habitat mapping is necessary, it alone will not allow for an evaluation of project operation impacts to the quantity, quality and location of suitable habitat for specific species of fish and aquatic invertebrates.

### **References**

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## **CRWC Study Request #4. Entrainment of Riverine Fish from the Deerfield River Into the Bear Swamp Pump Storage Facility and Fife Brook Dam**

### **Goals and Objectives**

The goal of the study is to determine the impact of the Bear Swamp Pump Storage (BSPS) facility during pumping and generation cycles and estimate the impact of the Fife Brook dam on entrainment of riverine fish, including early life stages.

The objective of the study is to quantify the number of riverine fishes entrained at the BSPS station intake on an annual basis in order to evaluate potential impacts to fish populations in the lower reservoir (Fife Brook impoundment) and Deerfield River Project's Deerfield No. 5 bypass reach. This will be accomplished through netting using various gear types to quantify and identify species of different life stages. A desktop analysis of entrainment at Fife Brook dam is being requested in this study.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting fish populations in the Deerfield River and its tributaries.

### **Existing Information and Need for Additional Information**

Limited project specific information exists regarding entrainment of fish and aquatic organisms at the BSPS facility. Under Article 44 of the Bear Swamp Project license, fisheries surveys were undertaken in the Fife Brook impoundment (lower reservoir) and the BSPS upper reservoir: two years of pre-operational surveys were conducted (1972 to 1973), one survey during a transitional year (1974), and two years of post-operational surveys (1975 to 1976). Those surveys collected fish in the newly created upper reservoir, indicating that fish were being entrained at the BSPS intake (Frost and Easte 1977). No further studies have been undertaken in the ensuing years.

BSPC evaluated the potential impact of increasing the hydraulic capacities of the two pump-turbines in 2008 as part of an amendment of license proceeding. In a March 8, 2008 letter responding to comments from Trout Unlimited on the proposed upgrade, BSPC stated that once the turbine upgrades are completed, the intake velocities at the BSPS trashracks will increase from 6.68 foot per second (fps) to 7.54 fps in pumping mode and from 7.79 fps to 8.88 fps in generation mode (13 percent and 14 percent increases, respectively).<sup>3</sup> However, in a supplementary filing to its amendment application that included an analysis of the potential risk of entrainment due to the proposed upgrade, the increase in intake velocity was calculated as being from 1.8 fps to 2.3 fps under high tailwater and from 2.5 fps to 2.8 fps under low tailwater.<sup>4</sup> CRWC assumes that those velocities represent the incremental increase (i.e., in excess of the 7.79/8.88 fps) as a result of the upgrade.

<sup>3</sup> Appendix A of Brookfield Power's March 27, 2008 Non-Capacity Amendment Application to FERC.

<sup>4</sup> BSPC letter to FERC dated July 3, 2008; Accession No. 20080703-4006.

Table E-2 of the July 3, 2008 supplementary filing identified 11 species of fish as occurring in the bypass of the Deerfield River Project's Deerfield No. 5 development (and therefore, conceivably present in the lower reservoir). Of those 11 species, BSPS only selected adult brown and rainbow trout to analyze for risk of entrainment (by comparing target species' burst swim speeds to the calculated intake velocities). As these two species have the highest sustained and burst swim speeds of any fish within the vicinity of the project, they are least likely to be at risk of entrainment. Their analysis of adult salmonids only leaves a large data gap with respect to understanding the relative risk of entrainment for other species and/or life stages. In addition, Table E-2 omitted the documented presence of longnose sucker in both the lower and upper reservoirs. As a state species of special concern, it should have been evaluated. Clearly, the fact that it was caught in the upper reservoir documents that it is at risk of entrainment.

The 2008 entrainment evaluation is insufficient in the context of the current relicense proceeding. Because the 2008 entrainment evaluation was a desktop exercise, no empirical data exist on the timing, magnitude and duration of entrainment of riverine fishes in the BSPS area. Riverine species occurrence and susceptibility relative to space and time exposure windows to BSPS pumping are undocumented. This lack of information leaves questions unanswered on the types and extent of impacts to these populations that may be linked to the near daily cycling of river water up and down through the BSPS operations system. Therefore, it is necessary to obtain baseline data on project operation impacts for species potentially impacted by BSPS. An additional study request seeks to obtain an up-to-date, accurate documentation of fish species within the project-affected area.

At Fife Brook Dam, the intake is equipped with trashracks consisting of 0.5-inch-wide bars having 3.0-inch clear spacing. The powerhouse houses a single Francis-type turbine and generator unit with an installed capacity of 10 MW. The PAD on page 5-47 states that there are no upstream or downstream passage facilities at the Bear Swamp Project. The impact of the operation of Fife Brook on resident fish populations with no passage facilities should be determined.

### **Nexus to Project Operations and Effects**

The BSPS consists of an intake located along the banks of the Deerfield River (which acts as the lower reservoir), a powerhouse, a pressure shaft, and a 118-acre upper reservoir. The powerhouse contains two reversible Francis-type pump turbines that have a total nameplate capacity of 600 MW. The BSPS pumps at a maximum hydraulic capacity of 4,520 cfs and generates at a capacity of 5,430 cfs. The intake to the lower reservoir is covered with trashracks that have 6-inch-clear spacing. An upgrade to the turbine units was approved in 2008 but has not been implemented yet.

BSPS operates as a peaking facility, typically pumping at night when power prices are low and generating during peak power periods during the day. The upper reservoir is allowed to fluctuate 50 feet (from elevation 1,600 feet mean sea level [msl] down to elevation 1,550 feet msl). However, the lowermost 5.5 feet of storage are held for emergency/reserve conditions, resulting in a usable storage capacity of 4,900 acre-feet. Within a 24-hour period, the facility will generate at full discharge off of the usable storage for 5.9 hours, and then pump for 7 hours to refill the upper reservoir.

The intake velocity at the BSPS lower reservoir trashracks has been calculated to be 6.68 fps in pumping mode and would increase to 7.54 fps once the approved upgrade has been completed. What remains unclear is what lower reservoir elevation these velocities are based on (i.e., if they are for "full pool" then the velocities could be higher when the lower reservoir is at minimum pool). Regardless, velocities ranging from nearly 7 fps (currently) to possibly over 8 fps (post-upgrade) exceed the swimming ability of many riverine species, particularly early life stages that may be moving past the intake.

Entrainment of fish and aquatic organisms associated with water withdrawal and hydroelectric operations has been documented to result in injury or death of entrained organisms. The Massachusetts Division of Fisheries and Wildlife (MADFW) documented the presence of brown and brook trout, longnose and blacknose dace, and white suckers in the No. 5 bypass reach. Frost and Easte (1977) collected 11 species of fish from the lower reservoir, including the state species of special concern longnose sucker. Eight of those 11 species also were sampled from the upper reservoir.

Some of these fish likely spend the majority of time in the lower reservoir (e.g., bluegill, rock bass, pumpkinseed and yellow perch), whereas other species would be expected to move between the lotic environment of the reservoir and the lentic environment of the No. 5 bypass (e.g., white sucker, fallfish, smallmouth bass). Regardless, while inhabiting the lower reservoir, these fish may pass within the vicinity of the BSPS intakes and would be at risk of entrainment and thus exposed to passage through the project pumps and reservoir supply tubes. Regardless of whether fish survive the pumping process, they are lost to the Deerfield River system. Depending on the species, life stages, and numbers entrained, this loss could impact the ecosystem productivity of the stretch of the Deerfield River between the No. 5 dam and the Fife Brook dam and may hinder management and/or restoration goals for fishes.

### **Proposed Methodology**

The Frost and Easte (1977) study used a combination of sampling methods (boat shocking, gill nets, and rotenone) to document fish assemblages in the upper and lower reservoirs. In order to quantify entrainment of various life stages, it is likely that a combination of methods would provide the most reliable results. As part of the relicensing of the Northfield Mountain Pump Storage Project (NMPS, FERC No. 2485) on the Connecticut River, FirstLight will use a combination of methodologies, including hydroacoustic monitoring, radiotelemetry, and ichthyoplankton netting to assess entrainment.

At BSPS, CRWC recommends ichthyoplankton netting either at the intake or off of the water conveyance system to quantify entrainment of early life stages (eggs and larva) and either sampling at the upper reservoir outlet or in the reservoir itself using boat shocking and gill or trap netting to collect older life stages (juveniles and adults). Sampling for planktonic fish larvae should capture early spring spawning species (white suckers) through later season centrarchid species (bass and sunfish). Plankton sampling should utilize a sampling design that adequately captures temporal and spatial changes in water pumping cycle.

At Fife Brook, a desktop analysis can take place after the fish assemblage study. First a qualitative assessment of entrainment and impingement can be done of the fish located in the Fife Brook impoundment for various size groups. Turbine mortality rates can be estimated based on literature values for studies of Francis-type turbines with characteristics similar to that located at Fife Brook.

### **Level of Effort and Cost**

We know of no other tool that will provide for this type of assessment for all fish species and organisms that may pass through the project. Cost and effort are expected to be moderate to high. At NMPS, the ichthyoplankton sampling component of the entrainment analysis was estimated to cost \$60,000 to \$70,000. Based on this information, CRWC estimates it would cost the Applicant \$75,000 to \$100,000 to conduct the requested study.

The Applicant did not propose any studies to meet this need in the PAD.



BSPC has not proposed any studies to address this deficiency; therefore CRWC is submitting a request for a rigorous, empirical entrainment study.

### **References**

Frost, J.N. and W.E. Easte. 1977. Bear Swamp Pumped Storage Hydroelectric Project Fishery Study, January 1972 – December 1976. New England Power Company and Massachusetts Division of Fisheries and Wildlife. 73 pp.

## **CRWC Study Request #5. Aquatic Mesohabitat Assessment and Mapping**

Determine the effect of Project operations on aquatic habitat within the Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment and in the Bear Swamp Pumped Storage Project's (BSPS) upper and lower reservoirs.

Aquatic mesohabitat characterization and mapping will provide the information necessary to choose sample sites for the *Fish Assemblage Study* and will provide information to help define whether, or to what degree, Project operations are impacting aquatic resources. To our knowledge, no comparable aquatic habitat mapping has been conducted in the study area.

### **Study Area**

The study area is divided into three distinct sections as follows:

- The Deerfield River from the Fife Brook Dam to the upstream extent of the Deerfield Project #4 impoundment
- The Bear Swamp Pumped Storage Project's upper reservoir
- The Bear Swamp Pumped Storage Project's lower reservoir

### **Goals and Objectives**

The goal of this study request is to quantify the type and extent of aquatic mesohabitat available in the areas affected by the Bear Swamp Pumped Storage Project. The objective of the aquatic mesohabitat assessment is to gain a preliminary understanding of the aquatic mesohabitat resources in the three areas described above. To reach this objective, aquatic mesohabitat will be delineated and mapped in each of these areas. The assessment will provide data that will support and focus other relicensing activities needed to assess Project effects on riverine resources.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting fish populations in the Deerfield River and its tributaries.

### **Existing Information and Need for Additional Information**

To the CRWC's knowledge, no comparable aquatic habitat mapping has been conducted in the study area.

The mesohabitat mapping and accompanying characterization of aquatic mesohabitat will provide essential information regarding the character and extent of aquatic habitat that may be affected by Project operation. The quantified spatial data generated by this survey will help to provide a framework for upcoming data collection efforts.

### **Nexus to Project Operations and Effects**

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. For example, headpond and tailwater water level fluctuations could dewater important spawning areas, thus limiting productivity of important game fish species by direct impacts to their spawning success or indirectly by limiting the spawning success of forage fish species. Accordingly, a thorough understanding of the current fish assemblage structure and associated metrics are needed in order to examine any potential Project-related impacts.

## Proposed Methodology

Mesohabitat delineation will follow the method of Ball (1982); see also FirstLight (2012).

The Project owner will conduct a field survey to identify the mesohabitat present in the study areas and to delineate the relative quantity and spatial distribution of each habitat type. Each mesohabitat type of interest will be assigned specific attributes to be used for field delineation. The exact classification criteria for each mesohabitat type will be developed in consultation with stakeholders, but will generally include:

Riffle: shallow, moderate velocity, turbulent, high gradient, moderate to large substrates (cobble/gravel)

Rapid: shallow, moderate to high velocity, turbulent, chutes and eddies present, high gradient, large substrates or bedrock

Run: moderately deep to deep, well defined non-turbulent laminar flow, low to moderate velocity, well defined thalweg, typically concave stream geometry, varying substrates, gentle slope

Glide: moderately shallow, well defined non-turbulent laminar flow, low velocity, well defined thalweg, typically flat stream geometry, typically finer substrates, transitional from pool

Pool: deep, low velocity, well defined hydraulic control at outlet

Backwater: varying depth, minimal or no velocity, long backwatered reaches

Delineation of Deerfield river reach should be conducted by boat or on foot, where too shallow, and will occur during a period of relatively low flow so that breaks in mesohabitat, substrate, object cover, and hydraulics, can be readily observed.

Habitat mapping below Fife Brook dam will require days to complete and flows during this period may vary due to operations of the Deerfield River Hydroelectric Project. To quantify the flow at which the mesohabitat mapping is conducted, records of discharge from Fife Brook dam will be used.

Aerial imagery should be uploaded to a laptop computer enabled with a Geographic Information System (GIS) to permit mesohabitat mapping directly in the field. The upstream and downstream boundary of each mesohabitat unit within the study area should be delineated and georeferenced.

Additional features relevant to differentiation of mesohabitats, such as biological and geomorphic, characteristics, should also be collected where appropriate including; readily observable aquatic fauna, predominate substrate types<sup>5</sup>, relative embeddedness<sup>6</sup>, wetted width, channel geometry, thalweg depth, and cover. The data should be recorded on data sheets, a dedicated field book, or via a laptop computer. Upon completion of the survey, all data will be rechecked for quality control and archived.

## Level of Effort and Cost

This study will require sampling of the Project-affected areas of during the summer. CRWC estimates the study will cost in the vicinity of \$30,000.

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<sup>5</sup> If substrate cannot be observed through the water, probing of the substrate and underwater pictures will be obtained to approximate the substrate type.

<sup>6</sup> Refers to the extent to which rocks (gravel, cobble, and boulders) and snags are covered or sunken into the silt, sand, or mud of the river bottom. Generally, classifications are: optimal – 0-25% surrounded by fine sediment; suboptimal – 25-50% surrounded by fine sediment; marginal – 50-75% surrounded by fine sediment; and poor – more than 75% surrounded by fine sediment (Ball, 1982).

## CRWC Study Request #6. Fish Assemblage Assessment

### Goals and Objectives

The goal of this study request is to determine the assemblage of fish species present in the areas affected by the Bear Swamp Project, which potentially includes Species of Greatest Conservation Need (SGCN) and/or state listed species for Massachusetts.

Specific objectives include:

- 1) Describe fish assemblage structure, distribution and abundance within the project-affected area along spatial and temporal gradients.
- 2) Compare historical records of fish species occurrence in the project area to results of this study.

### Relevant Resource Management Goals

Not applicable. Requester is not an agency or Indian tribe.

### Public Interest Consideration If Requester Is Not a Resource Agency

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting fish populations in the Deerfield River and its tributaries.

### Existing Information and Need for Additional Information

Based on surveys conducted as part of the relicensing process for the Deerfield River Project, fish assemblages of the Deerfield No. 5 and No. 4 development reservoirs include rainbow trout (*Oncorhynchus mykiss*), smallmouth bass (*Micropterus dolomieu*), rock bass (*Ambloplites rupestris*), pumpkinseed (*Lepomis gibbosus*), white sucker (*Catostomus commersonii*), fallfish (*Semotilus corporalis*) and spottail shiner (*Notropis hudsonius*). MADFW surveys of the Deerfield No. 5 bypass reach collected brown trout (*Salmo trutta*), brook trout (*Salvelinus fontinalis*), longnose dace (*Rhinichthys cataractae*), blacknose dace (*Rhinichthys atratulus*), and white suckers. Both age 0+ and age 1+ trout were collected, which documents that natural reproduction is occurring in that reach. MADFW stocks adult brown and rainbow trout in the river reach downstream of Fife Brook dam, which is managed as a catch-and-release fishery.

The only site-specific information on the fish community within the project boundary provided in the PAD dates from the 1970s (Frost and Easte 1977). Those surveys, conducted by the previous Licensee (New England Power) and MADFW, collected white sucker, smallmouth bass, yellow perch (*Perca flavescens*), rock bass, golden shiner (*Notemigonus crysoleucas*), chain pickerel (*Esox niger*), pumpkinseed, bluegill (*Lepomis macrochirus*), and the state-listed longnose sucker (*Catostomus catostomus*) from the lower reservoir over a 3-year period (1974 to 1976).

Upon review of the Frost and Easte (1977) report, we note that BSPP failed to identify that the survey also encompassed the upper reservoir. Eight species of fish were collected from the upper reservoir, including white sucker, rock bass, pumpkinseed, golden shiner, fallfish, brown bullhead (*Ameiurus nebulosus*), yellow perch, and longnose sucker.

### Nexus to Project Operations and Effects

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. For example, headpond and tailwater water level fluctuations could dewater important spawning or rearing areas, or affect habitat availability, thus limiting productivity of fish species by direct impacts to their spawning or rearing success or indirectly by limiting the spawning or rearing success of forage fish species. Furthermore, SGCN have been documented in the project-affected area. Accordingly, a thorough understanding of the current fish assemblage structure and associated metrics is needed in order to examine any potential project-related impacts.

### **Proposed Methodology**

An accepted and robust field sampling design (e.g., as described in Pollock et al. 2002 or MacKenzie et al. 2006) and accepted methods for collecting fish species likely to be present in the project-affected areas (Bonar et al. 2009) should be used to conduct field surveys. Fish sampling, measuring length and weight, and calculating associated metrics are commonly used methods to determine fish assemblages and assess fish populations (Bonar et al. 2009). Randomly sampling multiple habitat types using a multi-gear approach will be required to ensure that all fish species present are sampled. The spatial scope of the study is from the upstream extent of the Fife Brook impoundment (also called the lower reservoir) downstream to the head of the Deerfield River Project's (FERC No. 2323) Deerfield No. 4 development, including the BSPS upper reservoir. Sampling should occur at each selected site across multiple seasons (spring, summer, and fall). Digital photographs should be taken to avoid misidentification of certain species such as Cyprinids.

BSPC should ensure that at least one of the selected gear types is effective at collecting longnose sucker.

This will be a one-year study, provided river discharge conditions fall within the 25<sup>th</sup> to 75<sup>th</sup> percentile for weekly averages.

### **Specific Methodology**

The study should employ a stratified-random sampling design. The study area should be divided into strata based on mesohabitat type. Each mesohabitat type will be further stratified into two broad microhabitat types. Proposed sampling methods include daytime boat/barge electrofishing, nighttime boat electrofishing, gill nets, seine nets, and minnow traps. Sampling should be performed during in the spring, summer and fall.

The stratified random sampling design will randomly assign sampling stations within particular mesohabitat types in proportion to their linear habitat distance. Multiple methods of fish capture should be used in each stratum, and both near-shore (shallow) and mid-channel (deep) habitats will be sampled to evaluate the potential differential effect of hydropeaking on the fish species and life stages that utilize these two habitat types (Bain 1985). Selected locations within each station should be sampled either by day and nighttime boat/barge electrofishing (shoreline and littoral habitat), gill nets (deeper, benthic areas), seine net (wadeable shoreline and littoral habitat), minnow traps, and eel pots. The exact number of sampling locations will be dependent on the weighted stratification of the study area by mesohabitat and sampling within each station will be further stratified by depth and proximity to shore.

In addition to biological data, supporting data also should be collected for each sample site including: location (GPS), sampling gear type, sampling effort, mesohabitat type, average depth, average velocity, river flow, water temperature, turbidity, predominant substrate, time of day, day of year, presence of cover, and proportion of vegetation cover.

Catch per unit effort (CPUE) and standard errors should be calculated for each species, station, and sampling technique. Data will also be separated into groups by size and a CPUE per size group will be calculated. Values of CPUE for each segment and gear type should be calculated as the sum of catch from all samples within a station divided by the sum effort expended within that station. The Shannon-Weiner index of diversity, which is a function of species richness and evenness, should also be calculated.

A final study report should include tabular data summarizing length, weight, and size class of fish captured, a map of the study area to depict the location of sample stations, and overall results including occurrence, distribution and relative abundance. Comparisons should be made with historical records. Results should be described in relation to other studies. Raw data should be provided to stakeholders in digital format upon request.

This study design is similar to the one detailed in Study 3.3.11 of FirstLight Power Resources Revised Study Plan for the relicensing of its Turners Falls Project (FERC No. 1889),<sup>7</sup> which was approved by the Commission (with modifications) in its Study Plan Determination letter dated February 21, 2014; therefore, the methodology is consistent with accepted practice.

### **Level of Effort and Cost**

The level of effort for this study would be moderate to high as seasonal sampling with several types of gear would be required. CRWC estimates the cost of this study to be \$50,000 to \$75,000, based on the estimated cost to conduct a similar study at the Turners Falls Project (FERC No. 1889).<sup>8</sup>

BSPC has identified a fisheries survey as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would focus only on select locations within the lower reservoir and the 7.5 mile reach downstream of Fife Brook Dam within the project boundary. The level of specificity, limited geographical scope, and lack of firm commitment to conduct the study leads CRWC to believe that it would not achieve the objectives identified herein. The study proposed will adequately address the objectives by documenting fish species occurrence, distribution and abundance within the project area along spatial and temporal gradients.

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<sup>7</sup> Study 3.3.11 of the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485). August 14, 2013. FirstLight Power Resources.

<sup>8</sup> Ibid.

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Pollock, K.H., J.D. Nichols, T.R. Simons, G.L. Farnsworth, L.L. Bailey and J.R. Sauer. 2002. Large scale wildlife monitoring studies: statistical methods for design and analysis. *Environmetrics* 13: 105-119.

## **CRWC Study Request #7. Abundance of naturally reproduced trout and distribution of spawning areas in the Deerfield River below Fife Brook Dam.**

### **Goals and Objectives**

- Characterize the population of naturally spawning trout in the Deerfield River below the Fife Brook dam.
- Estimate the abundance of naturally produced trout in the project-affected area.
- Conduct spawning ground surveys to produce a map of spawning areas, characterize the habitat, and determine the distribution of spawning relative to river flows.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting fish populations in the Deerfield River and its tributaries.

### **Existing Information and Need for Additional Information**

The original fisheries studies of the Bear Swamp Project (MADFW, 1977) estimated that between 10% and 16% of the trout harvested in the Project area were naturally produced (wild). It was estimated that few stocked trout carried over to the following year, however increases in minimum flows required in the 1996 settlement agreement may now allow stocked trout to survive the summer months. Wild Brook, Brown, and Rainbow Trout were documented in the project area in the 1977 study report. Based on growth rates, the authors surmised that the Brook and Rainbow Trout were spawning in the tributaries and the Brown Trout were spawning in the Deerfield River.

### **Nexus to Project Operations and Effects**

Project operations have the potential to directly impact fish species life history requirements, biological interactions, and habitat quantity and quality. For example, peaking operations could dewater important spawning or rearing areas, thus limiting productivity of important game fish species by direct impacts to their spawning or rearing success or indirectly by limiting the spawning or rearing success of forage fish species. Accordingly, a thorough understanding of the current wild trout population in the project area is needed in order to examine any potential Project-related impacts.

### **Proposed Methodology**

Fish sampling, measuring length and weight, determining age and origin by reading scales, and calculating associated metrics are commonly used methods to determine fish assemblages and assess fish populations (Bonar et al. 2009).

### ***Specific Methodology***

*Abundance estimate*



*Fish Sampling* – Trout should be captured by electrofishing using a boat mounted with an electrofishing unit with the capacity to adjust the pulse rates between 30 - 120 pulses/second and vary voltage to accommodate ambient conductivity. A barge capable of negotiating riffles and shoals, similarly rigged with an electrofishing unit may be deployed for sampling in the shallower riverine habitats.

Electrofishing will be conducted in a downstream manner, following standardized methods developed specifically for large river quantitative electrofishing surveys (MBI, 2002, Yoder and Kulik, 2003). The start point, end point, and boat track for each sampling station should be geo-referenced using a handheld GPS and transposed to corresponding topographic mapping software program to produce maps of areas sampled.

All captured fish should be measured for fork length (FL; mm), weighed (g), and recorded. Scales should be removed from trout for age and origin (wild/hatchery) determination. Untagged trout will be tagged with a passive integrated transponder (PIT) tag. The PIT tags should be injected into the coelomic cavity, just posterior to the pectoral fins (CBFWA 1999).

*Abundance Estimation* – Trout abundance estimates within the study area should be calculated using the closed models *Mt*-Darroch and *Mt*-Chao, provided in the computer program CAPTURE (Otis et al. 1978; White et al. 1982; Chao 1989; Rexstad and Burnham 1991) or equivalent. The model *Mt*-Darroch will be used when capture probabilities of trout are 10% or greater. Model *Mt*-Chao will be used when the data were <10%, because it performs better when data are sparse (Chao 1989). The standard error and 95% confidence intervals for the abundance estimates will also be calculated in CAPTURE. Precision of the estimates will be measured by calculating a coefficient of variation (CV), which is the ratio of the standard error of the estimate to the estimate (Hightower and Gilbert 1984).

*Age and Origin Determination and Analysis* – Scales are to be sampled from each fish from a position above the lateral line and posterior to the dorsal fin with a knife and stored dry within individually labeled scale envelopes. A subsample of scales from each individual will be wet mounted on glass slides then viewed under a microscope. Regenerated scales will be discarded, and annuli and spawning checks identified. Ages will be determined by counting annuli. Ages will be assigned to trout from which scales were not analyzed by constructing an age-length key for each year (Iserman and Knight 2005). Origin (stocked or natural) will be qualitatively determined by examining multiple scales for the presence of annuli within areas of the scale corresponding to its juvenile life stages. In general, naturally produced trout will be exposed to colder water temperatures and limited food availability in winter, which results in areas of constricted or overlapping circuli (annuli). In contrast, hatchery fish are reared in controlled environments and therefore display little to no variability in circuli spacing throughout the year. Therefore the presence of annuli near the center of the scale will indicate the fish is of natural origin while the lack of such annuli or the general appearance of constant circuli spacing throughout the interior of the scale will suggest that the fish was stocked. Areas of the scale corresponding to periods after an individual was stocked (age >2) will however display annuli, and should be ignored for the purposes of origin determination. However, individuals displaying constant scale growth within central areas of the scale (stocked fish) and displaying distinct annuli along scale margins could be classified as holdover fish.

#### *Trout Spawning Ground Surveys*

The primary purpose of this study is to verify the overall distribution and extent of trout spawning in the project affected area of the Deerfield River below Fife Brook Dam. A secondary purpose is to determine the extent to which spawning redds are subject to de-watering (stranding), relative to the current project operation procedures. Two surveys of the entire project affected area should be conducted, one during the peak spawning period (if flow and turbidity conditions allow) and one post-season survey that roughly corresponds to the timing of fry emergence. The determination of the exact timing of the surveys will be based on water flow and turbidity conditions in the river, which will be assessed weekly. Surveys should

be conducted from a small boat, as well as on foot in selected sections of the river where spawning may be concentrated, documenting the numbers of fish and redds observed. The survey crew will also document spawning activity near the shorelines, where redds might be more prone to stranding by decreasing water levels. Efforts will be made to locate all areas of spawning within free-flowing reach. The approach for identifying spawning areas includes a combination of identifying redds as described above and investigation of channel margins for young-of-year trout when fry are expected to emerge (second survey). Although the intent is to cover as much of the study area as possible, the survey areas will depend on access to the river and safety.

The numbers of fish and redds will be summed over ¼ mile reaches of the river to characterize the magnitude of spawning activity relative to river reach location, and redd locations will be marked on maps of the river. The location of spawning activity will also be recorded with a hand-held GPS unit, either as individual redds (in areas of pocket spawning) or by recording GPS points around areas of extensive spawning activity. The number of redds within these larger areas will be enumerated for density estimates. At each spawning location, whether it contains a single or multiple redds the following information should be recorded: Date and time, habitat type, substrate, water velocity, width, length of red, water depth, water temperature,

In addition, as many visible redds as possible should be marked (e.g. with fluorescent painted rocks, or flagging markers) for subsequent identification. When possible, marking of redds should be conducted from a boat to minimize the physical disturbance of spawning areas. These sites should be resurveyed shortly afterward at minimum flow. The intent of this method is to determine the number of redds that are dewatered as water levels decline.

#### **Level of Effort and Cost**

This study will require sampling of the Project-affected areas of during spring, summer, and fall. The cost of the study would be moderate to high as seasonal sampling with several types of gear would be required. Based on first year study results, a second year of sampling or specific studies examining impacts of Project Operations may be requested.

FirstLight estimated that their sea lamprey spawning survey, which covers a longer stretch of the Connecticut River, would cost them \$125,000-150,000. CRWC therefore estimates this study downstream of Bear Swamp will cost \$75,000.

## **CRWC Study Request #8. Impacts of Water Level Fluctuations on Riparian and Aquatic Vegetation Including Invasive Species and their Associated Habitats in the Fife Brook Impoundment and 17-Mile Reach Downstream of Fife Brook Dam**

Conduct a study to quantify impacts of reservoir fluctuation on riparian, wetland, emergent aquatic vegetation (EAV), submerged aquatic vegetation (SAV), littoral zone and shallow water aquatic habitats in the Fife Brook impoundment (lower reservoir) and in the 17-mile reach downstream of Fife Brook Dam.

### **Goals and Objectives**

The goal of this study is to obtain baseline information on riparian, wetland, emergent and submerged aquatic vegetation, and associated shallow water aquatic habitats (subject to operational inundation and exposure to near exposure) known to occur in the project-affected area. Information would be used to determine whether riparian, wetland, EAV and SAV, littoral, and shallow water (e.g., mid-river bars and shoals) habitats are impacted by current water level fluctuations permitted under the Bear Swamp Project license and whether these vegetation types and shallow water habitats can be protected and restored by modifications to project operations or other mitigation measures. This information is needed to determine whether the project operations affect plants, habitat, and wildlife in the project area, whether aquatic vegetation and its habitats can be enhanced by modifications to project operations or other mitigative measures, and whether there is any unique or important shoreline or aquatic habitats that should be protected.

The specific objectives of the field study, at a minimum, include:

1. quantitatively describe and map wetland types within 200 feet of the shoreline in the Fife Brook impoundment and in the 17-mile reach downstream of the Fife Brook dam, and describe associated wildlife;
2. delineate, quantitatively describe, and map all wetland types, including invasive species and wildlife observed (e.g., bald eagle nesting, water fowl nesting) within 200 feet of the shoreline, and the extent of this habitat if it extends beyond 200 feet; and
3. quantitatively describe (e.g., substrate composition, vegetation type and abundance) and map shallow water aquatic habitat types subject to project operation inundation and exposure, noting and describing additional areas where water depths at lowest operational range are wetted to a depth of less than one foot (flats, near shore areas, gravel bars, with very slight bathymetric change).

A second year of study may be required should river discharge in the first year prove to be atypical (outside of 25<sup>th</sup> to 75<sup>th</sup> percentile of average weekly flow values) during the study period.

The field study should produce a habitat inventory report that includes:

1. the results of the field study in the form of maps and descriptions;
2. an assessment of project effects on wetland, riparian, littoral zone vegetation and shallow water habitats, invasive plant species, and wildlife habitat at the project;
3. recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures; and

4. recommendations for plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection and protection of key nest and roost trees for bald eagles.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting natural communities in the Deerfield River watershed.

### **Existing Information and Need for Additional Information**

In the PAD, BSPC states that no formal delineation of wetland, riparian, or littoral habitats has been conducted with the project boundary. Based on National Wetland Inventory (NWI) mapping, three wetland types occur within the project area: lacustrine, palustrine, and riverine wetlands. Of the 425 acres of wetlands mapped by NWI, 95 percent are lacustrine (the upper reservoir) or riverine (lower reservoir and river channel downstream of Fife Brook dam). The nearly 24 acres of palustrine habitat are located within the river channel or immediate floodplain of the river. In addition, the Massachusetts Natural Heritage and Endangered Species Program (NHESP) has identified four potential vernal pools within the project boundary. According to BSPC, no site-specific lists of plant or animal species known to occur in wetland, riparian, and littoral habitats are available.

While the PAD provides lists of plant and wildlife species whose native ranges overlap with the project area, it does not provide any baseline information on known occurrences of these species in the wetlands, riparian, littoral and shallow water habitats, within or adjacent to the project area. Plants and wildlife occurring in these habitats may benefit from protection, mitigation and enhancement (PMEs) measures, given the potential effects of continuing the current peaking operating regime.

Baseline information on the wetlands, riparian, and littoral resources within the project area is needed.

### **Nexus to Project Operations and Effects**

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam. In addition, pursuant to Article 404 of the license, BSPC provides whitewater releases from Fife Brook Dam at a minimum flow level of 700 cfs for a duration of at least three continuous hours on 50 weekend days and 56 weekdays from April 1 to October 31 each year. In the PAD, BSPC states that the shoreline of the lower reservoir and the reach of the Deerfield River immediately below Fife Brook Dam are lined with rip rap. While this likely limits the amount of natural vegetation that can persist, the exact geographic extent of the artificial armoring is unclear.

Outside of a two month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. The PAD contains no information on the timing, frequency and magnitude of reservoir

fluctuations over the course of a year and how that relates to aquatic plant species establishment, growth, survival, littoral zone or other shallow water habitat fish spawning periods and their effects on these fishes (reproduction success and subsequent recruitment) in available and utilized habitat, and how the quantity and quality of these shallow water habitats are effected by project operational manipulation/alteration, as currently permitted or proposed.

Water level fluctuations due to project operations could affect EAV and SAV habitat as well as the quantity and quality of littoral and shallow water habitat. These operational water level fluctuation effects (in both of the reservoirs and the riverine reach downstream of the dam) are expected to impact fish species' use of these habitats and may affect spawning fishes reproductive success and subsequent population recruitment, including to fallfish and the state listed special concern longnose sucker.

The current operating mode may affect wetland, riparian, littoral and other shallow water habitats, and promote the introduction and expansion of invasive plant species through fluctuating water levels. A study that explains the relationship between the proposed mode of operation and the type and quantity of wetland, riparian, littoral, shallow water habitats, and invasive species affected would help inform a decision on the need for protection and/or control of these resources in the license.

Riparian buffers provide for river bank stability, reduction in nutrient and sediment from runoff, shading and reduced solar heating of river waters and wildlife habitat (including eagle nesting and roosting habitat) and movement corridors. Management of the project's shorelines are within the scope of project review and a Shoreline Management Plan may be required. Incorporation of riparian resource protection and enhancement into this plan will require baseline information on existing conditions.

### **Proposed Methodology**

The PAD currently contains maps portraying general wetland types from the upper end of the lower reservoir to a point 7.5 miles downstream of the Fife Brook Dam. The proposed study should expand the survey area, but utilize existing information in conjunction with field surveys designed to describe the characteristics of each mapped wetland, riparian, littoral and shallow water habitat, including plant species composition, relative abundance/density, habitat quality, and land use. These surveys should be conducted to describe these habitats under low water level conditions (i.e., minimum reservoir elevations and minimum flows below Fife Brook Dam). Information collected should include:

1. Plant species composition, and their relative abundance/density and condition/structure (e.g., seedlings);
2. Structured data, including estimates of average heights and aerial cover of each vegetation layer (specifically denoting invasive species);
3. Aquatic habitat substrate composition, quantity (i.e., percent types and area), wood structure (relative abundance measure applied by area), water depths (inundated, exposed, and water less than one foot);
4. Predominant land use(s) associated with each cover type;
5. Wildlife sightings should be noted and any active nest or roost trees utilized by bald eagles, or potentially used during the term of the upcoming license as the eagle population increases, should be identified and geo-referenced; and
6. Field-verified wetland, riparian, and littoral and shallow water habitats and invasive species occurrences should be geo-referenced as polygons and overlain on orthophotos at a suitable scale.

### **Level of Effort and Cost**

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, CRWC estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified wetland, riparian and littoral habitat mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on select or critical areas within the project boundary, without providing guidance on what criteria it would use to determine whether an area was critical or not. As outlined in the expected framework (Table 6.3-1 of the PAD), CRWC does not believe BSPC's proposed study would achieve the objectives identified herein.

## **CRWC Study Request #9. Baseline Study of Terrestrial Wildlife and Botanical Resources**

Conduct a study to obtain baseline information on terrestrial wildlife and botanical resources within the project boundary.

### **Goals and Objectives**

The goal of this study is to characterize and describe the terrestrial wildlife and botanical resources that use representative upland habitats within and adjacent to the project boundary in order to evaluate potential project impacts from current or future operations and maintenance activities.

The specific objectives of the field study, at a minimum, include:

1. Survey and inventory overall existing upland wildlife habitats;
2. Note the occurrence of wildlife sighting during the course of the surveys;
3. Survey and inventory vegetation cover classes and land use;
4. Survey and evaluate the presence of targeted rare, threatened, and endangered (RTE) species or associated habitats; and
5. Survey and inventory the nature and extent of upland invasive and exotic vegetation species.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting natural communities in the Deerfield River watershed.

### **Existing Information and Need for Additional Information**

The PAD provides no specific information on the botanical resources within the project area, only descriptions of the dominant vegetative communities found within the watershed. While Table 5.5-1 provides a list of invasive plants found within the Deerfield River watershed, none are explicitly identified as occurring within the project area. Likewise, the lists of mammals, birds, amphibians and reptiles are only those that potentially may occur within the project area.

Baseline information on terrestrial and wildlife resources within the project area is needed in order to meet the goal of evaluating project effects. Plants and wildlife occurring in these habitats may benefit from protection, mitigation and enhancement (PMEs) measures, given the potential effects of current and future operations and maintenance activities.

### **Nexus to Project Operations and Effects**

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no

stipulations on the timing, frequency or duration of those fluctuations (though typically they occur on a daily basis).

The majority of lands associated with the project currently are protected through conservation restrictions (CR) conveyed to the Massachusetts Department of Environmental Management (MADEM). The CR protects 1,257 acres, including 1,056 acres at the upper and lower reservoirs and 201 acres of “river corridor” downstream from Fife Brook dam. The CR stipulates that the protected property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes. The CR expires concurrent with the existing license, and future intentions for this land are therefore not certain.

The project area contains habitat suitable for northern long eared bat (NLEB). In addition, according to the Massachusetts Natural Heritage and Endangered Species Program (NHESP) database, 27 state-listed species may occur in the vicinity of the project.

BSPC states it is not proposing any new construction, changes to current land management practices, or new land management activities as part of this licensing proceeding. However, the PAD provides no description of the types of land management practices that BSPC currently employs. Without knowing what terrestrial resources and wildlife occur in the project area, or what types of land management and/or maintenance activities BSPC routinely undertakes, CRWC is unable to determine if impacts are occurring currently or if they may occur under any new conditions that could be imposed on a new license (e.g., additional recreational amenities such as trails).

### **Proposed Methodology**

CRWC recommends that BSPC follow the methodology detailed in FirstLight’s Study Plan 3.4.1, as described in the Revised Study Plan for the Turners Falls Hydroelectric Project (No. 1889) and Northfield Mountain Pumped Storage Project (No. 2485) filed with FERC on August 14, 2013. Pursuant to the Study Plan Determination issued on September 13, 2013, FERC approved FirstLight’s proposed methodology; therefore, we assume it is consistent with accepted practice.

In general, the study consists of two tasks. The first task is a literature review to collect information needed to develop vegetation type maps and calculate percent acres of each vegetation type present in the study area. The second task is to conduct field surveys to document wildlife habitat and occurrence, vegetative cover types and invasive plant species in the project area.

There are anecdotal accounts of bald eagles nesting and roosting along the Deerfield River in the vicinity of the project. During the field surveys, biologists should document the occurrence of any bald eagle nesting and roosting sites and provide an assessment of the status (healthy, diseased, etc.) and level of protection (e.g., within a right-of-way, on protected conservation land) of each site. Potential sites should also be identified, since it is expected that the bald eagle population will continue to increase during the 30-50 year term of the next license. Where encountered, actual and potential bald eagle nests and roosting trees should be GPS located and photo-documented.

The study report should include:

1. Maps of the project area showing locations and extent of habitats, vegetative cover, locations of invasive species, and known eagle roosting and nesting trees (as both polygons and point locations, as appropriate);
2. Tabular summaries of the data;



3. An assessment of project effects (operations, maintenance activities, potential future recreational amenities, etc.) on terrestrial habitat and wildlife at the project;
4. Recommendations for any necessary plant, habitat type, or wildlife protection and/or invasive species control measures, including riparian buffer restoration and protection of key nest and roost trees for bald eagles.

### **Level of Effort and Cost**

The study likely will take one growing season to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls (FERC No. 1889) and Northfield Mountain Pumped Storage (FERC No. 2485) projects was estimated to cost \$60,000 to \$80,000. As the scope of the two studies are similar in size, CRWC estimates it will cost BSPC \$60,000 to \$80,000 to complete the requested study.

BSPC has identified terrestrial wildlife and vegetation cover type mapping as a potential study, but has not committed to undertaking such a study. Likewise, the objective of that study would only focus on the 7.5 miles reach downstream of Fife Brook Dam. This would omit the majority of upland project lands. CRWC does not believe BSPC's proposed study outlined in Table 6.3-1 of the PAD would achieve the objectives identified herein.

## CRWC Study Request #10. Baseline Mussel Survey

### *Goals and Objectives*

The goal of this study is to characterize the distribution, abundance and species composition of the freshwater mussel community in the upper end of the lower reservoir and in the 17-mile reach of river downstream of the Fife Brook Dam in order to evaluate potential project impacts from current or future operations and maintenance activities.

The specific objective of the field study is to conduct surveys for freshwater mussels in the upper Fife Brook impoundment and downstream-affected reach to determine presence/absence of mussels, relative abundance, location and habitat preference.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in protecting natural communities in the Deerfield River watershed.

In 2006, CRWC published Ethan Nedeau's book, "Freshwater Mussels and the Connecticut River Watershed." This book was referenced in the PAD. Funding for the book was provided by all four states in the watershed as well as several private and nonprofit organizations. Books are available for free from our office and through our website, [www.ctriver.org](http://www.ctriver.org).

### **Existing Information and Need for Additional Information**

In the PAD, BSPC states that four species of freshwater mussels are known to occur within the Deerfield River watershed: eastern elliptio (*Elliptio complanata*), eastern pearlshell (*Margaritifera margaritifera*), eastern floater (*Pyganodon cataracta*), and alewife floater (*Anodonta imbecilis*). However, no site-specific surveys have been conducted to determine whether any mussel species are present within the area impacted by project operations. This information is needed in order to determine whether project operations are impacting the diversity, distribution and/or abundance of the mussel community in the upper portions of the Fife Brook impoundment and the 17-mile-long riverine reach below the dam. BSPC has not proposed any studies to address this deficiency; therefore CRWC is submitting a request for such a study.

### **Nexus to Project Operations and Effects**

The project consists of the Bear Swamp Pump Storage (BSPS) development and the Fife Brook development. BSPS uses an upper reservoir and lower reservoir (which is also the impoundment for the Fife Brook facility). Both reservoirs are allowed to fluctuate up to 40 feet in elevation, with no stipulations on the timing or frequency of those fluctuations (though typically they occur on a daily basis). The Fife Brook Station alternates between providing a minimum flow of 125 cfs and generation flows of up to 1,540 cfs to the Deerfield River downstream of the Fife Brook Dam. In addition, pursuant to Article 404 of the license, BSPC provides whitewater releases from Fife Brook Dam at a minimum flow level of 700 cfs for a duration of at least three continuous hours on 50 weekend days and 56 weekdays from April 1 to October 31 each year.

Outside of a two month period in 2014, BSPC has provided no data on the operation of the BSPS and Fife Brook plants. Freshwater mussels, if present, could be negatively impacted by project operations. If mussels occur in the lower reservoir, routine drawdowns associated with peaking operations could strand them, leaving them vulnerable to desiccation or predation. Likewise, rapidly changing habitat conditions between base flows and generation flows below the project could restrict mussels from otherwise suitable habitat, limiting and/or stressing these sensitive populations.

CRWC requests that PSPC conduct a survey of the upper portion of the Fife Brook impoundment and the reach downstream of Fife Brook Dam in order to determine the diversity, abundance, and distribution of freshwater mussels. Results of the survey would be used, in conjunction with the Instream Flow Study, to determine an appropriate below-project flow prescription, as well as to recommend an appropriate water level management protocol for the headpond (e.g., limiting impoundment fluctuations to protect mussel populations).

### **Proposed Methodology**

CRWC requests a mussel survey be conducted at the project. Because field identification of freshwater mussels can be quite difficult, we recommend that the Applicant hire a freshwater mussel expert to perform the assessment. The methodology should be similar to that used in recent licensing proceedings, such as those on the Connecticut River.

In general, the survey should follow standard protocols developed by the Massachusetts Natural Heritage Endangered Species Program. For the headpond, the survey should occur along the uppermost 1,300 feet of the lower reservoir. Given the length of the downstream reach, a subsampling procedure may be appropriate; however, particular attention should be given to the island complexes. Results should include the number of each mussel species observed, relative abundance (catch per unit effort) by species, the location and condition of each mussel, and the habitat it was found in.

### **Level of Effort and Cost**

The study likely will take 2 to 3 weeks to complete. A similar study being undertaken by FirstLight as part of the relicensing of its Turners Falls Project (FERC No. 1889) was estimated to cost \$20,000 to \$30,000. As the scope of that study was broader than this one, CRWC estimates it will cost BSPC \$20,000 to complete the requested study.

The Applicant did not propose any studies to meet this need in the PAD.

## **CRWC Study Request #11. Controlled-flow Recreation Study**

Conduct a study to assess the angling, paddling, and floating experiences on the Deerfield River from the lower section of the “Dryway” (sometimes referred to as the “Dragons Tooth Section”), lower reservoir, pump storage upper reservoir, and for areas below Fife Dam to assess the impacts of current and proposed project operations. The study should include assessment of power company operations, relationships and level of cooperation and communication protocols by and between Brookfield/Bear Swamp and Transcanada, for the purpose of improving recreational experiences.

### **Goals and Objectives**

The goal of the flow study is to assess the presence, quality, flow information needs, and preferred flow ranges for river-based uses. The information to be obtained can be generally characterized as quantitative and qualitative descriptions.

- Assess the effects of a range of optimal and acceptable flows on whitewater recreation opportunities for whitewater paddling at the top of the Bear Swamp Reservoir and below the Fife Brook Development;
- The impact of the Bear Swamp Reservoir on whitewater flows in the natural river channel above Fife Brook Dam;
- The frequency, timing, duration and predictability of optimal and acceptable paddling flows under current, modified run-of-release (project inflows from the TransCanada No. 5 Dam are generally equal to Project outflows), and proposed alternative operations;
- The optimal timing for whitewater releases from Fife Brook Dam so as to maximize recreational use for both boaters and anglers;
- The location, challenge, and other recreational attributes associated with specific rapids and other river features;
- The access needs of whitewater boating use and the current and potential river access options for whitewater and other paddling;
- The flow information needs of whitewater boating and the current and potential flow information distribution system.
- Identify flows that are acceptable and safe for anglers;
- Identify ramping up/release levels that are acceptable and safe for anglers;
- Identify ramping down levels that are acceptable and safe for anglers;
- Identify impacts of hydro-peaking and flow fluctuations on angler access, enjoyment, and safety;
- Identify impacts on access, enjoyment, and safety of the angling experience as a result of the current notice protocol for releases;
- Assess communication processes and protocols by and between Brookfield/Bear Swamp and Transcanada with regard to un-anticipated/un-scheduled releases

Thus, the information to be obtained for controlled flow study is a combination of user-generated flow preferences and other data, information on current and proposed operation (e.g. discharges), geographic information and basic recreational information.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any

license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in recreational use of the Deerfield River.

### **Existing Information and Need for Additional Information**

Available information in the PAD does not indicate how project operations affect recreation experiences throughout the project area including up and down river of Fife Dam. Users are not allowed to access Lower Reservoir excepting the confluence of the Dry Way. No access at all is allowed in the pump storage upper reservoir. Various river access points on the river below Fife Dam are unsafe and need to be improved for easier angler access.

In preparation for the 1994 Deerfield Settlement Agreement, no controlled-flow whitewater study was done of the reach below the Fife Brook Dam, nor of the concealed rapids in the upper Fife Brook impoundment.

The only controlled-flow study on the Deerfield River was conducted on the Monroe Bridge section by Clark Associates in 1990, over twenty-five years ago. There has never been a controlled-flow study on the Fife Brook section, nor on the rapids submerged beneath the impoundment. A study of these resources is now relevant in terms of participant usage, and should be conducted using metrics and the present-day evaluation criteria that are now available for this type of recreational and resource assessment.

Current and historic project operations have resulted in significant information gaps and virtually eliminated all stable low and moderate flows from the reach under the impoundment. While there is limited anecdotal information on the rapids beneath the impoundment and substantial experience with flows below the dam, a controlled-flow study utilizing methods proscribed by Whittaker, et al. (2005) is necessary to provide FERC with a qualitative analysis of the resource.

Changes in project ownership over the years have also resulted in inconsistent and somewhat unreliable timing of flows in the Fife Brook Section. The result has been flows too low or too late to paddle or fish, and generally river-runners and anglers have received inconsistent information about the river at low flows.

### **Nexus to Project Operations and Effects**

The Project controls flows in the Deerfield River by fluctuating water levels in the impoundment as a result of the current mode of operation at the BSPS. In addition, the Fife Brook Development limits the paddling opportunities throughout each year as a result of the timing and velocity of generational flows. This includes the reduction or virtual elimination of valuable and regionally needed paddling opportunities several days each week during the summer. The Deerfield River is a high quality paddling and angling resource, and since both activities are flow dependent activity, the project operations directly affect recreation and the economic benefits of the Deerfield River.

Safety concerns from project operations are documented by emergency response episodes by the Charlemont Fire Department. In addition, Trout Unlimited member anglers have experienced and observed many accounts of anglers being stranded on the wrong side of the river when confronted with unexpected sudden releases.

As a result of operations detailed above, this is also having a negative impact on the local economy. Disillusioned anglers who no longer fish on the Deerfield River are spending their money at other fishing destinations. Local restaurants, hospitality, and other businesses that service anglers are suffering loss of

business. There are no less than six fly fishing guide professionals who regularly bring clients to the river from just below Fife Dam all the way to the confluence with the Connecticut River. Without accurate, timely, and reliable flow information these guides regularly have to make adjustments to client fishing locations.

Results of the study will be used to determine appropriate project operations/release levels and protocols that will protect and/or enhance angler safety, access, and enjoyment.

## **Proposed Methodology**

### Whitewater methods

The study on the Bear Swamp Reservoir impoundment and the Fife Brook Section should follow the standard methodology as described in Whittaker, et. al. (2005). This methodology is designed to assess the presence, quality, and preferred flow ranges for river-based boating resources in a step-wise manner. The process steps are generally 1) desktop analyses, 2) on-land feasibility assessment, 3) on-water single flow assessment, 4) on-water multiple flow assessment. We request that on-water multiple flow assessments be conducted with multiple types of paddlers and floaters.

One study should focus on the reach below the Fife Brook Dam. The other study should focus on the lower reservoir's submerged whitewater drops at various impoundment levels and flows. This whitewater boating study methodology has been used on dozens of other FERC regulated reaches, including recent studies on the Connecticut River.

### Angling methods

The flow study should include various release levels at the Project to evaluate angling at a range of flow conditions. A specified group of study participants should be invited to fish the river at minimum flow and at no less than three (3) additional flow/release levels, and then assess their experiences. The area of concern for this release study would be limited to the first 7.5 miles below Fife Dam, as this is the area of most concern for river safety issues. Recreational anglers and guides would assist in identifying the appropriate more popular areas for angling, and would participate in the study.

The flow survey should elicit specific responses to: whether the level of the initial warning release/ramped up flow was sufficient to warn of impending danger from peak flow, how well suited the level of release was for different skill levels, whether a higher or lower flow was correlates to a better angling experience, and overall angling experience.

A survey of anglers should be done to determine their overall experience on the river, or in the case of anglers that have decided not to fish the river the reasons why. This survey should include a ranking of angling experience characteristics, ranking of flows in order of preference, overall evaluation of flows, and assessment of Waterline information sought and relied upon.

## **Level of Effort and Cost**

CRWC estimates this study will cost approximately \$45,000-75,000. The Licensee PAD proposes no controlled flow analysis. We currently do not know the relationship between specific low and moderate flows and the paddling, floating, and angling experiences they provide. A desktop analysis cannot generate this information. Without this information we cannot fully define the project impacts, nor propose and consider provision of releases that provide targeted recreational experiences.

## **CRWC Study Request #12. Recreation Site Inventory, Use, and Needs Assessment**

### **Goals and Objectives**

The goal of this study is to identify and study the quantity, quality, and adequacy of the land-based recreational facilities associated with and in close proximity to the Fife Brook Dam and the Bear Swamp pumped storage facility. The study should evaluate facilities for the Bear Swamp and the Fife Brook developments for non-motorized use by commercial rafting companies, private whitewater boaters, paddlers and floaters, hikers, and anglers. This study should include put-in and take-out facilities especially for canoeing and kayaking, portage routes, campsites, multi-use trails, parking and road access, seasons of operation, maintenance, and sanitary facilities. The study should examine the facilities that are necessary for boat access to the river and to the Bear Swamp Reservoir, parking lot size consistent with projected usage, erosion control, electrical service for both outfitters and private users, and those whose needs are characterized under the “Americans with Disabilities Act” or ADA.

The goals of this study are to:

- obtain information about the condition of existing recreation facilities and access sites at and in close proximity to the project and along project-affected reaches of the Deerfield River;
- obtain information about existing recreation use and opportunities, access, and present and future use estimates for sites within the project-affected area;
- conduct an assessment of the need to enhance recreation opportunities and access at the project;
- present the recreation use and opportunities at the project within the larger context of regional opportunities; and
- lay the foundation for preparation of a Recreation Management Plan (RMP) for the Project that will be included in the license application.

Key objectives associated with the various components of this

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in recreation in and around the Deerfield River.

### **Existing Information and Need for Additional Information**

Section 5.9 of the PAD provides information on recreation facilities and opportunities provided on project lands and in the vicinity of the project. Section 5.9.1 of the PAD cites a 1991 study that estimated 50,000 visitors annually to the Fife Brook and Zoar Gap area. BSPC’s Form 80’s for Bear Swamp and Fife Brooks filed with FERC on March 27, 2015, however, estimates 13,321 annual visitors to Fife Brook and 1,301 visitors to Bear Swamp. There is no accurate, recent

information on the number of recreational users in the area and the adequacy of the facilities currently available.

The PAD provides an inventory of camping and sanitary facilities available to kayakers, canoeists, anglers, and other river users available at Mohawk Trail State Forest, Savoy State Forest, and Mohawk Park. However, all facilities are either state-run or private and are usually over-booked. There are currently no camping facilities provided by Bear Swamp Power and Brookfield. Under “*TABLE 5.9-2 PUBLIC ACCESS AREAS ALONG THE DEERFIELD RIVER*” there are no sanitary facilities listed. While we acknowledge that some sanitary facilities do exist at several access points, they are in woefully poor condition, unsanitary, and inadequate to support the volume of usage.

The information on the Form 80’s submitted by BSPC in March, 2015 are in conflict with information presented in the PAD. A complete inventory of recreational access and use is needed.

Site-specific information on visitor perceptions and identified needs at the project, and whether existing access facilities in the area are meeting current and expected future recreation demand has not been collected. There is no information available about whether some user groups avoid the area because of project operations or the condition of recreational facilities.

The area up river of Charlemont, being approximately 8 miles of river does not have cellular phone service. Some fishermen, even those that have a wealth of experience, have been caught on the wrong side of the river when an unknown and un-expected 800-900 cfs release arrives at their location. This is causing some to run the risk of wading across or having to hike sometimes in excess of 1-2 miles to gain access to a bridge. This unsafe situation is a recurring problem. As a result many anglers have abandoned fishing the Deerfield River.

### **Nexus to Project Operations and Effects**

As a result of the 1997 amendment to the license that established whitewater releases, much has changed on the Deerfield River. Rafting companies have flourished. Tubing has become wildly popular. On the other hand, fly fishing has apparently suffered. This study would provide new information regarding adequate access and facilities for a diverse cross-section of river enthusiasts. This study is vital to defining access facilities that can best be adapted for whitewater boaters, anglers, hikers, hunters, and other potential user groups. FERC and the applicant should be aware of the conditions on the ground, and the needs of user groups, before a new license is issued.

### **Proposed Methodology**

Methods used for this study should be similar to that proposed by TransCanada in their Revised Study 30 for the relicensing of the Vernon, Bellows Falls, and Wilder Dams on the Connecticut River (Revised study plan dated August 13, 2014 and approved by FERC with modifications on September 19, 2013). The study should be broken down into three components.

We feel that accurate counts should be made of recreational use of the river from Bear Swamp Reservoir down to the Deerfield #4 Dam. This would include all users on the river including kayakers, canoeists, rafters, solo rafts, tubers, and whatever. It should include all forms of recreation including fishing, bird watching, hikers, and so forth.



#### A. Recreation Site Inventory

An inventory form should be used for site visits at all publicly accessible sites within the project-affected area to document existing facilities and resources. These will include project sites and informal sites.

Amenities at each site, such as the presence and type of restrooms, types of activities supported, parking spaces, and parking surface, will be recorded along with digital photos and GPS points. This inventory will identify and characterize public facilities and resources, and the conditions of those facilities. Formal and informal river access sites will be visually assessed and photographed to record any opportunities or challenges for craft or anglers. The inventory should be one of the first tasks of the study.

The inventory will include the feasibility of incorporating a portage route around the Fife Brook Dam. The study should review land ownership surrounding the project area and investigate shoreline slope conditions (e.g., steepness, length) for alternative take-out and put-in options.

The results of the inventory will provide baseline information regarding existing recreation facilities and resources at the projects and along project-affected riverine reaches. The inventory information will be assessed in conjunction with a visitor intercept survey.

#### B. Recreation Use and Needs Survey

The use and needs assessment will document recreation activity types known to occur or potentially occurring at in the project-affected area.

*Use Survey:* Three components should be used to collect existing and potential (future) recreational visitor use data:

- 1) existing public use (traffic counters, spot counts, and visitor intercept interviews);
- 2) potential visitors (mailed and/or online questionnaire); and
- 3) use from outfitters (e.g., whitewater companies like Zoar Outdoor as well as professional fishing guides on the river). Data should be collected year-round, with an emphasis on the peak season (April 1 to October 31).

The use survey on the river should break down use by type of watercraft – personal canoe, personal kayak, multi-person float boat, inner tube, stand-up paddle board, etc.

An estimate also should be made as to the decrease in angler days on the Deerfield River as a result of the practice of hydropedding. Prior to electricity deregulation, scheduled releases on the Deerfield were mitigated by the practice of adhering for the most part to a schedule of releases that was made publically available. Thus, anglers were able to fish the River on mornings, evenings and weekend hours with some degree of confidence that when they arrived the water levels would be as scheduled in advance. That is no longer the case, and no assessment has been done to date on the estimate of the decrease in angler days or to the *non*-use of the resource.

An additional component of this study is the Waterline Flowcast. The study should capture the information provided on the Waterline Flowcast on a daily basis throughout the study period (<http://www.h2oline.com/default.aspx?pg=si&op=255123>). This information should then be compared to the actual flow information on the river, both at the Charlemont USGS gage and just below Fife Brook dam. The study report should show a separate graph with Flowcast vs. actual flow information at 15-minute increments for each week of the study period.

*Needs Assessment:* The needs assessment will address: 1) existing paddling, angling, hunting, hiking, and camping opportunities within the project-affected areas and nearby; 2) the feasibility of providing additional public access within the lower reservoir and in downstream reaches (potential locations, type of facilities and access, and any associated costs); 3) the feasibility of providing small walking bridges (such as those commonly available in Europe) over the river for hikers and anglers to use when stranded on the “wrong side” of the river; and 4) visitor perceptions of the adequacy of recreation facilities and access in the project areas during summer, fall, and winter sport seasons; and 4) .

The following issues should also be included:

- Access to the whitewater rapids in the Lower Reservoir when the pool height is at its lowest levels;
- Access to the shoreline areas surrounding the lower reservoir for hiking and angling;
- Access to the water in the lower reservoir for boating;
- Portage around the Fife Brook Dam;
- Adequacy of access at put-in areas below Fife Brook Dam;
- Adequacy of access at take-out area above Zoar Gap Rapid;
- Adequacy of access to put-in/take-out area below Zoar Gap Picnic Area;
- Adequacy of access to put-in/take-out at Shunpike Area on MA-Rte. 2;
- Adequacy of access at informal put-in and take-out locations;
- Adequacy of parking facilities at all formal and informal put-in/take-out locations;
- Adequacy of the Waterline Flowcast;
- Adequacy of camping opportunities;
- Need for electrical service to reduce the noise from generators; and wi-fi access at Fife Brook Dam and Zoar Gap Picnic Area so boaters and anglers can get up-to-date river flow and other pertinent user information that can change;
- River access by disabled individuals whose needs are characterized under the “*Americans with Disabilities Act.*”
- Adequacy of places to cross the river safely for recreational users

### C. Future Use Assessment

Future use estimates should be calculated by assessing future demand for recreation activities and population trends for the expected term of the new license. Growth in recreation activities and recreation use projections for the anticipated growth in recreational use through 2060 should be developed using Outdoor Recreation in American Life: A National Assessment of Demand and Supply Trends (Cordell et al., 1999), Outdoor Recreation Participation in the United States – Projections to 2060 (Bowker et al., 2012), and Outdoor Recreation Trends and Futures: A Technical Document Supporting the Forest Service 2010 RPA Assessment (Cordell, 2012). Current use estimates should be projected with indexed values of expected changes in the number of recreation days for given activities at the projects to estimate future recreation use in the project for 10-year increments out to 2050.

### **Level of Effort and Cost**

TransCanada has estimated that their Study 30 will cost \$390,000. The TransCanada study covers three projects on the Connecticut River. The Bear Swamp facility covers a much smaller geographic area, and CRWC estimates that the requested study will cost \$175,000-\$225,000.

BSPC has proposed to characterize recreational facilities and conditions in the project boundary and nearby areas. We believe there is justification to include the information requested here.

### **References**

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## **CRWC Study Request #13. Economic Analysis of Project Operations and Recreation**

The Deerfield River is an important recreational and economic resource to the northwestern region of Massachusetts. The river maintains its pristine water quality and at the same time remains a remarkable recreational resource. Its value reaches far beyond the river itself.

We therefore request that Bear Swamp Power and Brookfield undertake an independent analysis to quantify the economic impact of river-based activity on the Deerfield River.

### **Goals and Objectives**

The economic study should analyze the impact in economic terms of the 1997 Settlement Agreement recreation enhancements and of river use since then. This study will establish a baseline explaining the economic results of the Settlement Agreement and of present operations.

### **Relevant Resource Management Goals**

Not applicable. Requester is not an agency or Indian tribe.

### **Public Interest Consideration If Requester Is Not a Resource Agency**

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. The Deerfield River is valued public resource. The public has a strong interest in recreational opportunities in the Deerfield River watershed. Regional economic benefits derived from high quality outdoor recreation stabilize local economies and spin off other economic activity.

### **Existing Information and Need for Additional Information**

During the 1994 Settlement Agreement, a contingent valuation study was done of whitewater releases from the #5 Dam at Monroe Bridge. Among other findings, the study said that for every \$1 of foregone power generation, \$24 of regional economic value was derived from the recreational releases. Instead of requesting a contingent valuation study—which is, after all, an attempt to *predict* the future related to license conditions—we would like to see a study of the *actual* benefits from that Settlement Agreement. The study proposed here would examine the actual benefits that have been produced by the whitewater recreational releases from the Fife Brook Dam and other provisions of the agreement. This is important information for regional planners, and for FERC in considering license requirements and mitigation.

It would also examine economic losses from less angler use on the river. More recently an increasing number of anglers have come to avoid the Deerfield River entirely as they have become unwilling to travel to the River only to discover that it is essentially unfishable due to high water from unscheduled releases. The result is that the number of angler days has dropped significantly and the value of the recreational fishery on the Deerfield has been severely impacted.

The Form 80 responses from the applicant are significantly flawed in methodology. This study should fill in the gaps created by that inappropriate methodology.

### **Nexus to Project Operations and Effects**

The economic analysis will tie project operations to public benefits. FERC can use the analysis in determining appropriate provisions in the license as well as mitigation. The project operating changes in the 1997 Settlement Agreement that produced 106 whitewater releases created a new whitewater community and economy, as well as benefits for recreational anglers. There is a direct connection between project operations and impacts on the regional economy.

### **Proposed Methodology**

The economic analysis should be done with a broad understanding of the way a recreational resource can have wide impacts. Since the Deerfield Settlement Agreement, the whitewater rafting companies such as Zoar and Crab Apple have built multi-million dollar businesses that are a tremendous benefit for this depressed area of Massachusetts. Fishing guides have grown in number. What have been the net economic benefits/losses to the area from the Deerfield Settlement Agreement recreation enhancements, and what might we expect from extending and enhancing those opportunities?

The previous study request, recreational site inventory, use and needs assessment, will estimate a decrease in river angler days. This study will estimate the value of lost angler days in order to estimate the economic losses to the Deerfield recreational fishery.

### **Level of Effort and Cost**

The economic study involves desktop work, consultations with rafting companies and fishing guides, and analysis of before-and-after town and state tax documents and other useful information. This study may cost \$150,000.

Document Content(s)

CRWC Bear Swamp PAD-SD1-study requests 04-16-15.PDF.....1-46

**UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION**

**E-filing**

**To: Secretary  
Federal Energy Regulatory Commission  
888 First Street NE  
Washington, DC 20426**

Brookfield Renewable Energy Group      Bear Swamp Project No. 2669  
Application for New License

**THE APPALACHIAN MOUNTAIN CLUB, AMERICAN  
WHITEWATER, NEW ENGLAND FLOW, CRAB APPLE  
WHITEWATER, AND ZOAR OUTDOOR'S STUDY REQUESTS IN  
RESPONSE TO NOTICE OF INTENT TO FILE LICENSE  
APPLICATION, FILING OF PRE-APPLICATION DOCUMENT  
(PAD), AND ASSOCIATED STUDY REQUESTS REGARDING THE  
BEAR SWAMP PUMPED STORAGE PROJECT, FERC PROJECT  
NO. 2669-085.**

The Appalachian Mountain Club (AMC), American Whitewater, New England FLOW, Crab Apple Whitewater, and Zoar Outdoor submit the following Study Requests in response to the Pre-Application Document (PAD) filed by Brookfield Renewable Energy ("the Licensee") for the Bear Swamp Project, FERC Project No, 2669-085, located in the towns of Florida and Rowe, Massachusetts. We request that the Licensee conduct the following studies in order to provide FERC with sufficient information to conduct its NEPA analysis.

Since 1876, the Appalachian Mountain Club has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the Appalachian region. It is the largest conservation and recreation organization in the Northeast with more than 90,000 members, many of whom use the Deerfield River. The AMC was one of the key participants in the Deerfield Settlement Agreement of 1994 that improved minimum flows from Fife Brook Dam, provided 106 annual scheduled releases for whitewater boating, associated recreational access amenities, and protected the lands with a nexus to this project. The AMC has interests in both river-based and land-based recreation and conservation.

American Whitewater is a national non-profit 501(c)(3) river conservation and recreation organization founded in 1954. AW has approximately 6,000 members and 100 affiliate clubs, representing tens of thousands of whitewater paddlers across the nation. American Whitewater's mission is to protect and restore our nation's whitewater resources and to enhance opportunities to enjoy them safely. Our members are primarily conservation-oriented kayakers and canoeists, many of whom live and/or engage in recreational boating in the western Massachusetts region, including the Deerfield River on which the Bear Swamp Project is located.

Since 1988 New England FLOW (FLOW) has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the New England region. FLOW is the largest coalition of whitewater boaters in the Northeast, many of whom live within three hours of the Deerfield River, and currently enjoy this reach as a whitewater opportunity. In addition to whitewater, many others visit this region of western Massachusetts to camp, fish, hike, canoe and picnic as daylong or longer trips.

Crab Apple Whitewater, Inc. is a family-owned whitewater outfitter based on the Kennebec River in Maine and on the Deerfield River in Massachusetts. Opened in 1983, three generations help run guided raft trips on Class I-IV rapids as well as inflatable kayak rentals on mild whitewater. As the largest whitewater outfitter in New England, Crab Apple carries 20,000–25,000 passengers per season and has carried over 400,000 people since 1983.

Zoar Outdoor was founded in 1989 in Charlemont, Massachusetts, as an outdoor center located on the Deerfield River. Zoar Outdoor depends heavily on the releases from Fife Brook Dam to provide whitewater rafting and kayak rentals and trips on the Deerfield River. In addition, Zoar Outdoor offers zip line canopy tours, lodging and camping, and rock climbing programs in the Charlemont area. Zoar Outdoor employs up to 130 people seasonally and 10 people year round and takes 25,000 people on various adventures each year.

Our study and additional information requests listed below are intended to assist in developing meaningful and accurate data that reflect the changing recreational usage, demographic shifts, resource impacts, and project safety now demanded by the rapid growth in resource usage since the 1997 *Article 402 License Amendment*. The Draft Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP) published in 2012



noted as its No. 2 goal “to increase the availability of water-based recreation.”

### **Study Requests**

We hereby request several studies per 18 CFR 5.9(b).

#### **Study #1: Controlled-Flow Whitewater Studies**

***(1) Describe the goals and objectives of each study proposal and the information to be obtained.***

The volume of whitewater use has grown enormously since the 1997 license amendment. Aerial mapping during routine low reservoir levels has revealed at least five whitewater drops beneath the upstream end of the Bear Swamp Reservoir. These drops are visible and boat-able during low reservoir levels. They have not been studied in previous relicensings. They have been seen and paddled enough times that three of the drops have names: Show Time, Twin Bears, and Swamp Thing. They range in difficulty from Class II to Class IV. These rapids are alternately revealed or drowned depending on the impoundment level during scheduled releases from the TransCanada No. 5 Dam in Monroe Bridge. These concealed rapids should be evaluated using a controlled-flow whitewater study as to determine their quality. The reservoir level is under control of Bear Swamp Power and Brookfield. A management plan should be developed to coordinate Monroe Bridge flows provided by TransCanada and to make these resources available.

A separate controlled-flow whitewater study should be done from the Fife Brook Dam put-in down 17 miles to the Deerfield #4 Dam at the Charlemont/Buckland border. Above the Zoar Gap Rapid, more accomplished test paddlers would be needed, while below the Zoar Gap Rapid different boats and less accomplished paddlers should be used. This is the river reach controlled by releases from the Fife Brook Dam. As Bear Swamp Power said in the PAD, this is one of the most popular canoe, raft, and kayak reaches used by paddlers in all of New England. The study should evaluate all generational flows as well as higher flows. See SD1 for generational patterns.



Concealed rapids in Bear Swamp  
Reservoir. Photo from Google Earth,  
May 10, 2014.

The goal of an these updated whitewater flow studies is to assess the presence, quality, flow information needs, and preferred flow ranges for river-based boating resources in a stepwise manner. The information to be obtained can be generally characterized as quantitative and qualitative descriptions.

- Assess the effects of a range of optimal and acceptable flows on whitewater recreation opportunities at the top of the Bear Swamp Reservoir and below the Fife Brook Development;
- The impact of the Bear Swamp Reservoir on whitewater flows in the natural river channel above Fife Brook Dam;
- The frequency, timing, duration and predictability of optimal and acceptable paddling flows under current, modified run-off-release river (project inflows from the

TransCanada No. 5 Dam are generally equal to Project outflows), and proposed alternative operations;

- The optimal timing for whitewater releases from Fife Brook Dam so as to optimize recreational use for both boaters and anglers;
- Identify the need for, and define adequate put-in and take-out points that promote car-top boating, and also identify the needs for parking areas;
- The location, challenge, and other recreational attributes associated with specific rapids and other river features;.
- The access needs of whitewater boating use and the current and potential river access options for whitewater and other paddling;
- The flow information needs of whitewater boating and the current and potential flow information distribution system.

Thus, the information to be obtained for the whitewater paddling study is a combination of user-generated flow preferences and other data, information on current and proposed operation (e.g. discharges), geographic information and basic recreational information.

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.***

We are not a government agency nor a Native American tribe. We think that several state agencies might be interested in this information.

The Massachusetts Department of Fisheries & Wildlife (MA-DF&W) has regulated the Fife Brook Section of the Deerfield River as a “catch and release” reach of the Deerfield River, manages a stocking program, and thus has a clearly expressed interest in the public’s ability to fish the Fife Brook section from the shore and in boats.

Although the Atlantic Salmon Restoration Program has been curtailed, the U. S. Fish & Wildlife Service (USF&W), National Marine Fisheries Service (NMFS), and the Massachusetts Department of Fisheries & Wildlife (MA-DF&W) have a clear interest in the passage of other anadromous fish including shad, blue-back herring, eels and other species.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

As we explained above and as stated in the PAD, the Deerfield River offers the public a high quality whitewater boating resource when flow conditions are suitable. Conducting the necessary studies and implementing measures to ensure that the public has access to high quality outdoor recreational resources is in the public interest. It is widely accepted that outdoor recreation has significant benefits to participants including health, well-being, and quality of life. Outdoor recreation also has proven economic benefits for communities located near recreational resources.

Expanding recreation opportunities in the Fife Brook and Bear Swamp sections of the Deerfield River has the potential to offer the region additional economic benefits. The FERC said in “A Guide to Understanding and Applying the Integrated Licensing Process Study Criteria” (March 2012) that *“to fully evaluate the project’s effect on whitewater recreation opportunities and to balance potential enhancement opportunities with their cost, a controlled-flow whitewater boating study is relevant to Commission’s public interest determination.”* This is equally true regarding the Bear Swamp Impoundment and the Fife Brook Section of the Deerfield River.

The Licensee provides 106 scheduled whitewater releases from the Fife Brook Development Dam under the terms of the Settlement Agreement and project license. These scheduled releases attract tens of thousands of private whitewater boaters, commercial rafters, and tubers. Conducting a Controlled-Flow Study will provide FERC with additional information for its NEPA analysis with regard to the frequency, timing, and velocity of scheduled whitewater releases in any future license.

***(4) Describe existing information concerning the subject of the study proposal, and need for additional information.***

In preparation for the 1994 Deerfield Settlement Agreement, no controlled-flow whitewater study was done of the reach below the Fife Brook Dam, nor of the concealed rapids beneath the Bear Swamp Reservoir.

The only controlled-flow study on the Deerfield River was conducted on the Monroe Bridge section by Clark Associates in 1990, over 25 years ago. There has never been a controlled-flow study on the Fife Brook section,

nor on the rapids submerged beneath the impoundment. A study of these resources is relevant in terms of participant usage, and should be conducted using metrics and the present-day evaluation criteria that are now available for this type of recreational and resource assessment.

In evaluating operational and recreational changes for the new license, the information obtained from these studies will be useful. A range of flow releases and the operation of the Bear Swamp Reservoir to expose the concealed rapids could enhance recreational benefits on the river.

Current and historic project operations, however, have resulted in significant information gaps and have virtually eliminated all stable low and moderate flows from the reach under the impoundment. While there is limited anecdotal information on the rapids beneath the impoundment and substantial experience with flows below the dam, a controlled-flow study utilizing methods proscribed by Whittaker, et al. (2005) is necessary to provide FERC with a qualitative analysis of the resource.

Changes in project ownership over the years have often resulted in inconsistent and somewhat unreliable timing of flows in the Fife Brook Section. The result has been flows too low or too late to paddle or fish, and generally river-runners and anglers have received inconsistent information about the river at low flows.

***(5) Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

The Project controls flows in the Deerfield River by fluctuating water levels in the impoundment as a result of the current mode of operation at the Bear Swamp Pumped Storage Development. In addition, the Fife Brook Development limits the paddling opportunities throughout each year as a result of the timing and velocity of generational flows. This includes the reduction or virtual elimination of valuable and regionally needed paddling opportunities several days each week during the summer. The Deerfield River is a high quality paddling resource, and since paddling is a flow dependent activity, the project operations directly affect paddling and the economic benefits of the Deerfield River. The project nexus is direct.

The rapids concealed upstream beneath the reservoir are exposed and useful for recreation when operations create a lower reservoir level. This is within the control of Bear Swamp Power and Brookfield. License

requirements may coordinate operations to lower the reservoir level at certain times of day during the 32 annual whitewater releases from the Deerfield #5 Dam at Monroe Bridge.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

The studies we request on the Bear Swamp Reservoir impoundment and the Fife Brook Section follow the standard methodology as described in Whittaker, et. al.. (2005). This methodology determines the presence, quality, and preferred flow ranges for river-based boating resources in a step-wise manner. The process steps are generally 1) desktop analyses, 2) on-land feasibility assessment, 3) on-water single flow assessment, 4) on-water multiple flow assessment. We expect and request the full implementation of this methodology. Because the quality of the resource has not been fully analyzed with current metrics, we request that on-water multiple flow assessments be conducted.

One study should focus on the reach below the Fife Brook Dam. The other study should focus on in the upper portion of the project boundary in the lower reservoir's submerged whitewater drops at various impoundment levels and flows. We will work with the licensee to document the known information regarding the river. We will provide volunteers and technical support for the studies as appropriate. We hope to work collaboratively with the licensee on this study. The whitewater boating study methodology we have requested has been used on dozens of other FERC regulated reaches, including recent studies on the Connecticut River.

***(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.***

We are willing to work with the licensee on the whitewater paddling controlled-flow study to keep costs reasonable and the quality of information high. The information that is already known can jump-start the study process and avoid duplicate effort. The studies will need integration of this information and then organized flow studies during which several flows are paddled by boaters. The consultants usually employ still image and video documentation, surveys of the boaters, a

guided conversation among the boaters, and subsequently a written report. Given that this includes the impoundment and Fife Brook reach with some access and relatively straightforward hydrology, and given the collaborative approach sought by the paddling community, including in-kind contributions of time and expertise, a consultant should be able to complete this study on behalf of the licensee for a very reasonable cost. The FERC (on March 1, 2013) estimated the cost of similar studies on the Connecticut River at the Wilder and Bellows Falls dams at \$30,000. The estimated cost of a large controlled-flow whitewater study at the Turners Falls Dam owned by FirstLight was estimated at \$45,000 to \$50,000.

The Licensee PAD proposes no whitewater feasibility analysis. This no-action step will would reveal nothing about the current project impacts on whitewater recreation or opportunities for protection, mitigation, or enhancement measures. We currently do not know the relationship between specific low and moderate flows and the paddling experiences they provide. A desktop analysis cannot generate this information. Without this information, we cannot fully define the project impacts, nor propose and consider provision of releases that provide targeted recreational experiences.

## **Study #2: Public Access Adequacy for Whitewater Boating, Rafting, and Canoeing, Navigation, and Other Non-Motorized Recreational Uses on Project Lands.**

*(1) Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to identify and study the quantity, quality, and adequacy of the land-based recreational facilities associated with the Fife Brook Dam and the Bear Swamp pumped storage facility. It should evaluate facilities for the Bear Swamp Development and the Fife Brook developments on the Deerfield River for non-motorized use by commercial rafting companies, private whitewater boaters, canoeists, hikers and anglers. This study should include put-in and take-out facilities especially for canoeing and kayaking, portage routes, campsites, parking and road access, seasons of operation, maintenance, and sanitary facilities. The study should examine the facilities that are necessary for canoe access to the river and to the Bear Swamp Reservoir, parking lot size consistent with projected usage, erosion control, electrical service for both outfitters

and private users, and services for those whose needs are characterized under the “*Americans with Disabilities Act*.”

The regulations governing Form 80 filings says: “These data are used to determine whether the public’s need for water-based recreational facilities is being met by the licensees of such projects and whether additional efforts should be made to meet current and future recreational needs.” Since previous Form 80 reports have not done that analysis, this study will need to fill in information gaps.

Information should be obtained concerning:

- Access to whitewater rapids in the Lower Reservoir when the pool height is at lower levels;
- Access to the shoreline areas surrounding the lower reservoir for hiking and angling;
- Access to the water in the lower reservoir for boating;
- Portage around the Fife Brook Dam;
- Adequacy of access at put-in areas below Fife Brook Dam;
- Adequacy of access at take-out area above Zoar Gap Rapid;
- Adequacy of access to put-in/take-out areas at and below the Zoar Gap Picnic Area;
- Adequacy of access to put-in/take-out at Shunpike on MA-Rte 2;
- Adequacy of access at informal put-in and take-out locations;
- Adequacy of parking facilities at all formal and informal put-in/take-out locations;
- Need for electrical service to reduce the noise from generators; and Wi-Fi access at Fife Brook Dam and Zoar Gap Picnic Area so boaters and anglers can get up-to-date river flow and other pertinent user information that can change;
- River access by disabled individuals whose needs are characterized under the “*Americans with Disabilities Act*.”

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;***

We are not a government agency nor a Native American tribe. We think that several state agencies might be interested in this information.

The Massachusetts Department of Fisheries & Wildlife (MA-DF&W) has regulated the Fife Brook Section of the Deerfield River as a “catch and release” reach of the Deerfield River and manages a stocking program and thus has a clearly expressed interest in the public’s ability to fish the Fife



Brook section from shore and in boats. Further, the existing angler access points and facilities do not meet the provisions of the *“Americans with Disabilities Act.”*

Although the Atlantic Salmon Restoration Program has been curtailed, the U. S. Fish & Wildlife Service (USF&W), National Marine Fisheries Service (NMFS), and the Massachusetts Department of Fisheries & Wildlife (MA-DF&W) have a clear interest in the passage of other anadromous fish including shad, blue-back herring, eels and other species.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

The public has an interest in healthy rivers and streams that support the full suite of beneficial uses and other goals of the Clean Water Act. Access to streams and rivers with adequate base flows and sufficient variability to support high quality whitewater recreational use will support other businesses within the regional economy. Since the 1997 *“Article 402 Amendment Order,”* there has been an increased interest in providing handicapped access to rivers, lakes, and streams for angling and other river-based activities primarily for injured military personnel returning from both Afghan and Iraqi conflicts. Current facilities are not adequate to serve this handicapped segment of the population.

The public also has an interest in navigation along the Deerfield River. The Deerfield River is a navigable river based on its commercial and recreational use. [See, Knott v. Federal Energy Regulatory Commission, 386 F.3s 368 (1<sup>st</sup> Cir. 2004) (“the fact that the Blackstone River required portages [does not] defeat a finding of navigability”)] In Massachusetts, the public has the right to boat, fish, and fowl in navigable waters. [Opinion of the Justices, 383 Mass. 895 (1981)] Even in non-navigable waters, the public still retains the right of “passage up and down the stream in boats or other craft, for purposes of business, convenience, or pleasure.” [Brosnan v. Gage, 240 Mass. 113 (1921)] The Commonwealth, in trust for the public, owns the streambeds of navigable waterways, and the public has the right to freely pass over all waters in Massachusetts. This right of passage includes the recreational use of the water. Under Massachusetts law and regulations, any water-dependent use project which interferes with the public’s right to free passage over and through water, including “the right to float on, swim in, or otherwise move freely within the water column without touching the bottom,” is required to provide “compensation to the public for interfering with its broad rights to use such lands for any lawful purpose ... commensurate with the extent of

interference caused, and shall take the form of measures deemed appropriate by the Department to promote public use and enjoyment of the water, at a location on or near the project site if feasible.” [310 CMR 9.35]

***(4) Describe existing information concerning the subject of the study proposal, and the need for additional information.***

The PAD identifies seven (7) access points for any type of whitewater use but does not thoroughly characterize their adequacy to address the needs of different user groups. There is an inconsistent examination regarding differing access needs throughout this project, and we look forward to learning more. Additional information is also needed to determine appropriate points of access to the Lower Reservoir impoundment for both land-based and water-based recreation, and means of portage around the Fife Brook Dam for navigation.

***(5) Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

This study would provide new information regarding the need to address adequate access for a more diverse cross-section of river enthusiasts. This study is vital to defining access facilities that can best be adapted for both whitewater boaters, anglers, hikers and other potential user groups. Project operations and license requirements have an impact on recreational user groups. FERC and the applicant should be aware of the conditions on the ground, and the needs of user groups, before a new license is issued.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

We request sufficient analysis be conducted to understand the Project topography that would detail any or all access points that would provide adequate access for multiple user groups. Use of the Geographic Information System (GIS) may provide a general overview of potential access points within Project bounds and may be helpful. However, given the potentially steep terrain leading to the impoundment and its potential whitewater opportunities, this study should be completed using accepted and certified surveying methods that include GIS analysis and “ground

truthing.” The study should combine inventory analysis with qualitative analysis of access and other issues. The information obtained from this study can lead to the development of a Recreation Management Plan for the new license that should include a description of any proposed protection, mitigation, and enhancement measures, including: location of any proposed facilities and/or access areas (including description and figures depicting the relationship of any proposed facilities to the existing project boundaries), proposed ownership and management of any proposed facilities, associated capital, and operation and maintenance costs; and a timeline for implementation.

***(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.***

The recommended GIS analysis is a relatively simple desktop analysis using software that is currently available and thus should require little effort or cost. Once all potential access points are identified, the cost of surveying is nominal when presented in the context of other studies required by FERC or requested by other stakeholders. No other studies would address the specificity required to identify, lay out and design adequate access for this project. Field crews would be needed to inventory and assess the adequacy of existing, and potential, access sites. A somewhat similar study proposed by FirstLight Power for the Turners Falls Dam and Northfield Mountain projects on the Connecticut River was estimated to cost \$15,000 to \$20,000 in 2013.

### **Study #3: Assessment of Day Use and Overnight Facilities Associated with Non-Motorized Boating.**

The PAD provides an inventory of area camping and sanitary facilities available to kayakers, canoeists, anglers, and other river users available at Mohawk Trail State Forest, Savoy State Forest, and Mohawk Park. However, all facilities are either state-run or private and are usually over-booked. There are currently no camping facilities provided by Bear Swamp Power and Brookfield. Under “*TABLE 5.9-2 PUBLIC ACCESS AREAS ALONG THE DEERFIELD RIVER*,” there are no sanitary facilities listed. While we acknowledge that some sanitary facilities do exist at several access points, they are in woefully poor condition, unsanitary, and inadequate to support the volume of usage.

We feel that accurate counts should be made of recreational use of the river from Bear Swamp Reservoir down to the Deerfield #4 Dam. This would include all users on the river including kayakers, canoeists, rafters, solo rafts, tubers, and whatever. It should include all forms of recreation including fishing, bird watching, hikers, and so forth. These figures and associated methods will help Bear Swamp Power and Brookfield construct adequate Form 80 responses currently and in the future.

***(1) Describe the goals and objectives of each study proposal and the information to be obtained.***

The goal of this study is to provide a quantitative and qualitative analysis of existing facilities to determine their capacity to manage the increasing number of paddlers, anglers and other river users who are making trips on the Deerfield River. This study should examine put-in and take-out facilities especially for canoeing and kayaking, portage routes, campsites, parking and road access, seasons of operation, maintenance, and sanitary facilities. The study should examine the facilities that are necessary for canoe access to the river and the Bear Swamp Reservoir. The study should include a count of existing users, as should be done in a Form 80, along with a projection of usage during the 30-year life of the license, and the opportunities for the project owners to buy land in order to increase recreational benefits. This study should also include other amenities on project lands. This study should identify areas within project lands and along the Deerfield River that are suitable for establishing camping and additional sanitary facilities.

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;***

We are not a government agency nor a Native American tribe.

We note the values summarized in the *Draft Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP)* published in 2012, and the priorities described as regional trends in central and western Massachusetts. A variety of outdoor recreational needs are described and access to opportunities is prioritized. The state forests and state parks would have an interest in this resource, especially because their facilities are overwhelmed at many times of the year.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

The public has an interest in outdoor recreation that is compatible with water-based activities including those affected by the “*Americans with Disabilities Act*.” Handicapped access to camping and adequate sanitary facilities along streams and rivers will support high quality recreation. Current facilities are not adequate to serve this segment of the population. Improvements would extend recreation to this group.

Economic benefits will be shared with other businesses within the region. Additional facilities would also help control unauthorized camping and picnicking at sites not created for such purposes, often on private land. A more accurate count of current users and a projection of future users will help inform license requirements.

***(4) Describe existing information concerning the subject of the study proposal, and the need for additional information.***

Bear Swamp Power and Brookfield identified three sites but did not adequately characterize the full range of amenities available for river users at those sites. The applicant should survey existing project lands that would be suitable for construction of camping facilities that would be ADA compliant.

Existing Form 80 responses used an inappropriate methodology with no statistical reliability, and thus cannot be used or cited for this purpose.

***(5) Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

This study will identify additional sites that can best be adapted for increasing public access, particularly handicapped access, for day paddling trips on the Fife Brook section of the Deerfield River. Project operations have a direct impact on tourism and recreation in this area, and requests have been made to expand recreation and amenities in the license to serve the public.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted***

***practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

Our interest is in having sufficient information to understand what facilities exist and what, if any, improvements are necessary to manage the increasing use of day kayak and canoe trips on the Deerfield River. This analysis should include recommendations for the acquisition and development of additional facilities to meet the interest and needs identified in the Massachusetts SCORP documents cited by Bear Swamp Power and Brookfield in the PAD.

Desktop analysis of existing project lands would provide an immediate overview of parcels that would be appropriate for establishing additional camping areas. Ground surveys and geological examination of substrate would provide further information as to the adequacy of any site to provide sanitary facilities. Spring/summer/fall field seasons are appropriate for this inventory and analysis. We reserve our right to request an additional inventory study if deemed necessary. The study should address at least the following:

- A. The use and needs assessment will include all recreation activity types known to occur or potentially occurring at the project. Specific methods should include visitor observations; on-site visitor intercept surveys at formal and informal public recreation areas at the project reservoirs, tailraces, and riverine areas; and mail and/or internet surveys targeting unique stakeholder groups that may not be practically accessed through on-site surveys (e.g., adjacent residential land owners, residents of the counties in which the projects are located, rock climbers, whitewater boaters).
- B. Specific methods for each sampling approach in the use and needs assessment include: (1) the visitor observations should capture information such as location, date, time, weather, number of vehicles, watercraft (if any), number of recreation users or party size, and recreation activity engaged in; (2) the methodology for the visitor survey sampling will be based on a stratified sample that includes all seasons, various locations, and various times of week and day to enable representative responses from the visitors, while ensuring interview coverage during key times (e.g., holiday and weekend days, shoulder seasons,

hunting seasons, whitewater release hours). (Note: surveys of fisherman and hunters should include additional pertinent information related to game and harvest); (3) the mail-back survey will follow the Dillman Method or modified Dillman method, and include items such as frequency and duration of visits to the projects, qualitative ratings of existing public access and recreation facilities of the project area, and reasons for visiting **or not visiting** the projects for recreation. Sampling and results should also include the attendance numbers of paddlers and anglers served by commercial operations rather than just random surveys; survey questionnaires can be administered by outfitters to their customers.

- C. The needs assessment will include the demand for whitewater boating, existing boating opportunities within the project region, feasibility of providing additional public access at the project reservoir and riverine reaches (potential locations, type of facilities and access, and any associated costs), identifying visitor perceptions regarding the adequacy of recreation facilities, and access in the project area, and assessing future recreation demand and facility needs at the project.
- D. Annual recreation use by activity type and season should be quantified. The Form 80 methodology of using “random observations” by staff should be abandoned in favor of more appropriate and statistically accurate methodologies. Studies should begin with the annual records of the commercial raft companies and fishing guides, and then supplement that information with actual counts of non-commercial users and people engaged in other recreational activities. Any projections of usage should have appropriate statistical significance calculations included.
- E. Assess visitor perceptions of the effects of project operations and management on recreation and recreation opportunities at the project (including fluctuating reservoir levels, minimum flow releases, and anticipated changes over a new license term). Identify potential measures to alleviate any negative effects as well as to enhance existing recreation opportunities and access.

- F. A Recreation Management Plan for the projects should be included in the license application and should include, at a minimum: (1) description of any proposed protection, mitigation, and enhancement measures, including: location of any proposed facilities and/or access areas (including descriptions and figures depicting the relationship of any proposed facilities to the existing project boundaries), proposed ownership and management of any proposed facilities, associated capital, and operation and maintenance costs; and a timeline for implementation; (2) description of operation and management measures associated with project-related recreation access and facilities; and (3) description of measures and methodologies for future monitoring of recreation demand and adequacy of project-related facilities to meet this demand over the term of new licenses.

***(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.***

There are multiple sites along the Deerfield River that have access points—many of them simply inadequate roadside parking spots—but there are no camping facilities. There are vast differences in the ability or capacity of these potential sites to handle paddling groups of varying size and numbers, or their sanitation needs. Because there is no comprehensive guide or text that provides this information, visual inspection of potential sites should take place and be identified. This analysis can be completed during the spring, summer, and fall field seasons. When a similar but larger study was done at Turners Falls and Northfield Mountain for the FirstLight relicensing on the Connecticut River in Massachusetts, the estimated cost of a Recreation Facility Inventory and Use & Needs Assessment Study was about \$120,000, including field studies, study report development, and drafting of a Recreation Management Plan.

#### **Study #4: Economic Analysis of Project Operations and Recreation**

The Deerfield River is an important recreational and economic resource to the northwestern region of Massachusetts. The river maintains its pristine



water quality and at the same time remains a remarkable recreational resource. Its value reaches far beyond the river itself.

We therefore request that Bear Swamp Power and Brookfield undertake an independent analysis to quantify the economic impact of river-based activity on the Deerfield River.

***(1) Describe the goals and objectives of each study proposal and the information to be obtained.***

The economic study should analyze the impact in economic terms of the 1997 Settlement Agreement recreation enhancements and of river use since then. This study will establish a baseline explaining the economic results of the Settlement Agreement.

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;***

We are not a government agency nor a Native American tribe.

In addition to the values summarized in the *Draft Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP)* published in 2012, this information would provide insight to support public policy actions to maintain those values which make the region economically viable. FERC, the applicant, and state agencies with responsibility for this resource should be aware of the economic impacts of policy, operations management, and licensing decisions.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

Regional planners, policy makers, and the general public have an interest in water-based outdoor recreation. Regional economic benefits derived from high quality outdoor recreation stabilize local economies and spin off other economic activity.

***(4) Describe existing information concerning the subject of the study proposal, and the need for additional information.***

During the 1994 Settlement Agreement, a contingent valuation study was done of whitewater releases from the #5 Dam at Monroe Bridge. Among other findings, the study said that, for every \$1 of foregone power

generation, \$24 of regional economic value was derived from the recreational releases. Instead of requesting a contingent valuation study—which is, after all, an attempt to *predict* the future related to license conditions—we would like to see a study of the *actual* benefits from that Settlement Agreement. The study proposed here would examine the actual benefits that have been produced by the whitewater recreational releases from the Fife Brook Dam and other provisions of the agreement. This is important information for regional planners, and for FERC in considering license requirements and mitigation.

The Form 80 responses from the applicant are significantly flawed in methodology. This study should fill in the gaps created by that inappropriate methodology.

***(5) Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

The economic analysis will tie project operations to public benefits. FERC can use the analysis in determining appropriate provisions in the license as well as mitigation. The project operations changes in the 1997 Settlement Agreement that produced 106 whitewater releases created a new whitewater community and economy, as well as benefits for recreational anglers. There is a direct connection between project operations and impacts on the regional economy.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

The economic analysis should be done with a broad understanding of the way a recreational resource can have wide impacts. Since the Deerfield Settlement Agreement, the whitewater rafting companies such as Zoar and Crab Apple have built multi-million dollar businesses that are a tremendous benefit for this depressed area of Massachusetts. Fishing guides have grown in number. What have been the net economic benefits to the area from the Deerfield Settlement Agreement recreation enhancements, and what might we expect from extending and enhancing those opportunities?

There are several independent academic institutions in the area that can conduct such a study, such as the Donahue Institute at UMass Amherst, which recently did a similar study of the Vernon nuclear plant closing in Vermont.

As part of this request, we recommend that the recreational and economical studies assess the value of fishing as well as other forms of recreation, reaching beyond the usual biological studies.

***(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.***

The economic study involves desktop work, consultations with rafting companies and fishing guides, and analysis of before-and-after town and state tax documents and other useful information. This study may cost \$150,000.

### **Additional Information Requests:**

#### **AIR 1: Model River Flows and Water Levels Upstream and Downstream of Fife Brook Dam and Integration of Project Modeling with Upstream and Downstream Project Operations.**

We request that FERC require Bear Swamp Power and Brookfield to develop a river flow and operations model designed to evaluate the hydrologic changes to the Deerfield River caused by the operation of the Fife Brook Dam together with Bear Swamp Pumped Storage Project, and the interrelationships between the operation of Fife Brook/Bear Swamp and the Deerfield projects upstream and downstream. The study should assess the following topics:

1. Conduct quantitative hydrologic modeling of the hydrologic influences and interactions that exist between the water surface elevations of the Fife Brook impoundment and discharges from the generating facilities and the upstream and downstream hydroelectric projects. Data inputs to and outputs from the model(s) should include:

- Discharges into the Fife Brook impoundment from the Deerfield No. 5 Project,
  - Withdrawals from the Fife Brook impoundment by the Bear Swamp Pumped Storage Project,
  - Discharges to the Fife Brook impoundment by the Bear Swamp Pumped Storage Project,
  - Existing and potential discharges from the Fife Brook Dam generation, recreational releases, and spill flows,
  - Existing and potential water level fluctuation restrictions (maximum and minimum pond levels) of the Fife Brook impoundment and downstream flows from the project,
  - Existing and potential required minimum flows and/or other operation requirements at each of the upstream projects.
2. Document how the existing outflow characteristics from the upstream projects affect the operation of the Fife Brook Project including downstream flow releases and Fife Brook impoundment levels.
  3. Document how the existing Fife Brook and Bear Swamp operations affect the Deerfield River downstream of Fife Brook dam all the way to the upstream extent of the impoundment for Deerfield No. 4.
  4. Assess how recreational use (paddling, floating, and angling) of the Deerfield River is impacted by downstream flows under a range of river flow conditions.

***(1) Describe the goals and objectives of each study proposal and the information to be obtained.***

The model should help determine the extent of alteration of river hydrology caused by operation of the project and the interactions between upstream project operations, Fife Brook operations, and downstream operations at Deerfield No. 4. The models will provide necessary information on what changes can be made to the project's flow releases and/or water levels restrictions, and how those changes affect downstream resources.

As other specific modifications of the operations of each of the projects are identified based on results of other requested studies, these desired conditions will need to be input into the models to assess how each change affects that project and other project operations and the implications of those changes on other resources and/or the ability to achieve desired operational changes at other projects.

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied;***

We are not a government agency nor a Native American tribe.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

Sections 4(e) and 10(a) of the Federal Power Act require the Commission to give equal consideration to all uses of the waterway on which a project is located, and what conditions should be placed on any license that may be issued. Fish, wildlife, plants, and their habitats are important public resources, as is public recreation. There is a strong public interest in protecting, conserving, and enhancing these resources for public benefit, including recreation, fishing, and the preservation of wetlands, endangered species, and migratory species. This study will provide important information about how project operations affect river flows, which has a significant impact on the Deerfield River ecosystems, the plants and animals that depend on them, and the ability of the public to use the river for recreation.

***(4) Describe existing information concerning the subject of the study proposal, and the need for additional information.***

Available information in the PAD does not indicate how project operations have altered downstream hydrology, which may affect resident, macroinvertebrates, rare, threatened, and endangered species, aquatic plants and other biota and natural processes and recreation in the Deerfield River from below the Fife Brook Dam downstream to Dam #4.

The PAD indicates that Fife Brook operates in a run-of-release mode, reacting to and passing inflows from TransCanada's facilities upstream, and that Bear Swamp operations have no effect on Deerfield River flows upstream and downstream of the Bear Swamp and Fife Brook developments. However, no information is provided about fluctuations in the impoundments and the extent of upstream backwatering during pumping and generating, other than the range of fluctuation. A closer look at Figure 4.4-2 indicates that outflow peaks from Fife Brook may be lower than inflow peaks from TransCanada. Figure 4.4-2 includes data from only two months of a single year, however. Figure 4.4-3 from the PAD reinforces this observation, showing inflow and outflow at Fife Brook (for

two years only); however, the scale of this figure makes it hard to see much detail.

Article 401 in the 1997 Order Amending Bear Swamp's Project License requires a minimum flow of 125 cfs as measured below the dam for the protection and enhancement of fishery resources in the Deerfield River. Article 404 requires whitewater boating releases from Fife Brook of 700 cfs for 3 continuous hours on 50 weekend days and 56 weekdays between April 1 and October 31. After complaints about minimum flows, a gage was installed below Fife Brook but that gage was ruined in Tropical Storm Irene. Anglers complain that releases strand anglers on one side of the river. Brookfield Power says they increase flows and hold them for 15 minutes for safety, yet there is no data showing what that looks like and whether this is truly done.

A recent study completed by scientists at UMass Amherst indicates that the flows released from Fife Brook Dam actually decrease as they move downstream. Apparently about 10% of the flow is absorbed by the water table. We do not believe this has been factored into any model of project operations. References to the study can be found at these locations:

<http://www.umass.edu/newsoffice/article/daily-dam-releases-massachusetts%E2%80%99>  
<http://scholarworks.umass.edu/theses/760/>).

Operations and flow information are needed to better understand the impact of operations on recreational uses of the river and whether or not modifications can be made to improve river habitat and river uses. No information in the PAD is provided to how fisheries resources or recreational uses are affected by project operations.

***(5) Explain any nexus between Project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

The Bear Swamp Project is currently operated with a continuous minimum flow of 125 cfs. The project operates as a daily peaking project, often with daily flow fluctuations between the minimum and project and fluctuations in Fife Dam headpond elevation (830' to 870') and in the upper reservoir of the Bear Swamp Pumped Storage development (1,550' to 1,600'). These changes affect biotic habitat and biota upstream and downstream of the project, and provide public recreation. Results of river flow analyses will be used to develop flow-related license requirements and/or other mitigation measures.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

Methodology is likely to be similar to studies 3.2.2 and 3.8.1 in the Turners Falls and Northfield Mountain relicensing effort currently underway on the Connecticut River in Massachusetts.

River level loggers will need to be placed within the study area. Past project operations for 2005 to 2015 should be summarized and used in the model. Any proposed modifications should be identified and modeled.

***(7) Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.***

Level of effort and cost of model development are expected to be moderate but to be valuable in developing license conditions, the model(s) will need to be run under various scenarios throughout the relicensing process to assess the implications of any changes to the operations. Therefore, ongoing consultation and re-running of the model(s) are likely to be needed throughout the relicensing process. The modeling exercise will also require coordination and cooperation between Brookfield and TransCanada upstream to assure that the model inputs and outputs can be accurately related.

In its Connecticut River relicensing, FirstLight said that their study 3.2.2 will cost \$100,000–\$120,000 and study 3.8.1 will cost \$100,000–\$125,000. Because the Deerfield River is smaller than the Connecticut River, flows coming from upstream are more straightforward, and Fife Brook does not have a canal system. We expect the costs for this study to be significantly lower than the studies at Turners Falls and Northfield Mountain.

## **AIR 2. Water Budget for Bear Swamp Reservoir.**

The materials presented by Bear Swamp Power and Brookfield in the PAD and SD1 describe a run-of-release project where whatever water comes

into the Bear Swamp Reservoir immediately goes out through the Fife Brook Dam. As described, the pumped storage facility operates with 4900 acre-feet of water in the lower reservoir and 4900 acre-feet of capacity in the upper reservoir. The charts and graphs of reservoir levels and flows have a time frame that is difficult to interpret. This makes analysis for recreational purposes impossible.

***(1) Describe the goals and objectives of each study proposal and the information to be obtained.***

As an additional informational request, we would like to see records of hourly inflows to the Bear Swamp Reservoir and hourly outflows from the Fife Brook Dam for every day from March to October during the last three to five years. We want to know when the pumped storage facility has operated in the same time frame. And we want to learn the associated hourly levels in the lower reservoir. This will give us a much better understanding of project operations and how the whitewater releases and minimum flow work within the Bear Swamp system.

In addition, we would like to see weekly or monthly inflows and outflows between March and October for the last 10 to 15 years. The longer time frame of 10 to 15 years could be helpful in determining the range of flows that we could expect in the critical months of July and August.

***(2) If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.***

We are not a government agency nor a Native American tribe.

We think that several state agencies might be interested in this information as it relates to whitewater releases, minimum flows, recreation on the lower Bear Swamp Reservoir, and several other issues.

***(3) If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.***

The provision of 32 whitewater releases from the Deerfield #5 Dam in Monroe Bridge was a major public benefit of the Deerfield Settlement Agreement. It helped create jobs in this economically depressed region, and it created enormous public recreational benefits. The Monroe Bridge dryway lower drops concealed beneath the Bear Swamp Reservoir, and the drowned drops that are normally present in the dryway, can be part of the recreational benefits of the Monroe Bridge releases. Bear Swamp Power



and Brookfield have control of the lower reservoir and can provide those benefits as part of their normal operations. Information about the levels in the reservoir should be easily compiled for a run-of-release facility.

The information will also be relevant to providing additional whitewater releases from the Fife Brook Dam. For additional releases, water would need to be available. If the record of hourly inflows and outflows in the past three to five years shows additional Fife Brook generation, then that information can become part of the relicensing conversation.

***(4) Describe existing information concerning the subject of the study proposal, and the need for additional information.***

Other than the confusing information presented by Bear Swamp Power and Brookfield in the PAD, SD1, and at the scoping hearings, we know of no information relating to hourly inflows and outflows and reservoir levels at the Bear Swamp Reservoir. We need the information to understand project operations and to create possible mitigation in the new license.

***(5) Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.***

Reservoir levels within the lower Bear Swamp Reservoir determine when the upper whitewater drops—Show Time, Twin Bears, Swamp Thing and others—are available at the end of the Monroe Bridge dryway whitewater run, and when some of the normal dryway rapids—particularly Labyrinth—are buried beneath the reservoir. Sometimes it's up; sometimes it's down. The inflow and outflow hourly figures and matching reservoir levels will help us understand how project operations—including operation of the pumped storage facility—either expose or drown these rapids for paddlers.

License requirements may alter operations to insure that the concealed drops mentioned above—Show Time, Twin Bears, Swamp Thing and two others—are available for paddlers on the 32 scheduled release days. For such license requirements to work, we need to know how the lower reservoir works in real time.

***(6) Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted***

***practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.***

Clarity should be the primary methodology in presenting this information. Clear and accessible data in digital form on when water arrives and departs from the reservoir, the operation of the pumped storage facility, and the associated reservoir levels at the time, can inform our decision-making. This is mostly desktop work gathering information that is already stored on Brookfield computers, and then presenting it in lists, charts, and graphs that are accessible and informative. We hope to consult with the applicant on appropriate presentation of the data.

***(7) Describe considerations of level of effort and cost, as applicable, and why proposed alternative studies would not be sufficient to meet the stated information needs.***

Once a method of presentation is chosen and agreed upon, the compilation of information should be rapid. We do not know how Bear Swamp Power or Brookfield accounts for the time of its employees. We assume this information can be compiled and presented for less than \$10,000.

## **Conclusion:**

We respectfully request that FERC accept these comments and direct the licensee to conduct the studies and information requests to address the concerns raised. Thank you for considering these comments.

Respectfully submitted this 16th day of April, 2015

Dr. Ken Kimball  
Director of Research AMC  
P. O. Box 298  
Gorham, NH 03581

Dr. Norman Sims  
AMC  
77 Back Ashuelot Road  
Winchester, NH 03470

Bob Nasdor  
Northeast Stewardship Director  
American Whitewater

65 Blueberry Hill Lane  
Sudbury MA 01776

Thomas J. Christopher, Secretary/Director  
New England FLOW  
252 Fort Pond Inn Road  
Lancaster, Massachusetts 01523

Frank and Jennifer Mooney  
Crab Apple Whitewater  
2056 Mohawk Trail  
Charlemont, MA 01339

Bruce Lessels  
Zoar Outdoor  
7 Main St.  
Charlemont, MA 01339

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FEDERAL ENERGY REGULATORY COMMISSION

WASHINGTON, D.C. 20426

April 16, 2015

OFFICE OF ENERGY PROJECTS

Project No. 2669-085 – Massachusetts  
Bear Swamp Project  
Bear Swamp Power Company, LLC

Steven P. Murphy  
Brookfield Renewable Energy Group, LLC  
33 West 1<sup>st</sup> Street South  
Fulton, NY 13069

**Reference: Comments on the Pre-Application Document and Request for Studies and Additional Information**

Dear Mr. Murphy:

After reviewing Bear Swamp Power Company, LLC's (Bear Swamp Power) Pre-Application Document (PAD) for the Bear Swamp Project, participating in the March 18, 2015, scoping meetings, and the March 19, 2015, environmental site review, Commission staff has comments on the PAD (attached in Schedule A), additional information needs (attached in Schedule B), and study requests (attached in Schedule C). Please file your responses to schedules A, B, and C with your proposed study plan that is due on June 2, 2015.

Staff may determine a need for additional studies or information upon receipt and review of scoping comments, study requests, and your proposed study plan. As necessary, we will request additional information or studies or provide additional input on proposed or requested studies after you file the proposed study plan.

Please include a master schedule in your proposed study plan that includes the steps for conducting each proposed study (i.e., data collection, data analysis, consultation, and report preparation), the distribution of progress reports, the filing date of the initial study report, and the date of the initial study report meeting. Finally, if you are likely to propose any plans for protection, mitigation, or enhancement measures, drafts of those plans should be filed, if possible, with the study report.

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If you have any questions, please contact John Baummer at (202) 502-6837 or [john.baummer@ferc.gov](mailto:john.baummer@ferc.gov).

Sincerely,

Bob Easton, Chief  
New England Branch  
Division of Hydropower Licensing

Enclosures: Schedules A, B, and C

cc: Mailing list  
Public Files

Project No. 2669-085  
Schedule A

## **COMMENTS ON THE PRE-APPLICATION DOCUMENT**

### **Aquatic Resources**

1. Section 5.3.2 and Appendix H of the PAD provide a summary of monthly flow data and flow duration curves for the Deerfield River at the United States Geologic Survey gage at Charlemont, approximately 14 miles downstream of the project. Section 5.6(d)(3)(iii)(C) of the Commission's regulations requires monthly minimum, mean, and maximum recorded flows at the project intake. Please provide a table containing estimates of the monthly minimum, mean, and maximum flows at Fife Brook dam and include a description of how these estimates were obtained or calculated.

### **Recreation Resources**

2. Section 5.9.6.1 of the PAD discusses the 2012 Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP). However, the PAD does not contain any information, from the SCORP or other sources, regarding anticipated changes in demand for outdoor recreation in the project area or how project recreation facilities would be able to accommodate these changes. Therefore, as required by §5.6(d)(3)(viii)(D) of the Commission's regulations, please provide information on anticipated changes in outdoor recreation needs in the project area and, to the extent possible, describe how project recreation facilities would be able to accommodate these changes.

3. Section 5.9.7 of the PAD discusses the current Conservation Restriction Plan which identifies 1,257 acres of "Protected Property" within the project area. The PAD does not discuss if any of the conservation lands are necessary to access recreation sites. In addition, the PAD indicates that the Conservation Restriction Plan, grant, and agreement expire with the current license. Please indicate if the conservation lands provide any access to recreation sites and if there are any plans to update the Conservation Restriction Plan, grant, and agreement.

### **Cultural Resources**

4. In Section 6 of the PAD, Bear Swamp Power states it will conduct a Cultural Resources Study. Bear Swamp Power should include the Hoosac Tunnel Loop Hiking Trail and any areas needed for its construction in the Area of Potential Effect for the Cultural Resources Study.

Project No. 2669-085  
Schedule B

## **ADDITIONAL INFORMATION**

### **Project Description and Operation**

1. Section 4 of the PAD does not provide the composition and dimensions for all existing project facilities. To help us understand the physical configuration of the Bear Swamp Development, please provide the following information: (1) the lengths of the two 11-foot-diameter, steel-lined sections of penstock that terminate at the spherical valves; (2) the lengths of the two 13.8-kilovolt (kV), generator leads; (3) the lengths of the two 230-kV above-ground transmission lines; (4) the composition, and dimensions of the two tailrace outlet structures; (5) the composition, height, and width of the four slide gates; and (6) the composition, height, and width of the four trashracks.

To help us understand the physical configuration of the Fife Brook Development, please provide the following information: (1) the lengths and composition for each section of the minimum flow pipes (i.e., the 30-inch-diameter, 24-inch-diameter, and 20-inch-diameter pipes); (2) the length of the steel-lined draft tube; (3) the length, height, and width of the concrete powerhouse; (4) the height and width of the steel trashrack; and (5) the lengths of the 1.5-mile-long transmission lines that are above and below ground.

2. Section 4.4.3.2 of the PAD states that under normal generating conditions, Bear Swamp Power draws down the upper reservoir by 44.5-feet, which raises the water surface elevation of the lower reservoir by 40-feet in approximately 5.9-hours. Alternatively, during normal pumping conditions, Bear Swamp Power draws down the lower reservoir by 40-feet, which raises the water surface elevation of the upper reservoir by 44.5 feet in approximately 7-hours. Because the bathymetry of the upper and lower reservoirs is not uniform, the rate of change in water surface elevation is not consistent throughout all areas of the reservoirs during generation and pumping. To help us better understand the rate of change in water surface elevations within the upper and lower reservoirs, please provide a written and/or graphical description of the rate of change in water surface elevations (i.e., feet per hour) over the maximum operating range of each reservoir at normal, high, and low generation and pump rates.

### **Public Safety and Access**

3. Section 4.3.1.2 of the PAD indicates that Bear Swamp Power prohibits public access to the upper and lower reservoirs of the Bear Swamp Development due to safety and security concerns. To help us understand the safety and security concerns at the upper and lower reservoirs, please provide a description of conditions that present potential safety and security threats. Additionally, please provide a written and graphical



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Schedule B

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(i.e, maps and/or drawings) description of all existing safety measures, including fencing, boat barriers and signage.

### **Recreation and Land Management**

4. Section 5.9.1 of the PAD discusses the Comprehensive Project Recreation Plan and the construction of the Hoosac Tunnel Loop Hiking Trail. However, the PAD does not contain detailed information about the trail. On March 9, 2015, a filing was submitted containing an outline plan, a schedule of construction and permitting, and a map of the Hoosac Tunnel Loop Hiking Trail; however, the map is of poor quality and illegible. Therefore, please provide a legible map of the complete trail system that indicates the locations of the trail route, kiosks, parking areas, trailheads, and overlooks. Please also include any available photos from overlooks and vistas along the trail.

5. During the morning scoping meeting, American Whitewater stated that there is a hydraulic feature at the upstream end of Fife Brook impoundment that would be accessible for whitewater boaters at certain reservoir elevations, but no information about this area is available in the PAD. Please provide a general description of this feature and any available information on the location, access routes, and reservoir elevations when this feature is exposed.

6. Multiple commenters at the March 18, 2015, scoping meetings and the March 19, 2015, environmental site review stated that the flow gage in the reach of the Deerfield River immediately downstream of Fife Brook dam washed out during Hurricane Irene in 2011. Please describe how flows for recreational releases are measured or estimated downstream of the Fife Brook dam and at the Fife Brook Fishing and Boat access area.

Project No. 2669-085  
Schedule C

## STUDY REQUESTS

### 1. Recreation Survey

*§5.9(b)(1) – Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of this study is to identify recreation resources and activities that may be affected by the continued operation of the project, as well as measures that could be implemented to mitigate any project effects. The specific objectives of the study are to:

- Compile information on current and historic recreational use of the project area;
- Quantify current recreational use based on recent or newly conducted surveys and interviews and consultation with stakeholders, regional and statewide plans, and other available data;
- Evaluate the potential effects of continued operation of the project on recreation resources and activities in the project area;
- Identify a range of Protection Mitigation & Enhancement Measures (PM&Es) that could be implemented to enhance recreation or mitigate project effects on recreation; and
- Gather information on the condition of recreation facilities and identify any need for improvement.

*§5.9(b)(2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

*§5.9(b)(3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

Sections 4(e) and 10(a) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

Recreation in the project vicinity includes fishing, kayaking, tubing, hunting, and hiking. Describing the effects on these recreational activities is necessary to fulfill the Commission's responsibilities under the National Environmental Policy Act. Ensuring that potential measures associated with these recreational activities are analyzed is

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relevant to the Commission's public interest determination.

*§5.9(b)(4) – Describe the existing information concerning the subject of the study proposal, and the need for additional information.*

While the PAD indicates that public recreation is limited to the Fife Brook dam and lower reaches of the Deerfield River, comments received at the March 18, 2015 morning scoping meeting expressed the desire for increased access to project facilities and development of portage routes through/around the project area.

*§5.9(b)(5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Continued operation of the project could affect recreational resources in the vicinity through disruption or displacement of activities, changes to the recreational experience, increased use, changes in the types of recreation activities in the area, or by other means. The results of the study would identify existing types and locations of recreation resources and activities that occur in the project area, as well as current use patterns and the potential demand for new recreation facilities. The study would help to determine potential recreational demand and any effects on existing uses.

*§5.9(b)(6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

Study methods may include the following:

- Conduct literature reviews and interviews to determine past use of the project area;
- Conduct recreation field reconnaissance to determine current use of the project area. Recreation activities that should be assessed include, but are not limited to, fishing, kayaking, tubing, hiking, hunting, and winter activities;
- Surveys (based on accepted protocols described in English et al., 2001; National Visitor Use Monitoring Program, 2007; and Visitor Services Project, 2007), personal interviews, and analysis of available data, to quantify and describe current and future use and participation levels in outdoor recreation activities in the project area. Include numbers and types of users (e.g., age group, resident/visitor, activity type, etc.), means of access, time of visit (i.e.,

weekend/weekday, months, seasons);

- Examine the condition of existing recreation facilities for adequacy, including accessibility, sanitation, and safety; and
- Provide a detailed map of recreation areas, trails, etc. in and adjacent to the project area.

Two or three technicians would be needed to review existing data sources, survey sites in the field from the end of May through the beginning of October, develop the inventory, evaluate past and current use, evaluate potential effects of the project on area recreation resources, and draft and finalize maps and reports.

*§5.9(b)(7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The estimated cost of this study is \$50,000 to \$80,000, depending upon the amount of information that might be obtained from existing sources.

## **2. Cultural Resource Survey**

*§5.9(b)(1) – Describe the goals and objectives of each study proposal and the information to be obtained.*

The goal of the study is to determine the effects of project operation on archeological and historic resources. The study should be developed in consultation with the Massachusetts Historic Preservation Commission (SHPO), and other interested parties.

The survey and subsequent report should satisfy these specific study objectives:

- Recommend an appropriate Area of Potential Effects (APE);<sup>1</sup>

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<sup>1</sup> The APE is tentatively defined as the lands enclosed by the project's boundary as delineated in the PAD for the project, and lands or properties outside the project's boundaries where project 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. The APE for Bear Swamp Project should include the Hoosac Tunnel Loop Hiking Trail and any associated lands.

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- Identify known resources through the available literature;
- Identify locations that have the potential to contain archaeological resources;
- Locate any archeological sites that may exist in areas exhibiting effects from project operation and in areas where ground-disturbing enhancements are proposed;
- Assess the National Register of Historic Places (NRHP) eligibility of project facilities and other historic resources within the APE, including considering whether they may contribute to a larger district;
- Evaluate the potential for effects on historic and archaeological resources from operation of the project; and
- If necessary, prepare a draft historic properties management plan (HPMP) to be filed with the preliminary license proposal and a final HPMP to be filed with the license application.

*§5.9(b)(2) – If applicable, explain the relevant resource management goals of the agencies or Indian tribes with jurisdiction over the resource to be studied.*

Not applicable.

*§5.9(b)(3) – If the requester is not a resource agency, explain any relevant public interest considerations in regard to the proposed study.*

Sections 4(e) and 10(a) of the FPA require that the Commission give equal consideration to all uses of the waterway on which a project is located. When reviewing a proposed action, the Commission must consider the environmental, recreational, fish and wildlife, and other non-developmental values of the project, as well as power and developmental values.

The continued operation of the project, with any proposed changes or enhancements, may affect the value and integrity of cultural resources in the vicinity of the project.

*§5.9(b)(4) – Describe the existing information concerning the subject of the study proposal, and the need for additional information.*

Section 5.11 of the PAD describes the historic uses of the lands within and adjacent to the project area. While several historic resources were inventoried by Massachusetts Historical Commission as part of the Inventory of Historic Assets of the Commonwealth, the historic resources inventoried have not been formally evaluated for inclusion in the NRHP.

Information on the effects of project operation on cultural resources is needed for staff to assess any effects of continued operation of the project, and the effectiveness of any existing, proposed or recommended protection measures. In addition, there may be unknown historic properties or archeological sites surrounding the reservoir or downstream of the project that may be affected by project operation. Due to the possibility of historic properties or archeological sites, a survey of the project's APE is needed. Once known sites in the APE have been documented, potentially eligible historic properties, and any project effects upon them, should be identified.

*§5.9(b)(5) – Explain any nexus between project operations and effects (direct, indirect, and/or cumulative) on the resource to be studied, and how the study results would inform the development of license requirements.*

Section 106 of the National Historic Preservation Act requires that federal agencies, licensees, and those receiving federal assistance take into account the effect of proposed undertakings on any district, site, building, structure, or object that is included in or eligible for the National Register of Historic Places (Historic Properties). Operating and maintaining the Bear Swamp Project (such as reservoir fluctuations and fluctuation in downstream flows) could affect known or unknown Historic Properties.

The study would provide information on historic and archeological sites located within the APE. The subsequent report would provide information on which sites are potentially eligible for the National Register and any potential effects of the project on these sites. If there would be an adverse effect on Historic Properties, an applicant-prepared HPMP, developed in consultation with the Commission, the SHPO, and other interested parties, would likely be necessary to avoid or mitigate effects. Bear Swamp Power should file any needed HPMP with the license application. The implementation of the HPMP could then be required in any new license.

*§5.9(b)(6) – Explain how any proposed study methodology (including any preferred data collection and analysis techniques, or objectively quantified information, and a schedule including appropriate field season(s) and the duration) is consistent with generally accepted practice in the scientific community or, as appropriate, considers relevant tribal values and knowledge.*

The generally accepted practice is to conduct a literature review and field reconnaissance. Depending on the results, a more intensive field survey may be necessary. Prior to conducting the survey and report, Bear Swamp Power should consult with the SHPO on: (a) the delineation of the APE; (b) methods on how the survey should

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be conducted; (c) anticipated effects on cultural resources; and (d) what properties are and are not considered eligible for the National Register.

The Cultural Resources Report should include all the information necessary to satisfy the study objectives listed under §5.9(b)(1). The evaluation of project effects on cultural resources should include both site-specific effects (i.e., project operation and maintenance, erosion, vehicular traffic, etc.) and all potential future effects (i.e., new recreational facilities, etc.).

*§5.9(b)(7) – Describe considerations of level of effort and cost, as applicable, and why any proposed alternative studies would not be sufficient to meet the stated information needs.*

The study would likely take one study season to complete. The cost is estimated to be between \$20,000 and \$50,000, depending on the intensity of the surveys.

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### **LITERATURE CITED**

English, D.; Kocis, S., Zarnoch, S.; and Arnold, J. 2001. Forest Service national visitor use monitoring process: Research Method Documentation. United States Department of Agriculture Forest Service Southern Research Station; Athens, Georgia. 40pp. Available online at <http://www.fs.fed.us/recreation/programs/nvum/methods/methods052001.rtf>.

National Visitor Use Monitoring Program. 2007. National visitor use monitoring handbook. United States Department of Agriculture Forest Service; Washington, D.C. Available online at <http://www.fs.fed.us/recreation/programs/nvum>.

Visitor Services Project. 2007. Ebey's Landing National Historical Reserve visitor study. Park Studies Unit, College of Natural Resources, University of Idaho; Moscow, Idaho. 17pp. Available online at [http://psu.uidaho.edu/files/vsp/questionnaires/193\\_EBLA\\_Q.pdf](http://psu.uidaho.edu/files/vsp/questionnaires/193_EBLA_Q.pdf).



Document Content(s)

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## **E-filing**

**April 15, 2015**

**To: Secretary  
Federal Energy Regulatory Commission  
888 First Street NE  
Washington, DC 20426**

**APPALACHIAN MOUNTAIN CLUB'S COMMENTS ON THE PRE-  
APPLICATION DOCUMENT AND SCOPING DOCUMENT 1 FOR THE  
RELICENSING OF THE BEAR SWAMP POWER COMPANY, LLC PUMPED  
STORAGE AND THE FIFE BROOK HYDROELECTRIC DEVELOPMENTS  
(FERC PROJECT NO. P-2669-085)**

**A. AMC's Background and Standing:** Since 1876, the Appalachian Mountain Club has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the Appalachian region. It is the largest conservation and recreation organization in the Northeast with more than 90,000 members. Many of AMC's members recreate on the Deerfield River.

AMC is a steering committee member of the Hydropower Reform Coalition that had a prominent role in developing the integrated licensing process (ILP) with FERC staff. AMC is also a current and founding board member on the Low Impact Hydroelectric Institute (LIHI) that certifies low impact hydroelectric in the U.S., both for the voluntary and, in certain states, regulated renewable energy credit markets.

The AMC had a lead role in organizing the effort that led up to the collaborative Deerfield Settlement Agreement of October 5, 1994, that included improved minimum flows from Fife Brook Dam, provided 106 annual scheduled releases for whitewater boating, and placed a term conservation easement on the lands around the Project until its March 31, 2020, license expiration date. This was a nationwide precedent that successfully coordinated two separate project license dates involving multiple Projects into a comprehensive watershed relicensing agreement, understanding the integrated relationship of the involved projects.

AMC has reviewed and commented (AMC October 28, 2014) on the Preliminary Application Document (PAD) and AMC representative Norman Sims attended the scoping sessions and the Bear Swamp tour on March 18-19, 2015.

Following are AMC's comments on the Bear Swamp Power Company, LLC (BSPC) Project's Scoping Document 1 (SD1) and supplemental comments on the PAD.

## **B. AMC comments on the Bear Swamp Power Company, LLC Scoping Document 1**

**Section 3.1 No-action Alternative:** Section 3.1 states: *"Under the no-action alternative, the Bear Swamp Project would continue to operate as required by the current project license (i.e., there would be no change to the existing environment). No new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison with other alternatives."*

The current operating license, as negotiated in the Deerfield Settlement Agreement of 1994, includes protection of the associated Project lands (1,056 acres around the two reservoirs and 201 acres abutting the Deerfield River downstream of the Fife Brook Dam (total = 1,256 acres +/-) under a term conservation agreement with the State of Massachusetts Department of Environmental Management (Appendices A and B). This term easement expires with the current license date of March 31, 2020. The proper interpretation of the 'no-action' alternative should be that the term land protection easement (covered under the amendment License Article 405) would be renewed for the new term of any licensee re-issued, otherwise it would represent a change to the current project license. For clarity this should be stated in the Scoping Document and PAD.

### **3.1.1 Existing Project Facilities**

Listed under this section on page 9 is:

*"Fife Brook Overlook Hiking Trail: A 1.3-mile section of the Bear Swamp and Hoosac Tunnel Loop hiking trail is accessible from Tunnel Road near the upper reservoir. The trail provides views of the Deerfield River Valley, the Fife Brook impoundment, and the Fife Brook Dam."*

The PAD and SD1 should be clear that this promised amenity under the current license represents delinquency on the Applicant's part, as well as FERC's failure to require, without penalty or other mitigation reimbursement, timely completion of the 10-mile recreational trail under License Article 402, to be completed by the tenth anniversary of the approval of the supplemental Comprehensive Recreation Plan under the current license (i.e. completion date of December 10th, 2007). We are now eight years after this deadline with only 1.3 miles now completed. The public has been short-changed on this required recreational benefit, yet the Project owner continues to receive the full economic benefits of power production from this project. AMC understands FERC issued yet

another notice (April 1, 2015) that establishes a revised completion date for the trail by December 31, 2015. AMC posits that the public is due some form of recreational compensation for this long overdue delay, and that future mitigation and enhancement license articles issued require that all mitigation and enhancements conditions be completed within 1–3 years of post-license issuance, with compensating penalties defined for failure of timely implementation.

**Section 3.2 Applicant’s Proposal:** Similar to Section 3.1, the Applicant’s proposal is confusing on what is being proposed relative to the future status of the term land conservation easement covered under its amendment License Article 405. The Applicant basically proposes status quo on all other conditions. This would include continued non-public access to the Lower Fife Brook Reservoir (ca. 2.5 river miles) and Upper Reservoir for “safety and security” reasons, including “perimeter fencing, locked gates and posted signage” (see PAD at Section 5.9.4). Both reservoirs experience diurnal water level changes of 40+ feet and have armored banks to prevent resulting erosion, making their littoral zones biological deserts. A purpose of the negotiated land conservation easement in 1994 was to mitigate, in part, for the loss of public use of this 2.5 mile reservoir river reach (an almost unheralded and complete privatization of 2.5 miles of a publicly owned river reach), loss of access to these riverine shore lands, and a highly compromised riverine littoral and riparian ecosystem.

At Section 5.9.5 in the PAD, BSPPC proposes in its shoreline development policy “*to administer the shoreline policy and management within the terms and conditions of its existing license and in accordance with applicable regulations and BSPPC policies. Beyond these BSPPC does not have additional plans or policies to develop the shorelines in the project area that are outside of the license or applicable regulations.*” In the PAD at Section 5.9.7 (Land Use Management) the Applicant acknowledges the existence of the land conservation easement, but leaves vague whether it will renew the conservation easement on these 1,256 acres; instead it states that it will “*explore land management.*”

In summary, both the Scoping Document 1 and PAD obfuscate whether the conservation easement will or will not be renewed. For clarity, the Applicant as well as the PAD and SD1 should state forthrightly that the Application Proposal includes renewing the land conservation easement, and if not, why.

**Section 4.2.2 Aquatic Resources:** This section proposes to examine the:

- Effects of continued project operation on dissolved oxygen and water temperature in the Deerfield River downstream of the project.
- Effects of continued project operation on aquatic habitat for trout, other resident fish, and benthic macroinvertebrates.

This section should also examine the impacts of how daily reservoir fluctuations can decrease downstream flows up to 10%. A recent study published by scientists at the University of Massachusetts for the river reach below this project suggests this is a real

phenomenon. (see <http://www.umass.edu/newsoffice/article/daily-dam-releases-massachusetts%E2%80%9999> and <http://scholarworks.umass.edu/theses/760/>).

This section should also analyze the timing and implications of how water reaches this Project from the upstream TransCanada #5 Project (see attached Appendix C — River Operational Constraints chart). White water releases in the natural streambed and generation flow releases through the TransCanada #5 penstock likely have different time lags prior to reaching the Fife Brook Project.

## **6.0 REQUEST FOR INFORMATION AND STUDIES**

In addition to the Appendices attached with this filing, AMC offers the following on the initial studies proposed in the Bear Swamp PAD (Table 1):

### *3. Recreation, Land Use, and Aesthetics*

- *Characterize existing recreational facilities and conditions in the project boundary and nearby areas.*

Need for improved recreational opportunities: The Applicant's characterization of existing recreational facilities in the PAD and SD1 incorrectly suggests that they are adequate for today's usage. After the 1994 Settlement Agreement, recreational use of the Deerfield River increased dramatically especially for whitewater boating and fishing. Improved recreation enhancements should be analyzed to include but are not limited to the following:

- Adequacy of parking at the Zoar Gap Rapid and the associated picnic area, and need for a clothes changing pavilion. A shuttle service provided by the Applicant could reduce congestion and parking problems.
- Provisions for electrical power at put-ins to inflate watercraft, Wi-Fi access so that modifications to daily flow releases can be timely confirmed by user groups, adequate sanitation at access points and take-outs, and camping facilities.
- Need for a put-in below Fife Brook Dam, including a new kayak put-in at the end of the construction road below the dam, and a stairway to the river at the top of that access road.
- The adequacy and ability of the access points under the Americans with Disabilities Act to meet their needs. Facilities should be provided to permit ADA-compliant use by boaters, anglers, and sightseers. Boating now is an activity for many of the increasing number of wounded U.S. service men and women, particularly those with leg injuries.
- Opportunities exist for an increased number of scheduled whitewater releases from the Fife Brook Dam without substantial impact to power generation that could increase the recreational potential and its economic contribution to the broader

region of this project. Numerous and almost daily peak power flow releases are and have been common outside of the scheduled release days. An analysis on how more generational flows from the dam can be scheduled and noticed ahead of time as “scheduled whitewater releases” for public recreation needs to be done. The analysis should examine not only more days with required boating flow releases, but also public notification in a timely and effective manner of generation releases scheduled on shorter time frames.

- With the current scheduled whitewater flow releases, the daily time, duration, and flow of these releases is still quite variable within the day. This is problematic for user groups. More consistent actual time of day release times need to be defined and better optimized to enhance recreational use and ecological protection. For example, releases during the mid-morning hours of summer have been shown to produce benefits for the fishery by cooling the river during the heat of summer days.
- Additional appropriate low-impact, human powered recreation amenities on the Bear Swamp Project lands, including cross-country skiing, snowshoeing, mountain biking, hiking and other trails and environmental interpretive sites should be analyzed. These human-powered recreational activities should be provided and maintained free of charge year round to the public to compensate for the lost usage of the lower reservoir river reach and riparian lands. Such amenities could help improve economic conditions in this economically depressed area of Massachusetts.

Recreational use numbers: The information on recreational usage generated from Brookfield’s 2015 Form 80 report uses an inadequate methodology to estimate the number of annual visits to the facility. The Applicant estimated 13,321 recreational day users per year. Brookfield explained the methodology it developed this way:

*“In order to assist with the recreation data collection associated with the Form 80s, Brookfield developed project-specific Recreation Observation Forms for use by Brookfield staff during random sampling days throughout the year...A total of 40 days were sampled, which included weekdays, weekends and holidays (i.e., Memorial Day, July 4<sup>th</sup> and Labor Day weekends). Sampling occurred at various times throughout the day. Brookfield staff recorded the number of persons or vehicles observed, as well as the type of recreation activity occurring, on the appropriate Recreation Observation Form.”*

At some recreation sites, such as the Connecticut River, this might be an adequate method. Random observations—if they were truly randomized—assume that visitors are randomly distributed. That method is inappropriate for the Fife Brook reach of the Deerfield River because boating and float tube visitors are concentrated during the scheduled dam releases, while anglers are concentrated before and after the release flows. A randomly selected time therefore can dilute actual use numbers. This river reach has

commercial raft companies and commercial tubing companies that sell trips to customers based on scheduled flows, as well as commercial fishing guides. Most of the non-commercial users also do not use the river randomly. In summary, the river flows in this reach do not flow randomly nor does the recreational base use the river randomly.

A more accurate method for estimating usage would start with the annual records of the raft, tube, and fishing outfitters on the river. Had Brookfield done that, they would know that their estimate of total annual usage of 13,321 people is barely more than what only one of the raft companies runs on its own each season. A more reasonable estimate of total annual users for boaters and tubers would be in the vicinity of 53,000 visitors, and that's not counting anglers or sightseers. A FERC Form 80 estimate that uses improper methodology should not be accepted, and more appropriate methodologies and data should be in place for relicensing studies.

Economic analysis: As part of the Deerfield Settlement Agreement and New England Power relicensing, a contingent valuation study showed that \$24 of economic *value* was produced through public recreation for each \$1 of foregone power generation at the #5 Dam in Monroe Bridge. Those results and methods need to be updated. The whitewater rafting companies such as Zoar and Crab Apple have built multi-million dollar businesses that are a tremendous benefit for this depressed area of Massachusetts. The catch-and-release reach of the Fife Brook section is well known now, and the reach below the Route 2 bridge is now getting much more use as well. Fishing guides have grown in number. Assessing recreational economic benefits post the Deerfield Settlement Agreement and then into the future with enhanced mitigation and enhancement is needed. There are several independent academic institutions in the area that can conduct such a study, such as the Donahue Institute at UMass Amherst, which recently did such a study of the Vernon nuclear plant closing in Vermont.

Safety: Bear Swamp Power and Brookfield have in the past participated along with NGOs, rafting companies, and town governments in the management of heavy river usage. Management issues include river crowding by tubers, alcohol related safety issues, and enforcement of PFD requirements. The Applicant has provided financial support for the Charlemont Town River Safety Program including enforcement of an alcohol ban and river clean-up efforts. Support for such efforts is commendable and should be built into the new license.

River use education: The Project analysis should include how Bear Swamp Power and Brookfield could better promote environmental education and outdoor training in area schools. Additional kiosk and other education tools should be considered relative to invasive species, water flows, safety, the history of the area, who to call with problems or emergencies, and so forth.

#### *4. Cultural Resources*

- *Identify historic properties, assess project related effects on historic properties, and develop appropriate management measures.*

The Bear Swamp Visitors Center currently displays educational materials related to today's Project operations. Educational materials at the Visitors Center should be expanded to include materials and artifacts on the history of the Deerfield River prior to the construction of the dams and pumped storage facility, including photographs of the natural riverbed and landscape. This will reveal the original state of the river before construction. With multiple changes in ownership, these historical records should be located and preserved soon.

In addition to the above comments, under a separate filing, and by reference here AMC jointly filed with American Whitewater, New England FLOW, Crab Apple Whitewater and Zoar Outdoor's its Additional Information Request (AIR) and Study Proposals for the Bear Swamp Power Company, LLC (BSPC) Project.

We appreciate your consideration of AMC's comments. Respectively,

Dr. Kenneth Kimball  
Appalachian Mountain Club  
Director of Research  
P.O. Box 298  
Gorham, NH 03581  
Phone: 603-466-8149  
Email: [kkimball@outdoors.org](mailto:kkimball@outdoors.org)

Dr. Norman Sims  
77 Back Ashuelot Road  
Winchester, NH 03470  
Phone 603-392-0070  
Email: [sims@honors.umass.edu](mailto:sims@honors.umass.edu)  
[normansims1@gmail.com](mailto:normansims1@gmail.com)



## **Appendices:**

- A and B. Land Conservation Easements**
- C. River Operational Constraints Chart.**

### **Appendix A. Land Conservation Easement 1**

## **Northern Berkshire - 20/20 Perfect Vision i2 Document Detail Report Current datetime: 3/9/2015 3:59:13 PM**

**Doc# Document Type Town Book/Page File Date Consideration**

4078 RESTR 01031/819 07/18/2001 0.00

**Property-Street Address and/or Description**

RIVER ROAD &C, FLORI, &C

**Grantors**

USGEN NEW ENGLAND INC

**Grantees**

MASSACHUSETTS COMM OF, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL  
MAN

**References-Book/Pg Description Recorded Year**

**Registered Land Certificate(s)-Cert# Book/Pg**

### GRANT OF CONSERVATION RESTRICTIONS

WHEREAS, USGen New England, Inc., a Delaware corporation with its principal place of business in Bethesda, Maryland, (hereinafter "Grantor"), is the owner in fee of certain real property and of other real estate interests in Franklin and Berkshire Counties, Massachusetts, which has aesthetic, recreational, and natural resource values in its present state; and

WHEREAS, Grantor is the owner and licensed operator of the Deerfield River Hydroelectric Project as authorized under the Federal Energy Regulatory Commission License No. 2323 (hereinafter the "Deerfield River Hydroelectric Project") which makes certain property of the Grantor, being part of the Deerfield River Hydroelectric Project ("Project Lands"), subject to all terms and conditions of Federal License No. 2323 and to all other rules and regulations of the Federal Energy Regulatory Commission ("hereinafter FERC"); and

WHEREAS, this property contains approximately 1362 acres of primarily undeveloped land (provided, however, Grantor makes no representations herein regarding actual acreage), some of which is in agricultural and forestry use, which provides wildlife habitat, natural resource protection, as well as recreational and scenic opportunities; and

WHEREAS, the Massachusetts Department of Environmental Management is a state agency whose purposes include the preservation of undeveloped and open space land in order to protect the aesthetic, recreational, cultural, educational, scientific and natural resources of the state through non-regulatory means, thereby reducing the burdens on state and local governments; and

WHEREAS, the economic and environmental health of Massachusetts is closely linked to its agricultural and forest lands, which not only produce food products, fuel, timber and other products, but also provide much of Massachusetts' scenic beauty, upon which the state's tourist and recreation industries depend; and

WHEREAS, the Grantor's predecessor in title to the aforesaid real estate, New England Power Company, entered into a Settlement Agreement dated October 5, 1994 (hereafter "Settlement"), providing for the re-licensing of the Deerfield River and the Bear Swamp Hydroelectric Projects, which by its terms is binding upon the Grantor as successor in title; and

WHEREAS, the Settlement calls for the protection of the Project Lands and certain riverine non-Project lands both as defined therein;

NOW, THEREFORE, Grantor, in consideration of Ten Dollars and other valuable consideration paid, GRANTS to the Massachusetts Department of Environmental Management whose principal offices are at 251 Causeway Street, Boston, Massachusetts 02114, and its successors and assigns (hereinafter "Grantee") forever, perpetual conservation restrictions (as more particularly set forth below), as defined in G. L. c. 184, §§ 31-33, and for the purposes set forth in Article 97 of the Massachusetts Constitution, on certain tracts of land consisting of the Project Lands and the riverine non-Project lands, situated in the Towns of Rowe, Monroe,

Property Location: Deerfield River - Rowe, Monroe, Charlemont, Buckland,  
Conway, Shelburne and Deerfield, Franklin County  
Florida, Berkshire County

Charlemont, Buckland, Conway, Shelburne and Deerfield, in Franklin County, and Florida in Berkshire County, Massachusetts (hereinafter "Protected Property"), said Protected Property being more particularly described by the documents set forth in Schedule A, attached hereto and incorporated herein, and shown on maps on file with FERC.

The conservation restrictions hereby conveyed to Grantee consist of covenants on the part of Grantor to do or refrain from doing, severally and collectively, the various acts set forth below, subject to rights specifically reserved by Grantor herein. It is hereby acknowledged that these covenants shall constitute a servitude upon the land and run with the land. Grantee accepts such covenants in order to achieve the Purposes set forth in Section I, below.

#### **I. Purposes of this Grant**

Grantor and Grantee acknowledge that the Purposes of this Grant are as follows (hereinafter "Purposes of this Grant"):

1. This Grant serves to implement the agreement to preserve in their natural state the Protected Property associated with the Deerfield River Hydroelectric Project, while allowing for the continued operation of the Electricity Business as described in Paragraph I of Section III, below, that was negotiated as part of the Deerfield River Re-licensing Settlement entered into on October 5, 1994. The intent of this Grant is to implement the conservation protections agreed to, consistent with the Settlement, with the exception that the protections granted herein will be of perpetual duration.
2. To contribute to the implementation of the policies of the Commonwealth of Massachusetts designed to foster the conservation of the state's scenic, agricultural, forestry and other natural resources.
3. To conserve wood lands and open lands, and public access thereto, conserve wildlife and riverine habitat and other natural resource values of the Protected Property for the scenic, recreational and educational benefit of the public.

Grantor and Grantee recognize these scenic, forestry, recreational, agricultural, and natural values of the Protected Property, and share the common purpose of conserving these values by the conveyance of the conservation restrictions, to prevent the use or development of the property for any purpose or in any manner which would conflict with the maintenance of these scenic, forestry, recreational, agricultural, and natural resource values, except as herein set forth. Grantee accepts such conservation restrictions in order to conserve these values for present and future generations.

#### **II. Restricted Uses of Protected Property**

The restrictions hereby imposed upon the Protected Property, and the acts which Grantor shall do or refrain from doing, are as follows:

1. The Protected Property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes as set forth herein. No residential, commercial, industrial, or mining activities shall

be permitted, and no building, structure or appurtenant facility or improvement shall be constructed, created, installed, erected or moved onto the Protected Property, except in furtherance of the Grantor's business described in Paragraph 1 of Section III or as specifically permitted under this Grant.

2. Except in furtherance of the Grantor's business described in Paragraph 1 of Section III or as otherwise specifically permitted under this Grant, no rights-of-way, easements of ingress or egress, driveways, roads, or utility lines or easements shall be conveyed, constructed, developed or maintained into, on, over, under, or across the Protected Property, without the prior written permission of Grantee. Grantee may grant such permission if it determines, in its sole reasonable discretion, that any such improvement would be consistent with the Purposes of this Grant, and not adversely affect the agricultural and forestry potential, wildlife habitat value, or the scenic beauty of the Protected Property.

3. Except when incidental to the furtherance of the Grantor's business described in Paragraph 1 of Section III, there shall be no signs, billboards, or outdoor advertising of any kind erected or displayed on the Protected Property; provided, however, that Grantor may erect and maintain signs indicating the name of the Protected Property, boundary markers, directional signs, signs restricting hunting or trespassing on the Protected Property, memorial plaques, temporary signs indicating that the Protected Property is for sale or lease, signs informing the public that any agricultural or timber products are for sale or are being grown on the premises and temporary political or religious signs. Grantee, with the permission of Grantor, may erect and maintain signs designating the Protected Property as land under the protection of Grantee.

4. The placement, collection or storage of trash, human waste, or any other unsightly or offensive material on the Protected Property shall not be permitted except in connection with the Grantor's business described in Paragraph 1 of Section III and otherwise at such locations, if any, and in such a manner as shall be approved in advance in writing by Grantee. The storage and spreading of manure, lime or other fertilizer for agricultural practices and purposes and the temporary storage of trash in receptacles for periodic off-site disposal shall be permitted without such prior written approval.

5. There shall be no disturbance of the surface, including but not limited to filling, excavation, removal of topsoil, sand, gravel, rocks or minerals, or change of the topography of the land in any manner, except as incidental to the business operation of Grantor described in Paragraph 1 of Section III hereof and except as may be reasonably necessary to carry out the uses permitted on the Protected Property under the terms of this Grant. In no case shall mining of subsurface oil, gas, or other minerals be permitted.

6. The Protected Property shall not be subdivided or conveyed in separate parcels except (a) when necessary in furtherance of the uses permitted in Paragraph 1 of Section III, or (b) to carry out one of the other permitted uses in Section III. Any subdivision pursuant to subparagraph (b) will be subject to the Grantee's approval, such approval not to be unreasonably withheld. Any subdivision must be consistent with maintaining forestry management units that maintain the potential and current productivity of the lands for commercial forestry and preventing the fragmentation of wildlife habitat.

7. No use shall be made of the Protected Property, and no activity thereon shall be permitted which is inconsistent with the Purposes of this Grant.

### **III. Permitted Uses of the Protected Property**

Notwithstanding the foregoing, Grantor shall have the right to make the following uses of the Protected Property:

1. The right to use the Protected Property for all uses and activities associated with the present and future operation of the business of the generation of hydroelectric energy and the transmission and distribution of high and low voltage electricity and the transmission of intelligence by electrical energy or other means ("the Electricity Business"). Existing hydroelectric developments may be operated, maintained and replaced as necessary, but wholly new hydroelectric developments (e.g., dams and associated facilities) shall not be constructed, operated or maintained. New facilities may be added involving the transmission of intelligence in connection with the generation, transmission, and distribution of electricity, in which case, Grantor will use best efforts, to the extent practicable, to cause such facilities to be located on, or in proximity to, areas already used by facilities associated with the Electricity Business and to avoid or minimize negative impacts to the scenic, forestry, recreational, agricultural and natural values of the Protected Property.

The Grantor shall also have the right to make the following uses of the Protected Property, while using best efforts to avoid major negative impacts to the scenic, forestry, recreational, agricultural, and natural resource values of the Protected Property, or at a minimum, using best efforts to minimize, to the extent practicable, such impacts where they cannot be avoided:

2. The right to establish, reestablish, maintain, and use cultivated fields, orchards, and pastures in accordance with generally accepted agricultural practices and sound husbandry principles, together with the right to construct, maintain and repair access roads for these purposes; provided, however, that Grantor shall secure the written approval of Grantee prior to any clearing of forest land to establish new fields, orchards or pastures. Grantee's approval shall not be unreasonably withheld or conditioned, provided that such clearing is consistent with the Purposes of this Grant and the Forestry Management Plan prepared pursuant to Section IV.

3. The right to perform forest management activities in accordance with Section IV. Grantor will provide fifteen (15) days prior written notice to the Grantee of any commercial timber harvesting activity, unless such activities or notice for such activities are already specified in the plan prepared pursuant to Section IV.

4. The right to utilize, maintain, establish, construct, and improve water sources, courses, and bodies within the Protected Property for uses otherwise permitted hereunder, provided that Grantor does not unnecessarily disturb the natural course of the surface water drainage and runoff flowing over the Protected Property. The construction of ponds or reservoirs shall be permitted only upon the prior written approval of Grantee, which approval shall not be unreasonably withheld or conditioned provided that such pond or reservoir is located in a manner which is consistent with the Purposes of this Grant. The conditions, restrictions and prohibitions set forth in this paragraph shall not apply to the Electricity Business. Any rights retained by the Grantor in this paragraph are in addition to and subject to the rights and obligations set out in Paragraph 1 of Section III.

5. The right to clear, construct, and maintain public campgrounds, boat launches, trail shelters, parking areas, visitor and information facilities and trails for walking, horseback riding, skiing, and other non-motorized, recreational activities within and across the Protected Property. Snowmobiling may be permitted at the discretion of Grantor. The Grantor will provide free public access with no charge or fees to the water and undeveloped lands. Grantor may charge reasonable user fees to recover the actual cost of providing and operating developed public recreation facilities. Any rights retained by the Grantor in this paragraph are in addition to the reserved right to continue the Electricity Business.

#### IV. Forest Management

In connection with Grantor's operation of the Deerfield River Hydroelectric Project, and as an activity secondary thereto, Grantor shall perform forest management activities but only in accordance with a Forest Management Plan ("Forestry Plan"), to be approved by the Grantee prior to implementation. Said plan shall be consistent with the Deerfield River Project L.P. 2323 Forest Management Plan ("Management Plan") dated June 9, 1998, as approved and modified by FERC by Order issued November 24, 1999, and the Massachusetts Forestry Cutting Practices Act, G. L. c. 132, §§ 40-46 ("Mass. Cutting Practices Act") as applicable. All updates, amendments or other changes to the Forestry Plan shall be submitted to Grantee for its approval prior to any harvesting. The Forestry Plan as updated, amended or changed from time-to-time is hereinafter referred to as the "Amended Forestry Plan." Grantee's approval of the Forestry Plan and any Amended Forestry Plan shall not be unreasonably withheld or conditioned if the Forestry Plan and Amended Forestry Plan has been prepared by a professional forester and if the Forestry Plan and the Amended Forestry Plan are consistent with the Purposes of this Grant and the Mass. Cutting Practices Act. The Forestry Plan and any Amended Forestry Plan shall be consistent with the Purposes of this Grant and the Management Plan, and shall include at least the following elements (except that, those elements of the Forestry Plan or Amended Forestry Plan which do not change need not be re-submitted in updates, amendments or changes to the Forestry Plan):

- a) Grantor's forest management objectives;
- b) An appropriately scaled, accurate map indicating such items as forest stands, streams and wetlands, and major access routes (truck roads, landings and major skid trails);
- c) Forest stand ("treatment unit") descriptions (forest types, stocking levels before and after harvesting, soils, topography, stand quality, site class, insect and disease occurrence, previous management history, and prescribed silvicultural treatment);
- d) Plant and wildlife considerations (identification of known significant habitats and management recommendations);
- e) Aesthetic and recreational considerations (impact on viewsheds from public roads, trails and places); and
- f) Historic and cultural resource considerations (identification of known resources and associated management recommendations).

The Forestry Plan shall be updated at least once every ten (10) years if Grantor intends to harvest timber or other wood products. Amendments to the Forestry Plan shall be required in the event the Grantor proposes a treatment not included in the Forestry Plan, but no such amendment shall be required for any change in timing or sequence of treatments if such change does not vary more than five (5) years from the prescription schedule set forth in the Forestry Plan as approved by Grantee. In the event that any treatment unit is substantially damaged by natural causes such as insect infestation, disease, fire or wind, Grantor may elect to conduct an alternative treatment in which event Grantor shall submit an amendment to the Forestry Plan for Grantee's approval prior to conducting any alternative treatment.

Disapproval by Grantee of a Forestry Plan or an Amended Forestry Plan proposing a heavy cut (as defined below) shall not be deemed unreasonable. Grantee, however, may approve a Forestry Plan or an Amended Forestry Plan in its discretion if consistent with the Purposes of this Grant, such as to permit the planting of different species of trees or the establishment or re-establishment of a field, orchard or pasture. Grantee may rely upon the advice and recommendations of such foresters, wildlife experts, conservation biologists or other experts as Grantee may select to determine whether the Forestry Plan or Amended Forestry Plan would be detrimental to the values identified in Section I. "Heavy cut" shall mean the harvesting of wood products below the "C-Line" or minimum stocking level on the Protected Property as determined by applying the protocol set forth in the current U.S. Department of Agriculture, Forest Service Silvicultural Guidelines for the Northeast, or by applying a similar, successor standard approved by Grantee, or the harvesting of wood products that does not conform with the standards provided in the Mass. Cutting Practices Act.

#### **V. Enforcement of the Restrictions**

Grantee shall make reasonable efforts from time to time to assure compliance by Grantor with all of the restrictions herein. In connection with such efforts, Grantee, or its designee, may, at its own risk, make periodic inspection of all or any portion of the Protected Property, and for such inspection and enforcement purposes Grantee, or its designee, shall have the right of reasonable access to the Protected Property upon such terms and conditions and following such prior notice to Grantor as Grantor may from time to time reasonably impose and require. In the event that Grantee becomes aware of an event or circumstance of non-compliance with the terms and conditions herein set forth, Grantee shall give notice to Grantor of such event or circumstance of non-compliance via certified mail, return receipt requested, and demand corrective action sufficient to abate such event or circumstance of non-compliance and restore the Protected Property to its previous condition.

Failure by Grantor to cause discontinuance, abatement, or such other corrective action as may be demanded by Grantee within a reasonable time after receipt of notice and reasonable opportunity to take corrective action shall entitle Grantee to bring an action in a court of competent jurisdiction to enforce the terms of this Grant and to recover any damages arising from such non-compliance. Such damages when recovered, may be applied by Grantee to corrective action on the Protected Property, if necessary. If such court determines that Grantor has failed to comply with this Grant after receiving notice of noncompliance and reasonable opportunity to correct, Grantor shall reimburse Grantee for any reasonable costs of enforcement, including Grantee's staff time, court costs and reasonable attorneys' fees, in addition to any other payments ordered by such Court. In the event that Grantee initiates litigation and the court determines that Grantor has not failed to comply with the terms of this Grant, and

that Grantee has initiated litigation without reasonable cause or in bad faith, then Grantee shall reimburse Grantor for any reasonable costs of defending such action, including court costs and reasonable attorneys' fees. The parties to this Grant specifically acknowledge that events and circumstances of non-compliance constitute immediate and irreparable injury, loss, and damage to the Protected Property and accordingly entitle Grantee to such equitable relief, including but not limited to injunctive relief, as the Court deems just. The remedies described herein are in addition to, and not in limitation of, any other remedies available to Grantee at law, in equity, or through administrative proceedings.

No delay or omission by Grantee in the exercise of any right or remedy upon any breach by Grantor shall impair Grantee's rights or remedies or be construed as a waiver. Nothing in this enforcement section shall be construed as imposing a liability upon a prior owner of the Protected Property, where the event or circumstance of non-compliance shall have occurred after said prior owner's ownership or control of the Protected Property has terminated.

#### **VI. Integrity of the Hydroelectric Project**

1. The Grantee covenants and agrees with the Grantor that at any and all times that Grantee enters upon the Protected Property the Grantee shall take all necessary precautions to protect the scenic, recreational and environmental values of the Protected Property.
2. The Grantee covenants and agrees with the Grantor that Grantee's enforcement of the conservation restrictions set forth herein shall not endanger health, create a nuisance or otherwise be incompatible with the current use and operation of the Deerfield River Hydroelectric Project, or any future change in use as may from time to time be approved by FERC.
3. The Grantee acknowledges and agrees with the Grantor that this Grant of Conservation Restrictions and all terms and conditions contained herein are subject to Grantor's Federal License No. 2323 as issued by FERC and all the terms and conditions thereof and all amendments thereto or other licenses or orders which may be issued by FERC in connection with the Deerfield River Hydroelectric Project as well as any rules and regulations promulgated by FERC in the future.
4. The Grantee acknowledges and agrees with the Grantor that nothing in this Grant of Conservation Restrictions shall defeat, lessen or be in degradation of any interest or right acquired or reserved by the Grantor in connection with the Deerfield River Hydroelectric Project and issued under Federal License No. 2323.
5. The Grantee acknowledges that this grant of Conservation Restrictions by the Grantor is in full satisfaction of the Grantor's obligations under Section V, subsection A, of the Settlement, dated October 5, 1994.

#### **VII. Notices**

1. Unless otherwise provided herein or by law Grantor shall provide at least forty-five (45) days written notice prior to commencing any activity requiring Grantee's prior approval under the terms of this Grant. Grantor shall provide Grantee information reasonably necessary to determine whether the proposed activity is consistent with the purposes of this Grant. Grantee shall respond within forty-five



(45) days of receipt of such notice providing its consent, or specifying why the proposed activity is in conflict with this Grant. Grantee's approval shall not be unreasonably withheld. In the event that Grantee does not respond within forty-five (45) days of confirmation of actual receipt of such prior notice, Grantee will be deemed to have approved the activity.

#### **VIII. Miscellaneous Provisions**

1. It is hereby agreed that the construction of any buildings, structures or improvements, or any use of the land otherwise permitted under this Grant, shall be in accordance with all applicable law.

2. Grantee may transfer the conservation restrictions conveyed by Grantor herein only to a qualified government or non-government conservation organization that (a) agrees to enforce the conservation Purposes of this Grant, in accordance with the regulations established by the Internal Revenue Service governing such transfers (if applicable) and (b) has first been approved in writing by Grantor, The Conservation Law Foundation (CLF) and The Appalachian Mountain Club (AMC) (to the extent that CLF and AMC continue to exist), each of whom may withhold such approval in its sole discretion.

3. In the event the conservation restrictions conveyed to Grantee herein are extinguished by eminent domain or other legal proceedings, Grantee shall be entitled to any damages which are specifically allocated to the extinguishment of the conservation restrictions created by this Grant. Grantee shall use any such proceeds to preserve undeveloped and open space land in order to protect the aesthetic, cultural, educational, scientific and natural resources of the state through non-regulatory means.

4. This grant is made subject to existing rights of third parties, if any, including but not limited to all existing rights and easements of record of New England Power Company; without any warranties or covenants of title; and subject to all matters now of record in the Registries of Deeds of the Counties in which the Protected Property is located.

5. In any deed conveying an interest in all or part of the Protected Property, Grantor shall make reference to the conservation restrictions described herein and shall indicate that said restrictions are binding upon all successors in interest in the Protected Property in perpetuity.

6. Grantee shall be entitled to record any instruments necessary in the future to continue the validity of this Grant, and Grantor agrees to cooperate and execute any instruments necessary to do so.

7. If circumstances arise under which amendment to or modification of this Restriction would be appropriate, Grantor and Grantee may by mutual written agreement jointly amend this Restriction, provided that no amendment may be made that will be inconsistent with the purposes of this Restriction, affect its perpetual duration, violate the provisions of Article 97 of the Amendments to the Massachusetts Constitution, nor adversely affect any of the significant conservation values of the Protected Property. Any amendment to this restriction shall be duly recorded in the appropriate Registry of Deeds.

8. In the event all or any portion of the Protected Property is no longer required for electrical generation and transmission purposes, then existing, approved or with regulatory approvals pending (the "Surplus Property"), Grantee shall have, upon receipt of notice from the Grantor of the availability of Surplus Property ("Grantor's Notice"), an option to purchase the Surplus Property, subject to all regulatory approvals. Grantee shall exercise such option by giving written notice to Grantor at any time during the period ending six (6) months after Grantee's receipt of Grantor's Notice. The purchase price for the Surplus Property shall be the Fair Market Value of the Surplus Property (determined as hereafter provided).

If Grantor and Grantee shall not agree on the Fair Market Value of the Surplus Property within thirty (30) days after Grantee's notice exercising such option to purchase the Surplus Property, Fair Market Value shall be determined by appraisers (who shall hold the MAI designation), one to be chosen by Grantor, one to be chosen by Grantee, and a third to be selected, if necessary, as below provided. The written decision of a majority of the three appraisers shall be conclusive. Grantor and Grantee shall each notify the other of its chosen appraiser within fifteen (15) days following the call for appraisal. Such two appraisers shall attempt to reach a unanimous decision within thirty (30) days after their designation. If such two appraisers do not reach a unanimous decision within such time, they shall be afforded seven (7) days to choose a third appraiser. If they shall be unable to select a third appraiser, then they shall so notify the then President of the Greater Boston Real Estate Board and request him to select an impartial third appraiser, who shall hold the MAI designation. Such impartial third appraiser and the first two chosen shall hear the parties and their evidence and render their decision. Grantor and Grantee shall bear the expense of the third appraiser (if any) equally.

If Grantee shall exercise the option set forth in this Section, Grantor shall sell, and Grantee shall buy, subject to appropriation and necessary governmental approvals, the Surplus Property upon the terms set forth in this Section, including the following:

- (a) Unless otherwise agreed by Grantee, included in the sale as part of the Surplus Property are the buildings, structures and improvements now or hereafter thereon and the fixtures belonging to Grantor and used in connection therewith, including, if any, all furnaces, heaters, heating equipment, oil and gas burners and fixtures appurtenant thereto, hot water heaters, plumbing fixtures, electrical and lighting fixtures, fences, gates, trees, shrubs, plants, and, if built in, air conditioning equipment and ventilators.
- (b) The Surplus Property shall be conveyed by a good and sufficient quitclaim deed running to Grantee, or to the nominee designated by Grantee, and such deed shall convey a good and clear record and marketable title thereto, free from all encumbrances, except
  - (i) provisions of existing building and zoning laws;
  - (ii) such real estate taxes that are not Grantee's obligation to pay under this Lease;
  - (iii) any liens for municipal betterments assessed after the date of this Lease; and
  - (iv) all matters of record in the appropriate Registry of Deeds on the date Grantee exercises its option.
- (c) The purchase price for the Surplus Property shall be paid at the time of delivery of the deed by a check of the Commonwealth drawn by the State Treasurer or his designee.

- (d) Such deed shall be delivered at 10:00 a.m. on the thirtieth (30th) day (or if such day is not a business day, the first business day thereafter) after the purchase price shall be determined ("Closing Date"), at the offices of Foley, Hoag & Eliot, One Post Office Square, Boston, Massachusetts, unless otherwise agreed in writing. It is agreed that time is of the essence.
- (e) Full possession of the Surplus Property, free of all tenants and occupancy shall be delivered at the time of delivery of the deed, the Surplus Property to be in its then "as-is" condition.
- (f) If Grantor shall be unable to give title or to make conveyance or to deliver possession of the Surplus Property, all as herein stipulated, then, at the option of either party, all obligations of all parties under this Section shall cease and this Section shall be void without recourse to the parties hereto.
- (g) Grantee shall have the election to accept such title as Grantor can deliver to the Surplus Property in its then condition and to pay therefor the purchase price without deduction, in which case Grantor shall convey such title, provided that if there exists any title defect which may be cured by the payment of a readily ascertainable sum, such sum shall be deducted from the purchase price and used by Grantee to cure such defect simultaneously with the Closing.
- (h) The acceptance of a deed by Grantee or its nominee, as the case may be, shall be deemed to be a full performance and discharge of every agreement and obligation contained or expressed in this Section.

9. The term "Grantor" shall include the successors and assigns of USGen New England, Inc. The term "Grantee" shall include the permitted successors and assigns of the original Grantee, the Massachusetts Department of Environmental Management.

The land and real property interests held by Grantor to which these restrictions apply are described in deeds set out in Schedule A attached hereto, to which deeds reference may be had for Grantor's title.

INVALIDATION of any provision hereof shall not affect any other provision of this Grant.

TO HAVE AND TO HOLD said granted conservation restrictions, with all the privileges and appurtenances thereof, to the said Grantee, the Massachusetts Department of Environmental Management, its permitted successors and assigns, to their own use and behoof forever.

IN WITNESS WHEREOF, Grantor executes this Grant under seal this 16<sup>th</sup> day of July, 2001.

Signed and delivered  
In The Presence Of:

Thomas B. Powers

Witness to GEORGE T. GRUNBECK

GRANTOR  
USGen New England, Inc.

By: George T. Grunbeck

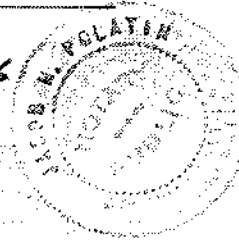
COMMONWEALTH OF MASSACHUSETTS

Suffolk County, ss:

At One Bowdoin Square, Boston, this 16<sup>th</sup> day of July, 2001, personally appeared George Grunbeck, VICE PRESIDENT of US Gen New England, Inc., duly authorized, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of USGen New England, Inc., before me.

Robert M. Cole  
Notary Public:

My commission expires: 3/3/06



**SCHEDULE A  
PROTECTED PROPERTY**

All those parcels of land and other real property interests, whether appurtenant or in gross, located in the towns of Rowe, Monroe, Buckland, Conway, Shelburne and Deerfield, Franklin County, Massachusetts, and the town of Florida, Berkshire County, Massachusetts, conveyed by New England Power Company (NEPCO) to Grantor by several instruments on record with the Franklin County Registry of Deeds in Greenfield, Massachusetts, and with the Berkshire Northern District Registry of Deeds in Adams, Massachusetts, being recorded as follows:

**Franklin Registry:**

1. Deed of NEPCO to Grantor dated August 21, 1998, Book 3393, Page 285 (Sherman).
2. Deed of NEPCO to Grantor dated August 18, 1998, Book 3393, Page 342 (Deerfield 2)<sup>1</sup>.
3. Deed of NEPCO to Grantor dated August 18, 1998, Book 3393, Page 333 (Deerfield 3)<sup>2</sup>.
4. Deed of NEPCO to Grantor dated August 21, 1998, Book 3393, Page 323 (Deerfield 4).
5. Deed of NEPCO to Grantor dated August 21, 1998, Book 3393, Page 299 (Deerfield 5).

**North Berkshire Registry:**

1. Deed of NEPCO to Grantor dated August 21, 1998, Book 963, Page 221 (Deerfield 4).
2. Deed of NEPCO to Grantor dated August 21, 1998, Book 963, Page 197 (Deerfield 5).

Also, unrecorded deed of NEPCO to Grantor dated July 10, 2001 (Zoar Gap picnic area).

Said parcels of land are shown on enlarged USGS topographic and other maps on file with the Federal Energy Regulatory Commission, License No. 2323.

Excepting from this conveyance any portion of the land or interests in land located within the bounds of the Bear Swamp Pumped Storage Facility located in the towns of Florida and Rowe, Massachusetts, shown on a plan entitled "Existing Conditions Plan of Bear Swamp - Project No. 2669 Prepared for USGen New England, Inc., Florida & Rowe, Massachusetts" dated November 23, 1998, by Cullinan Engineering Company, Inc., of Auburn and Boston, Massachusetts, a copy of which is on file with the Grantor and the Grantee, the bounds of said Facility being more particularly described in Exhibit A, attached.

Excepting also from this conveyance a parcel of land containing 14 acres, more or less, located in the Shelburne Village area of the town of Buckland, Massachusetts, shown on an unrecorded plan entitled "Plan of F.E.R.C. License Exclusion Buckland (Franklin Co.), MA Surveyed for USGen New England, Inc." dated September 14, 2000, by Ainsworth Associates, Inc., of Greenfield, Massachusetts, a reduced

<sup>1</sup> See also Document No. 5665 on Certificate of Title 7, and Certificate of Title 1202, Registration Book 7, Page 107

<sup>2</sup> See also Document No. 5664 on Certificate of Title 8, and Certificate of Title 1201, Registration Book 7, Page 106

copy of which is attached hereto as Exhibit B; another parcel of land located in Buckland on the west side of the Deerfield River on which Grantor's No. 4 Development, so-called, is located, including the powerhouse, penstock, forebay, gates and other facilities associated therewith, as shown on Exhibits C and C-1, attached hereto, being all or a portion of the parcel identified as DRE 180 on said Exhibits, and another parcel of land also located in the Shelburne Village area of Buckland on which Grantor's dam, gateworks, and associated facilities are located, and which is identified as DRE 210 on Exhibit D attached hereto.

**EXHIBIT A  
BEAR SWAMP DESCRIPTION**

DESCRIPTION OF LAND IN THE COMMONWEALTH OF MASSACHUSETTS, LOCATED ON TUNNEL ROAD IN THE TOWN OF ROWE, FRANKLIN COUNTY, AND ALSO ON RIVER ROAD IN THE TOWN OF FLORIDA, BERKSHIRE COUNTY, BEING OWNED BY USGEN NEW ENGLAND, INC., KNOWN AS AND LICENSED BY THE FEDERAL ENERGY REGULATORY COMMISSION AS "BEAR SWAMP - PROJECT 2669" BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT AN IRON ROD FOUND ON THE NORTHERLY SIDELINE OF TUNNEL ROAD AT THE SOUTHWESTERLY CORNER OF LAND NOW OR FORMERLY OF USGEN NEW ENGLAND INC.;

THENCE: N 01° 54' 58" W A DISTANCE OF 338.16 FEET ;

THENCE: N 42° 05' 30" E A DISTANCE OF 46 FEET ;

THENCE: N 00° 23' 30" E A DISTANCE OF 759 FEET ;

THENCE: N 53° 51' 30" W A DISTANCE OF 167 FEET ;

THENCE: N 81° 38' 30" W A DISTANCE OF 199 FEET ;

THENCE: S 81° 40' 30" W A DISTANCE OF 172 FEET ;

THENCE: S 88° 40' 30" W A DISTANCE OF 178 FEET ;

THENCE: N 74° 09' 30" W A DISTANCE OF 2323 FEET ;

THENCE: S 88° 02' 30" W A DISTANCE OF 448 FEET ;

THENCE: N 89° 11' 30" W A DISTANCE OF 200 FEET ;

THENCE: N 85° 53' 30" W A DISTANCE OF 852 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 396 FEET TO AN IRON PIN FOUND ON THE SOUTHERLY SIDELINE OF THE RIVER ROAD ;

THENCE: CROSSING THE RIVER ROAD ON A TIE COURSE OF N 09° 28' 30" W A DISTANCE OF 67.15 FEET TO THE NORTHERLY LINE OF SAID ROAD ;

THENCE: N 09° 28' 30" W A DISTANCE OF 415.95 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 495 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 1180 FEET TO FIFE BROOK ;

THENCE: SOUTHEASTERLY ALONG SAID BROOK A DISTANCE OF 114 FEET ;

THENCE: N 03° 28' 25" E A DISTANCE OF 1150 FEET ;

THENCE: S 84° 46' 35" E A DISTANCE OF 1399 FEET ;

THENCE: N 13° 46' 05" E A DISTANCE OF 926 FEET ;

THENCE: N 75° 36' 07" W A DISTANCE OF 2024.90 FEET ;

THENCE: S 56° 26' 48" W A DISTANCE OF 833.26 FEET ;

THENCE: S 04° 32' 25" W A DISTANCE OF 84.84 FEET ;

THENCE: N 72° 16' 35" W A DISTANCE OF 1199.80 FEET ;

THENCE: N 27° 08' 25" E A DISTANCE OF 191.92 FEET ;

THENCE: S 84° 32' 35" E A DISTANCE OF 1087.60 FEET ;

THENCE: S 03° 23' 40" W A DISTANCE OF 35.51 FEET ;

THENCE: N 56° 24' 25" E A DISTANCE OF 756.82 FEET ;

THENCE: S 75° 41' 33" E A DISTANCE OF 1852.87 FEET ;

THENCE: N 56° 09' 51" E A DISTANCE OF 968.51 FEET ;

THENCE: S 68° 43' 44" E A DISTANCE OF 1251.80 FEET ;

THENCE: S 84° 23' 17" E A DISTANCE OF 2067.75 FEET ;

THENCE: N 63° 15' 24" E A DISTANCE OF 1484 FEET TO OTHER LAND OF USGEN NEW ENGLAND, INC., KNOWN AS "DEERFIELD NO. 5 - PROJECT 2323" ;

THENCE: S 22° 15' 37" E A DISTANCE OF 381.22 FEET TO RIVER ROAD, SAID POINT LAYING 234 FEET EASTERLY OF A CONCRETE BOUND FOUND;

THENCE: N 67° 12' 19" E ALONG RIVER ROAD A DISTANCE OF 193.00 FEET ;

THENCE: S 05° 55' 41" E CROSSING RIVER ROAD A DISTANCE OF 68.96 FEET ;

THENCE: S 05° 55' 41" E A DISTANCE OF 526 FEET TO THE 880 FOOT CONTOUR ELEVATION ;

THENCE: EASTERLY AND NORTHERLY ALONG THE 880 FOOT CONTOUR BUT EXCEPTING THE DEERFIELD NO. 5 POWERHOUSE A DISTANCE OF 5430 FEET TO SAID "DEERFIELD NO. 5 - PROJECT 2323" ;

THENCE: S 88° 49' 20" E A DISTANCE OF 1360 FEET ;

THENCE: S 13° 08' 40" W A DISTANCE OF 1645 FEET ;



BK 1031 PG 834

THENCE: S 88° 09' 20" E A DISTANCE OF 165 FEET ;  
THENCE: S 08° 08' 40" W A DISTANCE OF 1655 FEET ;  
THENCE: S 88° 09' 20" E A DISTANCE OF 231 FEET ;  
THENCE: S 11° 12' 34" E A DISTANCE OF 527.74 FEET ;  
THENCE: S 25° 19' 40" W A DISTANCE OF 231 FEET ;  
THENCE: S 10° 19' 40" W A DISTANCE OF 924 FEET ;  
THENCE: S 89° 19' 40" W A DISTANCE OF 231 FEET ;  
THENCE: S 38° 40' 05" W A DISTANCE OF 771.72 FEET ;  
THENCE: S 07° 48' 55" E A DISTANCE OF 496.13 FEET ;  
THENCE: S 08° 15' 10" E A DISTANCE OF 412.91 FEET ;  
THENCE: S 13° 53' 39" E A DISTANCE OF 792.18 FEET ;  
THENCE: S 87° 39' 54" W A DISTANCE OF 1665.96 FEET ;  
THENCE: S 05° 30' 19" E A DISTANCE OF 725.91 FEET ;  
THENCE: S 87° 51' 22" W A DISTANCE OF 501 FEET ;  
THENCE: S 05° 30' 19" E A DISTANCE OF 1161 FEET TO TUNNEL ROAD ;  
THENCE: S 88° 12' 20" W A DISTANCE OF 178.10 FEET ;  
THENCE: N 76° 13' 02" W A DISTANCE OF 117.15 FEET ;  
THENCE: S 87° 20' 38" W A DISTANCE OF 402.92 FEET ;  
THENCE: AN ARC DISTANCE OF 156.62 FEET ALONG A CURVE TO THE RIGHT HAVING A  
RADIUS OF 200.00 FEET AND AN INTERIOR ANGLE OF 44° 52' 08" ;  
THENCE: N 47° 47' 14" W A DISTANCE OF 99.24 FEET ;  
THENCE: N 65° 51' 26" W A DISTANCE OF 326.50 FEET ;  
THENCE: AN ARC DISTANCE OF 142.91 FEET ALONG A CURVE TO THE LEFT HAVING A  
RADIUS OF 150.00 FEET AND AN INTERIOR ANGLE OF 54° 35' 13" ;  
THENCE: S 59° 33' 21" W A DISTANCE OF 182.30 FEET ;  
THENCE: AN ARC DISTANCE OF 134.59 FEET ALONG A CURVE TO THE LEFT HAVING A  
RADIUS OF 300.00 FEET AND AN INTERIOR ANGLE OF 25° 42' 18" ;

THENCE: S 33° 51' 03" W A DISTANCE OF 152.04 FEET ;

THENCE: S 42° 17' 56" W A DISTANCE OF 81.03 FEET ;

THENCE: S 50° 33' 56" W A DISTANCE OF 68.40 FEET ;

THENCE: S 56° 55' 56" W A DISTANCE OF 97.07 FEET ;

THENCE: S 47° 50' 56" W A DISTANCE OF 140.37 FEET ;

THENCE: AN ARC DISTANCE OF 231.29 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 351.75 FEET AND AN INTERIOR ANGLE OF 37° 40' 26" ;

THENCE: S 85° 31' 22" W A DISTANCE OF 89.88 FEET ;

THENCE: AN ARC DISTANCE OF 114.72 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 158.50 FEET AND AN INTERIOR ANGLE OF 41° 28' 05" ;

THENCE: S 44° 03' 17" W A DISTANCE OF 231.85 FEET ;

THENCE: S 42° 38' 29" W A DISTANCE OF 211.03 FEET ;

THENCE: S 39° 11' 00" W A DISTANCE OF 223.95 FEET ;

THENCE: S 62° 50' 19" W A DISTANCE OF 249.64 FEET TO AN IRON PIN AT THE POINT OF BEGINNING.

EXCEPTING RIVER ROAD, DESCRIBED AS FOLLOWS :

BEGINNING AT AN IRON PIN FOUND ON THE WESTERLY SIDELINE OF LAND OF USGEN NEW ENGLAND, INC., AND ON THE SOUTHERLY SIDELINE OF RIVER ROAD

THENCE: S 88° 50' 48" E A DISTANCE OF 528.64 FEET ;

THENCE: S 82° 37' 35" E A DISTANCE OF 200.00 FEET TO A POINT 33 FEET RIGHT OF STATION 0+00 AS SHOWN ON THE DECEMBER 5, 1972 BERKSHIRE COUNTY LAYOUT OF RIVER ROAD IN FLORIDA ;

THENCE: S 82° 37' 35" E A DISTANCE OF 390.00 FEET ;

THENCE: AN ARC DISTANCE OF 673.77 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 100° 47' 39" ;

THENCE: N 03° 25' 13" W A DISTANCE OF 180.17 FEET ;

THENCE: AN ARC DISTANCE OF 212.69 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 406.20 FEET AND AN INTERIOR ANGLE OF 30° 00' 02" ;

THENCE: N 33° 25' 13" W A DISTANCE OF 728.80 FEET ;

THENCE: AN ARC DISTANCE OF 380.24 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $68^{\circ} 43' 34''$ ;

THENCE: N  $35^{\circ} 18' 20''$  E A DISTANCE OF 134.75 FEET;

THENCE: AN ARC DISTANCE OF 283.73 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $42^{\circ} 26' 43''$ ;

THENCE: N  $07^{\circ} 08' 25''$  W A DISTANCE OF 84.94 FEET;

THENCE: AN ARC DISTANCE OF 207.38 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $37^{\circ} 28' 58''$ ;

THENCE: N  $30^{\circ} 20' 35''$  E A DISTANCE OF 166.46 FEET;

THENCE: AN ARC DISTANCE OF 110.71 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $16^{\circ} 33' 43''$ ;

THENCE: N  $13^{\circ} 46' 52''$  E A DISTANCE OF 1570.56 FEET;

THENCE: AN ARC DISTANCE OF 591.41 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $106^{\circ} 53' 36''$ ;

THENCE: S  $59^{\circ} 19' 32''$  E A DISTANCE OF 453.82 FEET;

THENCE: AN ARC DISTANCE OF 407.91 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 993.00 FEET AND AN INTERIOR ANGLE OF  $23^{\circ} 32' 11''$ ;

THENCE: S  $82^{\circ} 51' 44''$  E A DISTANCE OF 761.09 FEET;

THENCE: AN ARC DISTANCE OF 401.91 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 6512.67 FEET AND AN INTERIOR ANGLE OF  $3^{\circ} 32' 09''$ ;

THENCE: S  $86^{\circ} 23' 53''$  E A DISTANCE OF 1091.37 FEET;

THENCE: AN ARC DISTANCE OF 335.69 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 480.84 FEET AND AN INTERIOR ANGLE OF  $40^{\circ} 00' 00''$ ;

THENCE: AN ARC DISTANCE OF 245.05 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 1040.02 FEET AND AN INTERIOR ANGLE OF  $13^{\circ} 30' 00''$ ;

THENCE: N  $67^{\circ} 06' 07''$  E A DISTANCE OF 173.00 FEET;

THENCE: AN ARC DISTANCE OF 287.22 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1061.70 FEET AND AN INTERIOR ANGLE OF  $15^{\circ} 30' 00''$ ;

THENCE: AN ARC DISTANCE OF 428.53 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 1573.56 FEET AND AN INTERIOR ANGLE OF  $15^{\circ} 36' 12''$ ;

THENCE: N  $67^{\circ} 12' 19''$  E A DISTANCE OF 406.98 FEET TO OTHER LAND OF USGEN NEW ENGLAND INC., KNOWN AS "DEERFIELD NO. 5 - PROJECT 2323";

THENCE: CROSSING RIVER ROAD ON A TIE COURSE OF N 05° 55' 41" W A DISTANCE OF 68.96 FEET ;

THENCE: S 67° 12' 19" W A DISTANCE OF 427.00 FEET ;

THENCE: AN ARC DISTANCE OF 446.50 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1639.56 FEET AND AN INTERIOR ANGLE OF 15° 36' 12" ;

THENCE: AN ARC DISTANCE OF 269.36 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 995.70 FEET AND AN INTERIOR ANGLE OF 15° 30' 00" ;

THENCE: S 67° 06' 07" W A DISTANCE OF 173.00 FEET ;

THENCE: AN ARC DISTANCE OF 260.60 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1106.02 FEET AND AN INTERIOR ANGLE OF 13° 30' 00" ;

THENCE: AN ARC DISTANCE OF 289.61 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 414.84 FEET AND AN INTERIOR ANGLE OF 40° 00' 00" ;

THENCE: N 86° 23' 53" W A DISTANCE OF 1091.37 FEET ;

THENCE: AN ARC DISTANCE OF 397.84 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 6446.67 FEET AND AN INTERIOR ANGLE OF 3° 32' 09" ;

THENCE: N 82° 51' 44" W A DISTANCE OF 761.09 FEET ;

THENCE: AN ARC DISTANCE OF 380.80 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 927.00 FEET AND AN INTERIOR ANGLE OF 23° 32' 11" ;

THENCE: N 59° 19' 32" W A DISTANCE OF 453.82 FEET ;

THENCE: AN ARC DISTANCE OF 714.54 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 106° 53' 36" ;

THENCE: S 13° 46' 52" W A DISTANCE OF 1570.56 FEET ;

THENCE: AN ARC DISTANCE OF 91.63 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF 16° 33' 43" ;

THENCE: S 30° 20' 35" W A DISTANCE OF 166.46 FEET ;

THENCE: AN ARC DISTANCE OF 250.56 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 37° 28' 58" ;

THENCE: S 07° 08' 25" E A DISTANCE OF 84.94 FEET ;

THENCE: AN ARC DISTANCE OF 234.84 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF 42° 26' 43" ;

THENCE: S 35° 18' 20" W A DISTANCE OF 134.75 FEET ;

BK 1031 PG 838

THENCE: AN ARC DISTANCE OF 459.41 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $68^{\circ} 43' 34''$ ;

THENCE: S  $33^{\circ} 25' 13''$  E A DISTANCE OF 728.80 FEET;

THENCE: AN ARC DISTANCE OF 178.13 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 340.20 FEET AND AN INTERIOR ANGLE OF  $30^{\circ} 00' 02''$ ;

THENCE: S  $03^{\circ} 25' 13''$  E A DISTANCE OF 180.17 FEET;

THENCE: AN ARC DISTANCE OF 557.66 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $100^{\circ} 47' 39''$ ;

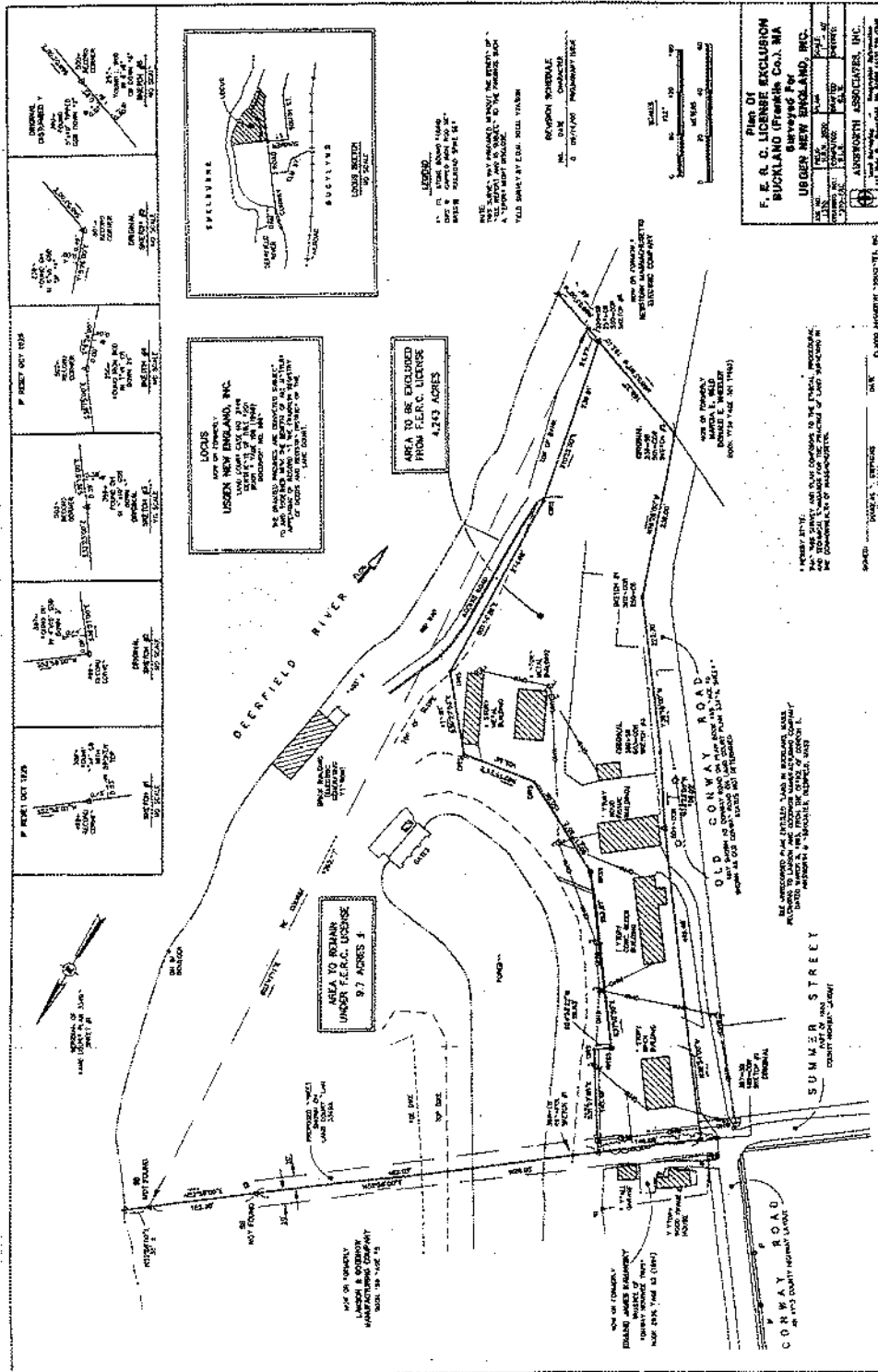
THENCE: N  $82^{\circ} 37' 35''$  W A DISTANCE OF 390.00 TO STATION 0+00 OF SAID COUNTY LAYOUT;

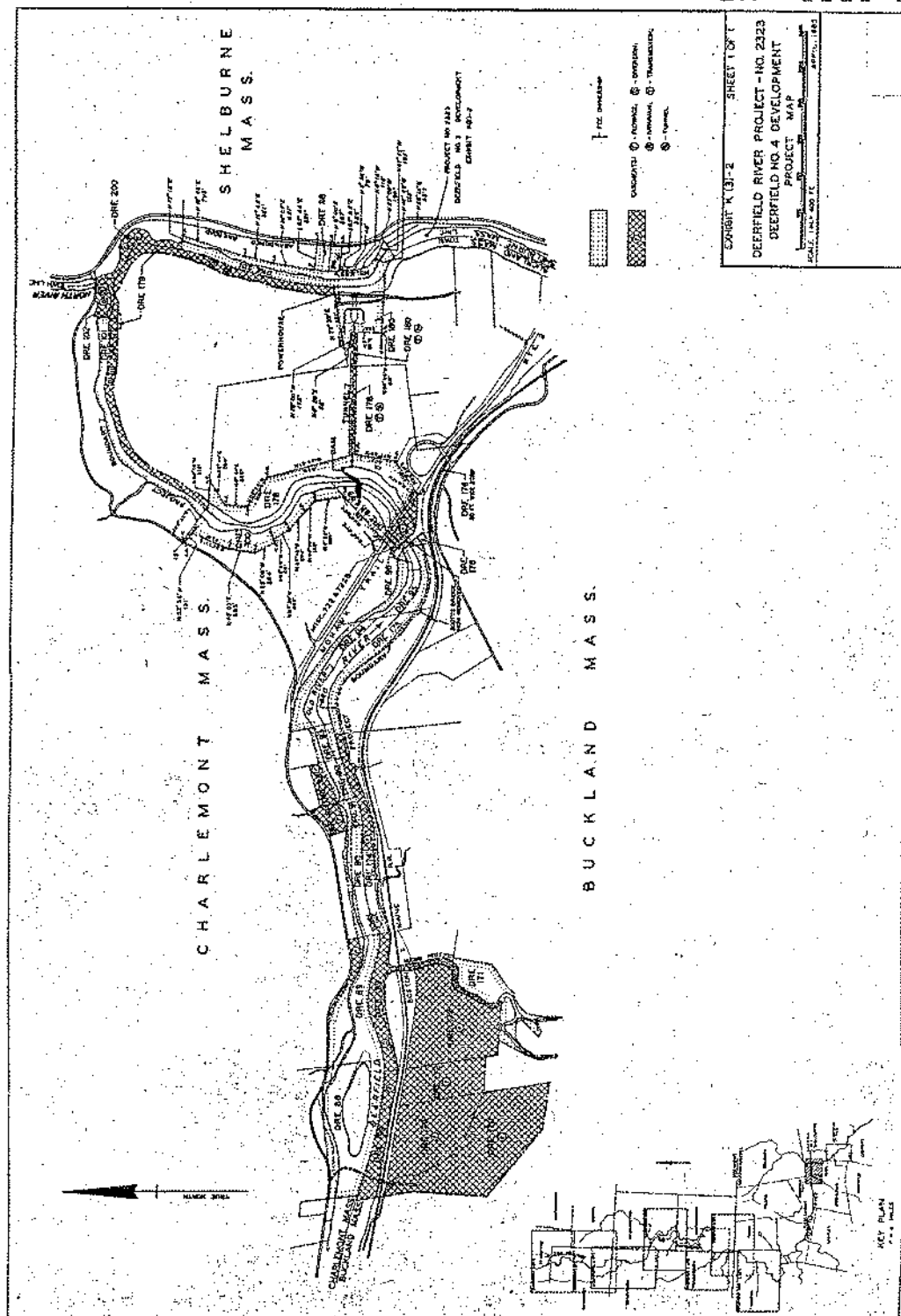
THENCE: N  $82^{\circ} 37' 35''$  W A DISTANCE OF 203.59 FEET;

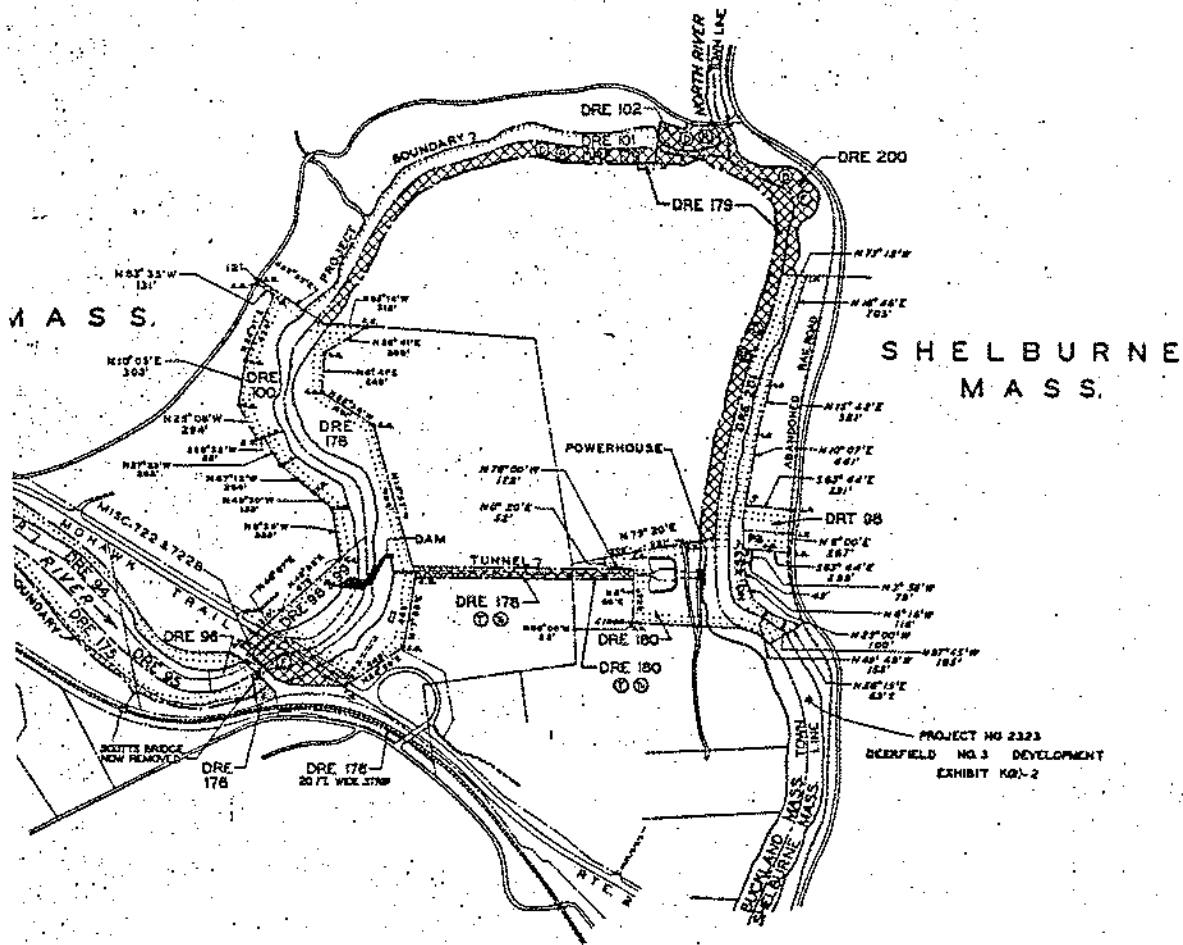
THENCE: N  $88^{\circ} 50' 48''$  W A DISTANCE OF 544.64 TO A POINT ON THE WESTERLY LINE OF LAND OF USGEN NEW ENGLAND INC.;

THENCE: CROSSING THE RIVER ROAD ON A TIE COURSE OF S  $09^{\circ} 30' 06''$  E A DISTANCE OF 67.16 TO AN IRON PIN FOUND AT THE POINT OF BEGINNING.

CONTAINING 1256 ACRES, MORE OR LESS







MASS.

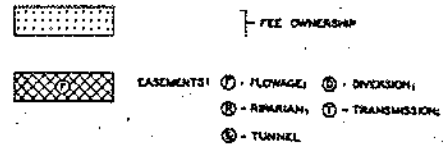


EXHIBIT K (3)-2

SHEET 1 OF 1

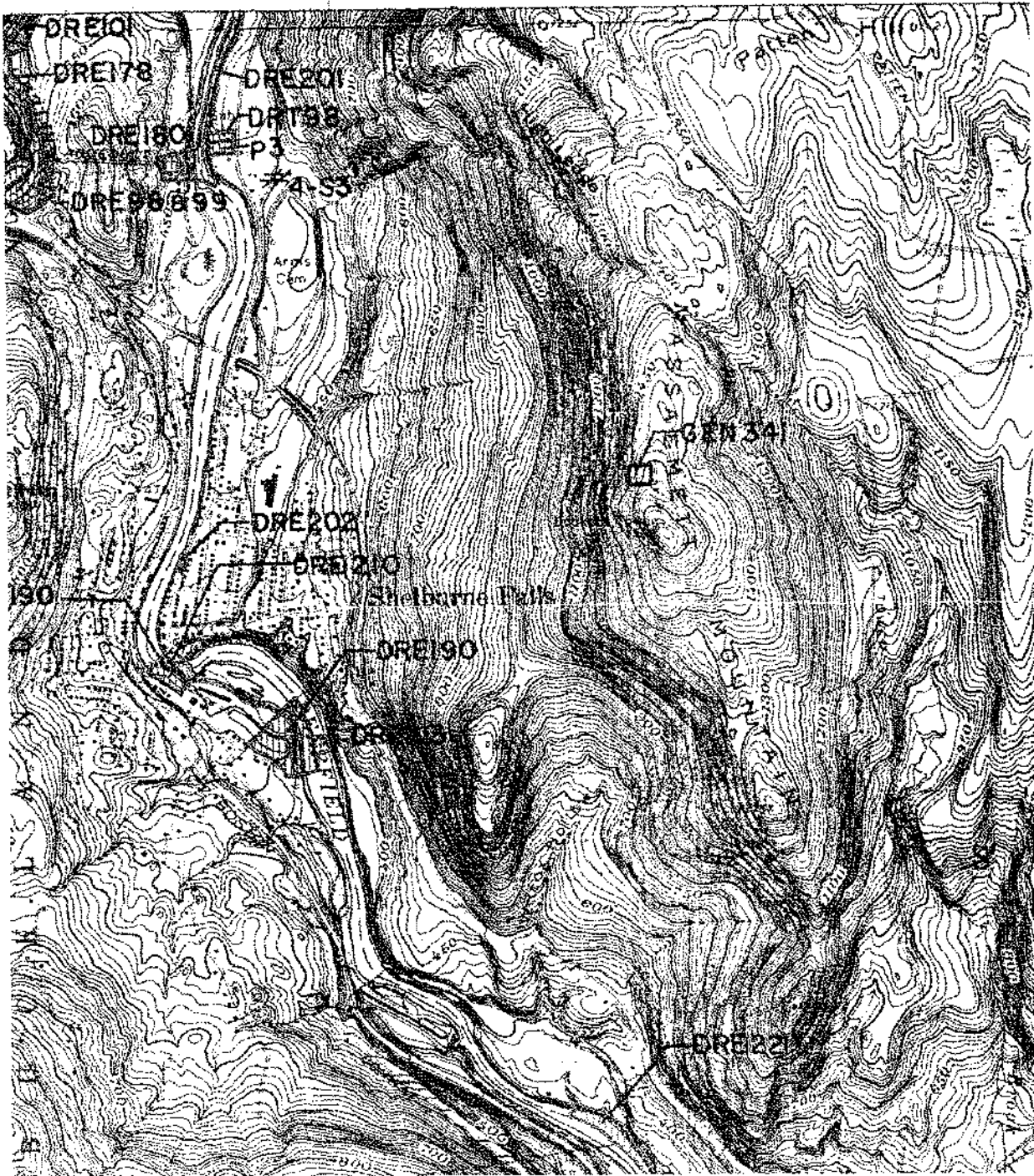
DEERFIELD RIVER PROJECT - NO. 2323  
DEERFIELD NO. 4 DEVELOPMENT  
PROJECT MAP

SCALE 1 IN. = 400 FE  
APRIL, 1983



EXHIBIT D

BK 1031 PG 842



BK 1031 PG 843

ACCEPTANCE OF GRANT

Grantee joins herein for the purpose of accepting the foregoing grant and agreeing to be bound by the provisions thereof.

IN WITNESS WHEREOF, Grantee executes this Grant under seal this 17th day of July, 2001.

GRANTEE

Commonwealth of Massachusetts  
Department of Environmental Management

By: Peter C. Webber  
Peter C. Webber, Commissioner

COMMONWEALTH OF MASSACHUSETTS

Suffolk County, ss:

At 11:10am, this 17th day of July, 2001, personally appeared Peter C. Webber, the Commissioner of the Massachusetts Department of Environmental Management, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of the Commonwealth of Massachusetts, before me.

John Black  
Notary Public: John Black

My commission expires: May 27, 2001

END OF DOCUMENT  
Northern Berkshire Registry of Deeds

## **Appendix B. Land Conservation Easement 2**

### **Northern Berkshire - 20/20 Perfect Vision i2 Document Detail Report Current datetime: 3/9/2015 3:59:15 PM**

**Doc# Document Type Town Book/Page File Date Consideration**

4079 RESTR 01031/844 07/18/2001 0.00

**Property-Street Address and/or Description**

RIVER ROAD &C, FLORI, &C

**Grantors**

USGEN NEW ENGLAND INC

**Grantees**

MASSACHUSETTS COMM OF, MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL  
MAN

**References-Book/Pg Description Recorded Year**

00963/209 GRANT 1998

**Registered Land Certificate(s)-Cert# Book/Pg**

### GRANT OF CONSERVATION RESTRICTIONS

WHEREAS, USGen New England, Inc., a Delaware corporation with its principal place of business in Bethesda, Maryland, (hereinafter "Grantor"), is the owner in fee of certain real property and of other real estate interests in Franklin and Berkshire Counties, Massachusetts, which has aesthetic, recreational, and natural resource values in its present state; and

WHEREAS, Grantor is the owner and licensed operator of the Bear Swamp Hydroelectric Project as authorized under the Federal Energy Regulatory Commission License No. 2669 (hereinafter the "Bear Swamp Hydroelectric Project") which makes certain property of the Grantor, being part of the Bear Swamp Hydroelectric Project ("Project Lands"), subject to all terms and conditions of Federal License No. 2669 and to all other rules and regulations of the Federal Energy Regulatory Commission ("hereinafter FERC"); and

WHEREAS, this property contains approximately 1256 acres of primarily undeveloped land (provided, however, Grantor makes no representations herein regarding actual acreage), some of which is in agricultural and forestry use, which provides wildlife habitat, natural resource protection, as well as recreational and scenic opportunities; and

WHEREAS, the Massachusetts Department of Environmental Management is a state agency whose purposes include the preservation of undeveloped and open space land in order to protect the aesthetic, recreational, cultural, educational, scientific and natural resources of the state through non-regulatory means, thereby reducing the burdens on state and local governments; and

WHEREAS, the economic and environmental health of Massachusetts is closely linked to its agricultural and forest lands, which not only produce food products, fuel, timber and other products, but also provide much of Massachusetts' scenic beauty, upon which the state's tourist and recreation industries depend; and

WHEREAS, the Grantor's predecessor in title to the aforesaid real estate, New England Power Company, entered into a Settlement Agreement dated October 5, 1994 (hereinafter "Settlement"), providing for the re-licensing of the Deerfield River and Bear Swamp Hydroelectric Projects, which by its terms is binding upon the Grantor as successor in title; and

WHEREAS, the Settlement calls for the protection of the Project Lands and certain riverine non-Project lands both as defined therein;

NOW, THEREFORE, Grantor, in consideration of Ten Dollars and other valuable consideration paid, GRANTS to the Massachusetts Department of Environmental Management whose principal offices are at 251 Causeway Street, Boston, Massachusetts 02114, and its successors and assigns (hereinafter "Grantee"), conservation restrictions (as more particularly set forth below), in accordance with G. L. c. 184, §§ 31-33, and c. 132A, §3, for a period of years

Property Location: Tunnel Road, Rowe, Franklin County  
River Road, Florida, Berkshire County

beginning on the date of this instrument and running uninterrupted until April 1, 2020, the date FERC License No. 2669 for the Bear Swamp Hydroelectric Project expires, said conservation restrictions to be held by the Grantee for the purposes set forth in Article 97 of the Massachusetts Constitution, on certain tracts of land consisting of the Project Lands and the riverine non-Project lands, situated in the Towns of Rowe, in Franklin County, and Florida, in Berkshire County, Massachusetts (hereinafter "Protected Property"), said Protected Property being more particularly described by the documents set forth in Schedule A, attached hereto and incorporated herein.

The conservation restrictions hereby conveyed to Grantee consist of covenants on the part of Grantor to do or refrain from doing, severally and collectively, the various acts set forth below, subject to rights specifically reserved by Grantor herein. It is hereby acknowledged that these covenants shall constitute a servitude upon the land and run with the land. Grantee accepts such covenants in order to achieve the Purposes set forth in Section I, below.

**I. Purposes of this Grant**

Grantor and Grantee acknowledge that the Purposes of this Grant are as follows (hereinafter "Purposes of this Grant"):

1. This Grant serves to implement the agreement to preserve in their natural state the Protected Property associated with the Bear Swamp Hydroelectric Project, while allowing for the continued operation of the Electricity Business as described in Paragraph I of Section III, below, that was negotiated as part of the Deerfield River Re-licensing Settlement entered into on October 5, 1994. The intent of this Grant is to implement the conservation protections agreed to, consistent with the Settlement, for the remaining term of the Bear Swamp Hydroelectric Project's existing license.
2. To contribute to the implementation of the policies of the Commonwealth of Massachusetts designed to foster the conservation of the state's scenic, agricultural, forestry and other natural resources.
3. To conserve wood lands and open lands, and public access thereto, conserve wildlife and riverine habitat and other natural resource values of the Protected Property for the scenic, recreational and educational benefit of the public.

Grantor and Grantee recognize these scenic, forestry, recreational, agricultural, and natural values of the Protected Property, and share the common purpose of conserving these values by the conveyance of the conservation restrictions, to prevent the use or development of the property for any purpose or in any manner which would conflict with the maintenance of these scenic, forestry, recreational, agricultural, and natural resource values, except as herein set forth. Grantee accepts such conservation restrictions in order to conserve these values for present and future generations.

## **II. Restricted Uses of Protected Property**

The restrictions hereby imposed upon the Protected Property, and the acts which Grantor shall do or refrain from doing, are as follows:

1. The Protected Property shall not be used for purposes other than agricultural, forestry, educational, non-commercial recreation, open space and electric transmission and hydroelectric generation purposes as set forth herein. No residential, commercial, industrial, or mining activities shall be permitted, and no building, structure or appurtenant facility or improvement shall be constructed, created, installed, erected or moved onto the Protected Property, except in furtherance of the Grantor's business described in Paragraph 1 of Section III or as specifically permitted under this Grant.
2. Except in furtherance of the Grantor's business described in Paragraph 1 of Section III or as otherwise specifically permitted under this Grant, no rights-of-way, easements of ingress or egress, driveways, roads, or utility lines or easements shall be conveyed, constructed, developed or maintained into, on, over, under, or across the Protected Property, without the prior written permission of Grantee. Grantee may grant such permission if it determines, in its sole reasonable discretion, that any such improvement would be consistent with the Purposes of this Grant, and not adversely affect the agricultural and forestry potential, wildlife habitat value, or the scenic beauty of the Protected Property.
3. Except when incidental to the furtherance of the Grantor's business described in Paragraph 1 of Section III, there shall be no signs, billboards, or outdoor advertising of any kind erected or displayed on the Protected Property; provided, however, that Grantor may erect and maintain signs indicating the name of the Protected Property, boundary markers, directional signs, signs restricting hunting or trespassing on the Protected Property, memorial plaques, temporary signs indicating that the Protected Property is for sale or lease, signs informing the public that any agricultural or timber products are for sale or are being grown on the premises and temporary political or religious signs. Grantee, with the permission of Grantor, may erect and maintain signs designating the Protected Property as land under the protection of Grantee.
4. The placement, collection or storage of trash, human waste, or any other unsightly or offensive material on the Protected Property shall not be permitted except in connection with the Grantor's business described in Paragraph 1 of Section III and otherwise at such locations, if any, and in such a manner as shall be approved in advance in writing by Grantee. The storage and spreading of manure, lime or other fertilizer for agricultural practices and purposes and the temporary storage of trash in receptacles for periodic off-site disposal shall be permitted without such prior written approval.
5. There shall be no disturbance of the surface, including but not limited to filling, excavation, removal of topsoil, sand, gravel, rocks or minerals, or change of the topography of the land in any manner, except as incidental to the business operation of Grantor described in Paragraph 1 of Section III hereof and except as may be reasonably necessary to carry out the uses permitted on the Protected Property under the terms of this Grant. In no case shall mining of subsurface oil, gas, or other minerals be permitted.

6. The Protected Property shall not be subdivided or conveyed in separate parcels except (a) when necessary in furtherance of the uses permitted in Paragraph 1 of Section III, or (b) to carry out one of the other permitted uses in Section III. Any subdivision pursuant to subparagraph (b) will be subject to the Grantee's approval, such approval not to be unreasonably withheld. Any subdivision must be consistent with maintaining forestry management units that maintain the potential and current productivity of the lands for commercial forestry and preventing the fragmentation of wildlife habitat.

7. No use shall be made of the Protected Property, and no activity thereon shall be permitted which is inconsistent with the Purposes of this Grant.

### **III. Permitted Uses of the Protected Property**

Notwithstanding the foregoing, Grantor shall have the right to make the following uses of the Protected Property:

1. The right to use the Protected Property for all uses and activities associated with the present and future operation of the business of the generation of hydroelectric energy and the transmission and distribution of high and low voltage electricity and the transmission of intelligence by electrical energy or other means ("the Electricity Business"). Existing hydroelectric developments may be operated, maintained and replaced as necessary, but wholly new hydroelectric developments (e.g., dams and associated facilities) shall not be constructed, operated or maintained. New facilities may be added involving the transmission of intelligence in connection with the generation, transmission, and distribution of electricity, in which case Grantor will use best efforts, to the extent practicable, to cause such facilities to be located on, or in proximity to, areas already used by facilities associated with the Electricity Business and to avoid or minimize negative impacts to the scenic, forestry, recreational, agricultural and natural values of the Protected Property.

The Grantor shall also have the right to make the following uses of the Protected Property, while using best efforts to avoid major negative impacts to the scenic, forestry, recreational, agricultural, and natural resource values of the Protected Property, or at a minimum, using best efforts to minimize, to the extent practicable, such impacts where they cannot be avoided:

2. The right to establish, reestablish, maintain, and use cultivated fields, orchards, and pastures in accordance with generally accepted agricultural practices and sound husbandry principles, together with the right to construct, maintain and repair access roads for these purposes; provided, however, that Grantor shall secure the written approval of Grantee prior to any clearing of forest land to establish new fields, orchards or pastures. Grantee's approval shall not be unreasonably withheld or conditioned, provided that such clearing is consistent with the Purposes of this Grant and the Forestry Management Plan prepared pursuant to Section IV.

3. The right to perform forest management activities in accordance with Section IV. Grantor will provide fifteen (15) days prior written notice to the Grantee of any commercial timber harvesting activity, unless such activities or notice for such activities are already specified in the plan prepared pursuant to Section IV.

4. The right to utilize, maintain, establish, construct, and improve water sources, courses, and bodies within the Protected Property for uses otherwise permitted hereunder, provided that Grantor does not unnecessarily disturb the natural course of the surface water drainage and runoff flowing over the Protected Property. The construction of ponds or reservoirs shall be permitted only upon the prior written approval of Grantee, which approval shall not be unreasonably withheld or conditioned provided that such pond or reservoir is located in a manner which is consistent with the Purposes of this Grant. The conditions, restrictions and prohibitions set forth in this paragraph shall not apply to the Electricity Business. Any rights retained by the Grantor in this paragraph are in addition to and subject to the rights and obligations set out in Paragraph 1 of Section III.

5. The right to clear, construct, and maintain public campgrounds, boat launches, trail shelters, parking areas, visitor and information facilities and trails for walking, horseback riding, skiing, and other non-motorized, recreational activities within and across the Protected Property. Snowmobiling may be permitted at the discretion of Grantor. The Grantor will provide free public access with no charge or fees to the water and undeveloped lands. Grantor may charge reasonable user fees to recover the actual cost of providing and operating developed public recreation facilities. Any rights retained by the Grantor in this paragraph are in addition to the reserved right to continue the Electricity Business.

#### **IV. Forest Management**

In connection with Grantor's operation of the Bear Swamp Hydroelectric Project, and as an activity secondary thereto, Grantor shall perform forest management activities but only in accordance with a Forest Management Plan ("Forestry Plan"), to be approved by the Grantee prior to implementation. Said plan shall be consistent with the Deerfield River Project L.P. 2323 Forest Management Plan ("Management Plan") dated June 9, 1998, as approved and modified by FERC by Order issued November 24, 1999, and the Massachusetts Forestry Cutting Practices Act, G. L. c. 132, §§ 40-46 ("Mass. Cutting Practices Act") as applicable. All updates, amendments or other changes to the Forestry Plan shall be submitted to Grantee for its approval prior to any harvesting. The Forestry Plan as updated, amended or changed from time-to-time is hereinafter referred to as the "Amended Forestry Plan." Grantee's approval of the Forestry Plan and any Amended Forestry Plan shall not be unreasonably withheld or conditioned if the Forestry Plan and Amended Forestry Plan has been prepared by a professional forester and if the Forestry Plan and the Amended Forestry Plan are consistent with the Purposes of this Grant and the Mass. Cutting Practices Act. The Forestry Plan and any Amended Forestry Plan shall be consistent with the Purposes of this Grant and the Management Plan, and shall include at least the following elements (except that, those elements of the Forestry Plan or Amended Forestry Plan which do not change need not be re-submitted in updates, amendments or changes to the Forestry Plan):

- a) Grantor's forest management objectives;
- b) An appropriately scaled, accurate map indicating such items as forest stands, streams and wetlands, and major access routes (truck roads, landings and major skid trails);
- c) Forest stand ("treatment unit") descriptions (forest types, stocking levels before and after harvesting, soils, topography, stand quality, site class, insect and disease occurrence, previous management history, and prescribed silvicultural treatment);



- d) Plant and wildlife considerations (identification of known significant habitats and management recommendations);
- e) Aesthetic and recreational considerations (impact on viewsheds from public roads, trails and places); and
- f) Historic and cultural resource considerations (identification of known resources and associated management recommendations).

The Forestry Plan shall be updated at least once every ten (10) years if Grantor intends to harvest timber or other wood products. Amendments to the Forestry Plan shall be required in the event the Grantor proposes a treatment not included in the Forestry Plan, but no such amendment shall be required for any change in timing or sequence of treatments if such change does not vary more than five (5) years from the prescription schedule set forth in the Forestry Plan as approved by Grantee. In the event that any treatment unit is substantially damaged by natural causes such as insect infestation, disease, fire or wind, Grantor may elect to conduct an alternative treatment in which event Grantor shall submit an amendment to the Forestry Plan for Grantee's approval prior to conducting any alternative treatment.

Disapproval by Grantee of a Forestry Plan or an Amended Forestry Plan proposing a heavy cut (as defined below) shall not be deemed unreasonable. Grantee, however, may approve a Forestry Plan or an Amended Forestry Plan in its discretion if consistent with the Purposes of this Grant, such as to permit the planting of different species of trees or the establishment or re-establishment of a field, orchard or pasture. Grantee may rely upon the advice and recommendations of such foresters, wildlife experts, conservation biologists or other experts as Grantee may select to determine whether the Forestry Plan or Amended Forestry Plan would be detrimental to the values identified in Section I. "Heavy cut" shall mean the harvesting of wood products below the "C-Line" or minimum stocking level on the Protected Property as determined by applying the protocol set forth in the current U.S. Department of Agriculture, Forest Service Silvicultural Guidelines for the Northeast, or by applying a similar, successor standard approved by Grantee, or the harvesting of wood products that does not conform with the standards provided in the Mass. Cutting Practices Act.

#### **V. Enforcement of the Restrictions**

Grantee shall make reasonable efforts from time to time to assure compliance by Grantor with all of the restrictions herein. In connection with such efforts, Grantee, or its designee, may, at its own risk, make periodic inspection of all or any portion of the Protected Property, and for such inspection and enforcement purposes Grantee, or its designee, shall have the right of reasonable access to the Protected Property upon such terms and conditions and following such prior notice to Grantor as Grantor may from time to time reasonably impose and require. In the event that Grantee becomes aware of an event or circumstance of non-compliance with the terms and conditions herein set forth, Grantee shall give notice to Grantor of such event or circumstance of non-compliance via certified mail, return receipt requested, and demand corrective action sufficient to abate such event or circumstance of non-compliance and restore the Protected Property to its previous condition.

Failure by Grantor to cause discontinuance, abatement, or such other corrective action as may be demanded by Grantee within a reasonable time after receipt of notice and reasonable opportunity to take corrective action shall entitle Grantee to bring an action in a court of competent jurisdiction to enforce the terms of this Grant and to recover any damages arising from such non-compliance. Such damages when recovered, may be applied by Grantee to corrective action on the Protected Property, if necessary. If such court determines that Grantor has failed to comply with this Grant after receiving notice of noncompliance and reasonable opportunity to correct, Grantor shall reimburse Grantee for any reasonable costs of enforcement, including Grantee's staff time, court costs and reasonable attorneys' fees, in addition to any other payments ordered by such Court. In the event that Grantee initiates litigation and the court determines that Grantor has not failed to comply with the terms of this Grant, and that Grantee has initiated litigation without reasonable cause or in bad faith, then Grantee shall reimburse Grantor for any reasonable costs of defending such action, including court costs and reasonable attorneys' fees. The parties to this Grant specifically acknowledge that events and circumstances of non-compliance constitute immediate and irreparable injury, loss, and damage to the Protected Property and accordingly entitle Grantee to such equitable relief, including but not limited to injunctive relief, as the Court deems just. The remedies described herein are in addition to, and not in limitation of, any other remedies available to Grantee at law, in equity, or through administrative proceedings.

No delay or omission by Grantee in the exercise of any right or remedy upon any breach by Grantor shall impair Grantee's rights or remedies or be construed as a waiver. Nothing in this enforcement section shall be construed as imposing a liability upon a prior owner of the Protected Property, where the event or circumstance of non-compliance shall have occurred after said prior owner's ownership or control of the Protected Property has terminated.

#### **VI. Integrity of the Hydroelectric Project**

1. The Grantee covenants and agrees with the Grantor that at any and all times that Grantee enters upon the Protected Property the Grantee shall take all necessary precautions to protect the scenic, recreational and environmental values of the Protected Property.

2. The Grantee covenants and agrees with the Grantor that Grantee's enforcement of the conservation restrictions set forth herein shall not endanger health, create a nuisance or otherwise be incompatible with the current use and operation of the Bear Swamp Hydroelectric Project, or any future change in use as may from time to time be approved by FERC.

3. The Grantee acknowledges and agrees with the Grantor that this Grant of Conservation Restrictions and all terms and conditions contained herein are subject to Grantor's Federal License No. 2669 as issued by FERC and all the terms and conditions thereof and all amendments thereto or other licenses or orders which may be issued by FERC in connection with the Bear Swamp Hydroelectric Project as well as any rules and regulations promulgated by FERC in the future.

4. The Grantee acknowledges and agrees with the Grantor that nothing in this Grant of Conservation Restrictions shall defeat, lessen or be in degradation of any interest or right acquired or reserved by the Grantor in connection with the Bear Swamp Hydroelectric Project and issued under Federal License No. 2669.

5. The Grantee acknowledges that this grant of Conservation Restrictions by the Grantor is in full satisfaction of the Grantor's obligations under Section V, subsection B, of the Settlement, dated October 5, 1994.

#### **VII. Notices**

1. Unless otherwise provided herein or by law Grantor shall provide at least forty-five (45) days written notice prior to commencing any activity requiring Grantee's prior approval under the terms of this Grant. Grantor shall provide Grantee information reasonably necessary to determine whether the proposed activity is consistent with the purposes of this Grant. Grantee shall respond within forty-five (45) days of receipt of such notice providing its consent, or specifying why the proposed activity is in conflict with this Grant. Grantee's approval shall not be unreasonably withheld. In the event that Grantee does not respond within forty-five (45) days of confirmation of actual receipt of such prior notice, Grantee will be deemed to have approved the activity.

#### **VIII. Miscellaneous Provisions**

1. It is hereby agreed that the construction of any buildings, structures or improvements, or any use of the land otherwise permitted under this Grant, shall be in accordance with all applicable law.

2. Grantee may transfer the conservation restrictions conveyed by Grantor herein only to a qualified government or non-government conservation organization that (a) agrees to enforce the conservation Purposes of this Grant, in accordance with the regulations established by the Internal Revenue Service governing such transfers (if applicable) and (b) has first been approved in writing by Grantor, The Conservation Law Foundation (CLF) and The Appalachian Mountain Club (AMC) (to the extent that CLF and AMC continue to exist), each of whom may withhold such approval in its sole discretion.

3. In the event the conservation restrictions conveyed to Grantee herein are extinguished by eminent domain or other legal proceedings, Grantee shall be entitled to any damages which are specifically allocated to the extinguishment of the conservation restrictions created by this Grant. Grantee shall use any such proceeds to preserve undeveloped and open space land in order to protect the aesthetic, cultural, educational, scientific and natural resources of the state through non-regulatory means.

4. This grant is made subject to existing rights of third parties, if any, including but not limited to all existing rights and easements of record of New England Power Company; without any warranties or covenants of title; and subject to all matters now of record in the Registries of Deeds of the Counties in which the Protected Property is located.

5. In any deed conveying an interest in all or part of the Protected Property, Grantor shall make reference to the conservation restrictions described herein and shall indicate that said restrictions are binding upon all successors in interest in the Protected Property in perpetuity.

6. Grantee shall be entitled to record any instruments necessary in the future to continue the validity of this Grant, and Grantor agrees to cooperate and execute any instruments necessary to do so.

7. If circumstances arise under which amendment to or modification of this Restriction would be appropriate, Grantor and Grantee may by mutual written agreement jointly amend this Restriction, provided that no amendment may be made that will be inconsistent with the purposes of this Restriction, affect its duration, violate the provisions of Article 97 of the Amendments to the Massachusetts Constitution, nor adversely affect any of the significant conservation values of the Protected Property. Any amendment to this restriction shall be duly recorded in the appropriate Registry of Deeds.

8. The term "Grantor" shall include the successors and assigns of USGen New England, Inc. The term "Grantee" shall include the permitted successors and assigns of the original Grantee, the Massachusetts Department of Environmental Management.

The land and real property interests held by Grantor to which these restrictions apply are described in deeds set out in Schedule A attached hereto, to which deeds reference may be had for Grantor's title.

INVALIDATION of any provision hereof shall not affect any other provision of this Grant.

TO HAVE AND TO HOLD said granted conservation restrictions, with all the privileges and appurtenances thereof, to the said Grantee, the Massachusetts Department of Environmental Management, its permitted successors and assigns, to their own use and behoof for the term provided for herein.

BK 1031 PG 853

IN WITNESS WHEREOF, Grantor executes this Grant under seal this 16<sup>th</sup> day of July, 2001.

Signed and delivered  
In The Presence Of:

Thomas B. Powers  
Witness to GEORGE J. GRUNBECK

GRANTOR  
USGen New England, Inc.

By: George J. Grunbeck

COMMONWEALTH OF MASSACHUSETTS

Suffolk County, ss:

At One Bowdoin Square, Boston, this 16<sup>th</sup> day of July, 2001, personally appeared George Grunbeck, VICE PRESIDENT of US Gen New England, Inc., duly authorized, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of USGen New England, Inc., before me.

Jacob M. Calais  
Notary Public:

My commission expires: March 3, 2006



**SCHEDULE A  
PROTECTED PROPERTY**

All those parcels of land and other real property interests, whether appurtenant or in gross, located in the town of Rowe, Franklin County, and the town of Florida, Berkshire County, Massachusetts, conveyed by New England Power Company (NEPCO) to Grantor by instrument dated August 21, 1998, on record with the Franklin County Registry of Deeds in Book 3393, Page 311, and with the Berkshire Northern District Registry of Deeds in Book 963, Page 209.

Together with Grantor's interests under lease dated November 23, 1998, between Grantor and Bear Swamp Generating Trust No. 1 and Bear Swamp Generating Trust No. 2, notice of which is recorded with the Franklin County Registry in Book 3429, Pages 141 and 163, and with the Berkshire North Registry in Book 969, Pages 692 and 714, subject to rights of tenant thereunder.

Said parcels of land being bounded and shown on a plan entitled "Existing Conditions Plan of Bear Swamp - Project No. 2669 Prepared for USGen New England, Inc., Florida & Rowe, Massachusetts" dated November 23, 1998, by Cullinan Engineering Company, Inc., of Auburn and Boston, Massachusetts, a copy of which is on file with the Grantor and the Grantee, being more particularly described in Exhibit A, attached.

**EXHIBIT A  
BEAR SWAMP DESCRIPTION**

DESCRIPTION OF LAND IN THE COMMONWEALTH OF MASSACHUSETTS, LOCATED ON TUNNEL ROAD IN THE TOWN OF ROWE, FRANKLIN COUNTY, AND ALSO ON RIVER ROAD IN THE TOWN OF FLORIDA, BERKSHIRE COUNTY, BEING OWNED BY USGEN NEW ENGLAND, INC., KNOWN AS AND LICENSED BY THE FEDERAL ENERGY REGULATORY COMMISSION AS "BEAR SWAMP - PROJECT 2669" BOUNDED AND DESCRIBED AS FOLLOWS:

BEGINNING AT AN IRON ROD FOUND ON THE NORTHERLY SIDELINE OF TUNNEL ROAD AT THE SOUTHWESTERLY CORNER OF LAND NOW OR FORMERLY OF USGEN NEW ENGLAND INC.;

THENCE: N 01° 54' 58" W A DISTANCE OF 338.16 FEET ;

THENCE: N 42° 05' 30" E A DISTANCE OF 46 FEET ;

THENCE: N 00° 23' 30" E A DISTANCE OF 759 FEET ;

THENCE: N 53° 51' 30" W A DISTANCE OF 167 FEET ;

THENCE: N 81° 38' 30" W A DISTANCE OF 199 FEET ;

THENCE: S 81° 40' 30" W A DISTANCE OF 172 FEET ;

THENCE: S 88° 40' 30" W A DISTANCE OF 178 FEET ;

THENCE: N 74° 09' 30" W A DISTANCE OF 2323 FEET ;

THENCE: S 88° 02' 30" W A DISTANCE OF 448 FEET ;

THENCE: N 89° 11' 30" W A DISTANCE OF 200 FEET ;

THENCE: N 85° 53' 30" W A DISTANCE OF 852 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 396 FEET TO AN IRON PIN FOUND ON THE SOUTHERLY SIDELINE OF THE RIVER ROAD ;

THENCE: CROSSING THE RIVER ROAD ON A TIE COURSE OF N 09° 28' 30" W A DISTANCE OF 67.15 FEET TO THE NORTHERLY LINE OF SAID ROAD ;

THENCE: N 09° 28' 30" W A DISTANCE OF 415.95 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 495 FEET ;

THENCE: N 09° 28' 30" W A DISTANCE OF 1180 FEET TO FIFE BROOK ;

THENCE: SOUTHEASTERLY ALONG SAID BROOK A DISTANCE OF 114 FEET ;

BK 1031 PG 856

THENCE: N 03° 28' 25" E A DISTANCE OF 1150 FEET ;

THENCE: S 84° 46' 35" E A DISTANCE OF 1399 FEET ;

THENCE: N 13° 46' 05" E A DISTANCE OF 926 FEET ;

THENCE: N 75° 36' 07" W A DISTANCE OF 2024.90 FEET ;

THENCE: S 56° 26' 48" W A DISTANCE OF 833.26 FEET ;

THENCE: S 04° 32' 25" W A DISTANCE OF 84.84 FEET ;

THENCE: N 72° 16' 35" W A DISTANCE OF 1199.80 FEET ;

THENCE: N 27° 08' 25" E A DISTANCE OF 191.92 FEET ;

THENCE: S 84° 32' 35" E A DISTANCE OF 1087.60 FEET ;

THENCE: S 03° 23' 40" W A DISTANCE OF 35.51 FEET ;

THENCE: N 56° 24' 25" E A DISTANCE OF 756.82 FEET ;

THENCE: S 75° 41' 33" E A DISTANCE OF 1852.87 FEET ;

THENCE: N 56° 09' 51" E A DISTANCE OF 968.51 FEET ;

THENCE: S 68° 43' 44" E A DISTANCE OF 1251.80 FEET ;

THENCE: S 84° 23' 17" E A DISTANCE OF 2067.75 FEET ;

THENCE: N 63° 15' 24" E A DISTANCE OF 1484 FEET TO OTHER LAND OF USGEN NEW ENGLAND, INC., KNOWN AS "DEERFIELD NO. 5 - PROJECT 2323" ;

THENCE: S 22° 15' 37" E A DISTANCE OF 381.22 FEET TO RIVER ROAD, SAID POINT LAYING 234 FEET EASTERLY OF A CONCRETE BOUND FOUND;

THENCE: N 67° 12' 19" E ALONG RIVER ROAD A DISTANCE OF 193.00 FEET ;

THENCE: S 05° 55' 41" E CROSSING RIVER ROAD A DISTANCE OF 68.96 FEET ;

THENCE: S 05° 55' 41" E A DISTANCE OF 526 FEET TO THE 880 FOOT CONTOUR ELEVATION ;

THENCE: EASTERLY AND NORTHERLY ALONG THE 880 FOOT CONTOUR BUT EXCEPTING THE DEERFIELD NO. 5 POWERHOUSE A DISTANCE OF 5430 FEET TO SAID "DEERFIELD NO. 5 - PROJECT 2323" ;

THENCE: S 88° 49' 20" E A DISTANCE OF 1360 FEET ;

THENCE: S 13° 08' 40" W A DISTANCE OF 1645 FEET ;



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THENCE: S 88° 09' 20" E A DISTANCE OF 165 FEET ;  
THENCE: S 08° 08' 40" W A DISTANCE OF 1655 FEET ;  
THENCE: S 88° 09' 20" E A DISTANCE OF 231 FEET ;  
THENCE: S 11° 12' 34" E A DISTANCE OF 527.74 FEET ;  
THENCE: S 25° 19' 40" W A DISTANCE OF 231 FEET ;  
THENCE: S 10° 19' 40" W A DISTANCE OF 924 FEET ;  
THENCE: S 89° 19' 40" W A DISTANCE OF 231 FEET ;  
THENCE: S 38° 40' 05" W A DISTANCE OF 771.72 FEET ;  
THENCE: S 07° 48' 55" E A DISTANCE OF 496.13 FEET ;  
THENCE: S 08° 15' 10" E A DISTANCE OF 412.91 FEET ;  
THENCE: S 13° 53' 39" E A DISTANCE OF 792.18 FEET ;  
THENCE: S 87° 39' 54" W A DISTANCE OF 1665.96 FEET ;  
THENCE: S 05° 30' 19" E A DISTANCE OF 725.91 FEET ;  
THENCE: S 87° 51' 22" W A DISTANCE OF 501 FEET ;  
THENCE: S 05° 30' 19" E A DISTANCE OF 1161 FEET TO TUNNEL ROAD ;  
THENCE: S 88° 12' 20" W A DISTANCE OF 178.10 FEET ;  
THENCE: N 76° 13' 02" W A DISTANCE OF 117.15 FEET ;  
THENCE: S 87° 20' 38" W A DISTANCE OF 402.92 FEET ;  
THENCE: AN ARC DISTANCE OF 156.62 FEET ALONG A CURVE TO THE RIGHT HAVING A  
RADIUS OF 200.00 FEET AND AN INTERIOR ANGLE OF 44° 52' 08" ;  
THENCE: N 47° 47' 14" W A DISTANCE OF 99.24 FEET ;  
THENCE: N 65° 51' 26" W A DISTANCE OF 326.50 FEET ;  
THENCE: AN ARC DISTANCE OF 142.91 FEET ALONG A CURVE TO THE LEFT HAVING A  
RADIUS OF 150.00 FEET AND AN INTERIOR ANGLE OF 54° 35' 13" ;  
THENCE: S 59° 33' 21" W A DISTANCE OF 182.30 FEET ;  
THENCE: AN ARC DISTANCE OF 134.59 FEET ALONG A CURVE TO THE LEFT HAVING A  
RADIUS OF 300.00 FEET AND AN INTERIOR ANGLE OF 25° 42' 18" ;

THENCE: S 33° 51' 03" W A DISTANCE OF 152.04 FEET ;

THENCE: S 42° 17' 56" W A DISTANCE OF 81.03 FEET ;

THENCE: S 50° 33' 56" W A DISTANCE OF 68.40 FEET ;

THENCE: S 56° 55' 56" W A DISTANCE OF 97.07 FEET ;

THENCE: S 47° 50' 56" W A DISTANCE OF 140.37 FEET ;

THENCE: AN ARC DISTANCE OF 231.29 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 351.75 FEET AND AN INTERIOR ANGLE OF 37° 40' 26" ;

THENCE: S 85° 31' 22" W A DISTANCE OF 89.88 FEET ;

THENCE: AN ARC DISTANCE OF 114.72 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 158.50 FEET AND AN INTERIOR ANGLE OF 41° 28' 05" ;

THENCE: S 44° 03' 17" W A DISTANCE OF 231.85 FEET ;

THENCE: S 42° 38' 29" W A DISTANCE OF 211.03 FEET ;

THENCE: S 39° 11' 00" W A DISTANCE OF 223.95 FEET ;

THENCE: S 62° 50' 19" W A DISTANCE OF 249.64 FEET TO AN IRON PIN AT THE POINT OF BEGINNING.

EXCEPTING RIVER ROAD, DESCRIBED AS FOLLOWS :

BEGINNING AT AN IRON PIN FOUND ON THE WESTERLY SIDELINE OF LAND OF USGEN NEW ENGLAND, INC., AND ON THE SOUTHERLY SIDELINE OF RIVER ROAD

THENCE: S 88° 50' 48" E A DISTANCE OF 528.64 FEET ;

THENCE: S 82° 37' 35" E A DISTANCE OF 200.00 FEET TO A POINT 33 FEET RIGHT OF STATION 0+00 AS SHOWN ON THE DECEMBER 5, 1972 BERKSHIRE COUNTY LAYOUT OF RIVER ROAD IN FLORIDA ;

THENCE: S 82° 37' 35" E A DISTANCE OF 390.00 FEET ;

THENCE: AN ARC DISTANCE OF 673.77 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 100° 47' 39" ;

THENCE: N 03° 25' 13" W A DISTANCE OF 180.17 FEET ;

THENCE: AN ARC DISTANCE OF 212.69 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 406.20 FEET AND AN INTERIOR ANGLE OF 30° 00' 02" ;

THENCE: N 33° 25' 13" W A DISTANCE OF 728.80 FEET ;

THENCE: AN ARC DISTANCE OF 380.24 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $68^{\circ} 43' 34''$ ;

THENCE: N  $35^{\circ} 18' 20''$  E A DISTANCE OF 134.75 FEET;

THENCE: AN ARC DISTANCE OF 283.73 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $42^{\circ} 26' 43''$ ;

THENCE: N  $07^{\circ} 08' 25''$  W A DISTANCE OF 84.94 FEET;

THENCE: AN ARC DISTANCE OF 207.38 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $37^{\circ} 28' 58''$ ;

THENCE: N  $30^{\circ} 20' 35''$  E A DISTANCE OF 166.46 FEET;

THENCE: AN ARC DISTANCE OF 110.71 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $16^{\circ} 33' 43''$ ;

THENCE: N  $13^{\circ} 46' 52''$  E A DISTANCE OF 1570.56 FEET;

THENCE: AN ARC DISTANCE OF 591.41 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $106^{\circ} 53' 36''$ ;

THENCE: S  $59^{\circ} 19' 32''$  E A DISTANCE OF 453.82 FEET;

THENCE: AN ARC DISTANCE OF 407.91 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 993.00 FEET AND AN INTERIOR ANGLE OF  $23^{\circ} 32' 11''$ ;

THENCE: S  $82^{\circ} 51' 44''$  E A DISTANCE OF 761.09 FEET;

THENCE: AN ARC DISTANCE OF 401.91 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 6512.67 FEET AND AN INTERIOR ANGLE OF  $3^{\circ} 32' 09''$ ;

THENCE: S  $86^{\circ} 23' 53''$  E A DISTANCE OF 1091.37 FEET;

THENCE: AN ARC DISTANCE OF 335.69 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 480.84 FEET AND AN INTERIOR ANGLE OF  $40^{\circ} 00' 00''$ ;

THENCE: AN ARC DISTANCE OF 245.05 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 1040.02 FEET AND AN INTERIOR ANGLE OF  $13^{\circ} 30' 00''$ ;

THENCE: N  $67^{\circ} 06' 07''$  E A DISTANCE OF 173.00 FEET;

THENCE: AN ARC DISTANCE OF 287.22 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1061.70 FEET AND AN INTERIOR ANGLE OF  $15^{\circ} 30' 00''$ ;

THENCE: AN ARC DISTANCE OF 428.53 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 1573.56 FEET AND AN INTERIOR ANGLE OF  $15^{\circ} 36' 12''$ ;

THENCE: N  $67^{\circ} 12' 19''$  E A DISTANCE OF 406.98 FEET TO OTHER LAND OF USGEN NEW ENGLAND INC., KNOWN AS "DEERFIELD NO. 5 - PROJECT 2323";

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THENCE: CROSSING RIVER ROAD ON A TIE COURSE OF N 05° 55' 41" W A DISTANCE OF 68.96 FEET ;

THENCE: S 67° 12' 19" W A DISTANCE OF 427.00 FEET ;

THENCE: AN ARC DISTANCE OF 446.50 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1639.56 FEET AND AN INTERIOR ANGLE OF 15° 36' 12" ;

THENCE: AN ARC DISTANCE OF 269.36 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 995.70 FEET AND AN INTERIOR ANGLE OF 15° 30' 00" ;

THENCE: S 67° 06' 07" W A DISTANCE OF 173.00 FEET ;

THENCE: AN ARC DISTANCE OF 260.60 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 1106.02 FEET AND AN INTERIOR ANGLE OF 13° 30' 00" ;

THENCE: AN ARC DISTANCE OF 289.61 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 414.84 FEET AND AN INTERIOR ANGLE OF 40° 00' 00" ;

THENCE: N 86° 23' 53" W A DISTANCE OF 1091.37 FEET ;

THENCE: AN ARC DISTANCE OF 397.84 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 6446.67 FEET AND AN INTERIOR ANGLE OF 3° 32' 09" ;

THENCE: N 82° 51' 44" W A DISTANCE OF 761.09 FEET ;

THENCE: AN ARC DISTANCE OF 380.80 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 927.00 FEET AND AN INTERIOR ANGLE OF 23° 32' 11" ;

THENCE: N 59° 19' 32" W A DISTANCE OF 453.82 FEET ;

THENCE: AN ARC DISTANCE OF 714.54 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 106° 53' 36" ;

THENCE: S 13° 46' 52" W A DISTANCE OF 1570.56 FEET ;

THENCE: AN ARC DISTANCE OF 91.63 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF 16° 33' 43" ;

THENCE: S 30° 20' 35" W A DISTANCE OF 166.46 FEET ;

THENCE: AN ARC DISTANCE OF 250.56 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF 37° 28' 58" ;

THENCE: S 07° 08' 25" E A DISTANCE OF 84.94 FEET ;

THENCE: AN ARC DISTANCE OF 234.84 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF 42° 26' 43" ;

THENCE: S 35° 18' 20" W A DISTANCE OF 134.75 FEET ;

BK 1031 PG 861

THENCE: AN ARC DISTANCE OF 459.41 FEET ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 383.00 FEET AND AN INTERIOR ANGLE OF  $68^{\circ} 43' 34''$  ;

THENCE: S  $33^{\circ} 25' 13''$  E A DISTANCE OF 728.80 FEET ;

THENCE: AN ARC DISTANCE OF 178.13 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 340.20 FEET AND AN INTERIOR ANGLE OF  $30^{\circ} 00' 02''$  ;

THENCE: S  $03^{\circ} 25' 13''$  E A DISTANCE OF 180.17 FEET ;

THENCE: AN ARC DISTANCE OF 557.66 FEET ALONG A CURVE TO THE RIGHT HAVING A RADIUS OF 317.00 FEET AND AN INTERIOR ANGLE OF  $100^{\circ} 47' 39''$  ;

THENCE: N  $82^{\circ} 37' 35''$  W A DISTANCE OF 390.00 TO STATION 0+00 OF SAID COUNTY LAYOUT ;

THENCE: N  $82^{\circ} 37' 35''$  W A DISTANCE OF 203.59 FEET ;

THENCE: N  $88^{\circ} 50' 48''$  W A DISTANCE OF 544.64 TO A POINT ON THE WESTERLY LINE OF LAND OF USGEN NEW ENGLAND INC.;

THENCE: CROSSING THE RIVER ROAD ON A TIE COURSE OF S  $09^{\circ} 30' 06''$  E A DISTANCE OF 67.16 TO AN IRON PIN FOUND AT THE POINT OF BEGINNING.

CONTAINING 1256 ACRES, MORE OR LESS

ACCEPTANCE OF GRANT

Grantee joins herein for the purpose of accepting the foregoing grant and agreeing to be bound by the provisions thereof.

*July* IN WITNESS WHEREOF, Grantee executes this Grant under seal this 11th day of July, 2001.

GRANTEE  
Commonwealth of Massachusetts  
Department of Environmental Management

By: *Peter C. Webber*  
Peter C. Webber, Commissioner

COMMONWEALTH OF MASSACHUSETTS

Suffolk County, ss:

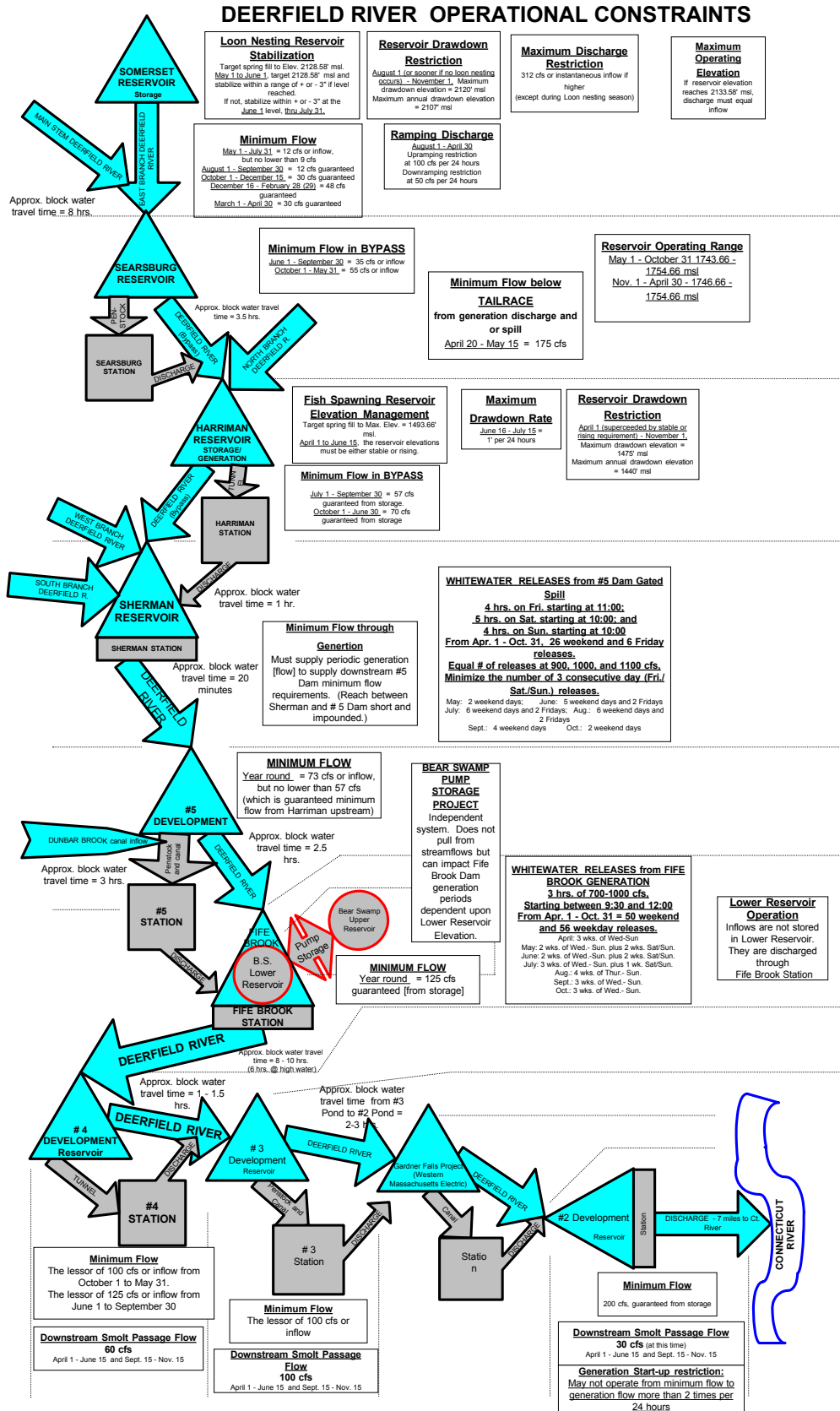
At 11:10am, this 11th day of July, 2001, personally appeared Peter C. Webber, the Commissioner of the Massachusetts Department of Environmental Management, and acknowledged the foregoing instrument to be his free act and deed and the free act and deed of the Commonwealth of Massachusetts, before me.

*John Black*  
Notary Public: John Black

My commission expires: May 27, 2005

END OF DOCUMENT  
Northern Berkshire Registry of Deeds

# Appendix C. River Operational Constraints Chart.



**UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION**

Brookfield Renewable Energy Group  
Project No. 2669  
Application for New License

Bear Swamp Project

CRAB APPLE WHITEWATER'S COMMENTS IN RESPONSE TO THE 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 REGARDING THE BEAR SWAMP  
PUMPED STORAGE PROJECT, FERC PROJECT NO. 2669  
Crab Apple Whitewater, Inc.

April 9, 2015



Crab Apple Whitewater, Inc. is a family owned whitewater business based in Charlemont, Massachusetts and The Forks, Maine. Crab Apple has run commercial rafting trips on the Deerfield since 1989. Crab Apple Whitewater, Inc. is a charter member of New England F.L.O.W.

Since 1989, Crab Apple has carried over 265,000 passengers on the Deerfield River. Commercial operations on the river are intertwined with the operation of the Bear Swamp Pumped Storage and Fife Brook Hydroelectric developments.

We have examined the PAD submitted by Brookfield Renewable Energy. In this letter, we make requests to be considered by FERC and Brookfield Renewable Energy related to the operations, access and safety of this facility and surrounding lands. Crab Apple Whitewater, Inc. was the first outfitter to run commercial trips on the Deerfield River in 1989. Our interests in this relicensing process are to improve recreational whitewater activities, safety and access.

### 1. PAD 4.3.1.1 Upper Reservoir

Safety is the number one goal of all river users looking to recreate on the Deerfield River. Communication is poor in the river valley.

Requested change:

- a. Add cell phone tower with multiple carriers at Upper Reservoir site.

### 2. PAD 5.3.5 Existing Instream Flow Uses

Requested changed:

- a. Add "commercial rafting"

### 3. PAD 5.9.1.1 Fife Brook Fishing and Boating Access Areas

The Fife Brook access area has become overwhelmed with the increased use and types of use at the site. Commercial raft operations, private rafters, kayak clinics, private kayak users, canoe clinics, private canoe users, private wading fishermen, commercial wading fishing operators, private fishermen with oar rigged rafts, commercial fishing operators with oar rigged rafts, private tubers and others are all competing for limited space at the site. One set of stairs and one aluminum pipe slide is inadequate. The downstream access is a simple rock slide that is dangerous and not controlling erosion.

Requested changes:

- a. 5.9.1.1 Correction. The access area has one aluminum slide, not two.
- b. Need for improvements:
  1. The upstream access point used by commercial rafting operators needs improvement in its landing area which is miniscule in size and has no flat landing areas on either the upstream or downstream side of the stairs.
  2. The downstream access (a rock slide) does not provide safe access for river users and no erosion/sediment control.

Requested changes:

- a. Build a cul de sac access point several hundred yards upstream of the existing stairs and aluminum slide. At this entry point build stairs/ramp and aluminum slide for large craft such as rafts and oar-rigged fishing boats.
- b. Improve landing at bottom of existing stairs and aluminum slide.
- c. Build stairs and aluminum slide at site of downstream access point.
- d. Provide power at all three access points for inflating craft. Currently, inflatable craft are inflated using a system of generators and air pumps. The generators are extremely loud and burn fuel. The noise is very detrimental to river users such as fishermen who are enjoying the tranquility of the river each morning.

- e. Provide Wi-Fi and telephone hotspots so river users can access resources such as Waterline to learn real-time and anticipated flow levels to make determinations on river safety.
- f. Remove gate at top of Fife Brook Access.
- g. Add signage at several locations indicating that "The stretch of river from Fife Brook Dam to Zoar Gap contains Class I-III rapids and is appropriate for craft and users with some experience and knowledge of whitewater. Users should have all relevant safety equipment including, but not limited to, PFD and helmet. Tubing is not an appropriate activity on this section of river. Safe access for tubing is provided five miles downstream at Zoar Picnic Area."

#### 4. PAD 5.9.1.1 Zoar Whitewater Access Area

The purpose of the access area above Zoar Gap rapid is to provide boat top access to river users beginning a river excursion at this site or ending a river trip at this site. Of special importance is the signage that warns downstream traffic that a significant rapid is immediately downstream and that unprepared or novice river users should exit the river.

The recent additions to the parking area are helpful. The kiosk is well placed. However, the entry and exit point at the river and the safety signage are inadequate.

Requested changes:

- a. Build large eddy in same location as small, informal eddy. Eddy needs to be large enough to hold any type of craft that is taking out or putting in.

- b. More visible, clear signage with warnings, portage options and name of approaching rapid, "Zoar Gap".

#### 5. PAD 5.9.1.1 Zoar Picnic Area

Zoar Picnic area is a very popular space for river users, picnickers and other area visitors. Portable toilets, river access and picnic spaces are well used and appreciated by the public.

Proposed changes:

- a. Additional parking and signage is needed outside the picnic grounds on the opposite side of the road, closer to Zoar Gap. The picnic area is overwhelmed on summer weekends and needs overflow parking available. If this land is not owned by Bear Swamp Power, purchase or lease this land for parking and access.
- b. A large, covered pavilion or several smaller pavilions are needed for inclement weather.

#### 6. PAD 5.9.1.1 Fife Brook Development Whitewater Releases

Scheduled, partially predictable whitewater releases are the driving force behind the growth in river use below Fife Brook Dam. Dam releases bring all kinds of river users to the river to paddle, raft and float.

Requested changes:

- a. Minimum whitewater flow needs to change to 800cfs or more. Whitewater flows have been run at 800cfs for over 15 years due to a handshake agreement made between FLOW and NEP in the late 1990's. A recalibration at Fife Brook station revealed that perceived whitewater flows of 700cfs were actually 800cfs and the agreement has been followed with every owner since.
- b. Offer some scheduled releases at flows in excess of 800cfs. Provide flows of 1,000 -1,400 cfs several times each month May – September. Dates to be determined at annual scheduling meeting.
- c. Release times must be more predictable. Scheduled three hour releases must begin at a certain time or earlier. A starting time of 10:00 is ideal for whitewater paddlers. This would follow projects such as Harris Station on the Kennebec River where commercial rafting is also very popular.
- d. More guaranteed whitewater releases are necessary. All generation from April through October should run at boatable flows (above 800cfs).

April – current schedule is OK

May – need to modify, augment schedule

June – need to augment schedule

July – need to augment schedule

August – need to augment schedule

September – need to modify schedule

October – need to modify schedule

- e. Waterline information needs to be updated more regularly. Delays in updates may result in safety issues for all river users.

Flow forecasts should immediately reflect changes relayed from ISO New England to Bear Swamp Power.

#### 7. PAD 5.9.1.1 Whitewater Boating

The Deerfield River is a premier resource for whitewater boating. It offers a wide range of challenge for all types of users and is rated Class I – IV. The Bear Swamp project divides two of the whitewater sections – the first runs below the No.5 project in Monroe to the Bear Swamp Lower Reservoir and the second extends from Fife Brook Dam to Deerfield No. 4 station.

The Monroe Bridge stretch below No.5 project is more than a 3 mile-long reach. Two or more miles at the end of the reach are under the lower reservoir. On occasion, rapids and drops under the lower reservoir are exposed and accessed by boaters. These rapids need to be made available when the 32 whitewater releases are scheduled at No. 5 station. Access needs to be provided from these exposed rapids to a new take-out or back to the existing river access.

Requested change:

- a. Drop the Bear Swamp Reservoir elevation to expose rapids and drops under reservoir on 32 scheduled whitewater release dates at #5 Station in Monroe.

## 8. PAD 5.9.1.1 Public Access Areas Along Deerfield River. Table 5.9-2

Access to and from the Deerfield in the lower reaches of the Deerfield are overwhelmed on busy weekend dates. Shunpike Rest Area needs improved access for safety and erosion control. Toilet facilities and more picnic tables are also needed. The “unnamed put-in”, referred to be locals as “the boat ramp” needs to be paved and dredged. Hurricane Irene damaged this area and it has not be rehabilitated.

Requested changes:

- a. Purchase/Lease Shunpike Rest Area property from Massachusetts Highway Department. Build multiple access points for safe access and egress as well as erosion control. Provide portable toilets similar to other popular facilities from April through October.
- b. Purchase the “unnamed put-in” and pave the road for vehicles hauling boats on trailers. Build a paved boat ramp. Dredge the area at the put-in. The boat ramp is full of debris from Hurricane Irene in 2011.

## 9. PAD 5.9.1.1 Tubing

The number of people floating on tubes on the Deerfield River below Fife Brook Dam has increased exponentially since 2000. Hundreds of tubers, occasionally more than one thousand, enjoy floating on the Deerfield on a hot summer day. Along with the increased number of users have come challenges related to parking, abuse of private property, litter and alcohol use on the river. Crab Apple Whitewater and Brookfield Renewable Energy have joined the Deerfield River Forum to discuss these issues and work



toward solutions. Bear Swamp Power has provided financial support to law enforcement efforts to address the safety and behavior issues on the Deerfield

Proposed change:

- a. Brookfield Renewable Energy contribute funds annually to law enforcement efforts and increase the amount by the CPI each year.

#### 10. PAD 5.9.1.1 Angling

Safety is a major concern for anglers and all river users below Fife Brook Dam when transitioning from 125cfs to generation discharge levels. Ramping for 15 minutes at a 3MW level is a good safety measure.

Requested change:

- a. Limit ramping to a maximum of 15 minutes.

#### 11. PAD 5.9.3 Current Project Recreational Use Levels

Figures for the recreational use below the Fife Brook Development are cited from 2009. They are low for 2009 and even more inaccurate in 2015.

Recreation below Fife Brook development occurs twelve months a year. It is not limited to Memorial Day through October. Anglers and paddlers can be found each month of the year.

Commercial use below Fife Brook Dam in 2014 was approximately 23,000 passengers. Private users include another 20,000 – 30,000 annually. User totals annually are 43,000 – 50,000+ users.

## 12. PAD 5.9.6.1 2012 SCORP

The number one need identified in the Massachusetts SCORP is for all types of trails. A trail needs to be developed from Fife Brook Dam or the 1.3 mile Lookout Trail to the Charlemont trail system. Lands need to be purchased to connect this stretch of the Deerfield to existing hiking and bike trails in Charlemont.

## Contacts for Crab Apple Whitewater, Inc.

Frank and Jennifer Mooney

Crab Apple Whitewater, Inc.

2056 Mohawk Trail

Charlemont, MA 01339

413-625-2288

[info@crabapplewhitewater.com](mailto:info@crabapplewhitewater.com)

[fjmooney@msn.com](mailto:fjmooney@msn.com)

Document Content(s)

PAD Response 4 - 15.DOCX.....1-12

**From:** Tom Christopher [<mailto:tom.christopher@comcast.net>]

**Sent:** Tuesday, April 07, 2015 11:28 AM

**To:** Culligan, David

**Subject:** Deerfield River Pictures

Good Morning Dave,

As promised, albeit late, I am attaching two photographs that demonstrate the crowding by tubers on the Deerfield River. I apologize for not getting these to you sooner but I had misplaced your business card, and just discovered it in another one of my files.

Also, the consultant group we have worked with on whitewater studies for the past 20+ years are the TRC group based out of Maine. You may want to contact:

Bill Campbell, Senior Environmental Specialist

Gabriel Drive

Augusta, Maine 04330

Phone: (207) 620-3849

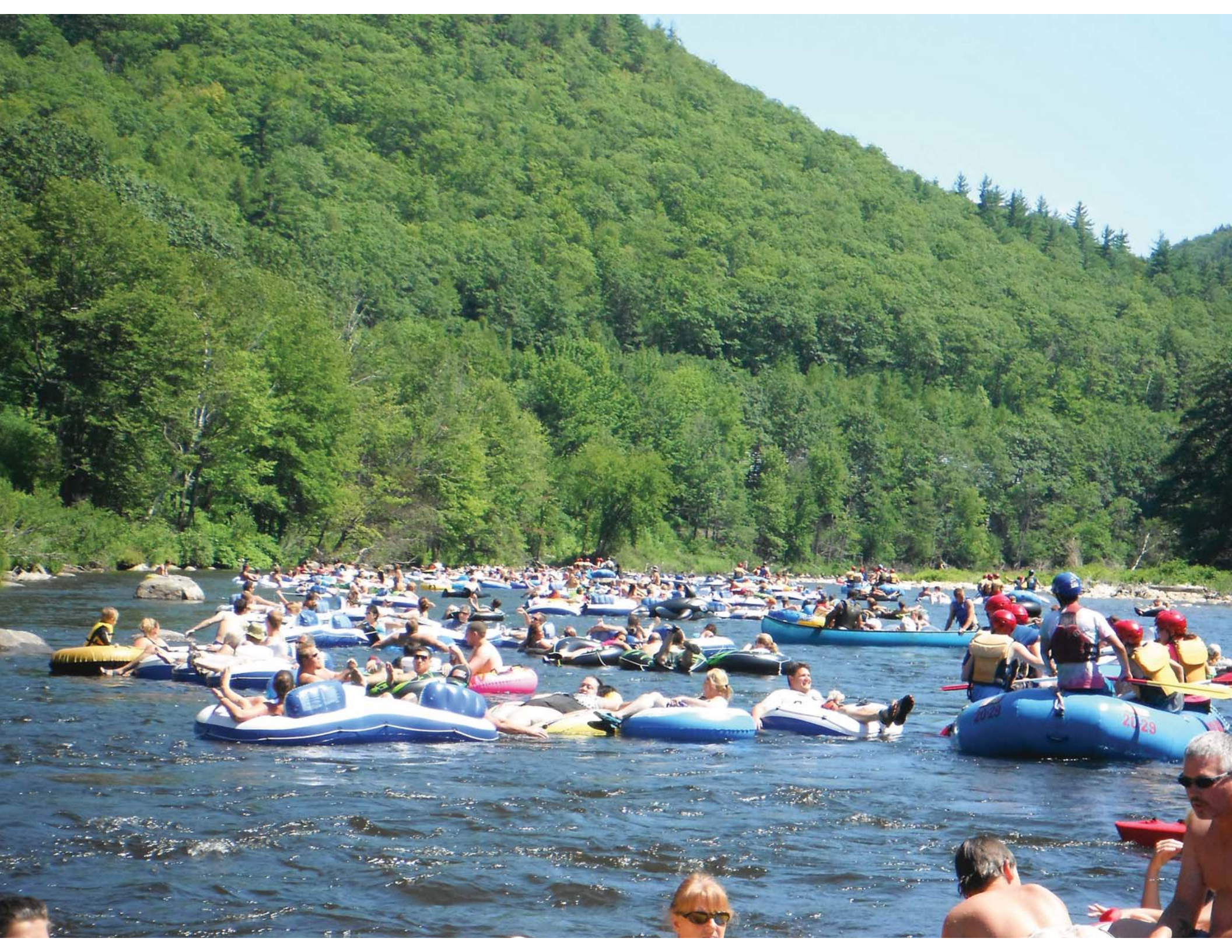
Email: [wbcambell@trcsolutions.com](mailto:wbcambell@trcsolutions.com)

FLOW, American Whitewater, and the Appalachian Mountain Club are very comfortable with their methodology in gathering the type of information that will be needed to complete the studies in the Bear Swamp Relicensing.

Regards,

Tom Chistopher





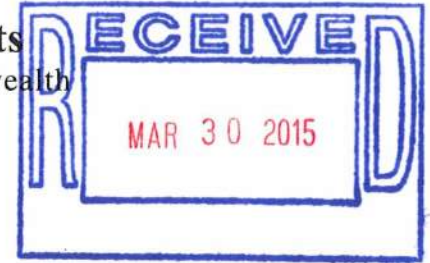








**The Commonwealth of Massachusetts**  
William Francis Galvin, Secretary of the Commonwealth  
Massachusetts Historical Commission



March 23, 2015

Secretary Kimberly D. Bose  
Federal Energy Regulatory Commission  
888 First St NE Room 1A  
Washington DC 20426

RE: Bear Swamp Power, L.L.C., Bear Swamp Project Relicensing (Bear Swamp Pumped Storage & Fife Brook Development), MA. MHC #RC.14672. **FERC Project #2669-085.**

Dear Secretary Bose:

The Massachusetts Historical Commission (MHC), office of the State Historic Preservation Officer (SHPO), received on February 24, 2015, the Federal Energy Regulatory Commission's "Notice of Intent to file license application, filing of pre-application document (PAD)," etc. and the "Scoping Document 1 for Bear Swamp Project.

The MHC concurs with the FERC's scope which includes a Cultural Resources Study. The Cultural Resources Study proposes to identify historic properties, to assess the effects of the operation of the facilities upon historic properties, and to develop a Cultural Resource Management Plan. Historic properties survey and inventory data pertinent to the project area is on file at the MHC, and should be reviewed and analyzed as part of that effort by qualified historic preservation and archaeology professionals.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 as amended (36 CFR 800). If you have any questions, please contact Edward L. Bell, Deputy State Historic Preservation Officer at the MHC.

Sincerely,

A handwritten signature in black ink that reads "Brona Simon".

Brona Simon  
State Historic Preservation Officer  
Executive Director  
State Archaeologist  
Massachusetts Historical Commission

xc: Steven P. Murphy, Brookfield Renewable Energy Group



# New England *FLOW*

252 Fort Pond Inn Road, Lancaster, MA 01523 Tel. (978) 331-4889 FAX: (978) 728-4544 Email: tom.christopher@comcast.net

## UNITED STATES OF AMERICA FEDERAL ENERGY REGULATORY COMMISSION

### NEW ENGLAND FLOW'S COMMENTS ON THE PRE-APPLICATION DOCUMENT AND SCOPING DOCUMENT (SD-1) FOR THE BEAR SWAMP POWER COMPANY, LLC--BEAR SWAMP PUMP STORAGE PROJECT

#### FERC PROJECT NO. P-2669-085

Since 1988 New England FLOW (FLOW) has promoted the protection, enjoyment, and understanding of the mountains, forests, waters, and trails of the New England region. FLOW is the largest coalition of whitewater boaters in the Northeast, many of whom live within three hours of the Deerfield River, and currently enjoys this reach as a whitewater opportunity. In addition to whitewater many others visit this region of western Massachusetts to camp, fish, hike, canoe and picnic as daylong or longer trips. FLOW is one of the original signatories to the precedent setting "*Deerfield Settlement Agreement*", and as a steering committee member of the Hydropower Reform Coalition has had a prominent role in developing the integrated licensing process (ILP) with FERC staff.

New England FLOW received a letter from HDR, Inc. (HDR) dated September 19, 2014 requesting assistance in gathering information "*with the goal of filing a complete and thorough Pre-Application Document (PAD) in preparation for the relicensing of the Bear Swamp Pump Storage Project FERC # P-2669-085*". New England FLOW responded to this request in a letter addressed to Mr. Rob Quiggle, Senior Regulatory Specialist, on October 8, 2014.

In FLOW's letter we identified eight (8) resources for information directly pertaining to current whitewater usage of the Deerfield River; three (3) resources for specific economic data directly connected to recreational use for the river and the region; and three (3) resources that could provide empirical data connected to the biological, ecological, and comprehensive health of the Deerfield River.

FLOW identified specific issues of concern that should be noted in the PAD and addressed in study plans. These issues include the following:

- Inconsistent water release times for river flows;
- Unresponsive communications with Brookfield staff to outfitters, private boaters, and fishermen;
- Inadequacy of access points to the Deerfield River;
- Free and unimpeded river access regardless of river levels;
- Inadequacy of management of project & non-project lands relative to heavy river usage by all groups;

- Lack of power at put-in points for inflating rafts and other craft;
- River crowding by tubers,
- Lack of PFD enforcement on river;
- Inadequate financial support to Charlemont Town River Safety Program including enforcement of the alcohol ban and prevention of river litter;
- Lack of adequate sanitation at access points including Shunpike area on MA-RT. 2;
- Lack of camping facilities;
- Inadequate trail system through project lands:

Our comments iterated below are intended to assist FERC in developing meaningful study plans that reflect the changing recreational usage, demographic shifts, resource impacts, and project safety now demanded by the rapid growth in resource usage since the 1997 *Article 402 License Amendment*.

### **Comment 1: Changes in Whitewater Recreational Usage**

The Licensee PAD currently characterizes the current boating release schedule for the Fife Brook reach of the Deerfield but scoping document SD-1 proposes no whitewater feasibility analysis.

This no-action step will reveal nothing about the current project impacts on whitewater recreation or opportunities for additional protection, mitigation, or enhancement measures. This project has changed ownership several times since the 1997 *"Settlement Agreement"* and deregulation has changed the way the project is operated. We currently do not know the relationship between specific low and moderate flows and the various paddling experiences they could optimally provide. A desktop analysis can't generate this information. Without this information project impacts cannot fully be defined, nor does scoping document SD-1 propose or consider the provision of releases that provide targeted recreational experiences.

Using modern aerial mapping equipment now available, FLOW has noted at least five (5) sets of rapids beneath the pump storage impoundment. These previously unknown features should be evaluated as to their quality and efforts should be to make these resources available to the boating community.

### **COMMENT #2: Public Access Adequacy**

The PAD has done a credible job in identifying access to the recreational facilities for the Bear Swamp Impoundment and the Fife Brook Section of the Deerfield River. However scoping document SD-1 does not propose analysis of the quality or adequacy of these facilities, or their ability to meet the expanding needs of a varying recreational public. Information is missing on sanitation, parking area size, site erosion control, electrical service, and most importantly the ability of the noted access points to meet those whose needs are defined under the *"Americans with Disabilities Act"*.

In addition to whitewater recreation the Fife Brook Section of the Deerfield River is a well-known “catch and release” reach of the Deerfield River and is fished by private anglers and a number of commercial outfitters who float this reach with their clients. Since the 1997 “*Article 402 Amendment Order*” there has been an increased interest in providing handicapped access to rivers, lakes, and streams for boating, angling and other river-based activities primarily for injured military personnel returning from both Afghan and Iraqi conflicts. Current facilities are not adequate to serve this handicapped segment of the population, and scoping document SD-1 does not propose any studies regarding improvement to these access points.

As stated above, SD-1 should provide new information regarding the need to address adequate access for a more diverse cross-section of river enthusiasts and *this is vital to defining access facilities that can best be adapted for* both whitewater boating and other potential user groups.

### **COMMENT # 3: Camping and sanitary facilities**

The PAD provides an inventory of area camping opportunities available at Mohawk Trail State Forest, Savoy State Forest, and Mohawk Park, however all facilities noted are either state-run or private and are usually over-booked. There are currently no camping facilities provided by BSPC. Under “*TABLE 5.9-2 PUBLIC ACCESS AREAS ALONG THE DEERFIELD RIVER*” there are no sanitary facilities listed. While FLOW acknowledges that some sanitary facilities do exist at several access points, they are in woefully poor condition, unsanitary, and inadequate to support the current volume of usage. Scoping document SD-1 proposes to “*characterize existing recreational facilities and conditions in the project boundary and nearby areas*”, but elaborates no further regarding the scope and depth of their analysis, nor does the document describe what metrics will be used in this study.

This effort, at a minimum, should provide a quantitative and qualitative analysis of existing facilities to determine their ability to manage the increasing number of paddlers, anglers and other river users who are making trips on the Deerfield River, including those individuals who may be using other amenities on project lands.

FLOW notes the values summarized in the *Draft Massachusetts Statewide Comprehensive Outdoor Recreation Plan (SCORP)* published in 2012, and the priorities described as regional trends in central and western Massachusetts. The public has an interest in outdoor recreation that is compatible with water-based activities including those individuals whose needs are supported by the “*Americans with Disabilities Act*”. Also, handicapped access to camping and adequate sanitary facilities along streams and rivers will support high quality recreational use and economic benefits to other businesses within the regional economy. Current facilities are not adequate to serve this handicapped segment of the population. Scoping document SD-1 should include a survey of existing project lands that would be suitable for construction of additional camping facilities that would also be ADA compliant.

FLOW’S interest is in having sufficient information to understand what facilities currently exist and what, if any, improvements are necessary to manage an increasing use of day kayak and canoe trips on the Deerfield River, include recommendations for the acquisition and

development of additional facilities to meet the interest and needs identified in the Massachusetts SCORP documents cited by BSPC in the PAD.

#### **COMMENT #4: River Safety and Economic Analysis**

The Deerfield River is an important recreational and economic resource to the northwestern region of Massachusetts. Over the past five years we have witnessed its growing popularity during the summer months, particularly people of all ages floating the river in inner tubes (Tubers). This has resulted in river crowding, rowdy groups, alcohol use, and unfortunately, drowning.

Safety is a top priority for FLOW, BSPC, commercial outfitters and others. Collectively we want to ensure the Deerfield River remains a safe and enjoyable place for the many recreational, environmental and economic interests for which it is renowned. BSPC, along with representatives from American Whitewater, New England FLOW, river outfitters, and concerned citizens, held a meeting on November 16, 2012 to discuss options to increase safety on the river.

This discussion with outfitters, private boaters, elected officials and others resulted with mutually agreed upon actions and management policies to make the Deerfield River a safer place for all. BSPC, commercial outfitters, and many others contributed annually to fund police presence at the Zoar Gap picnic area to control alcohol on the river, inappropriate behavior, trash, and lack of personal flotation devices (PFD's). BSPC has contributed generously to financially support this effort.

The Deerfield River remains one of the few rivers in Massachusetts to still maintain its pristine water quality and remarkable recreational resources. It is important that steps be taken to protect the Deerfield River different user groups have all come to love. Scoping document SD-1 does not propose any in-depth analysis other than a general characterization mentioned earlier.

It is important to define who is coming to the Deerfield River to recreate, and the volume of individuals using the Fife Brook section below the impoundment to the area on MA-Rt. 2 known as the Shunpike. It is important to know the age, type of craft, experience, distance traveled, and dollars expended for the trip. It should also note the use of PFD's, the presence of alcohol.

Scoping document SD-1 should gather substantial data to provide insight to law enforcement and regional planners, with enough specific detail to support public policy actions that protect the Deerfield River and to maintain those values which make the region economically viable. Regional economic benefits derived from Deerfield River help to stabilize local economies and spin off other economic activity.

Information is needed to define strategies and public policy that BSPC can support to prevent river degradation, resource overuse, and unsafe behavior by user groups who are unfamiliar with river safety or etiquette.

Once again, the Deerfield River remains one of the few rivers in Massachusetts to still maintain its pristine water quality and remarkable recreational resources. FLOW's interest is in having

sufficient information to understand what steps can be taken to educate all river users of different age groups needing monitoring to improve safety and reduce inappropriate behavior and alcohol consumption.

**Conclusion:**

The Bear Swamp Pumped Storage Project has a direct impact on thousands of river users coming to the region from great distances and scoping document SD-1 should reflect the level of analysis the public and the region deserve

New England FLOW respectfully requests that FERC accept these comments and direct the licensee to revise its proposed study plans to address the concerns raised. Thank you for considering these comments.

Respectfully submitted this 12th day of March, 2015

Handwritten signature of Thomas J. Christopher in black ink.

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Thomas J. Christopher, Secretary/Director  
New England FLOW  
252 Fort Pond Inn Road  
Lancaster, Massachusetts 01523

Document Content(s)

FLOW's COMMENTS BSPC Scoping Document (SD-1) 3-12-15.DOC.....1-5

**UNITED STATES OF AMERICA  
FEDERAL ENERGY REGULATORY COMMISSION**

Brookfield Renewable Energy Group

Bear Swamp Project  
Project No. 2669  
Application for New License

**AMERICAN WHITEWATER'S COMMENTS IN RESPONSE TO THE 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 REGARDING THE BEAR SWAMP  
PUMPED STORAGE PROJECT, FERC PROJECT NO. 2669**

American Whitewater is a national non-profit 501(c)(3) river conservation and recreation organization founded in 1954. We have approximately 6,000 members and 100 affiliate clubs, representing tens of thousands of whitewater paddlers across the nation. American Whitewater's mission is to protect and restore our nation's whitewater resources and to enhance opportunities to enjoy them safely. Our members are primarily conservation-oriented kayakers and canoeists, many of whom live and/or engage in recreational boating in the western Massachusetts region, including the Deerfield River on which the Bear Swamp Project is located.

American Whitewater submits these comments in order to address deficiencies in the Pre-Application Document filed by Brookfield Renewable Energy Group for the Bear Swamp Project. Specifically, the Licensee has failed to adequately address the impact of the project on whitewater boating and other recreational opportunities within the project boundary, and should study whether those opportunities might be enhanced under another mode of operation or through decommissioning of the project. Accordingly, we request that FERC direct the Licensee to correct the deficiencies in its Pre-Application Document by providing supplemental information on the impact of its project works and mode of operation on whitewater boating and other recreational opportunities in order to provide FERC with sufficient information with which to complete its NEPA analysis.

**Issues**

**Issue 1: Enhance recreational opportunities below the Fife Brook Development through flow, facility, and safety improvements**

Unquestionably, the 1994 Settlement Agreement between New England Power and a dozen NGOs and resource agencies has had a profound impact on the recreational opportunities on the Deerfield River. The 106 scheduled whitewater releases from the Fife Brook Dam, along with the 32 scheduled release from Dam #5 operated by TransCanada, has brought 25,000 rafters, many thousands of private whitewater boaters, and large numbers of tubers to the region. Each year in July, we celebrate the success of the whitewater releases on the Deerfield River and their

AW/1

impact on the local community at the annual Deerfield Fest in Charlemont, a festival started by New England FLOW and American Whitewater two decades ago to commemorate the historic settlement agreement that brought whitewater boating to the Deerfield River.

The whitewater releases have stimulated an outdoor industry that has expanded multi-sport recreation opportunities for fishing, mountain biking, and zip lining, and has helped support the local economy through jobs and spending on food and lodging in the region. A study of the expected economic benefits of whitewater releases conducted at the time of the prior relicensing showed that the benefits of whitewater releases far outweigh the benefits from power generation. The past 20 years have borne out those predicted benefits. As we enter into a new relicensing cycle, we seek address several issues of concern and seek improvements in the recreational opportunities available on and around the Deerfield River below the Fife Brook Dam.

- Flow Improvements

Under the terms of the Settlement Agreement and the project license, the Licensee is required to release flows of at least 700 cfs from the Fife Brook Dam on 106 days annually. The flows are released according to a schedule set each year by agreement between the Licensee, local outfitters, and interested NGOs including American Whitewater, New England FLOW, Appalachian Mountain Club, and Trout Unlimited. The Licensee is required to provide a 3-hour release starting between 9:30 a.m. and noon according to the schedule, although releases generally begin on the later side. At other times, the Licensee must provided a minimum flow of 125 cfs; however, the Licensee frequently releases flows well in excess of its minimum flows based on generational or other flows by TransCanada.

The scheduled Fife Brook Dam releases provide thousands of people with the opportunity for beginning and intermediate whitewater boating on a reach containing numerous waves, holes and playspots. The whitewater run culminates in the Class III Zoar Gap, site of the 1993 National Slalom Championship. Running Zoar Gap upright is a right of passage for every new kayaker in the region and is a precondition for more advanced boating on the Dryway section of the river below the No. 5 Dam in Monroe. This section of the river also provides the opportunity for family-oriented rafting as well as tubing on a scenic river section. The releases of cold water from the bottom of Fife Brook Dam have also benefitted river habitat and improved trout fishing opportunities downstream.

As an initial matter, the Licensee needs to provide a more accurate measure of flows from Fife Brook Dam. There is no USGS gage at the dam. The nearest gage is USGS-01168500, which is located in Charlemont. Based on the drainage area, the Bear Swamp Project (254 sq. mi.) accounts for approximately 70 percent of drainage area at the Charlemont gage (361 sq. mi). A review of the flow data during scheduled release days during 2014 suggests that the Licensee released flows below the level specified by the settlement agreement and FERC license during September of 2014. Inaccurate flow measurement has also resulted in an informal agreement by the Licensee to release water at 800 cfs rather than the specified 700 cfs due to the inaccuracy of the original flow measurement.



The renewal of Brookfield's license for the Bear Swamp Project provides an opportunity to make flow improvements that would provide additional recreation benefits and improve the recreation experience. Specifically, the Licensee should conduct a controlled flow study to determine the optimal flow level for whitewater boating. During the prior licensing process, there was no study performed to determine the optimal level for whitewater boating, and the flows specified in the Settlement Agreement were based on a "best guess" as to optimal flows. Now with more than 20 years of experience by commercial outfitters and private boaters, we have vastly more knowledge about the river characteristics and optimal flow levels.

The Licensee should also explore the feasibility of shifting the timing of scheduled releases earlier in the day. Earlier releases would benefit recreation by permitting boating earlier in the day, expanding the number of river users. Earlier releases would also improve fish habitat through cold-water releases before the peak heat of the day warms water temperatures. The Licensee should also explore the feasibility of more frequent summer releases, and shift the scheduled October releases to the summer months, benefitting both recreation and fish habitat.

- Facility Improvements

The recreational experience of boaters would be enhanced through facility improvements below the Fife Brook Dam. The Licensee should improve access for private boaters who access the river from the unimproved path at the put-in. Constructing stairs at this location would allow private boaters to reach the river safely and avoid injury from falling on the muddy path that leads from the parking area to the river. Parking at the put-in is limited, and additional parking would promote additional recreational usage. Further downriver, roadside parking for river access by boaters and anglers is also limited, creating an unsafe condition for unloading boats, and access to the river is gained through unimproved paths. The Licensee should improve access by adding additional parking and improving river access at several locations, including, but not limited to the Zoar Whitewater Access Area.

With increasing numbers of disabled veterans and other handicapped individuals showing an interest in kayaking, providing handicapped accessible put-in and takeout locations is becoming increasingly important. Providing handicapped accessibility in public accommodations is also a requirement of state and federal law. The Massachusetts Public Accommodation Law (M.G.L. c. 272, §92A, 98 and 98A) prohibits making any distinction, discrimination, or restriction in admission to or treatment in a place of public accommodation based on religion, creed, class, race, color, denomination, sex, sexual orientation, nationality, or because of deafness or blindness, or any physical or mental disability. Under Massachusetts law, a public accommodation includes "a place of public amusement, recreation, sport, exercise or entertainment" (M.G.L. c. 272, §92A). The Licensee should assure that all of its access locations are accessible to all members of the recreating public.

The Licensee should also make facility improvements to enhance the recreational experience of boaters and anglers. The Licensee should improve sanitation facilities at both the Zoar Picnic Area and Fife Brook Dam boat launch locations through the construction of permanent pit toilets and changing rooms.

- River Safety Improvements

An unintended consequence of the success of the river releases has been an abundance of river tubers, which has stressed the river. The Licensee should be credited for its support for the Deerfield River Forum and its support for boater education and safety. The Deerfield River Forum is a collaborative effort supported by the Licensee, local outfitters, and private organizations, including American Whitewater and Trout Unlimited, with the goal of promoting PFD usage, eliminating alcohol usage on the river and at the Zoar Picnic Area, and ending littering on the river. The Licensee's financial support for the Charlemont Police river patrols, along with the support from outfitters and river organizations, has been instrumental in cleaning up the river, making the Deerfield a safer and more family friendly experience, and reducing the overcrowding by river tubers. We would like that support for the Deerfield River Forum and the Charlemont Police to continue under the new license.

River safety would also be enhanced through real-time notification of river levels at the Zoar Picnic Area and at the Fife Brook Fishing and Boating Access Area via kiosk or wifi access to accurate real-time river level data. The Licensee should also make improvements to the WaterLine FlowCast system. WaterLine or another flow notification system should be updated automatically and in real-time, and the information should be made available to American Whitewater to integrate with its river database. These improvements will increase safety for boaters and anglers, and assure that those traveling to the Deerfield will know the actual and anticipated water levels. A cell tower at the Bear Swamp Pumped Storage Development would also benefit boater safety, as the area is totally lacking in cell phone coverage.

**Issue #2: The Pumped Storage Development has a negative impact on recreational boating above Fife Brook Dam**

The Licensee's Pre-Application Document erroneously maintains that the "Bear Swamp PSD operates independent of, and has no effect on Deerfield River flows upstream or downstream of the Bear Swamp PSD and Fife Brook Development." (PAD, 4-14). Contrary to the Licensee's assertion, its operation of the project has a damaging impact on river recreation and the ecological function of the river. These impacts include habitat fragmentation by blocking sediment, gravel and wood transport. Furthermore, the project negatively impacts whitewater boating opportunities above the Fife Brook Dam through fluctuation in the Lower Reservoir pool height, and obstructs the free and unimpeded access to the river and other lands in the project boundary.

Bear Swamp is not a closed-loop pumped storage project. Its lower reservoir obstructs the Deerfield River at Fife Brook Dam and disrupts the free passage of fish. Fluctuations in the pool height alternately reveal or obscure the significant Class IV Labrynth rapid at the bottom of the Dryway section of the Deerfield River below Dam #5. In addition, the Licensee's closure of 1.75 miles of the Deerfield River above the Fife Brook Dam eliminates access to the Class III Showtime rapid below the Dryway takeout. Contrary to the Licensee's assertion, the project has a damaging impact on river recreation and the ecological function of the river.

The Bear Swamp Project also has a negative impact on land based recreation opportunities. In the more than 20 years since New England Power signed a settlement agreement with a dozen NGOs and resource agencies, neither the Licensee nor its predecessors have complied with the requirements of this agreement, the terms of its Comprehensive Recreation Plan, and Article 402 of its license requiring the completion of the 10-mile long Hoosac Tunnel Loop Hiking Trail. To date, only a 1.2-mile segment of the trail has been completed and it appears that the Licensee or its predecessor sold much of the property on which it was obligated to construct the trail. It is unclear from the PAD whether the trail was to be located on the land that was subject to the easement granted to the Massachusetts Department of Environmental Management (now the Department of Conservation and Recreation). The Licensee's failure to complete the trail is a material breach of the terms the project license. This trail must be completed prior to the issuance of a new license, and a permanent easement must be granted to a qualified land trust. To be clear, completion of the trail should not be considered mitigation under a new license, but an unsatisfied obligation under the current license.

By way of contrast, the Northfield Mountain Pumped Storage Project provides a wealth of opportunities for hiking and cross country skiing on Northfield Mountain. Similar recreation opportunities should be provided by the Licensee in the vicinity of the Bear Swamp Pumped Storage Development. With the increasing popularity of mountain biking in the area, we would support the construction of a mountain bike trail linking the as yet to be completed Hoosac Tunnel Loop Trail to the trail network in Charlemont.

### **Issue #3: The Bear Swamp Project unlawfully and unjustifiably obstructs navigation on the Deerfield River**

The Deerfield River is a navigable river based on its commercial and recreational use. *See*, Knott v. Federal Energy Regulatory Commission, 386 F.3s 368 (1<sup>st</sup> Cir. 2004) ("the fact that the Blackstone River required portages [does not] defeat a finding of navigability"). In Massachusetts, the public has the right to boat, fish, and fowl in navigable waters. Opinion of the Justices, 383 Mass. 895 (1981). Even in non-navigable waters, the public still retains the right to "passage up and down the stream in boats or other craft, for purposes of business, convenience, or pleasure." Brosnan v. Gage, 240 Mass. 113 (1921). The Commonwealth, in trust for the public, owns the streambeds of navigable waterways, and the public has the right to freely pass over all waters in Massachusetts. This right of passage includes the recreational use of the water. Under Massachusetts law and regulations, any water-dependent use project which interferes with the public's right to free passage over and through water, including "the right to float on, swim in, or otherwise move freely within the water column without touching the bottom," is required to provide "compensation to the public for interfering with its broad rights to use such lands for any lawful purpose ... commensurate with the extent of interference caused, and shall take the form of measures deemed appropriate by the Department to promote public use and enjoyment of the water, at a location on or near the project site if feasible." 310 CMR 9.35.

The Licensee provides no access to the Lower Reservoir or riparian lands, prohibiting boating, fishing, hiking or other recreational use, and provides no portage around Fife Brook Dam. In an

effort to justify this river closure, the Licensee states in the PAD that “[d]ue to safety and security concerns, the Lower Reservoir is partially fenced and public access prohibited.” (PAD, 4-6). The PAD does not, however, contain any information that would support its basis for the closure. Furthermore, the extent of the closure appears unjustified. By way of contrast, the Blenheim-Gilboa Pumped Storage Project (FERC Project No. P-2685) in Blenheim, NY provides both boating and fishing access in both its upper and lower reservoirs on the Schoharie Creek. These opportunities are unavailable at the Bear Swamp Pumped Storage Project.

Through this closure and the denial of the public the right to use and enjoy this section of the Deerfield River, the Licensee has appropriated a public resource for private use without the payment of appropriate compensation. The Licensee’s actions are in violation of Article 19 of its license, which requires that it “allow free public access, to a reasonable extent, to project waters and adjacent project lands owned by the licensee for the purpose of full public utilization of such lands and waters for navigation and recreational purposes, including fishing and hunting....” While Article 19 does authorize the Licensee to reserve certain areas from public access as may be necessary for the protection of life, health, and property, the Article does not give the Licensee carte blanche to close nearly two miles of the river, prevent navigation, and prohibit access to the shoreline.

### **Specific Comments**

#### **4.3 Project Description**

The Licensee states the Lower Reservoir impoundment is partially fenced and closed to the public due to safety and security concerns. The Licensee has provided no criteria for evaluating safety and security concerns and has provided no documentation of its process for making this determination. Furthermore, the Licensee has not provided any evidence that it has received authorization from the State of Massachusetts for its closure of a navigable river.

#### **4.4 Project Operation**

The Licensee states that the Bear Swamp Pumped Storage Development operates independent of and has no effect on Deerfield River flows upstream or downstream of the Pumped Storage and Fife Brook developments. This is plainly incorrect. The Bear Swamp development has a significant impact on flows in the natural river channel. When the Lower Reservoir is filled to 870 feet, the lower rapids on the Dryway are submerged below the reservoir, eliminating the Class IV Labyrinth Rapid below the Dragon’s Tooth rapid,<sup>1</sup> as well as the Showtime rapid below the boater takeout on scheduled release days from the TransCanada’s No. 5 Dam. When the Upper Reservoir is filled and the Lower Reservoir levels drops to 830 feet, these rapids are revealed.

The Licensee states that it operates the Fife Brook Development in a run-of-release mode,

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<sup>1</sup> See American Whitewater website,  
<http://www.americanwhitewater.org/content/River/detail/id/681/>

meaning that outflows equal inflows simultaneously. This is only partially accurate. The Licensee deviates from run-of-release in order to maintain a minimum flow of 125 cfs as per its Article 401 license requirement, irrespective of inflows from TransCanada, which is required to provide minimum flows of 73 cfs from the No. 5 Dam. The Licensee also provides flows from storage due to sudden unscheduled flow changes by TransCanada. In addition, the Licensee is allowed, under the terms of its March 25, 2005 agreement with USGen New England, to provide flows out of storage to meet its obligations to provide whitewater releases required under the license. TransCanada is the successor in interest to that agreement. It is important to note, however, that the 2005 agreement requiring that TransCanada provide sufficient flows to the Licensee for whitewater releases will expire with the issuance of a new license.

As part of the relicensing process, the Licensee should explore whether a different mode of operation would enable it to increase the volume or change the timing or schedule of releases in order to provide additional recreation opportunities through the utilization of the Lower Reservoir storage as needed. For example, a release of an additional 200 cfs from reservoir storage would result in a reduction of reservoir storage by approximately 50 acre feet, or a lowering of reservoir levels by approximately 4 inches based on a surface area of 152 acres. In its renegotiation of its agreement with TransCanada, the Licensee should explore the feasibility of alternate modes of operation.

#### **4.5 Information for an Existing Licensed Project**

Like all pumped storage projects, the Bear Swamp Pumped Storage Development is a net energy consumer. The Project consumes approximately 37 percent more energy than it produces. Power generation from the Fife Brook Development does not offset the power losses, resulting in a net loss of 38 MW. While the Project does not produce a net power gain, it does produce significant revenue for the Licensee through the use of a public resource and serves a public function of load balancing and reserve generation. The Project, however, is not a source of renewable energy, as it does not utilize excess power to pump water. This results in the consumption of fossil fuels and contributes to global warming. Large-scale batteries for grid storage are being developed, and over time, may reduce the need for pumped storage.

With regard to current license requirements, the Licensee is not in compliance with its license requirement to complete the 10-mile Hoosac Tunnel Loop Trail as specified in its 1994 Settlement Agreement. More than 20 years have passed and still the trail remains largely uncompleted with property on which the trail was to be built having been improperly conveyed. The trail must be completed in order to fulfill current license obligations and should not be considered mitigation under any new license. In order to prevent future non-compliance, permanent conservation easements should be granted to a land trust, and additional trail construction should be required as past mitigation, including the construction of a mountain bike trail linking the Upper Reservoir to Charlemont.

#### **5.3 Water Resources**

The drainage area for the Deerfield River at the Bear Swamp Project is 254 sq. mi. The

minimum flow of 125 cfs from the Fife Brook Development represents approximately 0.5 CSM of the drainage area at the project. The Deerfield River at the Bear Swamp Project represents approximately 70 percent of the 361sq. mi. drainage area at USGS-01168500 gage in Charlemont. In order to more accurately measure flows from the Fife Brook Development, we recommend that the Licensee fund the installation and maintenance of a USGS stream gage below the Fife Brook impoundment, as it is difficult to determine the accuracy of flows from the Fife Brook Development using the Charlemont gage. Based on the Charlemont gage, it would appear that the Licensee did not provide the required whitewater flows in September of 2014.

## **5.9 Recreation**

The Licensee is obligated to provide free public access to its lands and waters under Article 19 of its License. Notwithstanding this obligation, the Licensee has closed significant portions of its lands and waters within the project boundary to public access including the waters and shorelines of the Upper Reservoir and Lower Reservoir, as well as significant portions of the land surrounding the pumped storage development. The Licensee has failed to meet its obligation to complete the Hoosac Tunnel Loop Trail and has not provided recreational access or facilities at this location similar to what is provided at the Northfield Mountain or Blenheim Gilboa pumped storage projects. Boating and fishing are prohibited at both the Upper Reservoir and Lower Reservoir, and there is no portage around Fife Brook Dam. The Licensee has imposed these restrictions without substantial justification and without any process for public input or dispute resolution. These issues should be addressed in relicensing.

## **Conclusion**

We respectfully request that FERC require the Licensee to supplement its Pre-Application Document with additional information to adequately describe the impact of the Bear Swamp Pumped Storage Project on recreation resources on and around the Deerfield River due the presence of project facilities and operations. American Whitewater will separately file study requests jointly with other parties in accordance with FERC guidelines. Thank you for considering these comments.

Respectfully submitted this 18th day of March, 2015,




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Bob Nasdor  
Northeast Stewardship Director  
American Whitewater  
65 Blueberry Hill Lane  
Sudbury, MA 01776

**UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION**

**Brookfield Renewable Energy Group  
Bear Swamp Pumped Storage Project**

**FERC Project No. 2669**

**CERTIFICATE OF SERVICE**

Pursuant to Rule 2010 of the Commission's Rules of Practice and Procedure, I hereby certify that I have this day caused the foregoing **American Whitewater's Comments on the NOI to File a License Application, Filing of the PAD, Commencement of the Pre-Filing Process and Scoping and Identification of Issues and Study Requests for the Bear Swamp Pumped Storage Project (FERC No. 2669)**, to be served upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated this 18th day of March 2015.

A handwritten signature in cursive script, appearing to read "Megan Hooker", written in black ink on a light gray rectangular background.

Megan Hooker  
American Whitewater

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