UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Black Bear Hydro Partners, LLC,

Project Nos. 2712-074
2710-057
Maine

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT

(July 9, 2012)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's (Commission or FERC's) regulations, 18 Code of Federal Regulations (CFR) Part 380 (Order No. 486, 52 Federal Register [FR] 47897), Commission staff has reviewed the application for the amendment of licenses for the Stillwater Hydroelectric Project (FERC Project No. 2712-074) and Orono Hydroelectric Project (FERC Project No. 2710-057), located on the Stillwater Branch of the Penobscot River in Penobscot County, near the communities of Old Town and Orono, respectively. The projects do not occupy any federal lands.

Staff prepared an environmental assessment (EA), which analyzes the potential environmental effects of the proposed modifications to the projects and the addition of new generating capacity, and concludes that authorizing amendments to the projects, with appropriate environmental protective measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the EA is available for review at the Commission in the Public Reference Room 2-A of the Commission's offices at 888 First Street, NE, Washington, DC 20426. The EA also may be viewed on the Commission's Internet web site at (www.ferc.gov) using the "eLibrary" link. Enter the docket number excluding the last three digits in the docket number field to access the document. Additional information about the project is available from the Commission's Office of External Affairs, at (202) 502-6088, or on the Commission's web site using the eLibrary link. For assistance with eLibrary, contact FERCOnlineSupport@ferc.gov or toll-free at (866) 208-3676; for TTY contact (202) 502-8659.

You may also register online at www.ferc.gov/docs-filing/esubscription.asp to be notified via email of new filings and issuances related to this or other pending projects. For assistance, contact FERC Online Support.

Any comments should be filed within 30 days from the date of this notice. Comments may be filed electronically via the Internet. See 18 CFR 385.2001(a)(1)(iii)

and the instructions on the Commission's web site at http://www.ferc.gov/docs-filing/efiling.asp. Commenters can submit brief comments up to 6,000 characters, without prior registration, using the eComment system at http://www.ferc.gov/docs-filing/ecomment.asp. You must include your name and contact information at the end of your comments. For assistance, please contact FERC Online Support. Although the Commission strongly encourages electronic filing, documents may also be paper-filed. To paper-file, mail an original and seven copies to: Kimberly D. Bose, Secretary, Federal Energy Regulatory Commission, 888 First Street, NE, Washington, DC 20426.

For further information, contact Rachel Price by telephone at 202-502-8907 or by email at Rachel.Price@ferc.gov.

Kimberly D. Bose,
Secretary.

ENVIRONMENTAL ASSESSMENT

FOR CAPACITY-RELATED AMENDMENTS TO LICENSES

Stillwater Hydroelectric Project—FERC Project No. 2712-074

Orono Hydroelectric Project—FERC Project No. 2710-057

Maine

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
888 First Street, NE
Washington, D.C. 20426

July 2012

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ACRONYMS AND ABBREVIATIONS

APE	area of potential effects
APLIC	Avian Power Line Interaction Committee
BE	Biological Evaluation
Black Bear Hydro	Black Bear Hydro Partners, LLC
BMP	best management practices
ºC	degrees Celsius
CFD	Computational Fluid Dynamics
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
dB	decibel
DO	dissolved oxygen
EA	environmental assessment
EFH	Essential Fish Habitat
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FWS	U.S. Fish and Wildlife Service
gpm	gallon per minute
Interior	U.S. Department of the Interior
ISO-NE	Independent System Operator, New England
kW	kilowatt
Maine DC	Maine Department of Conservation
Maine DEP	Maine Department of Environmental Protection
Maine DIFW	Maine Department of Inland Fisheries and Wildlife
Maine DMR	Maine Department of Marine Resources
Maine SHPO	Maine State Historic Preservation Officer
MWDCA	Maine Waterway Development Conservation Act
MW	megawatt
MWh	megawatt-hour
NEFMC	New England Fishery Management Council
NGVD	National Geodetic Vertical Datum
NMFS	National Marine Fisheries Service
NPCC	Northeast Power Coordinating Council
O&M	operation and maintenance
PA	Programmatic Agreement
ppm	parts per million
REA	Ready for Environmental Analysis
Restoration Project	Penobscot River Restoration Project
Settlement Agreement	Lower Penobscot River Multi-Party Settlement Agreement

THPO	Tribal Historic Preservation Officer
μPa	micro Pascal
USGS	U.S. Geological Survey
WQC	water quality certification

EXECUTIVE SUMMARY

On May 18, 2011,[1] Black Bear Hydro Partners, LLC (Black Bear Hydro) filed an application for proposed capacity increases for the Stillwater (FERC Project No. 2712) and Orono (FERC Project No. 2710) Projects. The projects are located on the Stillwater Branch of the Penobscot River near Orono, Maine, and do not occupy any federal lands.

The proposed amendments would authorize the construction of one new powerhouse at each project and installation of additional generation capacity that would increase the total installed capacity for Stillwater and Orono Projects to 4.180 megawatts (MW) and 6.531 MW, respectively. The hydraulic capacities of the Stillwater and Orono Projects would be increased by 1,700 and 1,740 cubic feet per second (cfs) to 3,458 cfs and 3,822 cfs, respectively. The projects would continue to operate as run-of-river. The normal maximum water level of the Orono impoundment would be raised by 0.6 foot, and the license terms of the Stillwater and Orono Projects would be extended by 10 and 3 years, respectively, so that they would both expire in 2048.

The proposed capacity improvements would contribute to replacing power generation lost from decommissioning three hydroelectric projects as part of the Penobscot River Restoration Project. The decommissioning of the three projects and the additional capacity at the Orono and Stillwater Projects are part of the terms of the Lower Penobscot River Multi-Party Settlement Agreement (settlement agreement), filed with the Commission on June 25, 2004. The settlement agreement also provides for reallocating flows from the main stem of the Penobscot River to the Stillwater Branch through operation of Black Bear Hydro's Milford Project, which will further increase the amount of power generation that is gained from the capacity improvements. Although the flow reallocation would not require any changes to the Stillwater or Orono license requirements, it would only be implemented as a result of the proposed capacity amendments; therefore, we evaluate its effects on environmental resources in this environmental assessment.

Black Bear Hydro proposes to implement a number of environmental measures to limit any adverse environmental effects of the proposed action. At both projects, it proposes to: (1) develop and implement a soil erosion and sediment control plan to help avoid effects on water quality and aquatic resources during and after construction; (2) develop and implement a blasting plan to address potential effects of construction on fish and aquatic species; (3) implement a Species Protection Plan to minimize or avoid effects on migrating Atlantic salmon; (4) implement a Mussel Relocation Plan, which would identify any state-listed mussel species or species of special concern mussels for

[1] Supplemented by filings on October 7, 2011; January 20, 2012; March 7, 2012; March 14, 2012; and June 5, 2012.

relocation, as necessary, prior to construction; and (5) consult with the Maine State Historic Preservation Officer (Maine SHPO) and Tribal Historic Preservation Officer to address any potential effects if resources are discovered during construction.

At the Stillwater Project, Black Bear Hydro also proposes to: (1) construct a new downstream fish passage facility consisting of trashracks with 1-inch-clear spacing and a bypass adjacent to the intake for the proposed Stillwater powerhouse B, and (2) replace the existing eel trap located at the east end of the dam with an upstream eel passage facility adjacent to the intake for powerhouse B.

At the Orono Project, Black Bear Hydro also proposes to: (1) construct a new downstream fish passage facility consisting of trashracks with 1-inch-clear spacing and a bypass adjacent to the intake for the proposed Orono powerhouse B, retaining a slot of the same dimensions and at the same approximate location as the existing downstream passage bypass opening for potential future use if a second bypass is needed; (2) relocate the existing upstream eel ladder to a location adjacent to the powerhouse B intake; (3) install a trap-and-truck facility at the Orono Project's spillway to provide upstream fish passage; and (4) implement a Sturgeon Handling Plan to prevent injury to any shortnose sturgeon and Atlantic sturgeon that are collected in the trap-and-truck facility or that become stranded in the bypassed reaches when flashboards are replaced. The trap-and-truck facility is a requirement of the existing license, but would be constructed at the same time as, and be integrated with, the new powerhouse and downstream passage facility. The Sturgeon Handling Plan is required for effective operation of the trap-and-truck facility.

The proposed action has the potential to affect aquatic resources by affecting dissolved oxygen levels downstream of the Stillwater and Orono Projects by reducing the amount of flow that is spilled over the project dams. Reducing spillage may also cause injury and mortality to a small number of fish that may become stranded in areas that are dewatered during construction, or that are entrained through the proposed trashracks at the intakes for the new powerhouses. Under the staff alternative, a monitoring plan would be developed and implemented to evaluate the potential effects of reduced spills on dissolved oxygen levels, and a fish salvage plan would reduce the potential for injuries associated with fish stranding.

The proposed action has the potential to affect three federally listed species that are known to occur in the vicinity of the Stillwater and Orono Projects or may occur after Veazie dam is removed: Atlantic salmon, shortnose sturgeon, and Atlantic sturgeon. In addition, it has the potential to affect critical habitat for the Atlantic salmon that exists in the project vicinity. On March 7, 2012, Black Bear Hydro provided the Commission with its Biological Evaluation (BE). The BE provided determinations on the effects of actions proposed in the application to amend the Stillwater and Orono licenses, as well as measures proposed at the Medway, West Enfield, and Milford projects to implement the

Species Protection Plan and Sturgeon Handling Plan proposed in the BE. The BE determined that the actions proposed at the Stillwater and Orono Projects are likely to adversely affect Atlantic salmon due to the potential for causing injury or mortality to a small number of downstream migrating smolts. The BE also determined that the actions proposed at the Orono Project are likely to adversely affect shortnose and Atlantic sturgeon due to potential harassment associated with the handling and relocation of sturgeon collected at the trap-and-truck facility or when flows are reduced in the bypassed reach when flashboards are being reinstalled, although these effects would be minimized by the proposed Sturgeon Handling Plan. On April 27, 2012, Commission staff adopted Black Bear Hydro's BE as its biological assessment and initiated formal consultation on the actions proposed in all five of the amendment applications.

The proposed action has the potential to affect botanical and wildlife resources by causing temporary disturbance during construction, potentially altering sensitive plant habitat, blasting near an active bald eagle nest, and introducing electrocution hazards also near the nest. Under the staff alternative, we include measures to restore native vegetation, limit introduction of invasive weeds, monitor existing sensitive plant populations, and limit potential for bald eagle injury associated with new transmission lines. These measures would limit potential adverse effects on plants and wildlife by restoring habitat following disturbance and minimizing potential effects of project operation on sensitive species. The proposed action would have no substantive effects on cultural resources, recreation, land use, or aesthetics.

In developing its draft amendment application, Black Bear Hydro consulted with the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Maine Department of Environmental Protection, Maine Department of Inland Fisheries and Wildlife, Maine Department of Marine Resources, Penobscot Indian Nation, Maine Department of Conservation, and the Maine SHPO, and most of these entities provided comments on the draft application. A total of 12 entities filed comments on the final application, and 11 of these expressed support for the proposed action.

Under the applicant's proposal, the combined levelized annual cost of the Stillwater and Orono Project amendments would be $99,740. Under the staff alternative, the combined levelized annual cost of the Stillwater and Orono Projects would be $107,690. Based on our analysis, staff recommends approval of the license amendments as proposed by the licensee with staff's additional measures. Staff finds that approval of these amendments to the existing licenses for the Stillwater and Orono Projects would not constitute a major federal action significantly affecting the quality of the human environment.

ENVIRONMENTAL ASSESSMENT

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
Washington, D.C.

Stillwater Hydroelectric Project
FERC Project No. 2712—Maine

Orono Hydroelectric Project
FERC Project No. 2710—Maine

1.0 INTRODUCTION

1.1 APPLICATION

Application Type:	Amendment of licenses
Date Filed:	May 18, 2011, supplemented by filings on October 7, 2011; January 20, 2012; March 7, 2012; March 14, 2012; and June 5, 2012
Applicant's Name:	Black Bear Hydro Partners, LLC
Waterbody:	Penobscot River
County and State:	Penobscot County, Maine
Federal Lands:	The projects do not occupy any federal lands

1.2 PURPOSE OF ACTION AND NEED FOR POWER

1.2.1 Purpose of Action

The Stillwater and Orono Hydroelectric Projects are located on the Stillwater Branch of the Penobscot River near the communities of Old Town and Orono, Maine (Figures 1 and 2). The projects create two contiguous impoundments on the Stillwater Branch using water that is diverted from the main stem of the Penobscot River at the Milford Project (Federal Energy Regulatory Commission [FERC] Project No. 2534). Flow passes through the Gilman Falls dam (part of the Milford Project) and into the Stillwater impoundment.

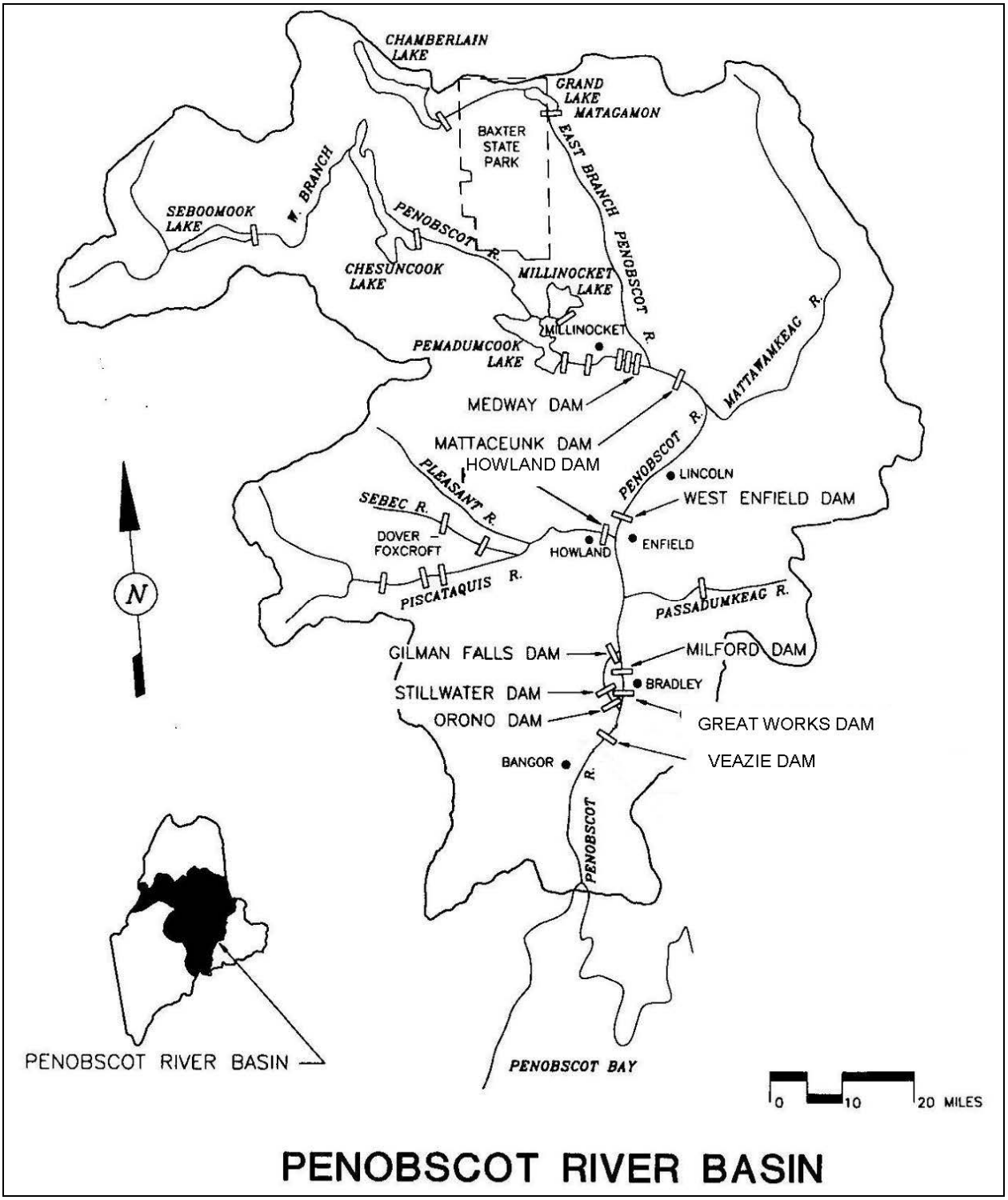

Figure 1. Penobscot River Basin (Source: Black Bear Hydro, 2011a).

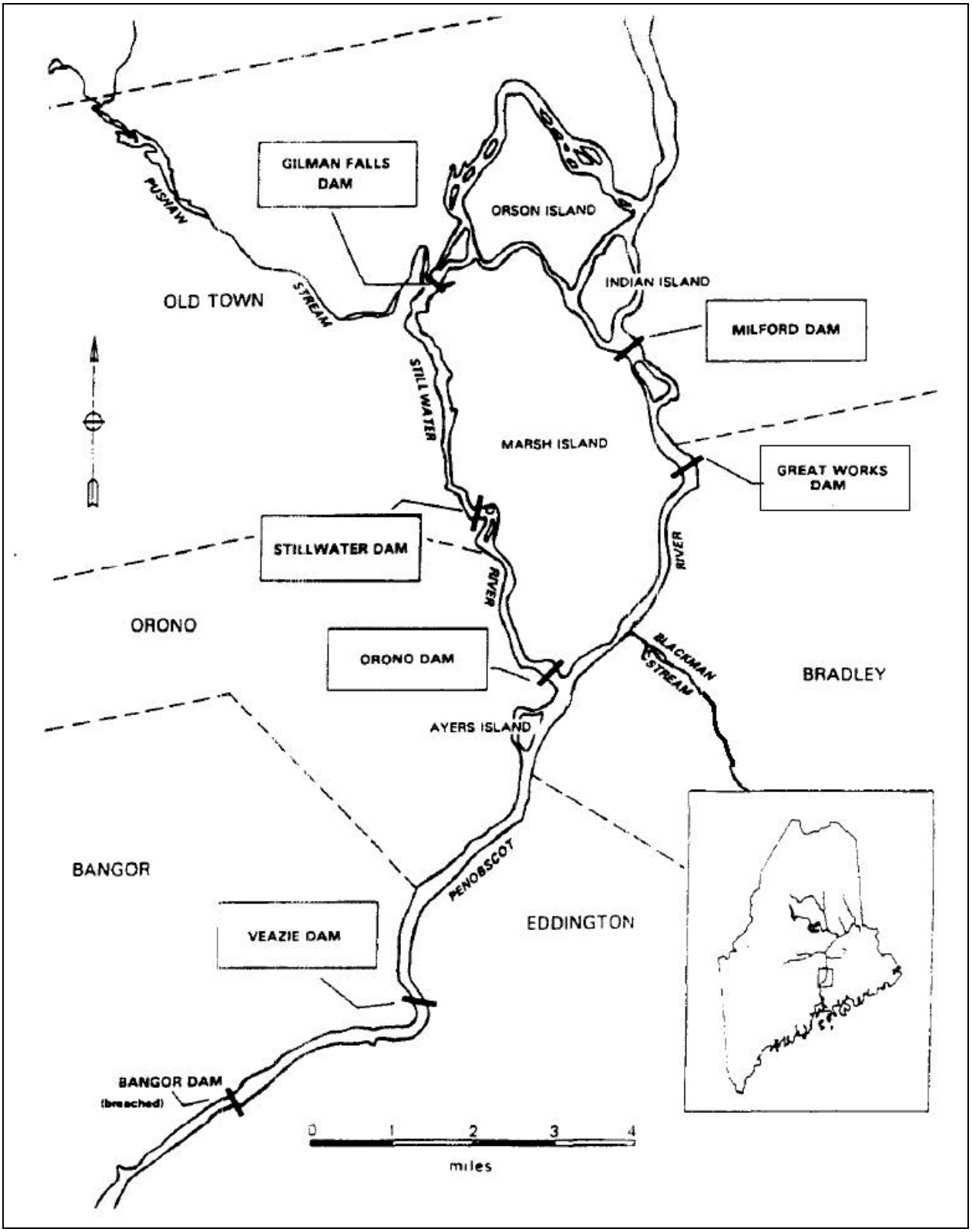

Figure 2. Location of Stillwater and Orono Hydroelectric Projects on the Stillwater Branch of the Penobscot River. (Source: Black Bear Hydro, 2011a)

Flow leaving the Stillwater Project enters the Orono impoundment, and then it returns to the main stem of the Penobscot River about 1,000 feet downstream of Orono dam.

The Stillwater Project currently operates under the terms of a FERC license issued on April 20, 1998, and amended on April 18, 2005,[2] which expires on March 31, 2040. The Orono Project operates under the terms of a license issued on December 8, 2005,[3] which expires on November 30, 2045. Black Bear Hydro Partners, LLC[4] (Black Bear Hydro) proposes to extend the license terms and construct new powerhouses at the Stillwater and Orono Projects and to increase the elevation of the Orono impoundment. These improvements would contribute to replacing power generation lost from decommissioning three hydroelectric projects as part of the terms of the Lower Penobscot River Multi-Party Settlement Agreement (settlement agreement),[5] filed with the Federal Energy Regulatory Commission (Commission) on June 25, 2004, as part of the Penobscot River Restoration Project (Restoration Project) (PPL et al., 2004; FERC, 2004). The settlement agreement also provides for reallocating flows from the main stem of the Penobscot River to the Stillwater Branch through operation of Black Bear Hydro's Milford Project, which would increase power generation in the Stillwater Branch and provide replacement power for the decommissioned projects (Veazie, Great Works, and Howland projects, FERC Project Nos. 2403, 2312, and 2721, respectively). The intent of the Restoration Project is to restore native sea-run fish and their habitat while also providing the opportunity to maintain comparable hydropower production from the river.

The Commission must determine whether to grant the licensee's request to amend the licenses for the Stillwater and Orono Projects and, if so, what conditions should be

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[2] See Order Issuing New License, 83 FERC ¶ 61,038 (issued April 20, 1998) and Order Modifying and Approving Amendment of License 111 FERC ¶ 62,065 (issued April 18, 2005).

[3] See Order On Offer of Settlement and Issuing New License, 113 FERC ¶ 62,181 (issued December 8, 2005).

[4] The licenses for the Stillwater and Orono Projects were transferred from PPL Maine LLC (PPL) to Black Bear Hydro on November 1, 2009.

[5] PPL Maine filed the Settlement Agreement on behalf of the Penobscot Indian Nation; the state of Maine agencies including the Maine State Planning Office, Maine Atlantic Salmon Commission, Maine Department of Inland Fisheries and Wildlife, and Maine Department of Marine Resources; the U.S. Department of the Interior; the Atlantic Salmon Federation; American Rivers, Inc.; Maine Audubon Society; the Natural Resources Council of Maine; Trout Unlimited; and the Penobscot River Restoration Trust.

required to protect and enhance resources in the area of the projects on the Stillwater Branch and main stem of the Penobscot River.

1.2.2 Need for Power

The Stillwater and Orono Projects are located within the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Corporation. Within the NPCC, the projects are located in the New England (ISO-NE) subregion. The NPCC estimates that summer peak demand in the ISO-NE subregion will increase at an equivalent compound growth rate of 1.4 percent per year from 2011 to 2020 (NERC, 2011).

The ISO-NE subregion is heavily dependent on fossil-fueled generation (gas—42 percent, oil—22.2 percent, and coal—8.3 percent). The Maine State Renewable Portfolio Standard requires that the amount of power sold in Maine that comes from renewable resources (e.g., solar, hydro, wind) must be 10 percent by 2017 and 30 percent by 2020. The proposed expansion of the Stillwater and Orono Projects would increase installed capacity by 5.979 MW and increase average annual generation by 51,800 megawatt-hours (MWh), which could help the state of Maine achieve its renewable resource goals and provide needed energy that might otherwise be provided by fossil-fueled generation.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

Capacity amendments for the Stillwater and Orono Projects are subject to numerous requirements under the Federal Power Act (FPA) and other applicable statutes described below.

1.3.1 Federal Power Act

1.3.1.1 Section 18 Fishway Prescriptions

Section 18 of the FPA states that the Commission is to require construction, operation, and maintenance by a licensee of such fishways as may be prescribed by the Secretaries of Commerce or the U.S. Department of the Interior (Interior). The licenses for the Orono and Stillwater Project contain fishway prescriptions from the Department of Commerce's National Marine Fisheries Service (NMFS) and Interior.

Ordering paragraph (E) of the license for the Orono Project requires the implementation of fishway prescriptions from NMFS and Interior which include: downstream passage of all fish species, upstream passage for American eel, and upstream

passage for species other than American eel.[6] Articles 406, 407, 408, and 409 of the license for the Stillwater Project require the implementation of fishway prescriptions from NMFS and Interior that include downstream passage for Atlantic salmon, American shad, alewife, blueback herring, and American eel; and upstream passage for American eel. These existing prescriptions would remain requirements of the license.

For the proposed amendments, NMFS and Interior, by letters filed May 23, 2012, and May 29, 2012, respectively, request that a reservation of authority to prescribe fishways under section 18 be included in any license issued for the project.

1.3.1.2 Section 10(j) Recommendations

Under section 10(j) of the FPA, each hydroelectric license issued by the Commission must include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, or enhancement of fish and wildlife resources affected by the project. The Commission is required to include these conditions unless it determines that they are inconsistent with the purposes and requirements of the FPA or other applicable law. Before rejecting or modifying an agency recommendation, the Commission is required to attempt to resolve any such inconsistency with the agency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency.

NMFS and Interior timely filed, on May 23 and May 29, 2012, respectively, recommendations under section 10(j), as summarized in Table 12, in section 5.3, *Recommendations of Fish and Wildlife Agencies*. In section 5.4, we also discuss how we address the agency recommendations and comply with section 10(j).

1.3.2 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency verifying compliance with the CWA. On May 19, 2011, Black Bear Hydro applied to the Maine Department of Environmental Protection (Maine DEP) for approval under the Maine Waterway Development Conservation Act (MWDCA) and 401 water quality certification (WQC) for the Stillwater and Orono Projects. Maine DEP received the requests on the same day. Maine DEP timely issued the section MWDCA approval and 401 WQC for both projects on August 17, 2011 (two separate letters from D. Murch, Hydropower Specialist, Maine DEP, Augusta, Maine, to S. Hall, Vice President, Environmental and Business Services, Black Bear Hydro, Milford, Maine). The conditions of the certification are described under section 2.2.5, *Modifications to Applicant's Proposal—Mandatory Conditions*.

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[6] Upstream passage for species other than American eel is contingent on actions taken under the Lower Penobscot Settlement Agreement and on effectiveness monitoring.

1.3.3 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species. Three federally listed species are known to occur in the vicinity of the Stillwater and Orono Projects: Atlantic salmon (Gulf of Maine Distinct Population Segment), shortnose sturgeon, and Atlantic sturgeon. Critical habitat for the Atlantic salmon exists in the project vicinity.

On March 7, 2012, Black Bear Hydro provided the Commission with its Biological Evaluation (BE),[7] which included a proposed Species Protection Plan for Atlantic salmon and a Sturgeon Handling Plan. The BE provided determinations on the effects of actions proposed in the application to amend the Stillwater and Orono licenses, as well as measures proposed at the Medway (FERC Project No. 2666), West Enfield (FERC Project No. 2600), and Milford Projects to implement the Species Protection Plan and Sturgeon Handling Plan.

The BE determined that the actions proposed at the Stillwater and Orono Projects are likely to adversely affect Atlantic salmon due to the potential for causing injury or mortality to a small number of downstream migrating smolts. The BE also determined that the actions proposed at the Orono Project are likely to adversely affect shortnose and Atlantic sturgeon due to potential harassment associated with the handling and relocation of sturgeon collected at the trap-and-truck facility or when flows in the bypassed reach are reduced when flashboards are being reinstalled, although these effects would be minimized by the proposed Sturgeon Handling Plan. On April 27, 2012, Commission staff adopted Black Bear Hydro's BE as its biological assessment and requested that NMFS initiate formal consultation on the actions proposed in all five of the amendment applications. NMFS initiated formal consultation on May 3, 2012, the date that the Commission's request was received.

1.3.4 National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966 requires that every federal agency "take into account" how each of its undertakings could affect historic properties. Historic properties are districts, sites, buildings, structures, traditional cultural properties, and objects significant in American history, architecture, engineering, and culture that are eligible for inclusion in the National Register of Historic Places (National Register).

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[7] Although the title of the document filed is "Draft Biological Assessment for Atlantic Salmon Shortnose Sturgeon, and Atlantic Sturgeon," the document should be referred to as a biological evaluation until it is adopted by the Commission.

Article 412 of the license for the Stillwater Project requires Black Bear Hydro to implement the *Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, and the Maine State Historic Preservation Officer, for Managing Historic Properties that may be Affected by a License Issuing to Bangor Hydro-Electric Company to Continue Operating the Stillwater Hydroelectric Project in Maine* (Programmatic Agreement [PA], executed on August 8, 1997), including, but not limited to, the Cultural Resources Management Plan (CRMP) for the project.

The CRMP requires Black Bear Hydro to notify the Maine State Historic Preservation Officer (Maine SHPO) of any proposed ground-disturbing activities associated with the Stillwater Project. While the Orono Hydroelectric Project does not operate under a CRMP or PA, Article 405 of the project license requires Black Bear Hydro to consult with the Maine SHPO and Penobscot Indian Nation Tribal Historic Preservation Officer (THPO) before starting any land-clearing or land-disturbing activities within the project boundaries, other than those specifically authorized under the license. The CRMP for the Stillwater Project and Article 405 of the Orono Project license also require consultation with the Maine SHPO and Penobscot Indian Nation THPO if any archaeological or cultural sites or human remains are discovered during ground-disturbing or land-clearing activities.

Black Bear Hydro consulted with the Maine SHPO and Penobscot Indian Nation, and by letter dated October 13, 2010, the Maine SHPO determined that no historic or archaeological properties would be affected by the proposed amendments at either project (letter to S.D. Hall, Black Bear Hydro, Milford, Maine, from K. Mohney, Deputy SHPO, Augusta, Maine, filed May 18, 2011). The existing PA for the Stillwater Hydroelectric Project remains applicable and in effect throughout the project's license term. However, because the Maine SHPO has concurred that no historic properties would be affected by the proposed amendments, a PA to resolve adverse effects would not be necessary.

1.3.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires federal agencies to consult with NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). EFH has been designated for Atlantic salmon, and includes the entire Penobscot River drainage (New England Fishery Management Council's [NEFMC], 1998).

The licensee filed its assessment of effects on EFH on October 7, 2011. We have incorporated the licensee's assessment into this final EA, as appropriate. The effects of the project on EFH are addressed in section 3.3.2.2, *Environmental Effects, Aquatic Resources*. In summary, we conclude that licensing the project would not likely

adversely affect EFH for Atlantic salmon. As such, no consultation with NMFS is required.

1.4 PRE-FILING PUBLIC REVIEW AND CONSULTATION

The Commission's regulations (18 Code of Federal Regulations [CFR] § 4.38) require that licensees consult with appropriate resource agencies, tribes, and other entities before filing an application for a capacity amendment to a license. This consultation is the first step in complying with the Fish and Wildlife Coordination Act, ESA, National Historic Preservation Act, and other federal statutes. Pre-filing consultation for a capacity amendment must be complete and documented according to the Commission's regulations.

1.4.1 Consultation

In its pre-filing consultation Black Bear Hydro consulted with NMFS, the U.S., Fish and Wildlife Service (FWS), Maine DEP, Penobscot Indian Nation, Maine Department of Conservation (Maine DC), and the Maine SHPO. Black Bear Hydro met with each affected agency and Penobscot Indian Nation on October 26, 2010, to provide them with information and answer questions about the proposed amendments. Studies were conducted to investigate: (1) wetlands; (2) effects of increasing the Orono impoundment elevation; (3) fisheries; (4) fish passage; and (5) special-status species of birds, reptiles, invertebrates, and plants.

On July 20, 2010, and March 24, 2011, Black Bear Hydro also met with Maine DEP to discuss the agency's needs relative to WQC for the projects. Black Bear Hydro provided the resource agencies and Penobscot Indian Nation with copies of the draft application on October 5, 2010, which included study results; the deadline for providing comments was January 31, 2011. The licensee received comments on its draft application from the Maine SHPO, NMFS, FWS, Penobscot Indian Nation, Maine Department of Marine Resources (Maine DMR), Maine DEP, and Maine DC. Black Bear Hydro discussed the comments it received with agency representatives between October 2010 and April 2011. When it filed its amendment application with the Commission on May 18, 2011, Black Bear Hydro served copies of the amendment application on all the consulted agencies and Penobscot Indian Nation.

1.4.2 Comments on the License Amendment Application and Interventions

On March 30, 2012, the Commission issued a notice that Black Bear Hydro had filed an application to amend the Stillwater and Orono Projects. This notice set May 29, 2012, as the deadline for filing protests and motions to intervene. In response to the notice, the following entities filed motions to intervene:

Intervenor	Date Filed
Penobscot Indian Nation	May 24, 2012
Interior	May 25, 2012
Douglas H. Watts	May 30, 2012*

* Late intervention granted on June 15, 2012.

1.4.3 Comments on the Application

A notice requesting comments, conditions, and recommendations was issued on March 30, 2012. The following entities commented:

Commenting Agency and Other Entity	Date Filed
Old Town	May 14, 2012
Olympia J. Snow, U.S. Senator; Susan M. Collins, U.S. Senator; and Michael H. Michaud, Member of Congress	May 16, 2012
Town of Orono	May 21, 2012
NMFS	May 23, 2012
Penobscot Indian Nation	May 24, 2012
Penobscot River Conservation Trust	May 25, 2012
Interior	May 29, 2012
Black Bear Hydro	May 29, 2012
Maine Audubon	May 29, 2012
Trout Unlimited	May 30, 2012
American Rivers	May 30, 2012
The Nature Conservancy	May 31, 2012

All of the commenters, with the exception of NMFS, express support for expeditious approval of the amendments.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 NO-ACTION ALTERNATIVE

The no-action alternative is amendment denial with the currently licensed projects remaining unchanged. Under the no-action alternative, additional generation units would not be installed, the license terms for the projects would remain unchanged, the elevation of the Orono impoundment would not be raised, and new transmission lines would not be constructed. Some of the existing fish passage facilities at both projects would continue to be improved as continuing requirements of the existing licenses as described herein.

2.1.1 Existing Project Facilities

2.1.1.1 Stillwater Project

The existing Stillwater Project works consist of: (1) an impoundment with a surface area of 191 acres and gross storage volume of 1,910 acre-feet at the normal maximum water surface elevation of 94.65 feet National Geodetic Vertical Datum (NGVD); (2) a concrete gravity dam that is 1,720 feet long and 22 feet high, including a 1,520-foot spillway topped with flashboards ranging from 0.65 to 3.8 feet high; (3) a concrete and wood powerhouse (to be referred to hereafter as Stillwater powerhouse A) that is about 83.5 feet long, 32 feet wide, and 45 feet tall; (4) powerhouse generating equipment comprising three 450.4-kW units and one 600-kilowatt (kW) unit;[8] (5) a tailrace; (6) downstream fish passage facilities and upstream eel passage facilities; (7) a 50-foot-long transmission line; and (8) appurtenant facilities.

2.1.1.2 Orono Project

The existing Orono Project works consist of: (1) an impoundment with a surface area of 175 acres and gross storage volume of 1,300 acre-feet at the normal maximum water surface elevation of 72.4 feet NGVD; (2) a concrete gravity dam that is 1,174 feet long and 15 feet high, including a 320 feet long spillway topped with 2.4 feet high flashboards; (3) a concrete intake structure that is 57 feet long and about 23 feet high with a top elevation of 83.9 feet NGVD and is integral with the dam; (4) a 866 feet long concrete penstock, with a surge tank, with an inside diameter of 20 feet wide by 12 feet high; (5) a masonry powerhouse (to be referred to hereafter as Orono powerhouse A) that is 150 feet long, 150 feet wide, and 50 feet tall; (6) powerhouse generating equipment

[8] These capacities are based on the capacities of the generators, which are the limiting components. The total capacity is 1,951 kW.

comprising one 539-kW unit, one 572.4-kW unit, and two 834.8-kW units;[9] (7) a tailrace; (8) downstream fish passage and upstream eel passage facilities; (9) three 325-foot-long transmission lines; and (10) appurtenant facilities.

2.1.2 Existing Project Operation

Flow to the Stillwater Branch is controlled by the Milford Hydroelectric Project. The Milford Project's Gilman Falls dam is located on the Penobscot River at the head of the Stillwater Branch where the Stillwater Branch splits from the main stem of the river. The Milford Project's Milford dam is located on the main stem of the Penobscot River downstream of the head of the Stillwater Branch. Under normal flow conditions, and in accordance with a 1911 Federal Circuit Court decree, from 9 percent up to approximately one-third of the Penobscot River flow is allocated to the Stillwater Branch, and the remaining flow continues down the main stem of the Penobscot River.

Black Bear Hydro operates the Stillwater and Orono Projects on the Stillwater Branch in a run-of-river mode and coordinates their operation for effective power and river flow management. The level of the Stillwater impoundment is manually controlled in a run-of-river mode within plus or minus 1 foot of elevation 94.65 feet NGVD when flashboards are in place and at or above the spillway crest elevation of 90.45 feet NGVD when flashboards are not in place. The level of the Orono impoundment is manually controlled in a run-of-river mode within plus or minus 1 foot of elevation 72.4 feet NGVD when flashboards are in place and at or above the spillway crest elevation of 70 feet NGVD when flashboards are not in place.

The hydraulic capacity of the turbines in Stillwater powerhouse A is about 1,700 cubic feet per second (cfs), and high flows in excess of the hydraulic capacity of the project are spilled over flashboards into the spillway. Water discharged from the Stillwater Project enters the Orono impoundment immediately downstream.

The hydraulic capacity of the turbines in Orono powerhouse A is 1,740 cfs, and high flows in excess of the hydraulic capacity of the project are spilled over flashboards into the spillway. Water discharged from the Orono Project flows into the main stem of the Penobscot River immediately downstream of the confluence with the Stillwater Branch.

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[9] These capacities are based on the capacities of the generators as the limiting components. The capacities, totaling 2,781 kW, are based on generator upgrades conducted in 2008 to 2009 that have not yet been approved by the Commission. The current authorized capacity of the project is 2,332 kW.

2.1.3 Existing Environmental Measures

The existing licenses contain several environmental measures; however, only the measures relevant to these amendments are listed below.

Stillwater Project

- A minimum flow of 20 cfs is released from Stillwater dam into the west bypassed channel, and a minimum flow of 50 cfs is released into the east bypassed channel.

- A downstream passage facility consists of intake trashracks with 1-inch-clear spacing and a 2.83-foot-wide flume and a bypass chute at Stillwater powerhouse A. The current license also requires the installation of a new bottom entrance to the existing facility, along with other improvements that would increase the total bypass flow from 35 to 70 cfs.[10] The licensee is proposing to install new full-depth 1-inch-clear spacing trashracks and mechanical gates that would allow the bypass flow to be allocated to either the surface or bottom entrance or divided between the two entrances. These improvements are currently in the design stage and have been filed for Commission approval.

- Upstream passage facilities consist of two eel traps and collection hoppers on the east and west ends of the dam that are periodically checked and any collected eels are passed upstream.

- The Stillwater CRMP (Penobscot Hydro, LLC, 1999) requires Black Bear Hydro to notify the Maine SHPO of any proposed ground-disturbing activities associated with the Stillwater Project and includes a plan for unanticipated discoveries of cultural material and/or human remains.

Orono Project

- A minimum flow of 200 cfs is maintained in the bypassed reach downstream of Orono dam, with 72 cfs provided via the downstream fish passage facilities and 128 cfs provided via leakage through the flashboards.

- A downstream fish passage facility consists of intake trashracks with 1-inch-clear spacing with a 5-foot-wide bypass entrance and a steel flume bypass at Orono powerhouse A.

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[10] Because these improvements are required under the existing license, we do not evaluate them in this EA.

- Upstream fish passage facilities consist of one eel ladder (inclined ramp with substrate), 2-feet-wide by 40-feet-long, located on a non-overflow section of the dam adjacent to the spillway. The current license also requires the installation of a new elevator trap-and-truck facility for collection of upstream-migrating anadromous species. This facility is currently in the design stage.

- Article 405 of the existing project license requires that Black Bear Hydro consult with the Maine SHPO and Penobscot Indian Nation THPO before starting any land-clearing or land-disturbing activities within the project boundaries, and provides a plan for unanticipated discoveries of cultural material and/or human remains.

2.2 LICENSEE'S PROPOSAL

2.2.1 Proposed Project Facilities and Construction Activities

2.2.1.1 Stillwater Project

The proposed project would include the following modifications:

- A new powerhouse (Stillwater powerhouse B), measuring about 55 feet long, 40 feet wide, and 56 feet high, would be constructed with a steel frame and metal walls on a reinforced concrete foundation. The powerhouse would be located adjacent to the existing left buttress of Stillwater dam.
- Three 743-kW, vertical axial flow turbine generating units would be installed in powerhouse B with a total installed capacity of 2.229 MW.[11]
- A forebay measuring 60 feet wide by 60 feet long and an intake measuring 60 feet wide and 22 feet high would be constructed.
- An aerial 12.5-kilovolt (kV) transmission line would be constructed between Stillwater powerhouse B and the existing 12.5-kV distribution system that is located adjacent to the existing project boundary and along the south side of Stillwater Avenue (about 300 feet).
- Construction activities would include: excavating about 1,500 cubic yards and 3,000 cubic yards of rock ledge material for Stillwater powerhouse B and the tailrace, respectively; installing and removing cofferdams; modifying the existing dam; and constructing an access road, parking area, and laydown area.

[11] The capacity of the units is based on the reduced tailwater conditions that would exist under the proposed conditions. The turbine-limited capacity of the proposed units would be reduced from 807 to 743 kW due to the tailwater limitations.

- A new downstream fish passage facility would be constructed at the intake for Stillwater powerhouse B, consisting of: full-depth trashracks with 1-inch-clear spacing; surface and bottom entrances; and a total bypass flow of 70 cfs. The 70 cfs flow would be allocated in full to either entrance or divided between the two entrances.
- A new eel ladder would be installed adjacent to Stillwater powerhouse B for upstream passage of American eels, replacing the current eel trap located at the east end of the spillway.

2.2.1.2 Orono Project

The proposed project would include the following modifications:

- A new powerhouse (Orono powerhouse B), measuring about 56 feet wide, 40 feet long, and 60 feet high, would be constructed of reinforced concrete, corrugated tin walls, and a beam-and-girder roof. It would be located about 420 feet downstream of Orono dam in the existing bypassed reach.
- Three 1,250-kW, vertical axial flow turbine generating units would be installed in Orono powerhouse B with a total installed capacity of 3.750 MW.
- An 84-foot-wide by 20-foot-high intake would be constructed for Orono powerhouse B.
- A 292-foot-long, 25-foot-wide, and 12-foot-high concrete box penstock would be constructed.
- A surge chamber would be installed, measuring 60 feet long by 25 feet wide, flaring to 44 feet wide at Orono powerhouse B, by 32 feet high on three walls, and 27 feet high on the spillway side.
- An aerial 12.5-kV transmission line would be constructed, extending about 600 feet between Orono powerhouse B and the existing 12.5-kV distribution system located near the Orono powerhouse A.
- Construction activities would include: excavating about 1,900, 50, and 1,100 cubic yards of rock ledge material for Orono powerhouse B, intake structure, and tailrace, respectively; installing and removing cofferdams; modifying the existing dam; and constructing an access road and parking area.
- The normal impoundment level would be raised from 72.4 to 73 feet NGVD and the gross storage capacity would be enlarged to 1,405 acre-feet by increasing the existing flashboard height by 0.6 foot.
- The existing downstream fish passage facility with a surface entrance and a bypass flow of 72 cfs would be replaced with a single facility consisting of full-depth trashracks with 1-inch-clear spacing extending across the intake for

both powerhouses and a bypass facility with both surface and bottom entrances and a total bypass flow of 153 cfs. The new surface entrance would be 4-feet-wide and lead to a 20-foot-long by 8-foot-wide sluiceway that narrows to 3-feet-wide at its exit. This facility would also be incorporated into the design of the proposed trap-and-truck facility required by the existing license, with about 120 to 130 cfs of the bypass flow being used as attraction water for the trap-and-truck facility. The new bottom entrance for downstream eel passage would be connected to a separate bypass pipe that empties into the spillway channel. The existing downstream fish bypass opening would be retained at the intake, in the event it is needed in the future to meet downstream passage performance standards.

2.2.2 Proposed Operational Modifications

Black Bear Hydro would continue to coordinate run-of-river operation of Stillwater and Orono Projects on the Stillwater Branch to maximize generation and manage river flow. However, Black Bear Hydro would reallocate flows between the main stem of the Penobscot River and Stillwater Branch (Table 1) through operation of its Milford Project, resulting in more water flowing through the Stillwater Branch in order to increase the power generation that would be provided by the proposed capacity enhancements at the Stillwater and Orono Projects. The flow reallocation is within the range of operations allowed by the current licenses for the Milford, Stillwater, and Orono Projects. Although the flow reallocation would not require any changes to the Milford, Stillwater, or Orono license requirements, it would be implemented as a result of the proposed capacity amendments; therefore we evaluate its effects on environmental resources in section 3 of the environmental assessment (EA).

Table 1. Flow allocation to the Stillwater Branch of the Penobscot River after implementing the proposed amendments. (Source: Black Bear Hydro, 2011a)

Inflows	Allocation
Flows below 3,800 cfs	Comply with the existing minimum flow requirements. At 3,800 cfs, 3,268 cfs in main stem (86%) and 532 cfs in the Stillwater Branch (14%) – 60 cfs from Gilman Falls dam and 472 cfs from the west channel. Incrementally decreasing to 9% in the Stillwater Branch (216 cfs) at an inflow of 2,400 cfs.
Flows between 3,800 cfs and 5,446 cfs	Maintain the existing allocation between May 1 and October 31, and from November 1 to April 30 allow a diversion of up to 40% of total river flow into the Stillwater Branch, but must continue to comply with minimum flows required by the current FERC license and 401 WQC.

Inflows	Allocation
Flows greater than 5,446 cfs, up to the limit of operational control	60% of flow to the Penobscot River 40% of flow to the Stillwater Branch
Flows above operational control (approximately 15,000 cfs)	70% of flow to the Penobscot River 30% of flow to the Stillwater Branch

2.2.2.1 Stillwater Project

The turbine-generator units of both Stillwater powerhouses would be operated to maximize power generation, using flows between 100 and 3,458 cfs. Under normal operations, the double-regulated turbine generator unit of powerhouse B closest to the proposed downstream fish passage facility would be operated on a first-on and last-off basis. The project would be operated to maintain: (1) the existing minimum flow of 20 cfs in the west channel; (2) the existing minimum flow of 50 cfs in the east channel (during the fish passage season, the 50-cfs requirement would be met by the release of 70 cfs through the new fish bypass facility at powerhouse B, and outside of the fish passage season a minimum of 50 cfs would be released through the powerhouse B); and (3) flow releases from the downstream fish passage facility at powerhouse A.[12]

During construction of Stillwater powerhouse B, minimum flows into the eastern and western bypassed channels may need to be suspended during some portions of the 6 to 8 weeks when downstream work is performed. However, the current minimum 35 cfs fish passage flow at the Stillwater powerhouse A would continue to be released into the tailrace channel throughout the construction period.

High flows in excess of the hydraulic capacity of the project would continue to spill over the existing flash boards that are designed to fail when they are overtopped by 1 foot of water. Installing Stillwater powerhouse B would modify a section of the dam; however, the design of the forebay structure and installation of a new fish bypass gate that could serve as an additional spillway would provide capacity to pass flows equal to the 100-year flood. Consequently, the upstream flood flow elevations under the proposed operation would be unchanged.

[12] The existing fish passage facilities are currently being upgraded under the existing license, and the total discharge would increase from 35 to 70 cfs.

2.2.2.2 Orono Project

The turbine-generator units of both Orono powerhouses would be operated to maximize power generation, using flows between the minimum and maximum (combined) hydraulic capacity, from 100 to 3,822 cfs. Under normal operations, the fully regulated turbine generator unit of the Orono powerhouse B, located closest to the entrance to the new downstream fish passage facility, would be operated on a first-on and last-off basis. The project would be operated to maintain the existing minimum flow of 200 cfs downstream of Orono dam by conveying 153 cfs through the proposed fish passage facility and 47 cfs through the flashboards or at another point source, as may be recommended by resource agencies. During construction, 200 cfs would be conveyed into the bypassed reach by lowering an appropriate number of flashboards.

Although the increased height of the flashboards would raise the impoundment by 0.6 foot, the new flashboards would be designed to fail at the same elevation as the existing flashboards. Consequently the upstream flood flow elevations under the proposed operation would be unchanged.

2.2.3 Proposed Environmental Measures

Black Bear Hydro's proposed environmental measures include certain fish passage measures that are required by the project licenses. Because some of these measures would be implemented as part of constructing the proposed generation facilities, they are also described below, as indicated, with the measures proposed by Black Bear Hydro.

Both Projects

- Develop and implement a soil erosion and sediment control plan
- Develop and implement a blasting plan to address potential effects of construction on fish and aquatic species
- Implement the Species Protection Plan for Atlantic salmon (submitted with the BE)
- Implement the Mussel Relocation Plan (submitted with the application)
- Consult with the Maine SHPO and Penobscot Indian Nation THPO to address any potential effects if unanticipated cultural materials or human remains are discovered during construction

Stillwater Project

- Construct a new downstream fish passage facility consisting of full-depth trashracks with 1-inch-clear spacing and a bypass adjacent to the intake for the proposed Stillwater powerhouse B

- Construct an upstream eel passage facility adjacent to the intake for powerhouse B to replace an existing eel trap located at the east end of the dam

Orono Project

- Construct a new downstream fish passage facility consisting of full-depth trashracks with 1-inch-clear spacing and a bypass adjacent to the intake[13] for the proposed Orono powerhouse B, replacing the existing downstream passage facility

- Relocate the existing upstream eel ladder to a location adjacent to the powerhouse B intake

- Install a trap-and-truck facility at the Orono Project's spillway to provide upstream fish passage (as required in Ordering Paragraph D of the existing project license)

- Implement a Sturgeon Handling Plan for shortnose sturgeon and Atlantic sturgeon (submitted with the BE)

Constructing the trap-and-truck facility is a requirement of the existing license, but it would be constructed at the same time as and be integrated with the new intake and downstream passage facility. The Sturgeon Handling Plan is required for effective operation of the trap-and-truck facility; therefore, we consider it to also be a requirement of the existing license.

[13] In its June 5, 2012, AIR response, Black Bear Hydro indicates that it will retain a slot of the same dimensions as the existing downstream passage opening in the same approximate location for future use in the event that future evaluations of the new downstream passage facility determine that a second downstream passage facility is needed.

2.2.4 Proposed License Term

Black Bear Hydro requests that the license term for the Stillwater Project be extended by 10 years, terminating in 2048, and that the license term for the Orono Project be extended by 3 years, also terminating in 2048.

2.2.5 Construction Schedule

Black Bear Hydro expects construction would take place over one to two years and would begin as soon as all necessary licenses and permits are obtained.[14] Black Bear Hydro would install all temporary sedimentation and erosion control devices prior to beginning construction activities (e.g., placing turbidity curtains, hay bales, and filter fabric). Construction at both projects would take place concurrently.

At the Stillwater Project, a new temporary gravel access road would be constructed off the existing dead end Old Mill Road and a laydown area would be located off the new access road near its intersection with the existing access road. The temporary gravel access road and laydown/staging area would be restored and revegetated after construction; however, the access road to the powerhouse would remain. Temporary cofferdams would be installed to excavate the tailrace and construct the intake and powerhouse in dry conditions; water impounded by the cofferdams would be discharged into the river after it is treated to remove sediments.

Construction would proceed by: (1) removing rock ledge to create space for Stillwater powerhouse B; (2) laying the concrete powerhouse foundation; (3) building Stillwater powerhouse B (including the intake) and setting the generating units; (4) constructing a site retaining wall; (5) excavating the tailrace channel, which would entail drilling and blasting; (6) constructing the forebay; and (7) removing the cofferdams. During construction of the Stillwater powerhouse B and tailrace, the 70 cfs minimum flow into the bypassed channel would be maintained; however, it may need to be temporarily suspended for construction downstream of the dam during a period of 6 to 8 weeks. The 35-cfs fish passage flow from Stillwater powerhouse A would be maintained throughout the construction period.

At the Orono Project, a new permanent access road, parking area, and temporary laydown area would be constructed. Temporary cofferdams would be installed to allow excavation for Orono powerhouse B to occur in dry conditions; water impounded by the

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[14] Based on information provided in Black Bear Hydro's October 7, 2011, response to the Commission's additional information request, Black Bear Hydro anticipates that it would begin construction at the projects in spring 2012 and complete construction in late 2013.

cofferdams would be discharged into the river after it is treated to remove sediments. Construction would proceed by: (1) excavating bedrock to create space for Orono powerhouse B; (2) laying the concrete powerhouse foundation; (3) building Orono powerhouse B (including the intake) and setting the generating units; (4) building new downstream fish passage and upstream fish trapping facilities; (5) constructing a concrete penstock and an open surge chamber; (6) excavating the tailrace channel, which would entail drilling and blasting; (7) constructing the forebay; and (8) removing the cofferdams. The existing downstream fish passage facility would not operate during powerhouse construction. Minimum flows would be maintained throughout the construction period.

2.2.6 Modifications to Applicant's Proposal—Mandatory Conditions

The only mandatory conditions provided for the Stillwater and Orono Projects are the WQCs issued by Maine DEP, and these are evaluated as part of the applicant's proposal. The conditions of the WQCs specify the following:

Stillwater Project

The Standard Conditions of Approval for projects under the MWDCA shall apply.

Condition 1. The Standard Conditions of Approval for projects under the MWDCA shall apply.

Condition 2. All existing conditions in the WQC for the continued operation of the Stillwater Project, as contained in Maine DEP Order#L-16773-33-A-N dated December 29, 1992, including any subsequent amendments, modifications and condition compliances, shall remain in effect.

Condition 3A. The applicant shall prepare, submit, and implement a final erosion and sedimentation control plan for all approved construction activities. This plan shall be reviewed by and must receive approval of Maine DEP prior to the initiation of in-stream activities.

Condition 3B. In addition to any specific erosion and sedimentation control measures that are included in the plan approved by Maine DEP under Part A of this condition, the applicant and its agents shall take all necessary measures to ensure that their activities do not result in erosion or sedimentation into the river during or following the approved activities.

Condition 4. All spoils removed from the construction area shall be reused or otherwise disposed of in accordance with the Maine Solid Waste Management Regulations.

Condition 5. Concrete shall be precast and cured at least three weeks before placing in the water, or where necessary, shall be placed in forms and shall cure at least one week prior to contact with surface water. No washing of tools, forms, etc. shall occur in or adjacent to the waterway.

Condition 6. Temporary fill placed in the waterway or within the 100-year floodway boundaries of the waterway to provide temporary equipment access shall consist of clean granular material free from vegetable matter, lumps or balls of clay and other deleterious substances. That portion passing a 3-inch (No. 200) sieve shall not exceed 10 percent fines, by weight. Those portions of the fill that come into contact with moving water shall be protected by filter fabric and/or riprap. All temporary fill shall be removed from the waterway following completion of the approved construction activities.

Condition 7. The minimum flow release stipulated in Maine DEP's WQC for the Stillwater Hydroelectric Project (Maine DEP Order #L-16773-33-A-N dated December 29, 1992, as modified by Maine DEP Order #L-16773-33-F-M dated January 13, 2005) shall be maintained whenever possible during and following the proposed construction activities. The required minimum flow releases may be temporarily reduced or suspended as necessary to facilitate construction activities with the approval of Maine Department of Inland Fisheries and Wildlife (Maine DIFW) and Maine DMR.

Orono Project

Condition 1. The Standard Conditions of Approval for projects under the MWDCA shall apply.

Condition 2. All existing conditions in the WQC for the continued operation of the Orono Hydroelectric Project, as contained in Maine DEP Order#L-21917-33-A-N dated December 14, 2004, including any subsequent amendments, modifications and condition compliances, shall remain in effect, except for Condition 1(A), which is modified to read as follows:

A. Except as temporarily modified by (1) approved maintenance activities, (2) extreme hydrologic conditions, as defined below, or (3) emergency electrical system conditions, as defined below, or (4) agreement between the applicant, appropriate state and/or federal agencies, and the Penobscot Indian Nation, beginning within 60 days of FERC approval of the flow and water level monitoring plan described in Condition 1(E) below, or upon such other schedule as established by FERC, the Orono Project shall be operated in a run-of-river mode, with outflow approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement, and impoundment levels maintained within one foot of full

pond (elevation 73.0 feet mean sea level). During times of flashboard failure, the applicant will maintain water levels at or above the spillway crest. During those times when flashboards are being replaced, the applicant will maintain water levels within one foot of the spillway crest.

Condition 3A. The applicant shall prepare, submit, and implement a final erosion and sedimentation control plan for all approved construction activities. This plan shall be reviewed by and must receive approval of Maine DEP prior to the initiation of in-stream activities.

Condition 3B. In addition to any specific erosion and sedimentation control measures that are included in the plan approved by Maine DEP under Part A of this condition, the applicant and its agents shall take all necessary measures to ensure that their activities do not result in erosion or sedimentation into the river during or following the approved activities.

Condition 4. All spoils removed from the construction area shall be reused or otherwise disposed of in accordance with the Maine Solid Waste Management Regulations.

Condition 5. Concrete shall be precast and cured at least three weeks before placing in the water, or where necessary, shall be placed in forms and shall cure at least one week prior to contact with surface water. No washing of tools, forms, etc. shall occur in or adjacent to the waterway.

Condition 6. Temporary fill placed in the waterway or within the 100-year floodway boundaries of the waterway to provide temporary equipment access shall consist of clean granular material free from vegetable matter, lumps or balls of clay and other deleterious substances. That portion passing a 3-inch (No. 200) sieve shall not exceed 10 percent fines, by weight. Those portions of the fill that come into contact with moving water shall be protected by filter fabric and/or riprap. All temporary fill shall be removed from the waterway following completion of the approved construction activities.

Condition 7. The minimum flow release stipulated in Maine DEP's WQC for the Orono Project (Department Order #21917-33-A-N dated December 14, 2004) shall be maintained at all times during and following the proposed construction activities.

2.3 STAFF ALTERNATIVE

Under the staff alternative, the project would include Black Bear Hydro's proposed measures, the terms of Maine DEP's WQC described above, and the following additional measures:

- Develop and implement a revised Operation and Flow Compliance Monitoring Plan for the Orono Project and a revised Water Level Monitoring Plan for the Stillwater Project. The revised plans should include: a detailed description of how impoundment levels, minimum flows, generation flows, and inflows are currently measured; updated information regarding flow compliance monitoring as it pertains to the new facilities (i.e., monitoring discharges from the new powerhouses and fish passage facilities); maintenance plan for ensuring that the monitoring methods remain accurate; measures to make flow and impoundment level data publicly available as proposed by Black Bear Hydro; and a description of the locations where minimum flows would be released and the methods that would be used to release minimum flows at both projects.

- Develop and implement a plan to conduct dissolved oxygen (DO) monitoring downstream of each of the Stillwater and Orono Projects. The monitoring should be conducted from June through September for at least the first year of operation of the new powerhouses. The plan should be developed in consultation with NMFS, FWS, Maine DEP, Maine DIFW, and Maine DMR.

- Develop and implement a fish salvage plan defining procedures for monitoring areas dewatered by cofferdams and transferring any stranded fish safely from those areas. The plan should be developed in consultation with NMFS, FWS, Maine DIFW, Maine DMR, and the Penobscot Indian Nation.

- Provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period in order to help ensure that appropriate measures are being implemented to provide for upstream passage to the extent practicable

- Develop and implement a plan for a one-year study at both projects to identify locations where eels congregate after construction of the new powerhouses to identify the best locations for the eel ladders associated with the new powerhouses and intakes. The plan should be developed in consultation with NMFS, FWS, Maine DMR, and the Penobscot Indian Nation.

- Use native plants and native seed mixes, identified through consultation with Maine DIFW and Maine DC, when revegetating disturbed areas.

- Develop and implement a plan to avoid the introduction and/or spread of invasive species during construction activities in consultation with Maine DIFW and Maine DC.

- Develop and implement a sensitive plant protection plan in consultation with Maine DIFW and Maine DC that includes: (1) flagging appropriate work

zones; (2) educating construction crews about the sensitivity of these plants and the importance of restricting activities to within the flagged areas; (3) determining whether transplanting is appropriate and, if so, identifying potential low-cost recovery/transplanting methods for the affected species; (4) conducting a post-construction survey for sensitive plants one year following project completion; and (5) identifying thresholds at which additional mitigation would be required.

- Consult with Maine DIFW, Maine DC, and FWS during preparation of the blasting plan.

- Construct new transmission lines in accordance with Avian Power Line Interaction Committee (APLIC) guidelines to prevent raptor electrocutions.

2.4 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Black Bear Hydro considered several alternative powerhouse locations for the proposed expansion of the Stillwater and Orono Projects. In response to requests by the U.S. Army Corps of Engineers (Corps) and the Commission in regard to the selection of preferred alternatives, Black Bear Hydro conducted a least environmentally damaging practicable alternative analysis. The analysis evaluated specific criteria for each alternative, including relative logistical issues, relative capital costs, constraints to the project purpose, and relative effects on fish passage and aquatic habitats. The analysis of capital costs included the cost of civil works, cofferdams, mechanical and electrical, design, construction supervision, and indirect costs.

Although the licensee conducted an analysis of alternative powerhouse locations for the Stillwater Project, we did not receive any comments or concerns regarding the proposed location. Therefore, we do not discuss alternative powerhouse locations for the Stillwater Project. However, NMFS expressed concerns regarding the proposed location of the new powerhouse at the Orono Project. Below we briefly discuss each powerhouse location alternative for the Orono Project and why it was eliminated from further analysis in this EA.

Black Bear Hydro considered five alternative powerhouse locations for the project expansion of the Orono Project, identified as Alternatives A, B, C, D, and E. These alternatives are discussed in further detail below.

2.4.1 Orono Powerhouse—Alternative Location A

Under Alternative A, the new powerhouse would be located on the east side of the Stillwater Branch opposite from the existing powerhouse at the non-overflow section of the spillway. This alternative would require large amounts of excavation underneath an

existing actively used railroad for the new tailrace. In addition, there is currently no access to this section of the spillway. Alternative A was the most expensive alternative considered. Compared to the proposed location, this alternative would provide less overall net head resulting in less power generated. We dismiss this alternative from further analysis because these factors would increase the cost of this alternative while not providing additional power generation, environmental benefits, or reduced environmental impacts compared to the preferred alternative.

2.4.2 Orono Powerhouse—Alternative Location B

Alternative B would expand Orono powerhouse A (the existing powerhouse) into the spillway. Alternative B project works would occupy or otherwise encroach into areas that are in use by other facilities. The proposed penstock alignment would encroach on the local distribution lines coming in and out of the Orono substation which would result in significant disruption to electric distribution services in the area. The penstock alignment would also cross an existing active railroad track where bedrock would prohibit burying the penstock under the track. The alternative would also require additional cofferdamming in the mainstem Penobscot River for tailrace excavation. Alternative B was more expensive than the preferred alternative. Compared to the proposed location, this alternative would provide less overall net head resulting in less power generated. We dismiss this alternative from further analysis because these factors would increase the cost of this alternative while not providing additional power generation, environmental benefits, or reduced environmental impacts compared to the preferred alternative.

2.4.3 Orono Powerhouse—Alternative Location C

Alternative C would place the new powerhouse (Orono powerhouse B) adjacent to the south side of Orono powerhouse A. Alternative C would require similar encroachments to Alternative B, but has a higher cost. Compared to the proposed location, this alternative would provide less hydraulic flow to the powerhouse resulting in less power generated. We dismiss this alternative from further analysis because these factors would increase the cost of this alternative while not providing additional power generation, environmental benefits, or reduced environmental impacts compared to the preferred alternative.

2.4.4 Orono Powerhouse—Alternative Location D

Alternative D would locate the new powerhouse adjacent to the north side of Orono powerhouse A. Evaluation of this alternative was requested by NMFS in its comments on the draft amendment application. Alternative D would have similar logistical issues to the preferred alternative. However, the penstock would be larger and longer and a significant amount of additional bedrock would be excavated, which would increase construction costs to be more than all alternatives except Alternative A. This

alternative would not improve guidance to the trap-and-haul facility because the outflows from both powerhouses would be on the opposite side of the dam from the trap-and-haul facility. We dismiss this alternative from further analysis because these factors would increase the cost of this alternative while not providing additional power generation, environmental benefits, or reduced environmental impacts compared to the preferred alternative.

2.4.5 Orono Powerhouse—Alternative Location E

Alternative E would place Orono powerhouse B in the same location as in the proposed alternative, but would use repurposed units from the Great Works Project. While the equipment acquisition cost would be lower than for the preferred alternative, the powerhouse would be much larger and therefore more expensive, the design cost would be higher, and the equipment would need to be refurbished prior to installation, which would not be required for the preferred alternative. All of these factors would make Alternative E much more expensive than the preferred alternative. Compared to the proposed action, using repurposed units would provide less efficiency resulting in less power generated. We dismiss this alternative from further analysis because these factors would increase the cost of this alternative while not providing additional power generation, environmental benefits, or reduced environmental impacts compared to the preferred alternative.

3.0 ENVIRONMENTAL ANALYSIS[15]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Stillwater and Orono Projects are located on the 10.5-mile-long Stillwater Branch of the Penobscot River, a channel of the Penobscot River that flows around the west side of Orson and Marsh Islands. The Penobscot River Basin encompasses about 8,570 square miles and encompasses nearly one-quarter of the state of Maine. Much of the Penobscot River Basin is upland with low, rolling hills rising above wide, flat valleys, and about 95 percent of the basin is forested. Lands surrounding the Stillwater and Orono Projects are a mix of residential development and undeveloped forestlands. The western side of the Stillwater Branch is the mainland and is predominantly developed. The eastern side of the Stillwater Branch is bounded by the uninhabited Orson Island and by Marsh Island, which is home to the towns of Orono at the southern tip and Old Town to the north. The projects are located in the towns of Stillwater and Orono. Population density is higher in the southern reach of the Stillwater Branch with some forested areas to the north. Orono had a population of 9,670 people in 2008.

The average annual precipitation in the Penobscot River Basin is about 42 inches. Annual snowfall throughout the basin varies from about 60 inches in the southern coastal region to more than 100 inches in the headwaters. The average runoff from the basin is about 1.7 cfs per square mile, equivalent to about 22 inches per year or about 52 percent of the mean annual precipitation.

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing the National Environmental Policy Act (40 CFR §1508.7), a cumulative effect is the impact on the environment that results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over time, including hydropower and other land and water development activities.

Based on our review of Black Bear Hydro's license amendment application, the settlement agreement and explanatory material, and agency and public comments, we

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[15] Unless otherwise indicated, our information is taken from the application for license for this project (Black Bear Hydro, 2011a) and additional information filed by Black Bear Hydro on October 7, 2011 (Black Bear Hydro, 2011b); January 20, 2012; March 7, 2012; and March 14, 2012.

have identified anadromous, catadromous, and resident fish as having the potential to be cumulatively affected by the proposed projects in combination with other past, present, and foreseeable future activities. These activities include the power generation enhancements proposed by Black Bear Hydro at the Stillwater and Orono Projects, in combination with other hydroelectric projects and future planned activities under the settlement agreement.

3.2.1 Geographic Scope

The geographic scope of analysis for cumulatively affected resources defines the physical limits or boundaries of the effects of the proposed action on the resources. Because the proposed action can affect resources differently, the geographic scope for each resource may vary. The scope of analysis for fisheries resources extends along the Stillwater Branch between its upstream and downstream confluences with the Penobscot River. We chose this geographic scope because of the potential effect the projects have on anadromous, catadromous, and resident fish resources that are using the Stillwater Branch as a secondary migration corridor. However, in our discussion of cumulative effects, we acknowledge that the full implementation of the settlement agreement would contribute to the overall fish restoration efforts occurring in the Penobscot River Basin.

3.2.2 Temporal Scope

The temporal scope of analysis includes a discussion of the past, present, and future actions and their effects on fisheries. Based on the potential term of a license, the temporal scope looks 30 to 50 years into the future, concentrating on the effect on fisheries from reasonably foreseeable future actions. The historical discussion is limited, by necessity, to the amount of available information for the resource. We identified the present resource conditions based on the license application, agency comments on the draft license application, and comprehensive plans.

3.3 PROPOSED ACTION AND ACTION ALTERNATIVES

In this section, we discuss the effect of the project alternatives on environmental resources. For each resource, we first describe the affected environment, which is the existing condition and baseline against which we measure effects. We then discuss and analyze the site-specific and cumulative environmental issues. In some instances, resources and issues at the two projects are different (relative to the proposed action), and we therefore address each project separately. In other instances, resources and issues at the two projects are similar enough that we address them together.

Only the resources that would be affected, or about which comments have been received, are addressed in detail in this EA. We have not identified any substantive issues related to socioeconomics associated with the proposed action, and, therefore,

socioeconomics is not assessed in this EA. We present our recommendations in section 5.2, *Comprehensive Development and Recommended Alternative.*

3.3.1 Geologic and Soil Resources

3.3.1.1 Affected Environment

Stillwater and Orono Projects

Bedrock Geology

The Stillwater and Orono Projects are located within the Central Interior Ecoregion, which extends from the foothills of the White Mountains to the lowlands of the lower Penobscot River Valley. The terrain is characterized by rolling hills in the lower river valleys, with topographic relief increasing east of the Penobscot River. This region is characterized by sedimentary and metamorphic bedrock with sizable granitic plutons also present in locations southwest of the immediate project area (Belgrade Lakes area; Androscoggin Lake; and Augusta, Maine). The Stillwater Branch lies within a large area of middle Paleozoic sedimentary rocks. The reach of the Penobscot Valley from Old Town to Bangor has an increased gradient including a number of bedrock outcrops which form of a series of bedrock "sills." These bedrock sills are the modern day location of a number of the dams located throughout this reach of the Penobscot River and the Stillwater Branch.

Soils

The soils within the area of the Orono and Stillwater Projects consist of water-deposited sediments of both glacial and glaciomarine origin. Along the western shoreline of the Stillwater Branch, a glacial esker[16] extends from the Orono Project upstream past the Stillwater Project toward Alton Bog. This esker also represents moderate-to-good potential groundwater yield based on mapping of significant sand and gravel aquifers. The remaining shoreline lies within a large portion of the Presumpscot Formation, consisting of fine-grained marine silts and clays, along with various occurrences of glacial till and more recently deposited alluvium. In general, soils along and downstream of the Orono and Stillwater impoundments range in erosion potential from low to moderate.

[16] A long winding ridge of stratified sand and gravel deposited under ice during glaciations.

3.3.1.2 Environmental Effects

Stillwater Project

Construction of the proposed facilities requires ground disturbance, blasting, and excavation. The areas of construction are primarily over-exposed bedrock or bedrock within, and submerged by, the Stillwater Branch. The excavation for powerhouse B would be immediately downstream of the intake excavation. The overall footprint of the intake and powerhouse would be about 75 feet by 55 feet (4,125 square feet), resulting in approximately 1,500 cubic yards of bedrock excavation. The existing grade is assumed to be at elevation 81.5 feet NGVD. No excavation would be required for the forebay and intake.

The proposed total tailrace excavation is anticipated to be about 3,000 cubic yards, which would occur in two areas. The first would be immediately downstream of the powerhouse where an estimated 500 cubic yards of rock would need to be removed, and the second area would be about 220 feet downstream. These areas are also expected to be bedrock material. The existing grade in this area is assumed to be at elevation 69.0 feet NGVD. The excavation amount was calculated using a 4H:1V slope and a width of 60 feet.

In addition, construction of a new temporary gravel access road, permanent access road, laydown area, and retaining wall would result in localized soil disturbance. An applicant-maintained access road currently exists, and a proposed permanent access road would be constructed as an extension of the existing access road. The extension to the existing road would be about 80 feet long and 20 feet wide with a 75 feet by 45-feet parking area. The proposed retaining wall would run perpendicular from the southeast corner of the powerhouse to the existing shore line. Black Bear Hydro anticipates this wall would be founded on bedrock, and minimal excavation would be needed. The approximate footprint of the wall would be 6 feet wide by 55 feet long. Black Bear Hydro would dispose of construction material (rock and soil) onsite or reuse it to the extent possible for shoreline stabilization and site topography to limit the need to truck material off site.

A 320-foot-long temporary access road, extending from the Old Mill Road, and a 150-foot by 50-foot laydown area would likewise be constructed, both of which would be revegetated post-construction. In order to minimize and avoid erosion and sedimentation, Black Bear Hydro proposes to develop and implement a soil erosion and sediment control plan. The soil erosion and sediment control plan would outline in detail, specific actions to ensure that erosion and sedimentation are minimized during the construction. This plan would detail specific measures to be implemented including: silt fencing, rip-rap,

and other standard best management practices (BMPs). This plan is also required by the 401 WQC and must be approved by Maine DEP prior to the start of construction.

The Stillwater Project would continue to be operated as a run-of-river project, with fewer impoundment level fluctuations as a result of the increased capacity at the project to pass downstream flows. The proposed action would not alter the existing water levels.

Orono Project

Construction of the proposed facilities requires ground disturbance, blasting, and excavation. The areas of construction are primarily over-exposed bedrock or bedrock within and submerged by the Stillwater Branch. The intake and gate structure would be constructed just downstream of the existing non-overflow structure, adjacent to the existing powerhouse A intake. Black Bear Hydro anticipates that a very minor amount of excavation would need to take place in this area, approximately 50 cubic yards. The intake structure has a trapezoidal shaped footprint with an approximate area of 500 square feet. The proposed penstock would be immediately downstream of the intake and run approximately 300 feet to the location of powerhouse. Black Bear Hydro anticipates that excavation would not be needed for the penstock, beyond typical surface preparation.

The excavation for powerhouse B would be immediately downstream of the penstock. The overall footprint of the powerhouse would be about 59.5 feet by 55.5 feet (3,300 square feet). However, because the entire footprint does not need to be excavated down to the same elevation, it would be excavated in steps to reduce the amount of excavation, resulting in approximately 1,900 cubic yards of bedrock excavation. The existing grade was assumed to be at elevation 50.5 feet NGVD.

The proposed tailrace excavation is anticipated to be approximately 1,100 cubic yards. This is also expected to be bedrock material and would be located immediately downstream of the powerhouse. The assumed existing grade in this area is at elevation 42.0 feet NGVD. The excavation amount was calculated using a 4:1 slope and a width of 60 feet. An additional 500 cubic yards of bedrock removal would occur to extend the permanent tailrace channel to re-enter the Penobscot River.

In addition, localized soil disturbance from the construction of an access road would occur. A 16-foot-wide permanent main access road would extend approximately 325 feet from the existing access road to powerhouse B. An additional parking area for powerhouse B would measure approximately 60 feet by 40 feet and would be served by the main access road. A permanent extension from the main access road would extend approximately 400 feet to the intake and have a 36-foot-diameter cul-de-sac at its terminus. Only minimal disturbance to the existing grade other than minor surface preparation would occur.

Black Bear Hydro would dispose of construction material (rock and soil) onsite or reuse it to the extent possible such as for shoreline stabilization and site topography to limit the need to truck material offsite.

In order to minimize and avoid erosion and sedimentation, Black Bear Hydro proposes to develop and implement a soil erosion and sediment control plan. The soil erosion and sediment control plan would outline in detail, specific actions to ensure that erosion and sedimentation are minimized during the construction. This plan would detail specific measures to be implemented including: silt fencing, rip-rap, and other standard BMPs. This plan is also required by the 401 WQC and must be approved by Maine DEP prior to the start of construction. The Orono Project would continue to be operated as a run-of-river project, with fewer impoundment level fluctuations as a result of the increased capacity of the project to pass downstream flows. Black Bear Hydro proposes to increase the elevation by approximately 0.6 foot to the project boundary of 73.0 feet NGVD. This water level increase would occur within areas that are already inundated approximately 51 percent of the time.

Our Analysis

Stillwater and Orono Projects

Project construction activities associated with the installation of the powerhouses and the excavation of the tailrace areas would involve the use of heavy equipment and would result in limited vegetation removal, blasting, excavation, and other earth disturbance that have the potential to contribute to erosion of soils and sedimentation of the waterways. Any potential effects on soils from construction activities related to earth moving and construction equipment would be temporary and limited to the construction footprint. Black Bear Hydro proposes to develop and implement a soil erosion and sediment control plan for the projects to address short-term effects resulting from ground disturbance during construction activities. Permanent alterations to the underlying bedrock from blasting and excavation would occur within and be limited to the footprint of the proposed project structures and would not contribute to additional effects once construction is complete.

Erosion is not extensive within the project areas. The majority of the shoreline along the project impoundments is forested, and some portions of the project shorelines are armored with bedrock. Current project operations have a minimal effect on bank erosion because natural flood flows exert a much stronger influence on bank stability and channel morphology than any influence from run-of-river operations, which closely follow the natural hydrologic regime.

In addition, soils within the impoundment do not exhibit highly erosive properties. As the proposed changes would not dramatically alter the existing water levels, and

impoundment fluctuations would be further minimized as a result of the additional hydraulic capacity through each of the new powerhouses, erosion would be minimal within the impoundment. Changes in water levels would not affect bedrock within the impoundment or any area outside of the construction area.

The reallocation of flows into the Stillwater Branch, as described in the amendment application, would result in an additional allocation of up to 20 percent of flows to the Stillwater Branch over existing conditions. As discussed above, this reallocation is not expected to have any long-term effects because the reallocation would not alter the maximum flows that have the greatest effect on erosion and maintenance of geomorphological features.

Operation of the projects could have very localized effects on the sediment distribution immediately downstream of the project dams and powerhouses. Any potential effect resulting from initial project operations is expected to be temporary because much of the existing tailrace areas consist of armored bedrock, and have been subjected to high flow events that have practically eliminated sediment accumulation in the spillway and tailrace areas.

3.3.2 Water Resources

3.3.2.1 Affected Environment

Water Quantity

Penobscot River at Milford Project

The Stillwater Branch diverges from the main stem of the Penobscot River in Old Town, Maine, flowing southwesterly about 12 miles before rejoining the Penobscot River just downstream of Orono dam. Under average mainstem flow conditions, flow to the Stillwater Branch is controlled by operations at the Milford Project, which includes Milford dam located on the main stem just downstream of the divergence of the Stillwater Branch, and Gilman Falls dam, located on the Stillwater Branch about 4 miles upstream of Stillwater dam.

Under normal flow conditions, in accordance with a 1911 Federal Circuit Court decree, from 9 percent to one-third of the Penobscot River flow is diverted to the Stillwater Branch; the remainder continues flowing in the main stem of the Penobscot River. Under very rare low-flow conditions, when flows in the main stem above the divergence are less than 2,400 cfs, about 2 percent of the flow is allocated to the Stillwater Branch. Table 2 provides monthly flow statistics based on the 1911 Federal Circuit Court decree and also the percent of time spillage occurs at the Milford dam.

Black Bear Hydro used average annual flow information from U.S. Geological Survey (USGS) Gage No. 01034500, located upstream of the Stillwater Branch diversion, to determine the pro-rated flows allocated to the Stillwater Branch. For the period of record, January 1, 1980, to May 2, 2010, average annual flow in the Stillwater Branch was 3,905 cfs. During the fish passage season, from April through December, average flows were 4,225 cfs. Minimum inflows to the projects were 278 cfs with maximum inflows at 47,867 cfs.

Table 2. Flow (cfs) statistics for the Stillwater Branch and spillage at the Milford Project based on the existing 1911 Federal Circuit Court decree allocation. (Source: Black Bear Hydro, 2011a)

Month	Average Flow (cfs)	Lowest Daily Average Flow (cfs)	Highest Daily Average Flow (cfs)	% of Time Spillage Occurs at Milford Dam
January	2,611	345	20,369	41
February	2,313	278	15,277	33
March	3,809	309	20,844	60
April	10,868	1,178	47,867	99
May	6,634	1,323	40,398	89
June	3,249	450	37,343	52
July	2,113	519	23,221	27
August	1,749	382	9,573	22
September	1,793	375	30,180	16
October	3,074	419	26,310	38
November	4,397	397	23,628	64
December	4,034	651	25,190	48
Annual	3,905	278	47,867	50
Fish Passage Season (April–December)	4,225	375	47,867	51

Stillwater Project

The Stillwater Project is operated in run-of-river mode in accordance with Article 401 of the existing license, with inflows equal to outflows (including turbine discharge, minimum and downstream fish passage flows, and spill. Currently, in accordance with

Article 402 of the existing project license, 20 cfs is discharged into the west channel of the bypassed reach, 50 cfs is discharged into the east channel of the bypassed reach, and 35 cfs is passed through the downstream fish bypass facility at existing Stillwater powerhouse A. The existing hydraulic capacity of the Stillwater Project is 1,700 cfs, and the minimum hydraulic capacity is 100 cfs.

Based on historical flow duration curves, inflows allow the Stillwater Project to meet the minimum and fish passage flow requirements and generation at the maximum capacity of one generating unit (380 cfs) nearly 100 percent of the time. Inflows sufficient to maximize generation at two of the three smaller units (combined capacity of 760 cfs) and meet the minimum and fish passage flow requirements are provided about 90 percent of the time. Inflows exceed the hydraulic capacity of the project (1,700 cfs), resulting in spills, about 60 percent of the time. The impoundment is maintained[17] at an elevation of 94.65 feet NGVD, creating a 3-mile-long impoundment with a surface area of about 191 acres and a gross storage capacity of 1,910 acre-feet. The flashboards are designed to fail when the water reaches a height of about 1 foot over the top of the flashboards at elevation 95.65 feet NGVD.

Orono Project

Similar to the Stillwater Project, the Orono Project is operated in a run-of-river mode with a 200-cfs minimum flow in the bypassed reach, in accordance to Article 401 of the existing license. The minimum flow is split between about 72 cfs to the fish bypass facility at the intake for Orono powerhouse A and the remaining 128 cfs is provided via leakage through the flashboards.

Based on historical flow duration curves, inflows allow the Orono Project to meet the minimum and fish passage flow requirements and generate at the maximum capacity of one generating unit (370 cfs) nearly 100 percent of the time. Inflows sufficient to maximize generation at units 1 and 2 (combined capacity of 740 cfs) are provided about 88 percent of the time. Spill, passed when inflows exceed the hydraulic capacity of the project (1,740 cfs), occurs about 57 percent of the time.

A normal impoundment[18] elevation of 72.4 feet NGVD is maintained when river flows are at or below the hydraulic capacity of the turbines. At the normal impoundment elevation, the existing impoundment has a surface area of about 175 acres and extends upstream 2.3 miles. The flashboards are designed to fail when the water reaches a height of about two feet over the top of the flashboards at an elevation of 74.4 feet NGVD.

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[17] With a ± 1-foot impoundment fluctuation.

Water Quality

Stillwater and Orono Projects

Under Maine's water quality regulations, the Stillwater Branch of the Penobscot River is designated as a Class B waterway (the third highest classification behind Class AA and Class A). According to Maine statute, Class B waters must be suitable for the following designated uses: drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and as habitat for fish and other aquatic life.

The water quality standards for Class B waters require that DO be maintained at not less than 7 parts per million (ppm) or 75 percent saturation, whichever is higher, except that for the period from October 1 to May 14, when the 7-day mean DO concentration must not be less than 9.5 ppm and the 1-day minimum DO concentration must not be less than 8.0 ppm in identified spawning areas in order to ensure spawning and egg incubation of indigenous fish species.

Maine DEP conducted ambient water quality sampling in the Stillwater Branch as recently as the summer of 2007 (Maine DEP, 2008). Sampling was performed for a 3 day period from July 31 through August 2, with readings taken in the morning and afternoon. Morning DO readings at the Orono site ranged from 6.4 to 6.7 ppm (80.2 to 82.6 percent saturation) and stream temperatures ranged from 26.0 to 26.9 degrees Celsius (˚C). Afternoon DO readings ranged from 7.0 to 7.6 ppm (88.2 to 96.7 percent saturation) and stream temperatures ranged from 26.9 to 27.8˚C.

According to Maine DEP's 2008 Integrated Water Quality and Assessment Report (305(b) report) to the U.S. Environmental Protection Agency, the Stillwater Branch is impaired in sections due to chemical pollution. It is classified as a Category 4B water (Rivers and Streams Impaired by Pollutants—Pollution Control Requirements Reasonably Expected to Result in Attainment) due to dioxin, and a Category 5D water (Rivers and Streams Impaired by Legacy Pollutants) due to polychlorinated biphenyls. The main stem of the Penobscot River at Orono, Old Town, and Milford is classified by Main DEP as a Category 5A water—Impaired By A Pollutant; Total Maximum Daily Load Required—as a result of excursions of Class B DO criteria and nutrients/eutrophication biological indicators including bacteria (*E. coli*). The primary impairment issue of segments of the main stem of the Penobscot River is non-attainment of the Fish Consumption use, with segments of the river listed in either Category 4 or Category 5.

3.3.2.2 Environmental Effects

Water Quantity

Stillwater and Orono Projects

NMFS, Interior, and the Penobscot Indian Nation recommend that both projects be operated as run-of-river facilities, consistent with Black Bear Hydro's proposed mode of operation. NMFS also recommends that Black Bear Hydro monitor flow in the Stillwater Branch and make flow data available to the public.

As described in section 2, the flow reallocation described in the license application would increase flows in the Stillwater Branch and reduce flows in the Milford reach of the main stem of the Penobscot River, although no changes in flow would occur at inflows below 3,800 cfs, above 15,000 cfs, or when flows are between 3,800 and 5,446 cfs from May 1 through October 31. Based on average monthly flows, some flow would be reallocated in every month of the year, although changes would be minimal in April and May (Table 3).

Based on the difference between average monthly flows and the 6,730-cfs hydraulic capacity of the Milford powerhouse, the greatest reduction in spill volumes at Milford dam would typically occur in January and February and moderate reductions would occur in October and June (Table 4). Relatively little change in spill volumes would occur during the peak flow months of March and April, and spill volumes would not change during July, August, and September, when the average monthly flow under existing conditions is lower than the hydraulic capacity of the powerhouse.

Although the reallocation would increase flows into the Stillwater Branch, spill volumes at Stillwater and Orono dams would be reduced due to increases in the hydraulic capacity of the projects provided by the new powerhouses. Addition of the second powerhouse at each project would increase the total hydraulic capacity of the turbines from 1,700 to 3,458 cfs at the Stillwater Project and from 1,740 to 3,822 cfs at the Orono Project. The greatest reduction in spill volumes on a percentage basis would occur in months with relatively low flow volumes (January, February, and July through September), while the greatest reduction on a volume basis would occur in the high flow months of March through May and November (Table 4).

Our Analysis

Implementation of the flow reallocation and the construction and operation of the new powerhouses has the potential to alter water levels in the project reservoirs, and would alter the locations where minimum flows are released into the bypassed reaches, a portion of which would be released through the new downstream fish passage facilities.

We recommend that the licensee develop and implement revisions to the existing impoundment level and minimum flow monitoring requirements for both projects in order to ensure the accuracy of monitoring information and provide monitoring data to the agencies and general public on a timely basis. In addition, these provisions would enable the Commission to determine the licensee's compliance with license requirements.

Water Quality

Stillwater and Orono Projects

Project construction activities associated with the installation of the powerhouses and the excavation of the tailrace areas would involve the use of heavy equipment, blasting, excavation, and other earth disturbance that have the potential to contribute to erosion of soils and affect water quality through temporary increases in turbidity. In addition, some changes in water quality may occur during project operation because of changes in the magnitude of spills at Stillwater, Orono, and Milford dams. Changes in spill volumes have the potential to affect both DO and total dissolved gas levels.

Our Analysis

Any effects of project construction on turbidity would be minimized by Black Bear Hydro's plans to construct most of the facilities in the dry behind cofferdams, develop and implement a soil erosion and sediment control plan, and revegetate disturbed areas after construction is complete. Any effects on turbidity in the downstream main stem of the Penobscot River would be greatly reduced by dilution. As a result, any effects on water quality resulting from turbidity would be minor and temporary.

As described above, the flow reallocation described in the license application would reduce spill volumes at the Milford, Stillwater, and Orono Projects. Reduced spill volumes have the potential to affect water quality and aquatic resources by reducing the amount of aeration that occurs when water passes over spillways, which would reduce the potential for occurrence of high total dissolved gas levels (and potential injuries to aquatic life associated with gas supersaturation), but could result in lower DO levels in waters downstream of the projects.

Table 3. Comparison of Penobscot River main stem and Stillwater Branch flows under existing and proposed conditions (mean flows). (Source: Black Bear Hydro, 2011b, as modified by staff)

	Existing 1911 Federal Circuit Court Decree			Flow Reallocation			Percent Change	
Month	% of Flow Allocated to Stillwater Branch	Stillwater Branch Average Flow (cfs)	Penobscot River (Milford Reach) Average Flow (cfs)	Stillwater Branch Average Flow (cfs)	% of Flow Allocated to Stillwater Branch	Milford Reach Average Flow (cfs)	Stillwater Reach	Milford Reach
January	25	2,611	7,677	3,681	36	6,608	+41	–10
February	25	2,313	7,072	3,387	36	5,998	+46	–11
March	28	3,809	10,032	4,650	34	9,191	+22	–6
April	30	10,868	25,449	10,982	30	25,335	+1	0
May	29	6,634	16,028	7,231	32	15,432	+9	–3
June	27	3,249	8,955	4,293	35	7,912	+32	–9
July	24	2,113	6,700	3,013	34	5,800	+43	–10
August	23	1,749	5,928	2,533	33	5,143	+45	–10
September	23	1,793	6,116	2,754	35	5,155	+54	–12
October	26	3,074	8,698	4,009	34	7,763	+30	–8
November	28	4,397	11,274	5,147	33	10,524	+17	–5
December	28	4,034	10,554	4,935	34	9,653	+22	–6
Annual	27	3,905	10,412	4,733	33	9,583	+21	–6
Fish passage season	28	4,225	11,106	4,999	33	10,331		

Table 4. Estimated monthly average spill volumes (cfs) at the Stillwater, Orono, and Milford Projects under existing conditions (1911 Federal Circuit Court decree, current hydraulic capacity) and proposed conditions (flow reallocation and increased hydraulic capacity at the Stillwater and Orono Projects). (Source: Black Bear Hydro, 2011b, as modified by staff)

	Stillwater			Orono			Milford		
Month	**Existing (cfs)**	**Proposed (cfs)**	**Percent Reduction**	**Existing (cfs)**	**Proposed (cfs)**	**Percent Reduction**	**Existing (cfs)**	**Proposed (cfs)**	**Percent Reduction**
January	911	223	76	871	0	100	947	0	100
February	613	0	100	573	0	100	342	0	100
March	2,109	1,192	43	2,069	828	60	3,302	2,461	25
April	9,168	7,524	18	9,128	7,160	22	18,719	18,605	1
May	4,934	3,773	24	4,894	3,409	30	9,298	8,702	6
June	1,549	835	46	1,509	471	69	2,225	1,182	47
July	413	0	100	373	0	100	0	0	--
August	49	0	100	9	0	100	0	0	--
September	93	0	100	53	0	100	0	0	--
October	1,374	551	60	1,334	187	86	1,968	1,033	48
November	2,697	1,689	37	2,657	1,325	50	4,544	3,794	17
December	2,334	1,477	37	2,294	1,113	51	3,824	2,923	24

[a] Estimated by subtracting the hydraulic capacity of the powerhouses from the average monthly flow.

Data from USGS Gage No. 0103639, Penobscot River at Eddington, about 4.5 miles downstream of the confluence of the Stillwater Branch with the main stem of the Penobscot River (Figure 3) indicate that DO levels in the main stem of the Penobscot River typically meet state water quality standards.

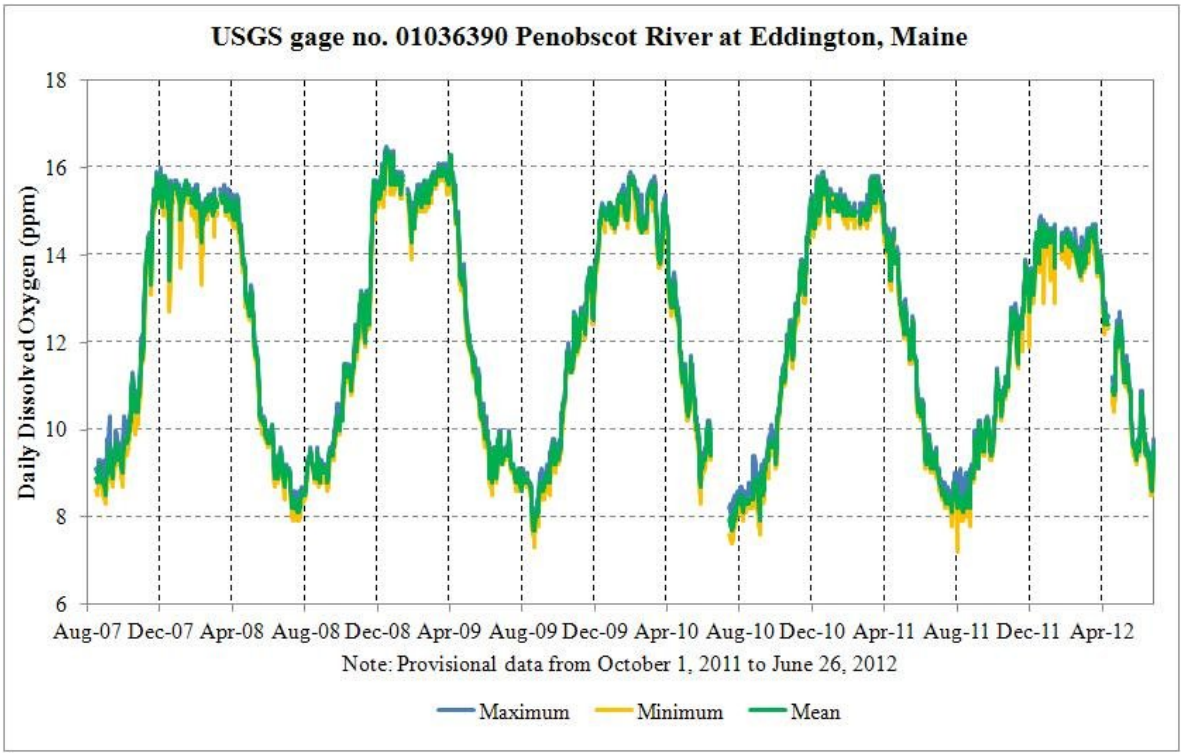

Figure 3. Dissolved oxygen levels measured at USGS Gage No. 01036390 at Eddington, Maine, approximately 4.5 miles downstream from the confluence of the Stillwater Branch with the main stem of the Penobscot River. (Source: USGS, 2012)

However, mid-summer sampling conducted in the Stillwater Branch by Maine DEP during the summer of 2007 (Maine DEP, 2008) indicates that instantaneous DO levels do not meet the minimum DO standard of 7.0 ppm at all times, with levels as low as 6.4 ppm being measured during the morning hours. We recommend that the licensee implement a one-year DO monitoring program conducted from June through October downstream of each of the Stillwater and Orono Projects after the new powerhouses are operational. This would help document DO conditions downstream of the projects and determine whether mitigation measures (e.g., increased spillage) would be needed to meet the DO standards during periods of low flows and high water temperatures. Implementation of this measure would minimize any adverse impact on DO the proposed amendments may have.

3.3.3 Aquatic Resources

3.3.3.1 Affected Environment

Aquatic Habitat

Stillwater Project

The Stillwater impoundment comprises a shallow 3-mile-long segment of the Stillwater Branch with a maximum depth of approximately 31 feet. A variety of substrate types are found in the impoundment, including ledge, cobble, gravel, sand, fines, and clay. The slope of the shoreline is variable ranging from flat to steep. Although aquatic plants are not prolific, there are several pockets of submerged aquatic vegetation and wetland habitat. Timber cribs, ledge outcrops, overhanging vegetation, and downed trees at various locations, as well as the remains of an old bridge, provide a fair amount of cover for aquatic species.

The reach downstream of Stillwater dam is complex with several channels and islands. The two main channels downstream of each spillway section (referred to as the east channel and west channel) join at a large pool. The approximately 390-foot-long east channel contains large deep pools, riffles, flat shallow pools, and backwater areas with varied substrates. The approximately l00-foot-long west channel contains generally shallow riffle habitats with course substrates. A secondary channel connects this pool and the downstream Orono Project impoundment, and the main channel below the pool diverges with one channel joining the powerhouse tailrace.

Orono Project

The Orono impoundment extends approximately 2.3 miles upstream to just below Stillwater dam. The impoundment is generally low velocity lacustrine habitat with moderate depth. Several beds of submerged aquatic vegetation are located mid-channel, and emergent fringe wetlands are located in sediment deposits along the shoreline. A fair amount of submerged debris, consisting primarily of timber cribs, lies within the impoundment.

The Orono bypassed reach is approximately 1,000 feet long and as much as 500 feet wide. In general, the bypassed reach is a wide, flat channel with heavy substrate (e.g., rock, cobble, and ledge) with three separate channels leading to the main stem of the Penobscot River.

Fishery Resources

Stillwater and Orono Projects

The Stillwater Branch of the Penobscot River supports a variety of resident fish species and serves as a secondary downstream migration corridor for several anadromous fishes and American eel. Resident warmwater species include smallmouth bass, chain pickerel, brown bullhead, white perch, yellow perch, white sucker, redbreast sunfish, pumpkinseed sunfish, burbot, banded killifish, fallfish, and several other minnow species. The two most important gamefish in the lower Penobscot River are smallmouth bass and chain pickerel. Smallmouth bass is the most abundant gamefish species present, inhabiting both riverine reaches and impoundments. Chain pickerel occupy backwater areas where stream velocities are low and submerged aquatic vegetation is available. Chain pickerel and smallmouth bass are not native species but were introduced in 1819 and 1869, respectively. Coldwater species, such as burbot, landlocked salmon, brook trout, and lake trout, may occur seasonally or immigrate from upstream reaches.

Anadromous species present in the Penobscot River include alewife, Atlantic salmon, American shad, and sea lamprey. The current production potential for Atlantic salmon has declined to an estimated 4,000 to 11,000 adult fish from annual runs of 40,000 to 75,000 that occurred prior to the 1900. Since the year 2000, actual salmon counts at the Veazie Project trap, however, have ranged from only 534 fish in 2000 to 3,124 fish in 2011, with an average annual return of 1,333 fish over this 12-year period (http://www.maine.gov/dmr/searunfish/salmonprojects/PenobscotHistoricTrapCounts.htm, accessed June 12, 2012). The catadromous American eel occurs throughout the Penobscot River Basin and supports a commercial fishery primarily for juvenile eels, known as elvers. Historically, the Penobscot River supported larger runs of American shad, blueback herring, Atlantic sturgeon, shortnose sturgeon, rainbow smelt, tomcod, and striped bass. A goal of the State of Maine is to restore native anadromous and catadromous species to their historical ranges, which includes appropriate habitat upstream of the Orono and Stillwater Projects.

Three of the fish species that occur in the project areas, Atlantic salmon, shortnose sturgeon and Atlantic sturgeon, are ESA-listed species. The project areas include critical habitat for Atlantic salmon,[18] which uses the Stillwater Branch as a secondary downstream migration route. Radio-telemetry studies conducted by Bangor Hydro-

[18] On June 19, 2009, FWS and NMFS issued a final rule expanding the Gulf of Maine Distinct Population Segment to include Atlantic salmon in larger river systems in Maine (Androscoggin, Kennebec, and Penobscot rivers) as well as the smaller coastal rivers that were initially designated in 2000. On June 19, 2009, NMFS designated critical habitat for the Gulf of Maine Distinct Population Segment.

Electric Company and the Atlantic Sea-Run Salmon Commission found that 30 to 40 percent of hatchery-reared smolts and kelts released into the main stem Penobscot River above the Milford Project migrated down the Stillwater Branch (Hall and Shepard, 1990; Shepard, 1991); this figure approximates the allocation of flow between the main stem of the Penobscot and the Stillwater Branch. Additionally, Atlantic salmon parr have been observed resting and holding in the Orono Project bypassed reach and tailrace areas.

Small numbers of shortnose sturgeon, which are listed as endangered,[19] have been documented to occur in the main stem of the Penobscot River in the project areas, and threatened[20] Atlantic sturgeon have been documented to occur in the lower Penobscot River. With the removal of Veazie dam, shortnose and Atlantic sturgeon will be able to migrate upstream from the estuary and the lower Penobscot River into the Stillwater Branch up to Orono dam. No critical habitat has been designated for either of the sturgeon species.

Atlantic Salmon Essential Fish Habitat

Stillwater and Orono Projects

EFH for Atlantic salmon is described as all waters currently or historically accessible to Atlantic salmon within the streams, rivers, lakes, ponds, wetlands, and other water bodies of Maine, New Hampshire, Vermont, Rhode Island, and Connecticut.

The following information for each life stage of Atlantic salmon from the NEFMC EFH Descriptions (NEFMC, 1998) is provided below.

Eggs: Bottom habitats with a gravel or cobble riffle above or below a pool. Generally, the following conditions exist in the egg pits (redds): water temperatures below 10°C, and clean, well-oxygenated fresh water. Atlantic salmon eggs are most frequently observed between October and April.

Larvae: Bottom habitats with a gravel or cobble riffle above or below a pool. Generally, the following conditions exist where Atlantic salmon larvae, or alevins/fry, are found: water temperatures below 10°C, and clean, well-oxygenated fresh water. Atlantic salmon alevins/fry are most frequently observed between March and June.

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[19] The shortnose sturgeon was listed as endangered on March 11, 1967, under the Endangered Species Preservation Act. Shortnose sturgeon remained on the endangered species list with enactment of the ESA in 1973.

[20] The Gulf of Maine Distinct Population Segment of Atlantic sturgeon was listed as threatened on February 6, 2012.

Juveniles: Bottom habitats of shallow gravel/cobble riffles interspersed with deeper riffles and pools in rivers and estuaries. Generally, the following conditions exist where Atlantic salmon parr are found: clean, well-oxygenated fresh water, water temperatures below 25°C, water depths between 10 centimeters and 61 centimeters, and water velocities between 30 and 92 centimeters per second. As they grow, parr transform into smolts. Atlantic salmon smolts require access downstream to make their way to the ocean. Upon entering the sea, "post-smolts" become pelagic and range from Long Island Sound north to the Labrador Sea.

Adults: For adult Atlantic salmon returning to spawn, habitats with resting and holding pools in rivers and estuaries. Returning Atlantic salmon require access to their natal streams and access to the spawning grounds. Generally, the following conditions exist where returning Atlantic salmon adults are found migrating to the spawning grounds: water temperatures below 22.8°C, and DO above 5 ppm. Oceanic adult Atlantic salmon are primarily pelagic and range from the waters of the continental shelf off southern New England north throughout the Gulf of Maine.

Spawning Adults: Bottom habitats with a gravel or cobble riffle above or below a pool. Generally, the following conditions exist where spawning Atlantic salmon adults are found: water temperatures below 10°C, water depths between 30 centimeters and 61 centimeters, water velocities around 61 centimeters per second, and clean, well-oxygenated fresh water. Spawning Atlantic salmon adults are most frequently observed during October and November.

Atlantic salmon EFH includes all aquatic habitats in the watersheds of the rivers identified in NEFMC (1998) including the Penobscot River and its tributaries, to the extent that they are currently or were historically accessible for salmon migration. Atlantic salmon EFH excludes areas upstream of longstanding naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years).

3.3.3.2 Environmental Effects

Aquatic Habitat and Essential Fish Habitat

Construction Effects

Stillwater and Orono Projects

The temporary effects of project construction on aquatic resources include the potential for habitat disturbance in the construction footprint for the proposed Stillwater and Orono Projects, including staging areas, cofferdams and causeway, and tailrace

excavations, and potential sensory effects on aquatic species, such as disturbance from noise and vibration. Temporary effects on water quality from erosion and sedimentation may also result from associated ground-disturbing construction activities.

Two temporary cofferdams and a causeway would be constructed at the Stillwater Project and three temporary cofferdams would be constructed at the Orono Project to allow construction work to occur "in the dry." The area that would be affected by cofferdams would cause temporary effects on approximately 74,052 square feet of the river bottom at the Stillwater Project and 41,870 square feet of the river bottom at the Orono Project.

At both projects, construction activities within cofferdam areas have the potential to cause injury or mortality to any mussels that occur in these areas. Black Bear Hydro proposes to implement its Mussel Relocation Plan prior to construction, which would identify any state-listed mussel species or species of special concern mussels for relocation, as necessary, prior to construction.

Construction activities, such as blasting and the use of heavy equipment for the installation of project facilities, would create noise and vibration that may temporarily affect aquatic biota in the Stillwater and Orono Project bypassed reaches and impoundments. Black Bear Hydro proposes to develop and implement a blasting plan, which it would develop in consultation with the agencies, to avoid or reduce the effect of these activities on the aquatic environment. All blasting activities would be conducted in the dry and would be timed and limited in charge weights to keep detonation related sound pressures at a safe level for aquatic resources, including Atlantic salmon.

At the Stillwater Project, minimum bypassed reach flows may need to be temporarily suspended during some portions of the 6 to 8 weeks when downstream work is being performed. At the Orono Project, the 200-cfs minimum flow would be maintained during construction activities by lowering an appropriate number of flashboards. During construction, the existing Stillwater powerhouse (powerhouse A) is expected to remain in operation, allowing normal flow in this section of the Stillwater Branch, except for the temporary suspension of minimum flows delivered into the bypassed reach of the Stillwater Project. At the Orono Project, the cofferdam associated with the construction of the proposed intake is expected to seal off the existing intake to the powerhouse for a period, resulting in the direction of all of the flow over the spillway.

Our Analysis

Although cofferdam construction could have a temporary adverse effect on aquatic biota and habitat, these effects would be minor and short-term given that the areas are predominantly ledge, some of which is exposed under average flows. After the cofferdams are removed, we expect that the capacity of the habitat would be restored by seasonal high flows, which would allow riparian vegetation to become established in

areas where suitable substrates accumulate. Implementing the proposed soil erosion and sediment control plan would minimize effects on aquatic resources and EFH for Atlantic salmon by reducing the potential for increased inputs of fine-grained sediments and siltation. At both projects, fish could potentially become trapped and stranded within the cofferdams during their construction. We recommend that the licensee prepare a fish salvage plan in consultation with the resource agencies, which would define procedures to transfer fish safely from the dewatered areas would reduce the potential for fish injury or mortality.

The effects of excavating and blasting would be temporary, limited to the construction period, and attenuated with distance from the construction sites; effects would be most prevalent during blasting operations. Development and implementation of the blasting plan should serve to limit any potential adverse effects of noise and vibration on aquatic biota during construction activities. We recommend that the licensee consult with Maine DIFW, Maine DC, and FWS during preparation of the blasting plan.

The effects of suspending minimum flows at the Stillwater Project would be temporary and would be generally localized to the specific area targeted for excavation. As a result, we expect that any adverse effects on aquatic resources and EFH for Atlantic salmon would be both limited and short-term. No flow-related adverse effects on Atlantic salmon are expected due to construction activities at the Orono Project.

Operational Effects

Stillwater and Orono Projects

As described in section 2.2.2, Black Bear Hydro proposes to continue to operate both the Stillwater and Orono Projects as run-of-river facilities, and the proposed flow reallocation would increase flows in the Stillwater Branch and reduce flows in the Milford reach of the main stem of the Penobscot River, as shown in Table 3. Altered flows in both reaches would affect water depth and velocity, which could affect the suitability of fish habitat for migration as well as spawning and rearing lifestages.

Average channel depths simulated by month for three locations in the Milford reach under current operations and under the flow reallocation are shown in Table 5. Average monthly channel depths under existing conditions range from 1.7 to 3.1 feet at the upstream location, 2.5 to 5.8 feet at the middle location, and 2.3 to 4.3 feet at the downstream location. The maximum change in water depth in any month ranged from a 0.2-foot reduction in the upstream and downstream locations and a 0.3-foot reduction at the middle location.

Table 5. Estimated average water depth at three locations in the Milford Reach of the main stem of the Penobscot River after removal of Great Works dam (0.78 miles upstream, at the dam site, and 2.12 miles downstream) under existing (1911 Federal Circuit Court decree) and proposed (flow reallocation) conditions. (Source: Black Bear Hydro, 2011b, as modified by staff)

	0.78 Mile Upstream			Great Works Dam Site			2.12 Miles Downstream		
Month	**Existing (feet)**	**Proposed (feet)**	**Change (feet)**	**Existing (feet)**	**Proposed (feet)**	**Change (feet)**	**Existing (feet)**	**Proposed (feet)**	**Change (feet)**
January	1.9	1.8	–0.1	2.7	2.4	–0.3	3.1	2.9	–0.2
February	1.9	1.7	–0.2	2.9	2.6	–0.3	2.5	2.4	–0.1
March	2.1	2.0	–0.1	2.8	2.6	–0.2	3.4	3.3	–0.1
April	3.1	3.1	0.0	5.8	5.8	0.0	4.3	4.3	0.0
May	2.4	2.4	0.0	4.0	4.0	0.0	3.2	3.2	0.0
June	2.0	1.9	–0.1	2.9	2.6	–0.3	3.3	3.1	–0.2
July	1.8	1.6	–0.2	2.6	2.4	–0.2	2.3	2.2	–0.1
August	1.7	1.6	–0.1	2.5	2.4	–0.1	2.3	2.2	–0.1
September	1.8	1.6	–0.2	2.6	2.4	–0.2	2.3	2.2	–0.1
October	1.9	1.7	–0.2	2.9	2.6	–0.3	2.5	2.4	–0.1
November	2.2	2.1	–0.1	3.2	3.0	–0.2	3.2	3.4	0.2
December	2.1	2.0	–0.1	2.9	2.6	–0.3	3.4	3.3	–0.1
Annual	2.0	1.8	–0.2	2.8	2.5	–0.3	3.2	3.1	–0.1
Fish passage season	2.0	1.9	–0.1	2.9	2.6	–0.3	3.3	3.1	–0.2

Table 6. Estimated average water velocity (feet per second) at three locations after removal of Great Works dam (0.78 mile upstream, at the dam site, and 2.12 miles downstream) under existing (1911 Federal Circuit Court decree) and proposed (flow reallocation) conditions.[a] (Source: Black Bear Hydro, 2011b, as modified by staff)

	0.78 Mile Upstream of Great Works Dam Site			Great Works Dam Site			2.12 Miles Downstream of Great Works Dam Site		
Month	**Existing**	**Proposed**	**Change**	**Existing**	**Proposed**	**Change**	**Existing**	**Proposed**	**Change**
January	7.9	7.6	–0.4	8.0	8.9	0.9	5.3	4.7	–0.7
February	7.8	7.4	–0.4	6.6	7.4	0.8	7.1	6.3	–0.7
March	8.3	7.9	–0.4	7.2	8.5	1.3	5.5	4.9	–0.6
April	10.0	10.0	0.0	7.7	7.7	0.0	7.0	7.0	0.0
May	8.8	8.8	0.0	6.6	6.7	0.0	5.7	5.7	0.0
June	8.2	7.7	–0.4	7.9	9.1	1.3	5.4	4.8	–0.6
July	7.6	7.3	–0.3	6.6	7.5	0.9	7.4	6.5	–0.8
August	7.5	7.2	–0.3	6.9	7.4	0.5	7.0	6.7	–0.3
September	7.6	7.2	–0.4	6.6	7.6	1.0	7.4	6.6	–0.9
October	7.8	7.4	–0.4	6.6	7.4	0.8	7.1	6.3	–0.8
November	8.4	8.2	–0.3	6.9	8.1	1.2	5.5	5.2	–0.3
December	8.3	8.0	–0.3	7.2	8.4	1.3	5.5	4.9	–0.6
Annual	8.1	7.7	–0.4	7.9	9.1	1.2	5.3	4.7	–0.6
Fish passage season	8.2	7.7	–0.4	7.9	9.1	1.3	5.4	4.8	–0.6

[a] All values are presented in feet per second.

Average channel velocities simulated by month for three locations in the Milford reach under the existing 1911 Federal Circuit Court decree and under the flow reallocation are shown in Table 6. Average monthly channel velocities under existing conditions range from 7.5 to 10 feet per second at the upstream location, from 6.6 to 7.7 feet per second at the middle location, and from 5.3 to 7.4 feet per second at the downstream location. The maximum change in water velocity in any month ranged from a 1.3 feet per second increase in velocity at the middle location (associated with the removal of Great Works dam) to a 0.9 foot per second reduction at the downstream location.

Black Bear Hydro proposes to increase the headpond elevation at the Orono impoundment by 0.6 foot from the current elevation of 72.4 feet NGVD. The proposed water level increase would result in a higher mean water level along the shoreline of the impoundment, resulting in the permanent inundation of about 4.4 additional acres of shoreline. This change has the potential to alter habitat conditions in the impoundment, especially in shoreline areas.

Our Analysis

The proposed flow releases from the project dams would meet or exceed current minimum flow requirements in each bypassed reach, ensuring that aquatic habitat would be maintained in these reaches. Flow levels in the east channel of the Stillwater bypassed reach would increase substantially when powerhouse B is operating, but the tailwater elevation would be similar to current conditions because excavation of the tailrace channel would increase channel depth at the downstream riffle that controls water levels in the spillway pool. Although the locations where most of the flow passes each dam would be altered, we anticipate that the distribution of any finer sediments and riparian vegetation would adjust within a few years to provide a diversity of aquatic habitats that is similar to current conditions.

As previously discussed, the flow reallocation described in the amendment application would reduce the frequency and magnitude of spills at the Milford, Stillwater, and Orono dams. Although a reduction in the amount of aeration provided by spillage may reduce DO downstream of the dams in some months, these effects would likely be minor with little or no effect on the condition of aquatic resources and EFH for Atlantic salmon downstream of the projects.

The flow reallocation, in conjunction with the removal of Great Works dam[21] located downstream of Milford dam and upstream of the confluence with the Stillwater Branch, would cause some changes in water depth and velocity in the main stem of the Penobscot River in the Milford reach, but these changes are not expected to cause any substantive effects on aquatic habitats. Based on available Habitat Suitability Index curves for fish species that occur in the project area, we do not expect that the magnitude

of depth change would have an appreciable effect on aquatic resources and EFH for Atlantic salmon.

The average cross-sectional velocities in the Milford reach of the Penobscot River (see Table 6) are unsuitably high for the fish species that occur in the project area under both scenarios, and we expect that this is also true in the Stillwater Branch. However, most riverine fish species are cover-oriented and gravitate to instream object cover, such as logs, boulders, debris, and deep holes, where localized velocity shelters and cover from predators exist. Such object cover is abundant throughout the project area. Nearshore (edge) velocities also are expected to be substantially lower than the average channel velocities, and are likely well within the suitability requirements. The velocities that would occur under the flow reallocation are within the range of natural variation that occurs under existing conditions. Therefore, no significant change to habitat suitability or to EFH for Atlantic salmon is expected as a result of the flow reallocation.

The most pronounced change in habitat characteristics due to the increased level of Orono reservoir would occur in shallow-water habitats along the shoreline where increased water depth may reduce the habitat value of some of the existing habitat for fry and juvenile fish. However, it is likely that a similar quantity of suitable habitat would be created in newly inundated areas. In addition, the area that would be inundated under the new water level currently experiences water level fluctuations from existing operations and seasonal flooding events up to and above the 73.0-foot NGVD elevation, which occur, on average, about 51 percent of the time. Aquatic species occupying this area are adapted to a riverine environment that includes variability in flows and can accommodate a certain amount of change. Given the limited increase in elevation, we do not anticipate any long-term adverse effects on aquatic habitat or biota in Orono reservoir.

Fisheries Resources—Upstream Passage

Stillwater and Orono Projects

Table 7 describes existing and proposed fish passage facilities at both projects. For upstream passage, both the Stillwater and Orono Projects currently have facilities for American eel, but no facilities to provide passage for other species. Modifications that would be implemented at the time that the proposed powerhouses are constructed include relocation of upstream passage facilities for American eel at both projects and construction of a trap and truck facility at Orono dam to provide upstream passage for other species.

Table 7. Summary of existing and proposed fish passage facilities at the Stillwater and Orono Projects. (Source: staff)

	Stillwater Project		Orono Project	
Facility	**Description**	**Hydraulic Capacity**	**Description**	**Hydraulic Capacity**
Existing Passage[a]				
Upstream	Two eel traps and collection hoppers on east and west ends of dam	10 gpm[b]	One eel ladder (inclined ramp with substrate), 2 feet wide by 40 feet long, on non-overflow section of dam	10 gpm with a 50-gpm attraction flow
Downstream	Intake trashracks with 1-inch-clear spacing, 2.83-foot-wide flume and bypass chute at existing powerhouse (powerhouses A)	35 cfs	Intake trashracks with partial-depth, 1-inch-clear spacing, 5-foot-wide entrance and steel flume bypass at existing powerhouse	72 cfs
Proposed Passage				
Upstream	Replace east side eel trap with new eel ladder at powerhouse B,[d] west side eel trap to remain	10 gpm[b]	Relocate eel ladder to new intake structure;[d] install new elevator trap-and-truck facility[c] at new intake structure	10 gpm with a 50-gpm attraction flow for eel ladder; 120 to 130 cfs attraction water for fish trap
Downstream	Add new bottom eel entrance at existing facility, along with other improvements;[c] install new bypass sluice (3 feet wide by 4 feet deep) at powerhouse B intake angled trashracks (1-inch-clear spacing) and use existing plunge pool, and new	Increase existing facility to total of 70 cfs, new facility also 70 cfs	Retire existing facility with full-depth trashracks and install new 4-foot-wide entrance to a 20-foot-long by 8-foot-wide sluiceway bypass at new intake; install bottom eel entrance and bypass pipe at new	Increase total capacity to 153 cfs

	Stillwater Project		Orono Project	
Facility	**Description**	**Hydraulic Capacity**	**Description**	**Hydraulic Capacity**
	bottom eel entrance and bypass pipe[d]		intake[d]	

Note: cfs – cubic feet per second; gpm – gallon per minute

[a] Existing facilities are current requirements of the license.

[b] Black Bear Hydro did not provide the hydraulic capacity, but we assume it would be similar to the Orono Project eel ladder.

[c] Proposed enhancement is required by the existing license.

[d] Proposed enhancement is part of the proposed license amendment.

Table 8 provides upstream passage data for the American eel for the past three years at the two projects. As the table shows, the number of eels passed upstream of the Orono Project is significantly higher than the number of eels passed upstream of the Stillwater Project.

Table 8. Observed total American eel upstream passage at the Stillwater and Orono Projects, 2009 to 2011. (Source: Moyse Environmental Services, 2012)

Project	**2009**	**2010**	**2011**	**2011 Night Observations**
Stillwater	183	464	132	7
Orono	5,171	3,027	6,036	208

Construction Effects

Stillwater Project

Black Bear Hydro proposes several specific construction activities that have the potential to impact fish movement through the reach downstream of the dam, including: (1) installing a temporary causeway to access the new powerhouse site; (2) constructing cofferdams for the powerhouse/tailrace and forebay; (3) excavating in the river bed (mostly in the dry) for the powerhouse, tailrace, and forebay; and (4) removing the causeway and cofferdams as construction is completed. Most of these construction activities would be limited to the east end of the dam.

Our Analysis

Construction activities would likely eliminate upstream passage of American eel at the east end of the dam for some period during construction. Upstream eel passage would still be available via the existing eel trap on the west end of the dam, and may also be available at some locations along the dam spillway.[22] This interruption in upstream passage, however, would be short-term, and upstream passage would be restored at the completion of construction. We recommend that the licensee provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period in order to help ensure that appropriate measures are being implemented to provide for upstream passage to the extent practicable.

Orono Project

Construction activities proposed at the Orono Project that have the potential to impact fish movement through the reach downstream of the dam include: (1) installation of a new access road to both the new powerhouse site and the intake; (2) construction of three temporary cofferdams at the intake structure, the new powerhouse site, and the tailrace; and (3) erection of an in-river diversion structure/cofferdam to prevent river flows from encroaching on the powerhouse and penstock work areas. During the proposed construction period, Black Bear Hydro would need to suspend operating some of the facilities at times during excavation and other construction activities for the new powerhouses, tailraces, and fish passage facilities and as a result of the retirement of some of the facilities.

Our Analysis

The single existing eel ladder at the project is located on a non-overflow section of the dam that would be used for the new intake structure, so the existing ladder would be dismantled and moved to a new location on the new intake structure. During the period that the existing ladder is out of service, upstream passage for eels would not be available at the project, except for possible passage via the spillway, as described for the Stillwater Project. The upstream migration of American eel could be delayed during this period, but the effects of this potential delay in accessing upstream rearing habitats would be negligible and short-term. We recommend that the licensee provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period in order to help ensure that appropriate measures are being implemented to provide for upstream passage to the extent practicable.

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[22] Studies conducted on the Presumpscot River, Maine, found that upstream eel passage occurred over the low-head dams on the river at locations in the spillways (FERC, 2002).

Operational Effects

Stillwater and Orono Projects

Based on comments received, the final design configurations for upstream fish passage facilities required under the existing license and as part of the proposed amendments have not been entirely agreed upon by the state and federal fishery agencies. Black Bear Hydro has proposed specific locations and designs for upstream passage facilities at both projects and has been consulting with the agencies over the past year to adjust those designs. However, consultation regarding the final designs is ongoing. Black Bear Hydro has stated that it will complete all final designs and O&M plans in consultation with the agencies, and will develop effectiveness study plans for all facilities in consultation with the agencies in accordance with the licenses and existing section 18 prescriptions, and as proposed in the Atlantic salmon Species Protection Plan. Black Bear Hydro also stated that whatever designs are finally constructed, it understands that those designs would need to meet performance standards as laid out in the Species Protection Plan. Black Bear Hydro also remarked that it is confident that the proposed designs would meet performance standards (minutes from conference call among Commission staff, Black Bear Hydro, and agency and Penobscot Indian Nation staffs, March 30, 2012). In response to the Commission's REA notice, NMFS, Interior, and Maine DMR filed comments regarding the final design of the upstream passage facilities (Table 9).

Table 9. Comments on final design of upstream passage facilities. (Source: NMFS, Interior, Maine DMR)

Agency	Summary of Comments on Upstream Fish Passage Design[a]
NMFS	**Both Projects:** NMFS will continue to consult with Black Bear Hydro regarding the location and effectiveness of upstream eel passage facilities. With respect to engineered design plans, Black Bear Hydro should consult with NMFS and the other resource agencies as draft 30%, 60% and 90% design plans are developed, with specific requirements for each design stage. **Orono:** The proposed trap-and-truck location well upstream of the tailraces of both the existing and new powerhouses would likely result in low success in attracting and trapping upstream migrants, resulting in delays in upstream migration as fish are attracted to a "dead end" in the project tailraces.
Interior	**Both Projects:** The location for the upstream eel ladder appears suitable, but Interior recommends at least one year of post-construction monitoring prior to installing the eel ladder to determine

Agency	Summary of Comments on Upstream Fish Passage Design[a]
	whether the proposed location is suitable, based on the distribution of eels. **Orono:** Interior is concerned that the proposed trap-and-truck facility and the proposed fish handling methods would not be sufficient to safely handle the numbers of fish that may be collected and additional consultations may be required to provide facilities of a greater capacity.
Maine DMR	**Orono:** Maine DMR is concerned that the proposed trap-and-truck facility and the proposed fish handling methods would not be sufficient to safely handle the numbers of fish that may be collected. If large numbers of anadromous fish are attracted to the trap, Maine DMR recommends additional consultations to determine alternative handling scenarios.

[a] Note that the agency comments did not differentiate between fish passage facilities required under the existing license, and those that would be constructed as part of the project amendments. All the fish passage facilities are closely interconnected, but Table 7 identifies which facilities are required under the existing license and which would be constructed as part of the project amendments.

Under the proposed flow reallocation, the portion of flow allocated to the Stillwater Branch (Table 3) would increase from a range of 23 to 30 percent to a range of 30 to 35 percent of the total Penobscot River flow during the upstream migration period (April through December). Commenting agencies made no specific recommendations regarding effects of this flow reallocation on upstream fish passage, except to state that the reallocation would increase the importance of having effective fish passage in the Stillwater Branch, to achieve fish restoration goals.

Our Analysis

The two primary issues associated with the design of the upstream passage facilities are: 1) the locations of the proposed eel ladders at both projects; and 2) the location, design, and fish handling methods for the proposed trap-and-truck facility at the Orono Project. At the Stillwater Project, the eel trap on the east end of the dam would be replaced with a new eel ladder at the powerhouse B intake, while the existing eel trap on the west end of the dam near powerhouse A would remain in its current location. At the Orono Project, the existing eel ladder would be moved to a new location adjacent to the powerhouse B intake structure. Although the proposed locations for the eel ladders appear to be in areas where there would be a good likelihood that eels would be successfully attracted, the specific locations where eels may actually congregate after

both new powerhouses are in operation cannot be predicted with certainty. The hydraulic conditions in the spillway and around the existing and new powerhouses may result in an eel distribution that is dissimilar to existing conditions.

Interior recommends a minimum one-year study at both projects after construction of the new powerhouses is completed to verify where eels congregate and to find the best locations for the eel ladders. This measure would be reasonable to ensure that the eel ladders are located where they would have the highest probability of collecting and passing eels. Therefore, we recommend a one-year study at both projects, which could be extended if high-flow conditions or other unforeseen events prevent the studies from being completed successfully. If that occurred, the studies could be repeated in the following year.

The location, design, and fish handling capabilities of the proposed trap-and-truck facility at the Orono Project, although not specifically related to the amendment of the Orono Project license (it is a requirement of the existing license), would nonetheless be closely tied to the proposed amendment. The new powerhouse would alter the location of discharges at the project and, therefore, we must consider the new powerhouse and trap-and-truck facility together.

The facility is proposed to be located near the intake to the new powerhouse, and would be integrated into the proposed downstream passage facility at that intake. NMFS raises a valid concern that the proposed trap would be located away from locations where most of the flow would be discharged from the project (the powerhouses). As stated in Clay (1995), a fishway entrance is the most important part of a facility and should be located where fish would be congregating; otherwise, if fish are unable to find the entrance and enter a facility, significant migration delays may occur. Although we understand that it is the agencies' objective that the primary route for upstream passage of anadromous species would remain the main stem of the Penobscot River, the proposed trap should be in a location where any fish that do enter the Stillwater Branch can be effectively trapped with minimal delay. The licensee's proposed effectiveness studies under the existing license and as proposed in the Species Protection Plan would assess any delay associated with the operation of the proposed fish trap. Therefore, we conclude that these measures would provide the means to resolve any issues related to the location and effectiveness of the trap.

Interior's and Maine DMR's concerns regarding the fish handling capabilities of the proposed trap are also valid. As proposed, fish would be collected from the trap by hand and transferred to smaller holding tanks that would be towed across the intake deck using an all-terrain vehicle, where they would be transferred to a transport truck. This method of transportation would be adequate if only small numbers of fish were collected, such as an occasional Atlantic salmon or small numbers of herring. However, if larger

numbers of river herring or American shad were collected, the logistics of transporting larger numbers of fish would become unwieldy. Maine DMR states that FWS has estimated that this trap can collected 8,200 Atlantic salmon, 18,000 American shad, and 250,000 river herring per year (based on the size of the hopper and the hopper cycle time). Although those numbers of fish may never be achieved at the Orono trap, even a small percentage of those numbers would likely exceed the handling capacity of the smaller holding and transfer tanks.

Black Bear Hydro and the agencies are continuing to consult on the final design of the fish trap at the Orono Project (and other facilities). In addition, the existing license and the settlement agreement require that Black Bear Hydro work cooperatively with the agencies and the Penobscot Indian Nation to develop efficient fish handling procedures at the trap-and-truck facility, and that if more fish are collected than can be efficiently handled, Black Bear Hydro would reconvene consultations with the agencies and the Penobscot Indian Nation to discuss and resolve the issue. Although no performance standards for the proposed lift at the Orono Project have been developed for any species to date,[23] the design of the trap-and-truck facilities should ensure that salmon and other species attracted into the Stillwater Branch can be effectively captured to prevent delay.

As noted previously, the agency objective is that the primary route for upstream passage of anadromous species would remain the mainstem of the Penobscot River. Because upstream-migrating fish tend to follow the greatest volume of flow during their migration, it is expected that there would be some increase in upstream migrants entering the Stillwater Branch under the higher flows that would occur in the Stillwater Branch with the flow reallocation. Black Bear Hydro assessed the potential effects of the flow reallocation on upstream fish migration, as shown in Tables 3, 5, and 6.

Tables 5 and 6 (see previous discussion under *Aquatic Habitat and Essential Fish Habitat*) show the average depths and velocities in the main stem of the Penobscot River in the reach immediately upstream of the mouth of the Stillwater Branch, the section of the mainstem of the river that includes the Great Works dam, which will be removed. The tables depict post-dam removal conditions. Table 5 shows that average depths in the Great Works reach would decrease slightly during the fish passage season, ranging from no decrease to a decrease of 0.3 foot (about 4 inches). None of the average depths, however, would reach depths that would be considered too shallow for fish passage or that would cause a major delay in upstream migration. Because this table shows average depths, there would also be some areas that are deeper and some that are shallower than the average, so even at the minimum average depth shown (1.6 feet in July through

[23] For example, the Species Protection Plan for Atlantic salmon states that the Milford Project performance standard for upstream salmon passage is 95 percent.

September, 0.78 mile upstream of the Great Works dam site), there would still be locations in the channel than would be deeper than this average.

Average velocities would be relatively high both upstream and at the Great Works dam site, under both existing flow conditions and after the flow reallocation (see Table 6). However, the differences are generally less than 1 foot per second, except for a few months at the Great Works dam site. Velocities of 8 to 9 feet per second during the fish passage season are within the range of sustained swimming speeds of Atlantic salmon and American shad (Bell, 1991). However, these velocities are approaching a range greater than the sustained swimming speed of alewife. Adult "herring" are reported to have a sustained swimming speed of about 5 feet per second, and a burst speed of up to about 7 feet per second (Bell, 1991). However, as noted for average depth, even though average cross-sectional velocities would be relatively high in the Great Works reach, there would be areas with lower velocities. In addition, the site 2.12 miles downstream of the Great Works dam site and closest to the confluence with the Stillwater Branch would have substantially lower velocities than the upstream modeled sites (see Table 6). Thus, it is unlikely that a small reduction in flow in the main stem of the Penobscot River and the removal of Great Works dam would result in an obstruction to migration in the main stem that would cause substantial numbers of upstream-migrating fish to divert to the Stillwater Branch.

The proposed fish trap at the Orono Project would serve as a good monitoring point and should detect whether increasing numbers of upstream migrants are entering the Stillwater Branch. If that occurred and indicated that substantial migratory delay was occurring on the mainstem Penobscot River, the existing license and the Species Protection Plan require that Black Bear Hydro reconvene consultations with the agencies and Penobscot Indian Nation to discuss any migratory delays and to resolve the issue.

Fisheries Resources—Downstream Passage

Stillwater and Orono Projects

Existing and proposed fish passage facilities at both projects are described in Table 7. For downstream passage, both the Stillwater and Orono Projects currently have facilities consisting of trashracks with 1-inch-clear spacing and fish bypasses adjacent to the powerhouse intakes. Modifications that would be implemented at the time that the proposed powerhouses are constructed include construction of trashracks at powerhouse B at the Stillwater Project and a new single trashrack spanning the intakes of both powerhouses at Orono with a new bypass facility. Both of the new trashracks would be constructed with 1-inch-clear spacing. Unlike the existing trashracks at Orono powerhouse A, which do not extend to the full depth of the intake, the existing

downstream passage facility at Stillwater powerhouse A and both of the new downstream passage facilities would include trashracks that extend to the full depth of the intake.

Construction Effects

Stillwater and Orono Projects

Both projects have existing downstream fish passage facilities that are being improved as required by existing license conditions and as part of the proposed amendment of license, as described in Table 7. Black Bear Hydro would also avoid major in-river construction activities during the Atlantic salmon smolt outmigration period. As we previously described, NMFS, Interior, and Maine DMR had specific comments regarding the design of the fish passage facilities, but these comments are discussed below under *Operational Effects*. None of the agencies made specific recommendations for the construction period, except that NMFS recommended that a NMFS engineer should be allowed to monitor construction of the proposed fish passage facilities.

Our Analysis

As we described for upstream passage facilities, Black Bear Hydro would construct cofferdams and an access road as part of construction and would isolate a section of the east end of the dam to allow for construction in the dry. This, however, would have no effect on the operation of the existing downstream passage at the existing powerhouse (powerhouse A). Although a section of the spillway dam would be removed as an active spillway during construction, a larger section of the spillway would still be available for water passage and, in turn, enable fish passage whenever the river flow exceeds the hydraulic capacity of the existing powerhouse. The occasional presence of a NMFS engineer, or other fisheries agency personnel, during the construction period would help ensure that appropriate measures are being implemented to provide for downstream passage to the extent practicable.

Construction effects at the Orono Project would be similar to those associated with the Stillwater Project, although Black Bear Hydro proposes to retire the existing downstream passage facility at the existing intake structure and replace it with a new downstream passage facility at the new intake structure, which would be continuous with

the existing intake.[24] Thus, for a short time, the existing facility may not be operational, prior to switching downstream passage to the new facility. Downstream passage may be impeded during this period. Any downstream passage that may continue over the spillway during spill periods would be routed away from the construction areas by the cofferdams. The occasional presence of a NMFS engineer, or other fisheries agency personnel, during the construction period would help ensure that appropriate measures are being implemented to provide for downstream passage to the extent practicable.

Operational Effects

Stillwater and Orono Projects

As discussed for upstream passage, the final design configurations for downstream fish passage facilities required under the existing license and as part of the proposed amendments have not been entirely agreed upon by the state and federal fishery agencies. In response to the Commission's REA notice, NMFS, Interior, Maine DMR, and the Penobscot Indian Nation filed comments regarding the final design of the downstream passage facilities (Table 10).

Table 10. Comments on final design of downstream passage facilities. (Source: NMFS, Interior, Maine DMR)

Agency	Summary of Comments on Downstream Passage Design[a]
NMFS	**Both Projects:** NMFS is not convinced that the proposed 1-inch-spaced trashracks and low-level bypass openings would be effective for downstream eel passage, and it will require effectiveness studies that NMFS will assist the licensee in developing and implementing. With respect to engineered design plans, Black Bear Hydro should consult with NMFS and the other resource agencies as draft 30%, 60%, and 90% design plans are developed, with specific requirements for each design stage. **Stillwater:** NMFS states that the proposed design of downstream passage at powerhouse B, including angled trashracks, would provide adequate downstream passage at the new powerhouse, but monitoring studies will be required to support this conclusion.

[24] In its June 5, 2012 AIR response, Black Bear Hydro indicates, however, that it will retain a slot of the same dimensions as the existing downstream passage opening in the same approximate location for future use in the event that future evaluations of the new downstream passage facility determine that a second downstream passage facility is needed.

Agency	Summary of Comments on Downstream Passage Design[a]
	Orono: Black Bear Hydro should make available the results of Computational Fluid Dynamics (CFD) modeling for downstream passage at the Orono Project, and NMFS will provide additional comments on downstream fish passage designs after it reviews the CFD modeling results.
Interior	**Orono:** Black Bear Hydro should make available the results of CFD modeling for downstream passage at the Orono Project, but Interior is concerned that these results may become available too late in the process to allow modifications in downstream fish passage designs. Interior recommends that the existing downstream bypass be retained in the event the proposed new downstream bypass at the combined intake structure is not effective.
Maine DMR	**Stillwater:** Maine DMR states that CFD modeling would have been useful for the design of the downstream passage facilities, but because Black Bear Hydro will not do CFD modeling at the Stillwater Project, effectiveness studies will be particularly important. **Orono:** Black Bear Hydro should make available the results of CFD modeling for downstream passage at Orono because Maine DMR will need to review these results to assess the adequacy of the proposed fishway design.
Penobscot Indian Nation	**Orono:** The Penobscot Indian Nation recommends that the existing downstream bypass be retained in the event the proposed new downstream bypass at the combined intake structure is not effective.

[a] Note that the agency comments did not differentiate between fish passage facilities required under the existing license, and those that would be constructed as part of the project amendments. All the fish passage facilities are closely interconnected, but Table 7 identifies which facilities are required under the existing license and which would be constructed as part of the project amendments.

The primary issue associated with the design of the downstream fish passage facilities is that the agencies and Black Bear Hydro have not totally agreed upon the final designs for all of the facilities. NMFS and Maine DMR are requesting results of CFD modeling at Orono, to assist in their evaluation of proposed designs, and also recommend that effectiveness studies be conducted to ensure all facilities are operating efficiently. At the Orono Project, both Interior and the Penobscot Indian Nation recommend that the existing downstream bypass be retained in the event the proposed new downstream bypass at the combined intake structure is not effective. Black Bear Hydro, in additional information filed on June 5, 2012, states that it is in agreement that existing downstream

passage capability be retained at the Orono intake, and proposes to retain a slot where a bypass opening of the same dimensions as the existing opening could be installed in the future in the same general location as the existing opening. Black Bear Hydro also states that final designs and O&M plans for all fish passage facilities will be completed in consultation with the agencies.

As discussed above, downstream passage facilities at both the Stillwater and Orono Projects would be required to meet the performance standards in the Atlantic salmon Species Protection Plan included in Black Bear Hydro's BE (Black Bear Hydro, 2012). Such standards have not been set for other species (American eel, alewife, blueback herring, American shad), but it is likely that effectiveness objectives would be developed as part of the development of study plans for other species, in consultation with state and federal agencies and the Penobscot Indian Nation. However, even with state-of-the-art downstream fish passage facilities with efficiencies that meet the performance standards, a small percentage of downstream-migrating fish would still be subjected to turbine passage and potential mortality.

Black Bear Hydro's BE (Black Bear Hydro, 2012) included an assessment of downstream passage survival for both Atlantic salmon kelts and smolts. The BE concluded that survival of downstream-migrating kelts is high in the Penobscot River, and would likely continue to be high after expansion of the Stillwater and Orono Projects. Radio telemetry studies have found that downstream-migrating kelts passed up to 7 dams in 7 days, with no indication of delay or injury/mortality related to the presence of the dams. For smolts, the BE estimated that under May median flows with existing conditions, total project survival would be 96.3 percent for both the Stillwater and Orono Projects. Under proposed conditions (addition of the new powerhouses and new fish passage facilities), the BE estimated that total project survival would be slightly reduced to 96.2 percent at the Stillwater Project and 96.1 percent at the Orono Project. A similar analysis was not conducted for other species that may pass downstream through the projects.

Under the proposed flow reallocation, flows in the Stillwater Branch would increase, compared to existing conditions, which could have a minor effect on downstream migration by attracting more fish into the Stillwater Branch. Previous studies with downstream-migrating Atlantic salmon on the Penobscot River, cited in Black Bear Hydro (2012), found that the distribution of migrating salmon between the mainstem and Stillwater Branch approximated the flow distribution between the two waterways. If higher numbers of salmon are attracted to the Stillwater Branch during their downstream migration, those fish would need to pass the Gilman, Stillwater, and Orono dams, compared to only passing the Milford dam on the mainstem (once the Great Works Project is removed in 2012). This would result in a small increase in mortality for those migrants that use the Stillwater Branch and must pass three projects. Other

downstream-migrating diadromous species would also likely be distributed according to the flow distribution and experience similar effects.

Our Analysis

As we discussed above for upstream passage, Black Bear Hydro and the agencies are continuing to consult on the final design of the downstream passage facilities at both projects. It would be appropriate and expected that Black Bear Hydro would address any final design issues during these consultations, and provide the results of the CFD modeling at Orono, when they become available. We agree that it would also be appropriate for Black Bear Hydro to retain the capability to install a fish bypass opening at the Orono Project intake at the location of the existing bypass if it is determined to be needed based on passage evaluation studies. Although the proposed new fish bypass may meet the performance standards for downstream passage of Atlantic salmon,[25] because these standards are high, it would be prudent to retain the option to install a second bypass entrance at the approximate location of the existing bypass entrance. The proposed combined intake structure would be about 150 feet wide, and if effectiveness studies indicate that the 96 percent standard is not being achieved, having the option to open a second bypass would increase the probability of achieving the performance standard for the federally listed Atlantic salmon. Performance standards have not been developed for other species, but if effectiveness studies indicate that efficient downstream passage is not being achieved for other anadromous or catadromous species, having the option to provide a second bypass would increase the potential for improving efficiency.

The BE analysis indicates that performance standards for salmon smolt survival are already met at both projects, and would continue to be met after installation of the proposed powerhouses, under median May flows. Because a greater portion of the Stillwater Branch flows would be passed through the expanded power generation facilities, more fish would likely be attracted to the powerhouse passage routes, and would experience a small increase in mortality, as reflected in the slightly lower survival estimates described above. Total project survival would vary depending on river flows and other factors, such as the actual timing of migration, environmental conditions (water temperature), and predation on salmon smolts by birds and other fish species. In general, however, higher survival would be probable during higher flow conditions (and higher spill), and survival would be lower during lower flow conditions, when higher portions of the flow would be passed through the powerhouses. For salmon smolt out-migration, however, the May period of peak emigration is typically one of the higher-flow months of the year with higher spills likely.

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[25] The performance standards are 96 percent survival at each project for Atlantic salmon smolts and kelts (Black Bear Hydro, 2012).

Similar analyses for other species were not conducted, because only relatively small numbers of other diadromous species currently occur in the lower Penobscot River, and no survival studies have been conducted for those species on the river. A relatively small run of alewife occurs in the Penobscot River,[26] and both juveniles and post-spawning adults could pass downstream through the Stillwater and Orono Projects during their outmigration. Emigration of post-spawning adults typically occurs during the late-spring and early-summer, while juveniles emigrate in late-summer and fall, during lower-flow periods of the year. This would increase the potential for attraction of migrants to the powerhouse routes of passage, but provision of the existing and proposed downstream fish passage facilities at all the powerhouses would also act to maintain good survival of out-migrants.

The only other diadromous species that may occur in the Stillwater Branch at this time is the American eel, which has been documented as passing upstream at both the Orono and Stillwater Projects (see Table 8). American eel outmigration typically occurs in the late-summer and fall and consists of adult eels migrating downstream to the Atlantic Ocean to spawn. These large adult eels would be excluded by the existing and proposed 1-inch spaced trashracks, so it is unlikely that downstream-migrating eels would be entrained and exposed to the turbine generators and potential mortality. All of the downstream passage facilities at both projects would include bottom bypass openings designed for eel passage. Operation of the proposed powerhouses at both projects is not expected to increase the mortality of eels passing the projects.

Under the proposed flow reallocation, the portion of flow allocated to the Stillwater Branch during the fish passage season (April through December) would increase from 28 to 33 percent (see Table 3). Assuming that the distribution of downstream-migrating fish would approximate the flow distribution, as studies have shown, the number of fish entering the Stillwater Branch may increase by about 5 percent. Those additional fish would then need to pass the three projects in the Stillwater Branch before re-entering the mainstem Penobscot River immediately downstream of the Orono Project. Table 11 presents an analysis of the potential effects of such a re-distribution of fish on Atlantic salmon smolts, the species of greatest concern. For this assessment, we assumed 1,000 smolts approaching the head of the Stillwater Branch upstream of the Milford Project, and 96 percent survival at all projects, which is the performance standard at all the projects. This analysis shows that, more fish would likely enter the Stillwater Branch and there would be a slight increase in fish mortality and entrainment of out-migrating fishes. Installation of downstream fish passage facilities at the new powerhouses at both projects, and the agreed-upon performance standards, would ensure that mortality of out-migrating fishes, including

[26] Only 2,039 "river herring" were counted in the Veazie trap in 2011 (Maine DMR provisional data, November 1, 2011).

Atlantic salmon and alewife, would be minimized. The effects of the proposed flow reallocation on downstream fish migration would be minor.

Table 11. Assessment of the effects of the proposed reallocation of river flows into the Stillwater Branch on survival of out-migrating Atlantic salmon smolts. (Source: staff)

Existing Conditions			**After Flow Reallocation and Removal of Great Works Dam**		
Location	**No. of Smolts in Stillwater Branch**	**No. of Smolts in Mainstem Penobscot River**	**Location**	**No. of Smolts in Stillwater Branch**	**No. of Smolts in Mainstem Penobscot River**
Head of Stillwater Branch	280	720	Head of Stillwater Branch	330	670
Confluence of Stillwater Branch and Mainstem River	248	664	Confluence of Stillwater Branch and Mainstem River	292	643
Total Fish Surviving	--	912	Total Fish Surviving	--	935

Assumptions: (1) Fish distribution would approximate flow distribution; and (2) survival is 96 percent at all projects under both existing and future conditions. For three projects, total survival would be (0.96) X (0.96) X (0.96) = 0.8847.

3.3.3.3 Cumulative Effects

Stillwater and Orono Projects

Installation of downstream fish passage facilities at the new powerhouses at both projects would ensure that mortality of out-migrating fishes, including Atlantic salmon and alewife, would be minimized. Any increases in fish entrainment and mortality associated with operation of the new powerhouses would be outweighed by the reduction in downstream mortality rates of out-migrating fishes at Veazie and Great Works dams, which should contribute to significant positive benefits to anadromous fish within the Penobscot River Basin. In addition, any increase in entrainment mortality associated with the new powerhouses may be compensated for by the installation of full-depth trashracks, which likely would reduce the number of fish that are entrained at Orono

powerhouse A. The installation of upstream and downstream fish passage facilities for American eel at Orono dam, together with other activities such as the removal of Veazie and Great Works dams, would also likely enhance eel stocks throughout the Penobscot River Basin. Any reduction in habitat in the Milford reach of the main stem of the Penobscot River associated with flow reallocation would be minor. The overall cumulative effects associated with the proposed capacity-related amendments to the Stillwater and Orono Projects, together with the other planned activities under the settlement agreement, would be beneficial to the restoration of anadromous and catadromous species (Atlantic salmon, American shad, alewife, and American eel) to the Penobscot River Basin and to some resident species, such as smallmouth bass.

3.3.4 Terrestrial Resources

3.3.4.1 Affected Environment

Vegetation

Stillwater and Orono Projects

Hardwood Forests

Hardwood forests are the dominant cover type of both project areas and make up about 39 percent of the Stillwater Project area and 11 percent of the Orono Project area. Dominant canopy species include broadleaf deciduous trees, such as northern red oak, white ash, and American elm. Species in the sapling and shrub layer include striped maple and speckled alder. The structure of the hardwood forest permits ample light to reach the forest floor, resulting in the growth of herbs, such as wild raisin, royal fern, and partridgeberry.

Softwood Forests

The Stillwater Project area contains about 22 percent of softwood forest stands. These areas largely comprise evergreen species, including white pine, eastern hemlock, balsam fir, red spruce, black spruce, and white spruce. The deep shade under a dense evergreen canopy and the acidic soils derived from slow-rotting needles make these areas a difficult place for most plants to grow. The limited understory flora is scarce and poorly diversified; it typically includes evergreen species, such as goldthread and partridgeberry, or herbaceous species, such as starflower, bunchberry, and clintonia. The Orono Project area does not contain pure stands of softwood forest.

Mixed Forests

Mixed forests of conifers and deciduous trees occur within the Stillwater and Orono Project areas, constituting about 19 and 7 percent, respectively. Areas of mixed forest are common throughout the project areas, typically along hillslopes with well-drained to excessively drained soils. Dominant canopy species include balsam fir, red spruce, white spruce, and yellow birch. The canopy of a mixed forest tends to be more dense than a hardwood forest, although a variable sapling/shrub layer does persist. Vegetative species common in the sapling/shrub layer include American beech, red maple, striped maple, and balsam fir. An herb layer of wood sorrel, wood ferns, and starflower may also develop in these areas.

Wetlands

Stillwater and Orono Projects

The lower Penobscot River Basin has high, steep banks with sparse, isolated wetland areas (from 5 to 50 acres) along the shoreline. Palustrine forested wetlands are the dominant wetland community. In contrast, the upper portions of the basin contain larger, contiguous areas of wetlands (from 50 to 200 acres), dominated by palustrine emergent and scrub-shrub wetlands.

Based on data collected in recent surveys (2003 and 2009), the Stillwater Project area contains 34 acres of wetlands, including 23 acres of forested wetlands, 7 acres of emergent wetlands, and 4 acres of scrub-shrub wetlands. These wetlands are concentrated in the mid- to upper portion of the Stillwater impoundment, with a few small forested wetlands located in the lower portion of the Orono impoundment. The Orono Project area contains about 11 acres of non-forested wetlands: 4 acres of scrub-shrub wetlands, 4 acres of emergent wetlands, and 3 acres of riverine aquatic bed.

Invasive Species

Stillwater and Orono Projects

Several invasive species were documented throughout the Stillwater and Orono tailraces and the Orono impoundment. The Stillwater impoundment was not included in the 2009 survey for invasive species. It is expected that invasive species are less prevalent in the Stillwater impoundment due to its less developed shoreline. The invasive species documented in conjunction with the 2009 wetland survey, included Japanese knotweed, glossy buckthorn, Japanese barberry, reed canary grass, purple loosestrife, and Lonicera spp. Glossy buckthorn and Lonicera spp. dominated the shrub layer along the shoreline of the Orono Project. A large isolated patch of Japanese knotweed occurred on the west bank of the Stillwater Branch downstream of the Route 2 Bridge. Most of the

invasive species and cultivated escapees were concentrated on private parcels located along the Orono impoundment shoreline.

Special-Status Plant Species

Stillwater and Orono Projects

Following consultation with Maine DC and field surveys focused in the tailrace, Black Bear Hydro identified three state-listed sensitive plant species: New England violet (*Viola novae-angliae*), hyssop-leaved fleabane (*Erigeron hyssopifolius*), and long-leaved bluet (*Houstonia longifolia*). All three species are state listed as Special Concern because of their rarity. Within the project area, habitat for these species is limited to rocky outcrops or gravelly areas adjacent to water.

At the Stillwater Project, hyssop-leaved fleabane is the most ubiquitous rare plant occurring in patches of up to 50 stems in some areas. This species occurred along both the eastern and western rocky ledge outcrops immediately downstream of the dam. The New England violet is less prevalent in the Stillwater tailrace, mostly occurring on a rocky ledge outcrop and within crevices of the eastern shoreline of a forested island, and primarily in more sheltered and shaded crevices closer to the tree line. The long-leaved bluet occurs primarily along the eastern shoreline rocky ledge outcrop as well, although small patches of less than 5 stems also occur along rocky ledges of the western shoreline. In total, surveyors mapped 181 hyssop-leaved fleabane stems, 6 New England violets, and 70 long-leaf bluet plants in the Stillwater tailrace.

At the Orono Project, the vast majority of the ledge outcrop areas are sparsely vegetated and, in many cases, the hyssop-leaved fleabane is the dominant species occupying the small cracks and crevices of the bedrock. The distribution of hyssop-leaved fleabane is patchy throughout the project area, although the most suitable habitat occurs along the western shoreline and along rocky ledge downstream of the railroad bed stretching across the tailrace to the east. Surveyors mapped 332 hyssop-leaved fleabane stems in the Orono tailrace. Surveyors did not observe New England violet or long-leaved bluet at the Orono Project.

Wildlife

Stillwater and Orono Projects

Wildlife habitats surrounding the projects are predominantly riverine and hardwood forest lands, with lesser amounts of mixed hardwood and softwood forest, residential and disturbed areas, forested wetlands, and scattered scrub-shrub and emergent wetlands. Common mammal species in the upland forests include white-tailed deer, porcupine, raccoon, striped skunk, weasels red squirrel, gray squirrel, northern

short-tailed shrew, voles, and mice. More than 50 bird species are known to occur in the project areas including osprey, bald eagle, American goldfinch, eastern phoebe, evening grosbeak, and various warblers. The wetland complexes surrounding the project areas provide breeding, feeding, and den sites for a variety of wildlife species guilds, including wading birds, shore birds, waterfowl, songbirds, aquatic mammals, reptiles, and amphibians.

In addition to upland areas, project waters provide lacustrine and riverine habitats capable of supporting a variety of amphibians and aquatic reptiles. About 27 reptile and amphibian species have the potential to occur in project waters based on their known ranges. As part of relicensing efforts undertaken in the 1990s, surveyors identified six reptile and amphibian species inhabiting the Stillwater and Orono Project areas: American toad, spring peeper, green frog, wood frog, northern leopard frog, and garter snake. Other species that may occur in the area include painted turtles, spotted salamanders, bullfrogs, and gray tree frogs.

Special-Status Wildlife Species

Stillwater and Orono Projects

Maine DIFW identified the bald eagle (*Haliaeetus leucocephalus*) and wood turtle (*Glyptemys insculpta*) as sensitive species that occur in the project area and could be affected by the proposed action. Numerous additional species listed as Maine species of concern have potential to occur in the project vicinity. These species include 12 perching birds, 5 bats, and 3 amphibians.

Based on results of rare species surveys conducted in 2009, Black Bear Hydro reported the presence of a bald eagle nest located on the eastern tip of an island downstream from the Stillwater dam. This species prefers to nest in trees taller than the majority of the surrounding canopy and adjacent to water providing access to fish, its primary food base. In Maine, bald eagles generally begin building nests in December, and egg laying, rearing, and fledging occur in February through August. Wood turtles, which are known to occur in the Orono Project area, overwinter in river channels, forage in floodplain forests, and nest in areas of bare, sandy gravel with direct sunlight, close to water. Black Bear Hydro's rare species and wetland surveys confirmed wood turtle habitat is located at both the Stillwater and Orono Projects, but wood turtles were not observed at either project.

3.3.4.2 Environmental Effects

Vegetation

Stillwater and Orono Projects

Construction at the Stillwater Project would include ground disturbance for constructing permanent and temporary access roads, laydown areas, and parking covering a total of 0.51 acre. Ledge removal for installing project structures and the tailrace would total 4,500 cubic yards with permanent project structures occupying about 0.1 acre. The habitat within this area is primarily disturbed from residential development. Dominant vegetation in the area comprises white ash, black cherry, red maple, red oak, Japanese knotweed, and Japanese barberry. To accommodate construction vehicles and future maintenance of project facilities, Black Bear Hydro proposed to develop a permanent parking area adjacent to the existing access road, which would occupy a previously disturbed area. The habitat in this area is primarily weedy upland species with similar species in the location of the temporary access road. Black Bear Hydro proposes to revegetate the temporary access road and laydown area following construction.

The new transmission line for Stillwater powerhouse B would generally follow the shoreline north from Powerhouse B about 300 feet to an existing transmission line at Stillwater Avenue. This path follows an existing gravel road adjacent to the river and vegetation disturbance would be minimal.

Construction at the Orono Project would include ground disturbance for constructing a permanent access road and parking area, which would cover a total of 0.34 acre of primarily disturbed upland dominated by weedy vegetation. Ledge removal for installing project structures and the tailrace would total 3,550 cubic yards with the project powerhouse and penstock occupying about 0.3 acre. Black Bear Hydro proposes to raise the Orono impoundment by 0.6 foot, as measured at Orono dam. This water level increase would decrease with increased distance from the dam.

For the Orono Project, the transmission line would extend generally northwest approximately 60 feet from Orono powerhouse B to the existing transmission line. No vegetation disturbance is proposed in this area.

Our Analysis

Construction activities at Stillwater dam would disturb about 0.51 acre of vegetation. About 0.41 acre of this disturbance (associated with the extension of Old Mill Road for project access and the laydown area) would be temporary, with the remaining 0.1 acre associated with development of permanent project features. Black Bear Hydro's proposed measure to revegetate the temporary access road and laydown

area would reduce long-term effects on vegetation. However, Black Bear Hydro provides little detail related to the proposed revegetation. We recommend the use of native species, as opposed to non-native or cultivated species. The use of native species would be more appropriate for restoring disturbed areas as these species are most suited to the natural conditions at the site and are likely to provide greater value to wildlife. Black Bear Hydro should consult with Maine DIFW and Maine DC to identify an appropriate native seed mix and planting list for revegetation in these areas.

Wetlands

Stillwater and Orono Projects

Implementation of the proposed license amendment could affect wetlands located in areas of project construction or around the impoundment perimeters if the amendment results in altered inundation patterns. Black Bear hydro's surveys indicate no wetlands are located in areas associated with construction of the proposed powerhouses, transmission lines, access roads, laydown areas, or tailrace excavation at either the Stillwater or Orono Projects.

Following tailrace excavation at the Stillwater Project, the wetted perimeter within fringe wetlands in the east channel may decline when flows are less than 1,400 cfs. Black Bear Hydro anticipates such flows would occur less than 13 percent of the time under the proposed operations at Stillwater powerhouse B. Because Black Bear Hydro proposes to operate the project in a run-of-river mode, the proposed project would not alter natural inundation patterns upstream of the dam.

At the Orono Project, existing conditions result in naturally occurring seasonal and intermittent increases in water levels from spring runoff and rain events. Specifically, the Orono impoundment experiences inflows that raise impoundment elevation above the flashboards between 73.0 feet and 74.4 feet NGVD approximately 32 percent of the time. Although the fringe wetlands that occur along the length of the impoundment are influenced by these conditions, they have adapted to fluctuations of water level. Under proposed conditions, Black Bear Hydro would maintain the Orono impoundment at the 73.0-foot NGVD elevation when inflows are at or below the combined hydraulic capacity of the existing and proposed powerhouses, extending inundation time and depth at some locations.

Black Bear Hydro expects the proposed increase in normal headpond elevation to inundate about an additional 4.4 acres of wetlands located along the shoreline of the Orono impoundment. Black Bear Hydro anticipates these increases would affect emergent fringe wetlands located within the main channel (below the high water mark) along gradually sloped sediment bars. The effect of the water level change on particular

wetland areas would depend on the channel gradient near shore but generally would result in increased inundation of 2 to 8 horizontal feet. Black Bear Hydro does not expect the change in water level to affect the wetlands located outside of the main channel because of the high vertical banks around much of the project impoundment, particularly the reach of the Stillwater Branch upstream of the Route 2 Bridge. The riverward edge of the fringe emergent wetlands would experience semi-permanently flooded conditions that favors plant species that develop best when permanently inundated or subjected to repeated flooding. Thus, a proportion of the fringe emergent wetlands currently occurring along the shoreline may transition to aquatic bed community that includes submerged or floating-leaved rooted plants.

In comments filed on January 26, 2011, the Corps indicated that although the proposed changes at the Orono Project would not result in complete loss of wetland function, but would rather result in transition from one wetland type to another, such transitions are considered indirect effects and may require mitigation. Black Bear Hydro responded that it agrees to compensatory mitigation the Corps deems appropriate.

Our Analysis

Implementation of the proposed license amendments would have minimal effects upstream or in the immediate vicinity of the Stillwater dam. An increased headpond at Orono dam is likely to affect wetlands upstream of the Orono Project and downstream of the Stillwater Project, resulting in increasing inundation periods for fringe wetlands in the main channel but no effect on wetlands outside of the channel. Effects of the license amendments on wetlands would be long-term, but minor, because most wetland values and functions would continue to be met. Black Bear Hydro is in consultation with the Corps to develop appropriate mitigation for these wetlands effects, so no additional mitigation would be necessary.

Invasive Species

Stillwater and Orono Projects

Disturbance to project soils associated with development of permanent access roads and parking areas, as well as temporary access roads and laydown areas, could create ideal conditions for colonization of invasive plant species. Black Bear Hydro notes that invasive species, including Japanese knotweed, glossy buckthorn, Japanese barberry, reed canary grass, purple loosestrife, and *Lonicera* spp. are prevalent in the area, but it does not propose any measures for limiting colonization or controlling these species in the project area.

Our Analysis

Black Bear Hydro's proposed construction activities would include grading areas with existing vegetation to develop access roads. At the Stillwater project, some of the road area used for access during construction would not be needed for project operation, and Black Bear Hydro would allow these areas to revegetate naturally. To prevent colonization from invasive weeds we recommend that Black Bear Hydro, in consultation with Maine DIFW and Maine DC, prepare and implement an invasive species control plan that includes: using weed-free materials for erosion prevention and sediment control measures; employing measures to prevent the transportation of weeds into the project area on construction vehicles; and conducting post-construction surveys to identify and control invasive species in areas disturbed by the proposed project activities.

Special-Status Plant Species

Stillwater and Orono Projects

Excavation and construction activities in the Stillwater tailrace and development of the access road have potential to disturb New England violet, hyssop-leaved fleabane, and long-leaved bluet occurring in the area. At the Orono Project, tailrace excavation has potential to affect hyssop-leaved fleabane. To minimize potential effects, Black Bear Hydro conducted surveys to identify individual plants and modified construction plans to avoid habitat for these species. However, Black Bear Hydro anticipates some disturbance to these plants would be unavoidable. At the Stillwater Project, Black Bear Hydro estimates disturbance to 32 hyssop-leaved fleabane stems (17.7 percent of existing population) and 1 New England violet (16.7 percent of existing population). At the Orono Project, only 5 stems (1.5 percent of existing population) are within the anticipated disturbance zone.

In comments filed on May 31, 2011, Maine DC recommends that Black Bear Hydro: (1) flag sensitive areas to reduce potential for accidental trampling or disturbance to sensitive plants outside of the anticipated work zone; (2) conduct surveys for sensitive species one year following completion of construction; and (3) place signage in the area to inform recreationists about the sensitive nature of the rocky outcrops.

Our Analysis

At the Stillwater Project, Black Bear Hydro's anticipated effects on sensitive plants are associated with construction of the project access road. Populations in this area are somewhat isolated from the majority of the mapped hyssop-leaved fleabane plants in the tailrace. Disturbance to this area would not likely affect the viability of the metapopulation in the tailrace. However, proposed tailrace excavation at both the Stillwater and Orono Projects is in proximity to additional hyssop-leaved fleabane plants.

We agree with Maine DC that flagging these areas would reduce potential for construction personnel to inadvertently disturb these plants. Conducting follow-up surveys for these species one year following completion of construction would ensure that the proposed methods for minimizing effects were successful or determine whether additional mitigation is needed. Additionally, there may be potential to recover the plants in the access road disturbance area.

Therefore, we recommend that Black Bear Hydro prepare, in consultation with Maine DIFW and Maine DC a sensitive plant protection plan. The plan should include measures to: (1) flag appropriate work zones; (2) educate construction crews about the sensitivity of these plants and the importance of restricting activities to within the flagged areas; (3) consult with botanists at Maine DIFW and Maine DC to identify potential low-cost recovery/transplanting methods for the affected species; (4) conduct a post-construction survey for sensitive plants one year following project completion; and (5) determine thresholds at which additional mitigation would be required. Implementation of these measures would further reduce potential effects of the proposed amendments of hyssop-leaved fleabane and New England violet.

As further discussed in section 3.3.4, we do not expect recreation activities to pose a risk to these species. Therefore, we do not recommend permanent signage because we anticipate recreational activity in areas supporting these species would be low and expect signs could draw attention to the area, resulting in more disturbance.

Wildlife

Stillwater and Orono Projects

Construction activities associated with the proposed amendments could affect wildlife species that are sensitive to loud noises, vehicle traffic, and general human presence. Vegetation clearing also has potential to disturb wildlife that may have burrows or nests in these areas. Noise associated with blasting bed rock and machinery use is likely to displace wildlife from areas immediately adjacent to these activities during construction periods. The proposed construction schedule includes site preparations in April and May, prior to nesting season for most common birds in the area. Additionally, Black Bear Hydro proposes to consult with agencies to develop a plan to address the effects of blasting on wildlife.

Our Analysis

Construction noise would likely cause wildlife to avoid the project area during periods of construction activity. However, because of the limited area of construction and lack of high value wildlife habitat, these effects would be minor and short-term. Our recommendation to consult with resource agencies to identify appropriate seasons for

blasting, and clearing vegetation outside of the primary nesting period, as proposed, would further limit effects on wildlife. Increasing water levels between the Stillwater and Orono dams would inundate some areas, modifying habitat characteristics. However, these modifications are highly localized and account for a small percentage of the landscape. These changes would also be gradual, allowing most animals to move away from rising water levels. Overall, the proposed projects would have moderate short-term effects on wildlife. Long-term effects would be minor. We do not anticipate effects on wildlife species would occur at a population level.

Special-Status Wildlife Species

Bald Eagle

Stillwater and Orono Projects

Bald eagles can be sensitive to human presence and noise disturbance, especially during the nesting period. This sensitivity is highly variable among individuals and some bald eagles have grown habituated to such disturbances occurring over long periods. However, to protect this species, FWS has issued national Bald Eagle Management Guidelines (FWS, 2007) for managing effects on the bald eagle. Because of their long wing span, bald eagles are also at risk of electrocution associated with electric lines. Identification of a bald eagle nest located on the eastern tip of an island downstream from the Stillwater dam increases the potential that construction or operation of the project could affect the species.

Black Bear Hydro evaluated the project in relationship to the FWS guidelines and concludes the proposed activities fall into Category B, which includes general construction with a footprint greater than 0.5 acre. Because Black Bear Hydro proposes to conduct all project activities more than 660 feet from the nest, no seasonal restrictions would be necessary. However, Black Bear Hydro notes that if the activity footprint exceeds that which is estimated, it would provide for the appropriate buffers and mitigation measures.

Our Analysis

Based on the licensee's maps and our review of Google Earth aerial imagery, we estimate the nest is approximately 0.2 mile downstream from the dam and 500 feet from the lower tailrace excavation area. This indicates that the proposed excavation of the tailrace would be less than 660 feet from the nest (we estimate about 640 feet to the upstream end of the larger excavation area and about 330 feet to the downstream end). We also note that Black Bear Hydro's characterization of the project as a Category B disturbance per the FWS guidelines does not take blasting into account. Rather, the FWS in its guidelines classify blasting, and other loud, intermittent noises as Category H and

recommend these activities are avoided within 0.5 mile of active nests during the nesting season. We recognize that Black Bear Hydro proposes to consult with resource agencies to develop a blasting plan and FWS should be included in such consultation. Furthermore, Black Bear Hydro should consult with FWS to identify appropriate periods for any additional general construction activities that may occur within the lower excavation area, including installation or removal of the turbidity curtain. Finally, we recommend that the licensee follow current state-of-the art practices to avoid potential for bald eagle electrocutions on the new transmission lines. Such standards are available in APLIC's *Suggested Practices for Avian Protection on Power Lines* (APLIC, 2006). With implementation of proper scheduling of activities and engineering of transmission line support structures and conductor separation, effects on bald eagles would be minor.

Wood Turtle

Stillwater and Orono Projects

Potential effects on wood turtle include potential for disturbance or direct injury during the construction period and potential inundation of nesting habitat associated with headpond increases at the Orono Project. Due to low potential for this species to occur in areas of project construction activities, Black Bear Hydro does not propose any specific protection measures for this species.

Our Analysis

Implementation of the proposed projects could affect the wood turtle through habitat alteration or direct disturbance or injury if construction activities occur in occupied habitat. Limited potential exists for construction crews to encounter wood turtles in areas proposed for access roads and laydown areas. However, because of the lack of wetlands in the immediate areas and the disturbed character in these areas, such encounters are highly unlikely. Increasing water levels associated with a higher headpond at the Orono Project could inundate nesting habitat. These effects would occur over the long-term but would be limited in geographic distribution and total area. Therefore, we expect the anticipated water level increases would result in long-term, minor effects on this species.

3.3.5 Recreation, Land Use, and Aesthetic Resources

3.3.5.1 Affected Environment

Recreation

Stillwater and Orono Projects

The projects provide about 5.3 miles of flatwater in two contiguous impoundments and, unless spill conditions exist, the impoundment elevations are maintained within a one-foot elevation range (see section 2.1.2). The project impoundments provide opportunities for angling (both warmwater and coldwater fish species) and flat water boating. During high flows, which typically occur in late spring, whitewater boaters have access to drops and rapids within the Stillwater tailrace, downstream of Stillwater dam. Most whitewater boating at this location occurs in April and May. The minimum flow necessary for whitewater boating is 6,000 cfs with 7,400 cfs considered optimal.[27] Whitewater boaters also access the Stillwater Branch near the train trestle bridge to boat rapids located under the bridge and another series of rapids on the Penobscot River that is located about 100 yards downstream of its confluence with the Stillwater Branch.

At and near the projects, the opportunities for flatwater boating and shoreline-based day use recreation activities include angling, canoeing/kayaking, bicycling, walking/hiking, picnicking, wildlife watching, and sightseeing. Existing recreation developments that provide public access for project recreational use include three canoe portages, an experimental forest, and public parks. Amenities at these areas include picnic areas with tables, barbeque grills, and restrooms; informal shoreline access for hand-launching boats; and parking areas. Pedestrian and bicycle trails provide abundant shoreline access including access to an area known as the Ledges where visitors sunbathe, picnic, swim and fish. No nationally designated rivers, trails, or wilderness areas are located at or would be affected by the projects.

Although the projects are near the communities of Old Town and Orono, Black Bear Hydro reports that the Stillwater Project has low recreation use—about 215 annual recreation-days with only about 10 percent occupancy at the canoe portage on weekends between April 1 and October 14. At the Orono Project, Black Bear Hydro reports similarly low use at the access sites, parks, and picnic areas; however, trail use is reported to be 25 percent of capacity. The results of recent Environmental and Public Use

[27] Although Black Bear Hydro does not report minimum or optimal flows for whitewater boating downstream of Orono dam, we assume the seasonal use pattern and flows are the same that are reported for whitewater boating downstream of the Stillwater Project.

Inspections (2005 and 2009) by the Commission indicate the project recreation facilities are adequate, functional, and in good condition.

Land Use and Aesthetic Resources

Stillwater and Orono Projects

The towns and cities within the project vicinity have sporadic residential and limited commercial development. The population density is higher in the southern reach of the Stillwater Branch where the town of Orono is located. In 2008, the population of Orono was 9,670. Vegetation in the project vicinity is dominated by forestland; approximately 75 percent of the total acreage of Penobscot County is also forested. Only 4 percent of the land in the project vicinity is developed. Most of the land along the Stillwater Branch is privately owned, containing some recreational lands and facilities owned by the University of Maine, Penobscot Indian Nation, and the State of Maine.

At the Stillwater Project, the shoreline has steep banks and rolling fields that, together with restricted public access on privately owned lands, limit access to the Stillwater impoundment. Lands along the Stillwater impoundment that are owned by the University of Maine are managed for multiple uses including public recreation, timber, and preservation. With the exception of hydropower, industrial use of the lands at the Stillwater Project area is limited. The Orono impoundment shoreline is largely undeveloped forestland and the University of Maine campus, occupies 660 acres of land on the eastern shore. Although much of the shoreline is privately owned, several access points, trails, and day-use areas provide access to the Orono impoundment.

Black Bear Hydro owns or has rights to all lands within the boundaries of the projects that include lands up to an elevation of 94.65 feet at the Stillwater Project and 73 feet at the Orono Project. Lands within and adjacent to the Stillwater Project have a variety of zoning designations, including: Commercial Business, Low Density Residence, Farming Shoreland, and Resource Protection.

Zoning designations for lands near Orono Project facilities include Limited Residential Shoreland and Limited Commercial Shoreland; lands along the impoundment are zoned as Limited Residential Shoreland, General Development Shoreland, and Resource Protection.

The most constrained zone is Resource Protection where there is limited use of vulnerable shoreland areas and other areas with sensitive water quality, productive habitat, biological systems, or scenic and natural values such as wetlands, floodplains and excessively steep slopes. Development activities on land with this designation are very limited with only non-intensive recreation and resource management activities allowed.

3.3.5.2 Environmental Effects

Recreation

Aspects of the proposed action that have the potential to affect recreational use, facilities and access relate to: (1) reallocating flows between the Penobscot River and the Stillwater Branch; (2) raising the elevation of the Orono impoundment by 0.6 foot; and (3) constructing project improvements.

Flow Reallocation

Stillwater and Orono Projects

During the peak recreation season, flows would only be reallocated when the mid-range of inflows to the main stem Penobscot River occurs. From May through September flows would be unchanged at inflows less than 5,446 cfs and greater than 15,000 cfs. Overall, this reallocation would pass more water through (1) the project reservoirs (2) between Stillwater dam and the high water surface elevation of the Orono impoundment; and (3) between Orono dam and the downstream confluence of Stillwater Branch and Penobscot River. Black Bear Hydro reports whitewater boating occurs in the short, flowing reaches located immediately downstream of the project dams. Modified flows could potentially affect whitewater recreation in these areas. Reallocating flows would also decrease flows in the 4.8-mile reach of the main stem of the Penobscot River between Milford dam and the confluence with the Stillwater Branch and this could affect river access.

Black Bear Hydro would continue run-of-river project operations and maintain impoundment elevations within plus or minus one foot of the normal operating levels.

Our Analysis

Although there would be more flow passing through the Stillwater Branch, Black Bear Hydro would continue run-of-river project operations and maintain impoundment elevations within plus or minus one foot of the normal operating levels. Consequently, this operation would not cause any change in recreational access to the impoundments or flatwater boating opportunities.

Because the minimum suitable flow for whitewater boating is 6,000 cfs, the mean flows under the proposed action would typically provide boating opportunities in April and May when the highest mean flows of 10,982 and 7,231 cfs, respectively, would occur (see Table 3). Although the mean flows in the fall are not expected to be sufficient for whitewater boating, they would be closer to the 6,000 cfs minimum suitable whitewater boating flow (e.g., 5,147 cfs in November). Compared to existing conditions, whitewater

boating opportunities may increase slightly because suitable flows would continue to typically occur in April and May and there may occasionally be additional days with suitable whitewater boating flows in the fall.

The change in flows to the main stem of the river would range from 3 to 12 percent less than what currently exists from May to September. The changes in water levels associated with the reallocation during the peak recreation season range from less than 1 inch to just under 10 inches, so there would be no noticeable effect on recreational use of this river reach. No formal boat launches, fishing piers or other water-based recreation facilities are located on this river reach, so reallocating flows would not affect the developed recreation facilities.

Raising Orono Impoundment Elevation

Stillwater and Orono Projects

Shorelines along the project reservoirs are used for public recreation. At Orono reservoir Black Bear Hydro would change the shoreline by adding taller flashboards to the spillway which would raise the impoundment by 0.6 foot. Black Bear Hydro reports that this increased reservoir elevation would move the high water level upland by about 2 to 8 feet (horizontal distance), depending on the shoreline slope.

Our Analysis

Raising the normal maximum water surface elevation of the Orono impoundment by 0.6 foot would inundate an additional 4.4 acres of land. Where the shoreline has gently sloping land, the perimeter of the impoundment could possibly extend 2 to 8 feet upland (horizontally) along a small portion of the impoundment shoreline. However, because most of this area of the Stillwater Branch is characterized by steep banks, the extent of the increased impoundment perimeter along most of the impoundment would be much smaller and not probably noticeable. Some land along the shoreline would be lost as the impoundment expands from 175 to about 180 acres, but this loss of shoreline would not affect flatwater boating use or any of the facilities that provide recreational access; it would not create a need for changed or additional recreation facilities.

Construction Activities

Stillwater and Orono Projects

Construction activities in the channel would partially remove a ledge downstream of Stillwater dam (estimated 4,500 cubic yards of material) that is used by whitewater boaters. Local roads would be used to transport workers and equipment to and from work sites during construction and Black Bear Hydro proposes to continue consulting

with the City of Old Town concerning traffic patterns during construction. Public access to the river channel, staging areas and construction access roads would be restricted to protect public safety.

Our Analysis

Construction activities would have short- and long-term effects on recreation resources. Rapids currently used by whitewater boaters downstream of Stillwater dam (Typewriter Rapids) are located on a ledge that would be partially removed as part of constructing the powerhouse, thereby possibly altering or eliminating this feature. Conversely, changes to the channel from project construction and increased flows from reallocation may create different conditions that could replace what may be lost, but these conditions and any associated benefit cannot be predicted with certainty. Because there is low whitewater boating use that opportunistically occurs during spill events and there may be new whitewater features created by the project and its operation, it is most likely that the proposed amendment would have a slight long-term negative effect on whitewater boating use.

Whitewater boating also occurs near the train trestle bridge that crosses the bypassed reach downstream of Orono dam and immediately downstream of the confluence of Stillwater Branch and Penobscot River. Construction activities for Orono powerhouse B would require restricting public access for safety reasons, temporarily limiting access to whitewater boating in this reach. In addition, under lower flow conditions, the rapids near the train trestle bridge may not have sufficient flow for whitewater boating because flows would be diverted to the fish passage facilities. However, because whitewater boating takes place during the spring when flashboards would not be in place and low flow conditions would not occur, no long-term effect on whitewater boating rapids would occur in the tailrace near the train trestle bridge. Whitewater boating would not be affected downstream of the confluence of Stillwater Branch and Penobscot River because no construction activity would occur in this area and all reallocated flow to the Stillwater Branch would have re-entered the river.

Project construction activities would have temporary unavoidable adverse effects on recreation resources because public access would need to be restricted in the areas near the dams and construction activity would take place during the peak recreation season. Canoe portages and tailwater shoreline fishing sites associated with the projects would be temporarily unavailable. Although this effect would be adverse, we expect few visitors would be displaced because construction would be limited to one recreation season, and as reported in the 2009 FERC Form 80 Recreation Report, recreation use is low at these sites.

Land Use

Aspects of the proposed action that have the potential to affect land use relate to: (1) changing impoundment elevations; (2) adding new project facilities and (3) constructing project facilities.

Impoundment Elevations

Stillwater and Orono Projects

Reallocated flows would cause an overall increase in the amount of flow passing through the two project reservoirs on the Stillwater Branch and increased height of the flashboards on the Orono spillway would raise the impoundment by 0.6 foot. Black Bear Hydro reports that increasing the reservoir elevation would move the normal maximum water level upland by about 2 to 8 feet (horizontal distance), depending on the shoreline slope.

Our Analysis

Increasing generation capacity would allow the increased flows reallocated to the Stillwater Branch to pass downstream and improve Black Bear Hydro's ability to control the impoundment levels. Stabilized impoundment levels would decrease flooding that would benefit uses of shoreline lands.

The Orono impoundment would be raised from elevation of 72.4 feet to 73.0 feet—an increase of 0.6 feet. This action could potentially inundate some riverbanks in the immediate vicinity by 2 to 8 feet (horizontal distance). However, because the Stillwater Branch is characterized by steep banks, particularly in the vicinity of the Orono Project, a minor loss of shoreline would occur when 4.4 additional acres would be inundated by the impoundment. This effect would be minor and long-term, considering the existing impoundment occupies 175 acres and the project would be operated with this new normal maximum water surface elevation for the license term.

Black Bear Hydro would install new, taller flashboards to raise the level of Orono impoundment, and these flashboards would be designed to fail at the same impoundment elevation (74.4 feet) as the existing flashboards. Consequently, the project would maintain the same ability to pass 100-year flood flows, so there would be no change in the frequency of flood events that would occur on lands surrounding the Orono impoundment.

New Project Facilities

Stillwater and Orono Projects

The licensee would construct two powerhouses, two transmission lines, forebay, surge chamber, access road, fish and eel passage facilities, and penstock that would occupy less than about 5 acres. Access roads, laydown areas and parking areas constructed for the project would occupy less than 1 acre. Black Bear Hydro would restore and revegetate the temporary access road after construction and the existing project dams would be modified to accommodate the new generation facilities and passage facilities for fish and eels. Changes in the character of the landscape and land use associated with adding new project facilities could challenge established land use zone designations.

Our Analysis

The projects are existing facilities with large and evident features including dams, spillways, powerhouses, and transmission lines that operate as run-of-river facilities. The development associated with the proposed new facilities would be consistent with existing zoning designations. Accordingly, installing additional turbine/generator units enclosed in new powerhouses, constructing new intake structures, altering tailraces, and constructing new transmission lines within the existing project boundary would not result in any effect on the land use of the surrounding area. Additionally, all of the proposed facilities would be constructed within the existing boundaries of the projects, so it would not be necessary to expand the project boundaries.

Construction Activities

Stillwater and Orono Projects

During construction activities Black Bear Hydro would close some areas to public use and control traffic by creating detours or temporarily stopping traffic (e.g., using flaggers). Black Bear Hydro would consult and coordinate with the City of Old Town to identify and implement actions related to traffic control during construction.

Construction activities would also require removing vegetation and disturbing soil and Black Bear Hydro proposes to develop and implement a soil erosion and sediment control plan for the project.

During construction, the existing Orono powerhouse A and a portion of the flow in the spillway would be closed off temporarily while the cofferdam is in place. Black Bear Hydro states that this would reduce the ability for flows to pass downstream.

Our Analysis

Construction vehicles entering and leaving work sites might temporarily disrupt traffic in the project vicinity and drivers may encounter delays or detours. Consulting and coordinating with the City of Old Town to identify and implement actions during construction would minimize impacts on local vehicular traffic. Developing and implementing a soil erosion and sediment control plan, which would include installing standard silt-fencing and rip-rap, would minimize erosion and sedimentation during construction. Proposed measures would lessen the effects of traffic disruption and erosion, so there would be minor short-term effects from construction but there would be no long-term effects on land use.

If unanticipated high flows occurred while the spillway is isolated by the cofferdam, the reduced ability to pass flows could temporarily inundate shoreline lands and affect land use. However, because Black Bear Hydro would conduct this phase of construction during periods of low flow to avoid causing this potential effect, the proposed action is not expected to have any short-term effect on land uses.

Aesthetic Resources

Aspects of the proposed action that have the potential to aesthetic resources relate to: (1) changing impoundment elevations; (2) adding new project facilities and (3) constructing project facilities.

Impoundment Elevations

Stillwater and Orono Projects

The projects would increase the amount of water passing through the two project reservoirs on the Stillwater Branch possibly affecting the extent and frequency of time when contrasting unvegetated land below the high water mark of the reservoirs is exposed. Black Bear Hydro would continue run-of-river project operations and manage the impoundments to within plus or minus 1 foot of the normal elevation range (see section 2.1.2). Additionally, taller flashboards would be used to raise the level of Orono reservoir by 0.6 foot.

Our Analysis

Because the impoundment levels would still be managed within a narrow, plus or minus 1-foot elevation range (see section 2.1.2) there would be no change in the extent or frequency of exposed, unvegetated land around the reservoir shoreline. Although raising the Orono impoundment by 0.6 foot would increase the impoundment from 175 to 180 acres, the marginal increase would not be noticeable to most viewers. As described above, increasing generation capacity would improve the stability of the impoundment

levels, which, in turn, would improve views of the impoundments. Because there would be increased impoundment level stability and no changed appearance to the impoundments from water fluctuation, there would be a minor, long-term improvement of the visual character of the impoundments.

New Project Facilities

Stillwater and Orono Projects

New visible infrastructure that would be constructed includes two powerhouses, with tailraces, modified dams, access roads, laydown areas, parking areas and transmission lines. Black Bear Hydro would restore and revegetate the temporary access road and disturbed areas after construction. The new project facilities could affect the character of the landscape in the vicinity of the project by increasing the number or changing the type of man-made structures in the area.

Our Analysis

The new structures would be similar to and compatible with the existing facilities. Because the projects are already in existence with large and evident features similar to what would be constructed, there would be only a marginal increase in the frequency of viewing these types of facilities from the surrounding area. Because the projects are located in an area that includes development where buildings, roads, and power lines commonly occur, the long-term effect on visual resources would be minimal.

The proposed excavation for the Stillwater powerhouse B would not affect the appearance of the current bypassed reach at lower flows because Black Bear Hydro would reduce the elevation of the berm at the entrance to the side channel to maintain wetted area during low flow conditions and release 50 cfs to the east channel at all times. Dewatering of the existing bypassed reach would only occur during emergency project shut-downs, which would be temporary and brief and would be the same as the current practice of an emergency shut-down of the project.

Construction Activities

Stillwater and Orono Projects

Local roads would be used to transport workers and equipment to and from work sites during construction and Black Bear Hydro proposes to continue consulting with the City of Old Town concerning traffic patterns during construction. Black Bear Hydro would restore and revegetate the temporary access road and disturbed areas after construction.

Our Analysis

Because Black Bear Hydro would continue to consult and coordinate with the City of Old Town to identify and implement actions to minimize these effects during construction, any short-term effects on aesthetic resources would be minimized. In addition, temporary roads, laydown areas and parking area that would not be necessary for continued project operations would be restored after construction, and only one new road at the Orono Project would remain after construction. The projects would not result in any long-term effects on aesthetic resources because lands would be restored and the new access road would appear consistent with adjacent lands that have residential development with similarly-appearing streets.

3.3.6 Cultural Resources

3.3.6.1 Affected Environment

Stillwater and Orono Projects

Pursuant to section 106, the Commission must take into account whether any historic property could be affected by a proposed undertaking within a project's area of potential effects (APE). "Undertakings" include activities that require a federal permit, license, or approval (36 CFR 800.16[y])). The APE is determined in consultation with the SHPO and is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist" (36 C.F.R. 800.16[3]). For the existing Stillwater Project, the APE includes the impoundment area within the 95.65-foot NGVD contour, extending upstream of the dam about 3.1 miles, and also includes the main concrete gravity dam, a concrete and wooden powerhouse, and a tailrace (Penobscot Hydro, 1999). For the proposed Stillwater and Orono Project amendments, Figures E-3.2-1 and E-3.2.2, of the application depict the areas that would be affected by the proposed new installations, including access roads and equipment laydown areas.

The earliest evidence of habitation in the Penobscot Basin area dates to greater than 8,000 years ago. The Penobscot Indian Nation is the remaining tribe of several that traditionally inhabited in the area. Today, there is a vital Penobscot community on Indian Island, located in Old Town above the Milford Project dam. The Penobscot community actively participated in proceedings to relicense and amend both the Stillwater and Orono Projects. Black Bear Hydro also has consulted with the Penobscot community to prepare the amendment application.

European exploration of the project vicinity began in the 1500s with permanent settlements becoming established in the 1600s. Agricultural activity occurred within river basins, and settlers began altering the existing landscape by building dams and

sawmills. In the nineteenth and twentieth centuries, the Penobscot and Stillwater rivers gave rise to lumber and sawmill operations, paper mills, fisheries, canneries, and other industrial enterprises. The Stillwater Project was constructed in 1913. In 1932, a second powerhouse was installed, and by 1942, the original powerhouse was abandoned, but remnants of this structure still remain. The Orono Project originally consisted of a timber crib dam and penstocks that provided power to a pulp mill operating in 1898. Between 1917 and 1925, the timber crib dam was replaced with a new concrete dam and intake, and between 1949 and 1950, Bangor Hydro Electric Company acquired the project and added three new generators to the three existing turbines that had not been in use. In 1960, the entire concrete dam was replaced. Between 1994 and 1996, the three penstocks collapsed. The project did not operate again until 2008, when it was repowered and a single concrete penstock was installed to replace the three collapsed structures.

Both project areas were recently surveyed for cultural resources during relicensing and/or subsequent amendment processes, and no historic or archaeological properties that are either listed or eligible for listing on the National Register were reported. The final EAs for these undertakings reflect these findings (FERC 2005a, 2005b).

3.3.6.2 Environmental Effects

Stillwater and Orono Projects

No historic properties have been identified within the Stillwater or Orono Project areas that will be affected by the proposed amendments. However, the Stillwater CRMP (Penobscot Hydro, 1999) requires Black Bear Hydro to notify the Maine SHPO of any proposed ground-disturbing activities associated with the Stillwater Project and provides a procedure for the inadvertent discovery of cultural materials and/or human remains. While there is no CRMP associated with the Orono Project, Article 405 of the project license also requires that Black Bear Hydro consult with the Maine SHPO and Penobscot Indian Nation THPO before starting any land-clearing or land-disturbing activities within the project boundaries; it also contains a procedure for the discovery of cultural materials and human remains.

By letter dated October 13, 2010, the Maine SHPO stated that no historic or archaeological properties would be affected by the proposed installations at either the Stillwater or Orono Projects. In its letter, the Maine SHPO also agreed the three-stage consultation requirements of 18 CR 4.38 should be waived. Black Bear Hydro also consulted with the Penobscot Indian Nation THPO during the preparation of the amendment application, and no concerns regarding the proposed actions were expressed.

Our Analysis

The proposed installations at the Stillwater and Orono Projects would not affect any known historic properties. However, adherence to the procedures set forth in the Stillwater CRMP would ensure the protection of previously unidentified cultural resources and/or human remains, if they are identified during project construction of the proposed new facilities at this location. Likewise, adherence to the requirements of Article 405 of the Orono Project license would ensure that appropriate measures would be implemented if cultural materials or human remains are identified during construction activities associated with the Orono Project.

4.0 DEVELOPMENTAL ANALYSIS

In this section, we look at Black Bear Hydro's proposed action and alternatives to the proposed action to compare differences in the project's costs and power generation. In keeping with Commission policy as described in *Mead Corporation, Publishing Paper Division*,[28] our economic analysis is based on current costs with no consideration for potential future inflation or escalation.[29]

Our economic analysis helps to support an informed decision concerning what is in the public interest with respect to a proposed license amendment. However, our economic analysis is not a determination that any action is reasonable or prudent. Our analysis shows that the proposed amended facilities, with additional staff recommendations, would cost more to construct and operate than the increased generation benefits to be derived based upon our estimated cost of alternative power. However, it is the licensee who must decide whether to accept this amendment and any financial risk that entails.

4.1 NO-ACTION ALTERNATIVE

Under the no-action alternative, there would be no change in project facilities, operations or term of licenses and no change to project generation. Therefore, there would be no change in the economics of the projects.

4.2 PROPOSED ACTION

Black Bear Hydro proposes to modify the Stillwater and Orono Project facilities, extend the terms of the licenses and implement environmental enhancement and protection measures.

The generating facility modifications at the Stillwater Project would have an estimated capital construction cost of $9,039,010 (2012 dollars - $626,190 levelized annual cost). This cost would include the following project modifications: a new intake structure, a new powerhouse containing three 743-kW generating units, and new tailrace. These additions to the project would require an additional $308,500 in routine annual O&M costs (2012 dollars). The proposed project would also include the following environmental measures: (1) a soil erosion and sediment control plan would be developed prior to construction and implemented prior to and during construction ($4,100 levelized annual cost); (2) a blasting plan for rock and bedrock excavation

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[28] 72 FERC ¶61,027 (July 13, 1995).

[29] We assumed a 20-year financing period with an interest rate of 6 percent for all capital expenses.

would be developed prior to construction and implemented during construction ($210 levelized annual cost); (3) a Mussel Relocation Plan would be implemented prior to construction ($360 levelized annual cost); (4) a new downstream fish passage facility and bypass adjacent to the intake for the proposed powerhouse B ($27,280 levelized annual cost); (5) a new upstream eel passage facility adjacent to the intake for powerhouse B to replace the existing eel trap located at the east end of the dam ($5,330 levelized annual cost); and (6) implement a Species Protection Plan ($9,850 levelized annual cost).[30] The total levelized annual cost of the proposed project would be $1,247,650.

Commission staff estimates that operation of the modified project would result in an increase in annual generation of approximately 20,000 MWh. Using a regional estimated alternative energy value of $35.68/MWh, based on replacement of project energy with gas-fired generation and a capacity value for dependable capacity, this additional generation and capacity would be valued at $1,068,010 annually. Therefore, the net cost of Black Bear Hydro's proposed action at the Stillwater Project, including total capital and annual costs and generation benefits, would be approximately $179,640 annually.

The generating facility modifications at the Orono Project would have an estimated capital construction cost of $11,414,240 (2012 dollars - $790,740 levelized annual cost). This cost would include the following project modifications: a new intake structure, new penstock, new powerhouse containing three 1,246 kW generating units, and a new tailrace. These additions to the project would require an additional $308,500 in routine annual O&M costs (2012 dollars). The proposed project would also include the following environmental measures:(1) a soil erosion and sediment control plan would be developed prior to construction and implemented prior to and during construction ($4,100 levelized annual cost); (2) a blasting plan for rock and bedrock excavation would be developed prior to construction and implemented during construction ($210 levelized annual cost); (3) a Mussel Relocation Plan would be implemented prior to construction ($360 levelized annual cost; (4) a new downstream fish passage facility and bypass adjacent to the intake for the proposed powerhouse B intake replacing the existing downstream fish passage facility($34,210 levelized annual cost); and (5) relocation of the existing upstream eel ladder to a location adjacent to the powerhouse B intake($3,940 levelized annual cost); and (6) implement a Species Protection Plan ($9,850 levelized annual cost). The total levelized annual cost of the proposed project would be $1,649,070.

Commission staff estimates that operation of the modified project would result in an increase in annual generation of approximately 31,800 MWh. Using a regional

[30] Filed with the Commission on March 7, 2012.

estimated alternative energy value of $35.68/MWh, based on replacement of project energy with gas-fired generation, and a capacity value for dependable capacity, this additional generation and capacity would be valued at $1,728,970 annually. Therefore, the net annual benefit of Black Bear Hydro's proposed action at the Orono Project, including total capital and annual costs and generation benefits, would be approximately $79,900.

Combined, the proposals at the two projects would have an annual cost of $99,740.

4.3 STAFF-RECOMMENDED ALTERNATIVE

In addition to Black Bear Hydro's proposal to modify the project, the staff-recommended alternative includes several environmental mitigation and enhancement measures at each project.

For the Stillwater Project, these recommended measures would require the licensee to: (1) develop and implement a revised Water Level Monitoring Plan at an estimated levelized annual cost of $210; (2) develop and implement a fish salvage plan at an estimated levelized annual cost of $1,150; (3) develop and implement a plan to conduct DO monitoring downstream of the project at an estimated levelized annual cost of $440; (4) provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period at no additional cost; (5) develop and implement a plan for a study to identify locations where eels congregate to identify the best location for the eel ladders at an estimated levelized annual cost of $650; (6) use native plants and native seed mixes when revegetating disturbed areas at no additional cost; (7) develop and implement a plan to avoid the introduction and/or spread of invasive species during construction activities at an estimated levelized annual cost of $690; (8) develop and implement a sensitive species protection plan at an estimated levelized annual cost of $690; and (9) construct new transmission lines in accordance with APLIC guidelines to prevent raptor electrocutions at no additional cost.

The total levelized annual cost for these staff-recommended measures would be approximately $3,970. Under the staff-recommended alternative, annual generation and its value would be the same as under the proposed action. The total levelized annual cost of the licensee's proposed action, including staff's recommended measures and mandatory conditions, would be approximately $1,251,620. Therefore, the net cost of the licensee's proposed action at the Stillwater Project, including total capital costs, power benefits, and staff recommended alternatives, would be approximately $183,610 annually.

For the Orono Project, these recommended measures would require the licensee to: (1) develop and implement a revised Operation and Flow Compliance Monitoring Plan at an estimated levelized annual cost of $210; (2) develop and implement a fish

salvage plan at an estimated levelized annual cost of $1,150; (3) develop and implement a plan to conduct DO monitoring downstream of the project at an estimated levelized annual cost of $440; (4) provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period at no additional cost; (5) develop and implement a plan for a study to identify locations where eels congregate to identify the best location for the eel ladders at an estimated levelized annual cost of $650; (6) use native plants and native seed mixes when revegetating disturbed areas at no additional cost; (7) develop and implement a plan to avoid the introduction and/or spread of invasive species during construction activities at an estimated levelized annual cost of $690; (8) develop and implement a sensitive species protection plan at an estimated levelized annual cost of $690; and (9) construct new transmission lines in accordance with APLIC guidelines to prevent raptor electrocutions at no additional cost.

The total levelized annual cost for these staff-recommended measures would be approximately $3,970. Under the staff-recommended alternative, annual generation and its value would be the same as under the proposed action. The total levelized annual cost of the licensee's proposed action, including staff's recommended measures and mandatory conditions, would be approximately $1,653,050. Therefore, the net annual benefit of the licensee's proposed action at the Orono Project, including total capital costs, power benefits, and staff recommended alternatives, would be approximately $75,920.

Combined, the proposals at the two projects with staff recommendations would have an annual cost of $107,690.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 COMPARISON OF ALTERNATIVES

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 we review a hydropower project, we consider the water quality, fish and wildlife, recreation, cultural, and other non-developmental values of the involved waterway equally with its electric energy and other developmental values. In deciding whether, and under what conditions a hydropower project should be licensed, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. This section contains the basis for, and a summary of, our recommendations for conditions to be included in any amendments to the licenses for the Stillwater and Orono Projects.

Based on our independent review and evaluation of the environmental and economic effects of the proposed action, the proposed action with additional staff modifications, and the no-action alternative, we recommend the proposed action with additional staff-recommended measures as the preferred alternative. We recommend this alternative because: (1) issuing amendments to the project licenses would allow the licensee to continue operating the projects as beneficial and dependable sources of electric energy; (2) increasing the installed capacity of the projects by 5.967 MW would eliminate the need for an equivalent amount of fossil-fuel-produced energy and capacity, which would help conserve these nonrenewable resources and decrease atmospheric pollution; and (3) the proposed and staff-recommended environmental measures would protect project resources.

5.1.1 Measures Proposed by the Licensee

We recommend including the following environmental measures proposed by Black Bear Hydro in any amended license issued by the Commission for the Stillwater and Orono Projects:

Both Projects

- Develop and implement a soil erosion and sediment control plan
- Develop and implement a blasting plan to address potential effects of construction on fish and aquatic species
- Implement the Species Protection Plan for Atlantic salmon (submitted with the BE)
- Implement the Mussel Relocation Plan (submitted with the application)

- Consult with the Maine SHPO and Penobscot Indian Nation THPO to address any potential effects if unanticipated cultural materials or human remains are discovered during construction

Stillwater Project

- Construct a new downstream fish passage facility consisting of full-depth trashracks with 1-inch-clear spacing and a bypass adjacent to the intake for the proposed Stillwater powerhouse B

- Construct an upstream eel passage facility adjacent to the intake for powerhouse B to replace an existing eel trap located at the east end of the dam

Orono Project

- Construct a new downstream fish passage facility consisting of full-depth trashracks with 1-inch-clear spacing and a bypass adjacent to the intake[31] for the proposed Orono powerhouse B, replacing the existing downstream passage facility

- Relocate the existing upstream eel ladder to a location adjacent to the powerhouse B intake

- Install a trap-and-truck facility at the Orono Project's spillway to provide upstream fish passage (as required in Ordering Paragraph D of the existing project license)

- Implement a Sturgeon Handling Plan for shortnose sturgeon and Atlantic sturgeon (submitted with the BE)

Constructing the trap-and-truck facility is a requirement of the existing license, but would be constructed at the same time as and be integrated with the new intake and downstream passage facility. The Sturgeon Handling Plan is required for effective operation of the trap-and-truck facility, and we consider it to also be a requirement of the existing license.

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[31] In its June 5, 2012, AIR response, Black Bear Hydro indicates that it will retain a slot of the same dimensions as the existing downstream passage opening in the same approximate location for future use in the event that future evaluations of the new downstream passage facility determine that a second downstream passage facility is needed.

5.1.2 Additional Measures Recommended by Staff

Staff recommends that Black Bear Hydro implement the following proposed measures and develop plans in consultation with appropriate agencies and file the plans with the Commission for approval. Staff also recommends adoption of the terms of the WQC, which are listed in section 2.2.6.

1. Develop and implement a revised Operation and Flow Compliance Monitoring Plan for the Orono Project and a revised Water Level Monitoring Plan for the Stillwater Project. The revised plans should include: a detailed description of how impoundment levels, minimum flows, generation flows, and inflows are currently measured; updated information regarding flow compliance monitoring as it pertains to the new facilities (i.e., monitoring discharges from the new powerhouses and fish passage facilities); maintenance plan for ensuring that the monitoring methods remain accurate; measures to make flow and impoundment level data publicly available as proposed by Black Bear Hydro; and a description of the locations where minimum flows would be released and the methods that would be used to release minimum flows at both projects.

2. Develop and implement a plan to conduct DO monitoring downstream of each of the Stillwater and Orono Projects. The monitoring should be conducted from June through September for at least the first year of operation of the new powerhouses. The plan should be developed in consultation with NMFS, FWS, Maine DEP, Maine DIFW, and Maine DMR.

3. Develop and implement a fish salvage plan defining procedures for monitoring areas dewatered by cofferdams and transferring any stranded fish safely from those areas. The plan should be developed in consultation with NMFS, FWS, Maine DIFW, Maine DMR, and the Penobscot Indian Nation.

4. Provide access to a NMFS engineer, or other fisheries agency personnel, during the construction period.

5. Develop and implement a plan for a one-year study at both projects to identify locations where eels congregate after construction of the new powerhouses to identify the best locations for the eel ladders associated with the new powerhouses and intakes. The plan should be developed in consultation with NMFS, FWS, Maine DMR, and the Penobscot Indian Nation.

6. Use native plants and native seed mixes, identified through consultation with Maine DIFW and Maine DC, when revegetating disturbed areas.

7. Develop and implement a plan to avoid the introduction and/or spread of invasive species during construction activities in consultation with Maine DIFW and Maine DC.

8. Develop and implement a sensitive plant protection plan in consultation with Maine DIFW and Maine DC that includes: (1) flagging appropriate work zones; (2) educating construction crews about the sensitivity of these plants and the importance of restricting activities to within the flagged areas; (3) determining whether transplanting is appropriate and, if so, identifying potential low-cost recovery/transplanting methods for the affected species; (4) conducting a post-construction survey for sensitive plants one year following project completion; and (5) identifying thresholds at which additional mitigation would be required.

9. Consult with Maine DIFW, Maine DC, and FWS during preparation of the blasting plan.

10. Construct new transmission lines in accordance with APLIC guidelines to prevent raptor electrocutions.

The following discussion describes the basis for staff-recommended modifications and additional measures:

1. The reallocation of flows into the Stillwater Branch and the construction and operation of the new powerhouses and fish passage facilities have the potential to alter water levels in the project reservoirs and minimum flows released into the bypassed reaches. This could affect compliance with license conditions and the protection of aquatic, recreational, and aesthetic resources. Revising the existing impoundment level and minimum flow monitoring requirements for both projects would help the Commission to determine compliance and to ensure that resources are protected. Including provisions to make these data accessible to the public would assist state and federal agencies with the management of environmental resources and inform the public of flow conditions.

2. Increasing the hydraulic capacity of the generating facilities at the Stillwater and Orono projects would reduce spill volumes at both projects, which could contribute to violations of water quality standards for DO during the summer and early fall months, which may adversely affect aquatic resources. Implementing a one-year DO monitoring program conducted from June through October downstream of each of the Stillwater and Orono Projects after the new powerhouses are operational would help document DO conditions downstream of the projects, and determine whether mitigation

measures are needed to meet the DO standards during periods of low flows and high water temperatures.

3. At both projects, fish could potentially become trapped and stranded within the cofferdams during their construction. Preparing a Fish Salvage Plan defining procedures to transfer fish safely from the dewatered areas would reduce the potential for fish injury or mortality. Black Bear Hydro should develop and file a plan for fish rescue with the Commission for approval prior to initiation of construction and after consulting with the NMFS, FWS, Maine DIFW, Maine DMR, and the Penobscot Indian Nation in the development of the plan. Preparation of this plan in consultation with the agencies, and approval by the Commission, should ensure that the operation uses the most appropriate techniques for maximizing the rescue and survival of fish from the construction areas at both projects.

4. Providing access to a NMFS engineer, or other fisheries agency personnel, during the construction period in order to help ensure that appropriate measures are being implemented to provide for upstream passage to the extent practicable.

5. The specific locations where upstream migrating eels would congregate after both new powerhouses are in operation cannot be predicted with certainty. Interior recommends a minimum one-year study at both projects after construction of the new powerhouses is completed to verify where eels are congregated and to find the best locations for the eel ladders. This measure would be reasonable to ensure that the eel ladders are located where they would have the highest probability of collecting and passing eels. Black Bear Hydro should file the plan with the Commission for approval prior to initiation of construction and after consulting with the NMFS, FWS, Maine DIFW, Maine DMR, and the Penobscot Indian Nation in the development of the plan. Preparation of this plan in consultation with the agencies, and approval by the Commission, should ensure that the study is well designed and would provide the information that is needed to locate the eel ladders where they would be effective.

6. Black Bear Hydro's proposed measure to revegetate the temporary access road and laydown area that would be used during construction at the Stillwater Project would reduce long-term effects on vegetation. However, Black Bear Hydro provides little detail related to the methods that would be used to revegetate these areas. Use of native species, as opposed to non-native or cultivated species would be more appropriate for restoring disturbed areas, and these species are most suited to the natural conditions at the site and are likely to provide greater value to wildlife. Consultation with Maine

DIFW and Maine DC prior to construction would help to identify an appropriate native seed mix and planting list for revegetation in these areas.

7. At the Stillwater Project, Black Bear Hydro proposes to allow some of the areas associated with temporary access roads to revegetate naturally. To prevent colonization by invasive weeds, Black Bear Hydro should prepare and implement an invasive species control plan in consultation with Maine DIFW and Maine DC, that includes using weed-free materials for erosion prevention and sediment control measures, employing measures to prevent the transportation of weeds into the project area on construction vehicles, and conducting post-construction surveys to identify and control invasive species in areas disturbed by the proposed project activities.

8. The hyssop-leaved fleabane and New England violet, which are state listed as species of Special Concern, occur in the vicinity of the areas that would be disturbed during project construction. To protect these species from potential impacts during construction, Black Bear Hydro should develop and file a sensitive species protection plan with the Commission for approval prior to initiation of construction and after consulting with Maine DIFW and Maine DC. Implementation of a plan that has been prepared in consultation with the agencies, and approved by the Commission, would reduce the potential effects of construction activities on hyssop-leaved fleabane and New England violet.

9. Black Bear Hydro did not specify which agencies would be consulted during development of the blasting plan. To ensure that the plan serves to minimize potential adverse effects on fish and wildlife resources, including nesting bald eagles, Black Bear Hydro should consult with Maine DIFW, Main DC, and FWS during preparation of the plan and file the plan for Commission approval.

10. Because bald eagles use habitat and are nesting in the project area, it is important that project facilities be designed to minimize the potential for injuries to bald eagles. Accordingly, Black Bear Hydro should follow current state-of-the art practices to avoid potential for bald eagle electrocutions on the new transmission lines.

5.2 UNAVOIDABLE ADVERSE EFFECTS

Construction of the proposed project would result in a temporary increase in sedimentation and turbidity in the Stillwater Branch, and to a lesser degree in the downstream main stem of the Penobscot River during installation and removal of the cofferdams required for construction of the new powerhouses. However, any potential adverse effects would be minor and short-term in nature. Reduced spills associated with

the increased hydraulic capacity of the projects may cause a slight reduction in DO concentrations downstream of the project during periods when spills are curtailed. There would likely be a small increase in the number of fish that are entrained and subject to potential injury or mortality when passing through the turbines at the new powerhouses, but the mortality rate would be relatively low and the number of fish entrained at Orono powerhouse A would be reduced by the replacement of partial-depth trashracks with full-depth 1-inch trashracks.

Temporary disturbance of botanical and wildlife resources would occur during project construction, including disturbance of a small number of the state-listed sensitive hyssop-leaved fleabane, and increased headpond levels at the Orono Project would have a minor adverse effect on wetlands along the shoreline of the Orono impoundment. Construction activity would have minor and temporary adverse effects on recreation because public access would need to be restricted in the areas near the dams and construction.

5.3 SUMMARY OF SECTION 10(j) RECOMMENDATIONS

Under the provisions of section 10(j) of the FPA, each hydroelectric license issued by the Commission shall include conditions based on recommendations provided by federal and state fish and wildlife agencies for the protection, mitigation, and enhancement of fish and wildlife resources affected by the project.

Section 10(j) of the FPA states that, whenever the Commission believes that any fish and wildlife agency recommendation is inconsistent with the purposes and the requirements of the FPA or other applicable law, the Commission and the agency will attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agency. In response to our REA notice, the following fish and wildlife agencies submitted recommendations for the project: NMFS (letter filed May 23, 2012) and Interior (letter filed May 29, 2012.

Table 12 lists six recommendations filed pursuant to section 10(j), and whether the recommendations are adopted under the staff alternative. We considered four out of the six of the measures to be within the scope of section 10(j), and considered the remaining two measures under section 10(a). We adopt all six of these measures.

Table 12. Fish and wildlife agency recommendations for the Stillwater and Orono Hydroelectric Projects. (Source: staff)

Recommendation	Agency	Within the Scope of Section 10(j)	Annual Cost	Adopted
1. Monitor flow in the Stillwater Branch of the Penobscot River.	NMFS	No, not a specific measure to protect fish and wildlife	$420	Yes
2. Operate the Stillwater and Orono Projects in a run-of-river mode.	NMFS, Interior	Yes	$0[32]	Yes
3. Develop and implement a plan in consultation with NMFS and Interior to monitor upstream and downstream fish passage effectiveness at the Stillwater and Orono Projects. Interior recommends that a draft of the plan be provided to the resource agencies and Penobscot Indian Nation for review at least 30 days prior to filing the plan with the Commission.	NMFS, Interior	Yes	$0[33]	Yes
4. Define the downstream migration period as April 1 to June 30 and November 1 to December 15 for Atlantic salmon, July 1 to December 31 for American shad and alewife, August to December 31 for blueback herring, and August 15 to November 15 (or other time periods determined when adequate information is available, and	NMFS	No, not a specific measure to protect fish and wildlife	$0	Yes

[32] Consistent with Black Bear Hydro's proposal.

[33] Black Bear Hydro would be required to conduct effectiveness studies on all fish passage facilities as requirements of its existing licenses, section 18 fishway prescriptions, and WQCs.

Recommendation	Agency	Within the Scope of Section 10(j)	Annual Cost	Adopted
during spring runs that may occur) for American eel.				
5. Provide the resource agencies with at least 30 days to review draft fishway designs, O&M plans, and effectiveness studies, and when filing the final plans with the Commission include copies of agency comments and recommendations and specific descriptions of how these comments and recommendations are accommodated by the plan. If the licensee does not adopt a recommendation, the filing should include the licensee's reasons for not accepting the recommendation as well as any supporting information. For engineered design plans, the applicant should consult with NMFS and the other resource agencies as draft 30%, 60% and 90% design plans are developed. The 60% plans should include bypass flow volumes, the 90% drawings should include bid packages, specifications, motor sizes, gate specifications, concrete reinforcement drawings, and edge details, and the 100% drawings should be submitted as record drawings and include all the design change recommendations, and change orders that occurred during construction.	NMFS	Yes	$0[34]	Yes
6. Allow access for an NMFS engineer to monitor the construction of fish passage facilities.	NMFS	Yes	$0	Yes

[34] We assume that Black Bear Hydro anticipated this level of review when it developed its cost for design and construction of the fish passage facilities.

5.4 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2)(A) of the FPA, 16 U.S.C.§803(a)(2)(A), requires the Commission to consider the extent to which a project is consistent with the federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed five comprehensive plans that are applicable to the Stillwater and Orono Projects, located in Maine. No inconsistencies were found.

Maine State Comprehensive Outdoor Recreation Plan (SCORP)

State of Maine Comprehensive Rivers Management Plan, dated February 1993

Maine Bureau of Parks and Recreation submits Comprehensive Plan for Maine Wetlands Conservation Priority Plan

The Atlantic Sea-Run Salmon Commission submits the Comprehensive Plan, Strategic Plan for Management of Atlantic Salmon in the State of Maine

Maine Department of Inland Fisheries and Wildlife et al. submits Comprehensive Plan, Statewide River Fisheries Management Plan

6.0 FINDING OF NO SIGNIFICANT IMPACT

If the capacity-related amendments for the Stillwater and Orono Projects are approved with the staff-recommended measures, the projects would continue to operate and provide increased hydroelectric power generation, while providing protection and enhancements to water quality, aquatic, terrestrial, and recreation resources.

Based on our independent analysis, approval of the amendments with staff-recommended measures would not constitute a major federal action significantly affecting the quality of the human environment.

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