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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PPL Maine, LLC Project No. 2710-035 - ME

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT

(August 19, 2005)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's regulations, 18 CFR Part 380 (Order No. 486, 52 F.R. 47879), the Office of Energy Projects has reviewed the application for a new license for the Orono Hydroelectric Project, located on the Stillwater Branch of the Penobscot River, in Penobscot County, Maine, and has prepared an Environmental Assessment (EA). In the EA, Commission staff analyze the potential environmental effects of relicensing the project and conclude that issuing a new license for the project, with appropriate environmental measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the EA is on file with the Commission and is available for public inspection. The EA may also be viewed on the Commission's website at http://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. For assistance, contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll-free at 1-866-208-3676, or for TTY, (202) 502-8659.

Any comments should be filed within 30 days from the issuance date of this notice, and should be addressed to the Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Room 1-A, Washington, D.C. 20426. Please affix "Orono Project No. 2710" to all comments. Comments may be filed electronically via Internet in lieu of paper. The Commission strongly encourages electronic filings. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's website under the "eFiling" link. For further information, contact Patrick Murphy (202) 502-8755.

Linda Mitry
Deputy Secretary

PUBLIC

Environmental Assessment

PPL Maine, LLC

Orono Hydroelectric Project

Project No. 2710-035

ENVIRONMENTAL ASSESSMENT
FOR
NEW HYDROPOWER LICENSE

Orono Hydroelectric Project

FERC Project No. 2710-035

Maine

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

August 2005

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

PPL Maine, LLC (PPL Maine) filed an application for a new license on June 25, 2004, to rehabilitate, operate and maintain the 2.3-megawatt (MW) Orono Hydroelectric Project located on the Stillwater Branch of the Penobscot River in Penobscot County, Maine. The project is currently not operating. It does not occupy any federal land.

On the same day, PPL Maine also filed the Lower Penobscot River Basin Comprehensive Settlement Accord with Explanatory Statement (Settlement) on behalf of the Penobscot Indian Nation (Penobscot); the state of Maine agencies including the Maine State Planning Office, Maine Atlantic Salmon Commission (Salmon Commission), Maine Department of Inland Fisheries and Wildlife (Maine Fish and Wildlife), and Maine Department of Marine Resources (Marine Resources); the U.S. Department of the Interior (Interior); the Atlantic Salmon Federation (Salmon Federation); American Rivers, Inc. (American Rivers); Maine Audubon Society; the Natural Resources Council of Maine; Trout Unlimited; and the Penobscot River Restoration Trust (Trust). The Settlement calls for phased implementation of its provisions and would affect nine projects in the Penobscot River Basin and one project just outside the basin. One of the provisions included under Phase 1 of the Settlement is the relicensing of the Orono Project which is the action considered in this Environmental Assessment (EA).

A key element of the Settlement involves PPL Maine providing the Trust with a 5-year option (Option) to acquire the Veazie (FERC No. 2403), Howland (FERC No. 2721), and Great Works (FERC No. 2312) projects. Under later implementation phases of the Settlement, if the above projects are acquired by the Trust, the Veazie and Great Works dams would be removed and the Howland dam would be studied for potential removal. Because certain conditions of the section 401 water quality certification for the Orono Project relicensing depend on whether the above projects are acquired and ultimately removed, this EA considers alternatives for the Option being exercised and not exercised to the extent that information is available.

As such, this EA includes five alternatives: (1) the proposed action (Settlement with the option to acquire projects; (2) the proposed action (Settlement without the option to acquire projects); (3) a staff-recommended alternative - rehabilitating and operating the Orono Project with staff-recommended measures; (4) a composite alternative - the proposed action (Settlement with the option to acquire projects with staff-recommended measures including mandatory conditions); and (5) the no-action alternative.

Based on our analysis, we recommend alternative 3, licensing the project under the staff-recommended alternative. We do not recommend measures that are contingent upon whether the Option is exercised or not, since those measures depend on some future

action that is not defined at this time. Our recommended measures include or are based in part on recommendations made by the federal and state resource agencies.

In section VI of the EA, we estimate the annual net benefits of operating and maintaining the project under the five alternatives identified above. Our analysis shows that the annual net benefit would be $395,130 under the proposed action (Settlement with the option to acquire projects), $357,570 under the proposed action (Settlement without the option to acquire projects), $414,530 under the staff-recommended alternative, $394,220 under the composite alternative, and -$75,760 under the no-action alternative.

On the basis of our independent analysis, we conclude that issuing a new license for the project with the environmental measures under the staff-recommended alternative, would not be 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 Licensing
Washington, D.C.

ORONO HYDROELECTRIC PROJECT
FERC No. 2710-035, Maine

I. APPLICATION

On June 25, 2004, PPL Maine, LLC (PPL Maine) filed an application with the Federal Energy Regulatory Commission (Commission) for a new major license for the redevelopment and operation of the 2.3-megawatt (MW) Orono Hydroelectric Project (Orono Project), located on the Stillwater Branch of the Penobscot River in Penobscot County, Maine (figures 1 and 2). The project is currently not operating. On June 25, 2004, PPL Maine also filed a comprehensive settlement agreement (discussed below). PPL Maine estimates that the project will produce an average annual energy generation of about 16,682 megawatt-hours (MWh). The project does not occupy any federal land.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

The Commission must decide whether to issue a license for the project, and what, if any, conditions should be placed in any license issued. Issuing a license would allow PPL Maine to generate electricity at the project, making electric power from a renewable resource available to the area. In this environmental assessment (EA), we assess the effects of project redevelopment and operation, alternatives to the proposed project, and a no-action alternative, and recommend conditions to become a part of any new license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

Figure 1
Page 2

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov.

Figure 2
Page 3

Public access for the above information is available only through the Public Reference Room, or by e-mail at public.referenceroom@ferc.gov

B. Penobscot Settlement

PPL Maine filed the Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement) on behalf of the Penobscot Indian Nation (Penobscot); the state of Maine agencies including the Maine State Planning Office, Maine Atlantic Salmon Commission (Salmon Commission), Maine Department of Inland Fisheries and Wildlife (Maine Fish and Wildlife), and Maine Department of Marine Resources (Marine Resources); the U.S. Department of the Interior (Interior); the Atlantic Salmon Federation (Salmon Federation); American Rivers, Inc. (American Rivers); Maine Audubon Society; the Natural Resources Council of Maine; Trout Unlimited; and the Penobscot River Restoration Trust (Trust). The Settlement includes two attachments: Attachment A containing details regarding fish passage provisions applicable to the Penobscot River hydroelectric projects, and Attachment B representing the establishment and funding of a Contingent Mitigation Fund (Fund). The Settlement also includes two additional agreements, the Lower Penobscot River Option Agreement (Option),[1] and the Comprehensive Settlement Agreement between the Penobscot, PPL Maine, and the Bureau of Indian Affairs.

The Settlement calls for phased implementation of its provisions and would affect nine projects in the Penobscot River Basin and one project just outside the basin.[2] Under phase 1, the parties requested that the Commission approve amendment applications for the Milford (FERC No. 2534), Veazie, Stillwater (FERC No. 2712), Medway (FERC No. 2666), and West Enfield (FERC No. 2600) projects;[3] issue a new 40-year license for the Orono Project (FERC No. 2710), the subject of this EA; suspend processing of the relicensing applications for the Howland and Great Works projects; and to extend certain requirements of the licenses for the Veazie and Milford projects. The remaining three

[1] A key element of the Settlement involves PPL Maine providing the Trust with a 5-year option (Option) to acquire the Veazie (FERC No. 2403), Howland (FERC No. 2721), and Great Works (FERC No. 2312) projects from PPL Maine.

[2] The Ellsworth Project (FERC No. 2727) is located on the Union River in the Union River Basin to the east of the Penobscot River.

[3] By Orders Modifying and Approving Amendment of License 111 FERC ¶62,061, 111 FERC ¶62,062, 111 FERC ¶62,063, 111 FERC ¶62,064, 111 FERC ¶62,065, the Commission approved the amendment requests for increased headpond levels, decreased minimum flows, and modified fishway prescriptions.

phases of the Settlement include, the withdrawal of pending requests for rehearing from the parties in the Basin Mills (FERC No. 10981), Milford, Stillwater, and Veazie licensing proceedings and withdrawal of Interior's section 4(e) and 10(e) requests for the Milford Project (Phase 2); the transfer and surrender of three licenses if the Option is exercised (Phase 3),[4] and the potential for increased generating capacity at several projects (Phase 4).[5]

C. Need for Power

To assess the need for project power, we reviewed PPL Maine's anticipated future use of project power, together with that of the operating region in which the project is located. The Orono Project, when rehabilitated, would generate an average of 16,682 MWh annually. PPL Maine would sell the project's power for wholesale purchase through Independent System Operator New England, if issued a new license for the project.

The Orono Project is located in the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Council (NERC). According to NERC, a 1.3 percent compound annual growth rate is expected over the 2004-2013 period, and compared to last year's load forecast, peak loads have increased by 0.18 percent (NERC, 2004).

By producing hydroelectricity, the Orono Project would displace the need for other power plants, primarily fossil-fueled facilities, to operate, thereby avoiding some power plant emissions and creating an environmental benefit. The future use of the Orono Project power, its displacement of nonrenewable fossil-fired generation, and contribution to a resource diversified generation mix, support a finding that the power from the project would help meet both the short- and long-term need for power in the NPCC region.

[4] The Veazie and Great Works projects would be decommissioned and their dams removed; the Howland Project would be decommissioned and studied for potential dam removal.

[5] The final phase of the Settlement calls for additional generation at Milford, Orono, Stillwater, Medway, and Ellsworth.

III. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

1. Project Description

The Orono Hydroelectric Project would consist of the following facilities: (1) an existing 1,174-foot-long by 15-foot-high dam with 2.4-foot-high flashboards; (2) an existing 2.3-mile-long reservoir, which has a surface area of 175 acres at the normal full pond elevation of 72.4 feet above mean sea level (msl); (3) three new 10-foot-diameter penstocks; (4) a restored powerhouse containing four existing generating units with a total installed generating capacity of 2.3 MW; and (5) appurtenant facilities. The dam and existing project facilities are owned by the applicant. The current project boundary encloses the dam, the entire reservoir up to the 73.0-foot msl elevation, the powerhouse, and the penstocks except for a section beneath the Maine Central railroad bridge.

PPL Maine estimates the project's total average annual generation, when redeveloped, would be 16,682 MWh.

2. Past and Proposed Project Operation

Historically, prior to the June 1996 penstock failure and project shutdown, PPL operated the project in a run-of-river mode, with a normal reservoir surface elevation of 72.4 feet msl. The normal 72.4-foot msl reservoir elevation was maintained when river flows were at or below the hydraulic capacity of the turbines. At 72.4 feet elevation, the reservoir has a gross storage capacity of 1,300 acre-feet.

PPL Maine proposes to rehabilitate the existing turbines. The current bypassed reach is 1,000 feet long and as much as 500 feet wide. Flows through the bypassed reach during past operation consisted of leakage flows and unplanned spillage. PPL Maine proposes to operate in a run-of-river mode and maintain a 200-cfs minimum flow release in the bypassed reach.

3. Proposed Project Rehabilitation

The following project facilities are proposed to be replaced or rehabilitated:

- Replacement of the three failed wood-stave penstocks within the existing penstock right-of-way;

- Rehabilitation of the concrete surge tank that is integral to the powerhouse;

- Replacement of the wood-planked wheelpit floors with new concrete floors;

- Rehabilitation of the four triple-runner horizontal turbines by removal and alignment, and the replacement of two waterwheels.;

- Debris removal from the tailraces of each turbine discharge flume;

- Rehabilitation of the four generators and associated ancillary equipment (wicket gate pins, bushings, weak links, gateshaft bearings, push-pull arms, etc);

- Replacement of the generator controls and switchgear; and

- Rehabilitation of the powerhouse structure by replacement of windows, plank decking above the wheelpits, wheelpit gates, access doors, and roofing as needed.

4. Proposed Environmental Measures

In addition to PPL Maine's proposed project operation and rehabilitation measures discussed above, PPL Maine proposes, consistent with Phase 1 of the Settlement to:

- Install and operate upstream eel passage facilities;

- Develop and implement a plan to monitor the effectiveness of the upstream eel passage facilities;

- Install and operate a fish trapping facility if the Veazie and Great Works projects are acquired by the Trust and their dams subsequently removed, or install and operate upstream fish passage facilities if the projects are not acquired and their dams not removed;

- Install and operate a downstream fish passage facility that includes a trash rack with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass sluice capable of discharging 70 cfs during the downstream migration period;

- Conduct effectiveness studies of the downstream fish passage facility;[6]

- Establish and contribute to the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their dams not subsequently removed; and

- Maintain the existing canoe portage trail around the project.

B. Staff-Recommended Alternative

In addition to PPL Maine's proposed measures under Phase 1 of the Settlement, excluding the Fund, fish trapping facility, and upstream fish passage facilities, we recommend the following environmental measures:

- a soil erosion and sedimentation control plan;
- an impoundment level and minimum flow monitoring plan;
- maintaining mature riparian vegetation at the project;
- using a penstock color that blends with the surrounding; and
- protecting historic properties that may be discovered during the license term.

Specific measures recommended under each plan are discussed under the appropriate resource sections and summarized in section VII of the EA.

C. No-Action Alternative

Under the no-action alternative, the project would remain in its inoperable state and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish the baseline environmental condition for comparison with other alternatives.

[6] If the studies show that the measures are not effective at passing American eel, PPL Maine would institute nightly shutdowns for a 2-week period during the downstream migration season. The shutdowns, however, would not be implemented prior to the expiration of the 10-year safe harbor provision specified in Attachment A, section II(c) of the Settlement.

D. Alternatives Considered but Eliminated from Detailed Study

We have considered, but eliminated from detailed study, several alternatives to the proposed project, because they are not reasonable under the circumstances of this case. These alternatives include: (1) federal takeover; (2) issuing a non-power license; and (3) project retirement via partial or total project removal.

1. Federal Takeover

We don't consider federal takeover a reasonable alternative. Federal takeover and operation of the project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that a federal takeover should be recommended to Congress. No agency has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2. Non-power License

A non-power license is a temporary license that would be in effect until the licensee either surrenders the license or the Commission determines that another government agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. No entity has recommended a non-power license, and there is no basis for concluding that the Orono Project should not produce power. Therefore, issuing a non-power license is not a reasonable alternative to relicensing the Orono Project.

3. Project Retirement

Project retirement could be accomplished with or without dam removal. Either alternative would require denial of the relicense application and surrender or termination of the existing license with appropriate conditions. No party has suggested project decommissioning and thus there is no basis for recommending it. Rehabilitation of the project would provide a clean, renewable source of power to the region and contribute to the local economy by providing a source of revenue to PPL Maine and by providing recreation and aquatic resource enhancements. Thus removal is not a reasonable alternative to relicensing the project with appropriate enhancement measures.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation and Interventions

The Commission's regulations require that applicants consult with appropriate state and federal agencies, tribes, and the public before filing a license application. This consultation is required to comply with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Pre-filing consultation must be complete and documented in accordance with Commission regulations.

B. Comments and Interventions

On February 25, 2005, the Commission issued a public notice accepting the application and soliciting motions to intervene. The deadline for filing was April 26, 2005. The following entities filed a motion to intervene. None of the interventions were in opposition to the project.

Intervenor	Date Filed
Conservation Interests (American Rivers, Inc., Atlantic Salmon Federation, Maine Audubon Society, Natural Resources Council of Maine, and Trout Unlimited)	April 20, 2005
Penobscot Indian Nation	April 22, 2005
Maine State Planning Office/Maine Agencies (Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and Atlantic Salmon Commission)	April 26, 2005

On February 23, 2005 the Commission issued a public notice that the application was ready for environmental analysis and soliciting comments, recommendations, terms and conditions, and prescriptions. The filing deadline was April 25, 2005. The following entities filed comments.

Commenting Entity	Date Filed
Department of the Interior	April 13, 2005
Conservation Interests (American Rivers, Inc., Atlantic Salmon Federation, Maine Audubon Society, Natural Resources Council of Maine, and Trout Unlimited)	April 20, 2005
National Oceanographic and Atmospheric	April 20, 2005

Commenting Entity	Date Filed
Administration (NOAA Fisheries)	
Penobscot Indian Nation	April 22, 2005
Maine State Planning Office/Maine Agencies (Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and Atlantic Salmon Commission)	April 25, 2005

C. Scoping

By public notice issued February 23, 2005, the Commission waived three-stage consultation requirements in response to a request from the Settlement parties and substituted the prefiling consultation that occurred during preparation of the Settlement for our standard NEPA scoping process.

D. Compliance

1. Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act (CWA), license applicants must obtain either state certification that any discharge from a project would comply with applicable provisions of the CWA, or a waiver of certification by the appropriate state agency.

The Maine Department of Environmental Protection (Maine DEP) received PPL Maine's request for water quality certification (WQC) for the Orono Project on June 14, 2004. Maine DEP issued the WQC on December 15, 2004. The WQC contains conditions for water levels and flows, upstream and downstream fish passage, and recreational facilities, along with several administrative conditions. The substantive conditions are summarized below according to its WQC number.

Water levels and flows

Condition 1.A. would require the project to operate 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 1 foot of the full pond elevation of 72.4 feet above msl. During times of flashboard failure, PPL Maine would maintain water levels at or above the spillway crest. During flashboard replacement activities, PPL Maine would maintain water levels within 1 foot of the spillway crest.

Condition 1.B.would require a minimum flow of 200 cfs in the bypassed reach except as temporarily modified by approved maintenance activities, agreement between PPL Maine and the state or federal resource agencies, or extreme hydrologic conditions or emergency electrical system conditions as defined in the WQC. Conditions 1.C. and 1.D. define "Extreme Hydrologic Conditions" and "Emergency Electric System Conditions," respectively.

Condition 1.E would require a plan for providing and monitoring the water levels and flows described above in consultation with the U.S. Fish and Wildlife Service (FWS), Maine Fish and Wildlife, Salmon Commission, Marine Resources, Penobscot, and Maine DEP.

Fish Passage

Conditions 2.A. through 2.D. pertain to fish passage and the establishment of the Fund.

Condition 2.A. would require installation and operation of an upstream fishway for eels in accordance with the terms of the Settlement.

Condition 2.B. would require installation and operation of downstream fish passage facilities in accordance with the Settlement and Interior's fishway prescription dated May 20, 1997. The fish passage facilities would be operational concurrent with the commencement of project operation.

Condition 2.C. would require 2-week nightly shutdowns for downstream eel migration if shown to be necessary by effectiveness studies. The shutdown would not be required to occur earlier than the expiration of the Safe Harbor period described in the Settlement.[7]

Condition 2.D. would require, depending upon whether the Veazie, Great Works, and Howland projects are purchased by the Trust as detailed in the Settlement, either, installation and operation of a fish trapping facility at the Orono spillway, or installation of upstream fish passage facilities at the Orono Project in accordance with the Settlement and Interior's fishway prescription.

[7] Under the Safe Harbor provision, major changes to fish passage facilities constructed by PPL Maine in accordance with the Settlement would not be required for a period of 10 years after installation and certification that the facilities are operated properly.

If the Veazie and Great Works projects are not purchased by the Trust, or if purchased, are not subsequently removed, Condition 2.E. would require PPL Maine to contribute to the Fund in accordance with the terms of the Settlement. According to the Settlement, the Fund would be used for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensations for loss or degradation of fish and wildlife habitat due to habitat effected by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and habitat in which these fisheries rely.

Condition 2 F. would require all final design and operation plans and schedules for fish passage facilities to be submitted to Maine DEP for review and approval prior to construction.

Condition 2.G. would require a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and operational measures. The study plans would be subject to review and approval of the Maine DEP prior to implementation. PPL Maine would file the results of the studies and any recommendations for changes in the design or operation of the facilities with the Maine DEP.

Recreation Facilities

Condition 3 would require maintenance of a portage trail around the project.

2. Section 18 Fishway Prescription

Section 18 of the FPA states that the Commission shall require the construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Interior and Department of Commerce may prescribe.

Interior and Commerce's NOAA Fisheries filed preliminary prescriptions for upstream and downstream fishways, pursuant to section 18 of the FPA, on July 2, 2004, and April 20, 2005, respectively. Interior and NOAA Fisheries also included requests for reservation of their respective authorities to prescribe the construction, operation, and maintenance of fishways, to be consistent with the Settlement.[8]

[8] Interior's and NOAA Fisheries' reservations include the authority to prescribe a fish trap, as specified in the Settlement, upon acquisition by the Trust of the Veazie, Great Works, and Howland projects.

The preliminary prescriptions are similar and include provisions for downstream passage of all fish species, upstream passage for American eel, and effectiveness monitoring. The prescription for downstream facilities specifies the installation of trash racks with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass discharging up to 70 cfs during the downstream migration period.[9] The prescription specifies operating periods and protocols, and would require the development of maintenance and operational plans, and detailed design drawings and schedules. For upstream passage of American eel, the licensee is to assess the appropriate location for the siting of a new upstream eel fishway, and upon approval of its proposed location by the FWS, Marine Resources, and the Penobscot, would complete installation and initial testing, and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Settlement. The prescription defines the upstream migration period as April 1 to November 30. As with the downstream passage facilities, the prescription specifies operating periods and protocols, and requires the development of maintenance and operational plans, and detailed design drawings and schedules. Lastly, the preliminary prescriptions require the development and implementation of plans to monitor the effectiveness of the downstream and upstream facilities.

Whether upstream fish passage for other species is required depends upon the disposition of the Veazie, Great Works, and Howland projects in accordance with the Settlement. If the above projects are acquired by the Trust and removed, PPL Maine would file an amendment for installation and operation of a fish trapping facility at the Orono Project spillway. Trapped fish would be transported a short distance to the tailwater of the Orono Project at the confluence of the main stem Penobscot River and Stillwater Branch. If the above projects are not acquired, the licensee would implement the fishway prescriptions for upstream facilities previously filed by Interior and NOAA Fisheries on May 20, 1997, and February 16, 1995, respectively, no later than June 25, 2010.

3. Section 10 (j) Recommendations

Under section 10(j) of the Federal Power Act (FPA), each hydroelectric license issued by the Commission must include conditions based on recommendations provided

[9] If shown to be necessary by studies of the effectiveness of these measures, but in no case before the expiration of the safe harbor period delimited in Attachment A, section II(c) of the Settlement, PPL Maine would institute nightly shutdowns for downstream eel passage for a 2-week period during the downstream eel migration season.

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. Four section 10(j) recommendations were timely filed by NOAA Fisheries on April 20, 2005.[10]

Recommendation 1 - maintain a continuous, year-round minimum flow of 200 cubic feet per second (cfs), or inflow if less, in the bypassed reach below the dam.

Recommendation 2 – develop a minimum flow operations and monitoring plan.

Recommendation 3 - maintain the project as a run-of-river operation so that, at any given time, flows downstream of the project would approximate the sum of inflows to the project reservoir.

Recommendation 4 - coordinated with the resource agencies the timing of headpond drawdowns for maintenance and repair to ensure adequacy of water flows and downstream passage for all species of concern.

Table 6 in section VIII lists each of the recommendations subject to section 10(j) and whether the recommendations are recommended for adoption under the staff alternative. All recommendations are addressed in the specific resource sections of the EA.

4. Endangered Species Act

[10] In its April 25, 2005, filing, the Maine State Planning Office submitting comments on behalf of Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and the Atlantic Salmon Commission recommended as licensing conditions the terms and conditions submitted by NOAA Fisheries pursuant to section 10(j) of the FPA.

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 threatened and endangered species or detrimentally affect the critical habitat of such species.

By letter filed August 6, 2004, NOAA Fisheries indicated that the Settlement did not address ESA concerns for the federally listed Cove Brook Atlantic salmon and the shortnose sturgeon.

Cove Brook Atlantic salmon are included in the Gulf of Maine Distinct Population Segment (DPS) and occur downstream of the former site of the Bangor dam. Shortnose sturgeon are believed to occupy habitats in the lower Penobscot River drainage most likely downstream of the Veazie dam. Because the project would be operated run-of-river, the project would not affect habitat conditions in the lower Penobscot drainage below Veazie dam. We, therefore, conclude that redeveloping and operating the project, as proposed by PPL Maine, and in accordance with the Settlement, would not affect the Gulf of Maine DPS of Atlantic salmon or shortnose sturgeon.

The FWS, in its letter dated December 16, 2004,[11] states that the bald eagle is the only federally listed species in the project area. The FWS notes that it is not unusual to see eagles foraging in the Orono project area year-round. FWS states that it is important to maintain the existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future eagle nesting habitat. In this regard, FWS recommends that PPL Maine help protect and maintain riparian forested habitat adjacent to the Orono project to provide a long-term benefit for eagles.

Because project rehabilitation will be of short duration with limited ground disturbance, much of which would be within the project powerhouse, no significant adverse effect is anticipated on bald eagles that may be foraging in the project area. Construction noise, activity, and traffic may cause eagles to temporarily relocate to nearby feeding areas, but any such effects should be insignificant. Currently, all flows at the project dam are released into the 1,000-foot-long bypassed reach. After project rehabilitation, project operation would release 200 cfs of flow through this bypassed reach. The proposed 200-cfs flow release through the project bypassed reach should protect habitat for fish that eagles may use for food. Therefore, based on our analysis, the redevelopment of the Orono Project is not likely to adversely affect the bald eagle.

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[11] The FWS letter is included in PPL Maine's additional information filed January 24, 2005.

Concurrent with issuance of this EA we will be seeking FWS's concurrence with our effects determination.

5. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972, as amended, requires review of the project's consistency with the state's Coastal Management Program. The Maine State Planning Office is responsible for reviewing hydroelectric projects for consistency with the state's Coastal Zone Management Program (CZMP). In a letter dated March 17, 2004, the Maine State Planning Office states that the Orono Project is not located in Maine's designated coastal zone. The Maine State Planning Office notes that any issues regarding coastal resources or uses will be addressed through pertinent state license and permitting processes, as applicable.

6. Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)[12] requires federal agencies to consult with NOAA Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH).[13] EFH has been designated for Atlantic salmon in the Penobscot River and its tributaries (NEFMC, 1998).

On December 15, 2004, PPL Maine filed an EFH assessment with the Commission that was prepared in consultation with NOAA Fisheries, FWS, the Salmon Commission, and the Penobscot. The purpose of the EFH assessment was to evaluate the effects of the Settlement on EFH for Atlantic salmon. PPL Maine's assessment indicates that the relicensing of the Orono Project and the requested modifications to the West Enfield, Stillwater, Medway, Milford, and Veazie Projects[14] are part of an overall Penobscot River restoration project that would ultimately result in significant net and cumulative improvements to areas designated as Atlantic salmon EFH, as well as improve access for Atlantic salmon to areas containing EFH not directly involved with these projects. We have incorporated PPL Maine's assessment into this EA as it pertains

[12] 16 U.S.C. § 1855(b)(2).

[13] EFH is defined under the Magnuson-Stevens Act as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity."

[14] See Orders Modifying and Approving Amendment of License 111 FERC ¶62,061, 111 FERC ¶62,062, 111 FERC ¶62,063, 111 FERC ¶62,064, 111 FERC ¶62,065.

to the Orono Project, and conclude that licensing the project, as proposed by PPL Maine, in accordance with the Settlement, would not adversely affect EFH. As such, no consultation is required with NOAA Fisheries.

V. ENVIRONMENTAL ANALYSIS

In this section, the general environmental setting in the project area and the scope of our cumulative effects analysis are described. An analysis of the environmental effects of the proposed action and action alternatives is also included. Sections are organized by resource area (aquatic and terrestrial, etc.). Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommendations are discussed in section VII of the EA.

Unless noted otherwise, the sources of our information are the license application and Settlement (PPL Maine, 2004), additional information filed by PPL Maine (PPL Maine, 2005), and the Final Environmental Impact Statement for the Lower Penobscot River Basin, Maine (FERC, 1997).

A. General Description of the Area

The Orono Project is located on the Stillwater Branch of the Penobscot River. The Stillwater Branch is 10.5 miles long and is a channel of the Penobscot River as it flows around the west side of Orson and Marsh Islands. The Orono Project's powerhouse discharges into the main stem Penobscot River downstream of the confluence of the Stillwater Branch and the main stem resulting in a 1,000-foot-long bypassed reach.

The Penobscot River and Stillwater Branch drainages above the project encompass approximately 7,602 square miles. The surface geology of the Penobscot River Basin ranges from high hills of resistant rock to wide, flat river valleys.

B. Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing NEPA (40 CFR, Section 1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor

but collectively significant actions taking place over a period of time, including hydropower and other land and water development.

Based on our review of PPL Maine's license application, the Settlement and explanatory material, and agency and public comments, we have identified anadromous, catadromous and resident fish because of their potential to be cumulatively affected by the continued operation of the Orono Project in combination with other hydroelectric projects and future planned activities under the Settlement.

Under the Settlement, the focus for anadromous and catadromous fish restoration activities is the main stem Penobscot River. The Stillwater Branch, on the other hand, would be managed primarily for enhanced power production and the protection of any anadromous or catadromous fishes that happen to be using it as a migration corridor; the primary migration corridor being the main stem Penobscot River. In addition to the Orono Project, two other dams are located on the Stillwater Branch; the Gilman Falls dam which is part of the Milford Project and the Stillwater Project dam.

1. Geographic Scope

The geographic scope of our cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects on aquatic resources. The scope of analysis for these resources encompasses the Stillwater Branch of the Penobscot River from the Gilman Falls dam of the Milford Project to the confluence of the Penobscot River. We chose this geographic scope because of the potential effect the project has 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 the effects associated with the relicensing of the Orono Project that would contribute to the overall fish restoration efforts occurring in the Penobscot Basin. We anticipate that the cumulative effects associated with the future phased-activities of the Settlement would be addressed in later Commission proceedings.

2. Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and future actions and their effect on aquatic and recreation resources. Based on the potential new license term, the temporal scope looks 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion of past actions and effects is, by necessity, limited to the amount of available information for the resource. The quality and quantity of information diminishes as we analyze the resource further away in time from the present.

C. Proposed Action and Action Alternatives

Only the resources that would be affected, or about which comments have been received, are included in detail in this EA and discussed in this section. Based on this, we have determined that aquatic resources, terrestrial, recreation, land use, aesthetics, and cultural resources may be affected by the proposed action and action alternatives. Geology and soils and socioeconomics are not discussed in detail in this EA. However, the effects of temporary land-disturbing activities associated with the rehabilitation of the Orono Project are discussed in the aquatics, terrestrial, and land use and aesthetics resource sections. Because rehabilitating the project would not likely create increases in the permanent labor force, be completed within 8 to 10 months, and as an operating unmanned station would not generate additional full time employment, socioeconomics are not addressed in the EA.

1. Aquatic Resources

Affected Environment

Hydrologic information

A 1911 court decree specifies flow proportions for the Stillwater Branch and the main stem Penobscot River at the Milford and Gilman Falls dams, both part of the Milford Project. The flow proportion is 30 percent and 70 percent, for the Stillwater and Penobscot, respectively, for average flow conditions; as flows decrease, the required proportion of flow to the Stillwater Branch decreases, reaching 9 percent (216 cfs) at a Penobscot River flow of 2,400 cfs. Monthly and annual median flows for the period of record from 1968 through 1990 at the Orono Project are listed in table 1. The average, highest, lowest, and 7Q10[15] flows for the Stillwater Branch at Orono dam are 4,000, 47,000, 320, and 530 cfs, respectively (FERC, 1997).

Table 1. Monthly and annual median flows (cfs) for the Orono Project for the period of record 1968 through 1990 as stipulated by the 1911 Court Decree for flows at Gilman Falls.

Month	Median flow (cfs)
January	1,933
February	2,133
March	2,593

[15] The lowest streamflow for 7 consecutive days that occurs on average once every 10 years.

April	8,615
May	7,200
June	2,600
July	1,450
August	1,250
September	1,240
October	1,533
November	2,733
December	2,700
Annual	2,200

Water quality standards

The Maine DEP rates the Stillwater Branch of the Penobscot River including the project's reservoir as Class B waters. Designated uses for Class B waters include drinking water supply after treatment, fishing, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and habitat for fish and other aquatic life.

The water quality standards for Class B waters require that dissolved oxygen (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, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration shall not be less than 9.5 ppm and the 1-day minimum DO concentration shall not be less than 8.0 ppm in identified spawning areas.

Maine DEP conducted ambient water quality sampling in the Stillwater Branch and Penobscot River main stem as recent as the summer of 2001 (Maine DEP, 2002). The 2001 data were used in conjunction with 1997 data for the calibration and verification of a water quality model for the Penobscot River Basin. DO sampling was performed for a 3-day period from August 7 through August 9; readings were taken in the morning and afternoon. Morning readings at the Orono site ranged from 6.1 to 6.5 ppm (74.6 to 80.3 percent saturation) and stream temperatures ranged from 25.6 degrees Celsius (˚C) to 26.1 ˚C. Afternoon DO readings ranged from 7.9 to 8.7 ppm (greater than 100 percent saturation) and stream temperatures ranged from 28.2 to 29.1˚C. The diurnal range in DO at the Orono site averaged 2.1 ppm and was attributed to the presence of algal activity and a productive system (Maine DEP, 2002). Based on the 2001 sampling and modeling studies, Maine DEP concluded that the project waters attain Maine's DO standard for Class B waters under critical water quality conditions (Maine DEP, 2002).

Fisheries

The Stillwater Branch of the lower 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, fallfish, and several other minnow species. The two most important gamefish in the lower Penobscot River include smallmouth bass and chain pickerel. Smallmouth bass are the most abundant gamefish species present, inhabiting both riverine reaches and impoundments. Chain pickerel occupy backwater areas where stream velocities are low and there is submerged aquatic vegetation. 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 as dropdowns from upstream reaches.

Anadromous species present in the Penobscot River include alewife, Atlantic salmon, and sea lamprey. 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 possible prior to the 1800's. The catadromous American eel occurs throughout the Penobscot River Basin and supports a commercial fishery primarily for juvenile eels known as elvers.[16] Historically, the Penobscot River supported 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 historic range, which includes appropriate habitat upstream from the Orono Project.

Atlantic salmon and alewife are believed to use the Stillwater Branch as a secondary downstream migration route. Radio-telemetry studies conducted by Bangor Hydro-Electric Company and the Atlantic Sea-Run Salmon Commission found that 30 to 40 percent of hatchery-reared smolts[17] and kelts[18] when 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 Penobscot main stem and the Stillwater Branch. Additionally, Atlantic

[16] Elvers are a life stage of American eel that occur when juveniles move from ocean waters to fresh waters and begin an upstream migration, although some remain in the estuarine waters until maturation (Helfman et al., 1987).

[17] A smolt is a juvenile life stage ready to emigrate to the ocean.

[18] A kelt is a post-spawn Atlantic salmon adult.

salmon parr[19] have been observed resting and holding in the Orono Project bypassed reach and tailrace areas.

Atlantic salmon EFH

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 New England Fishery Management Council's (NEFMC) Essential Fish Habitat 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.

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 (cm) and 61 cm, and water velocities between 30 and 92 cm 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 dissolved oxygen above 5ppm. 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.

[19] A parr is a juvenile life stage that rears in freshwater.

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 cm and 61 cm, water velocities around 61 cm 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, including all 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).

Environmental Impacts and Recommendations

a. Short-term construction effects.

PPL Maine's proposal to replace previously demolished penstocks with new penstocks within the existing penstock right-of-way could cause some short-term erosion and sedimentation effects in the Stillwater Branch.

No agency has recommended any measures to address the project rehabilitation efforts and the 401 WQC did not contain any conditions on instream construction activities. PPL Maine estimates that total construction time for all of the remaining rehabilitation activities including penstock replacement would occur over an 8 to 10 month period (May through October).

Staff Analysis

Because any construction activities needed to install the new penstock would occur within the existing right-of-way for the previous penstock, we anticipate that land-disturbing activities would be minor. However, because the right-of-way lies within or adjacent to the bypassed reach some short-term erosion and sedimentation could still affect aquatic habitats within the bypassed reach. A soil erosion control plan that specifies the measures that would be used during penstock installation to control erosion and sedimentation would help ensure that aquatic habitats are protected during rehabilitation activities.

b. Run-of-river operation.

PPL Maine proposes to operate the Orono Project in a run-of-river mode. Under condition 1.A of the WQC, the Orono Project would 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 the Orono Project impoundment would be maintained within 1 foot of full pond or elevation 72.4 feet msl. During periods of flashboard failure, PPL Maine would maintain water levels at or above the spillway crest. During flashboard replacement, PPL Maine would be required to hold water levels within 1 foot of the spillway crest. The WQC allows temporary modifications from the above specified operation for (1) approved maintenance activities, (2) hydrologic conditions beyond PPL Maine's control, (3) emergency electrical system conditions beyond PPL Maine's control, or (4) agreement between PPL Maine, the appropriate resource agencies, and the Penobscot. Run-of-river operation would be required within 60 days of Commission approval of a plan for monitoring water levels and flows. The monitoring plan would be developed in consultation with FWS, Maine Fish and Wildlife, the Salmon Commission, Marine Resources, the Penobscot, and Maine DEP within 6 months of any license issuance.

NOAA Fisheries (10(j) recommendation 3) recommends run-of-river operation consistent with condition 1.A. of the WQC.

Staff Analysis

The Orono Project discharges powerhouse flows directly into the Penobscot River just below the confluence with the Stillwater Branch. Operating the project in a run-of-river mode would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be due to operation of the Orono Project. Therefore, Orono Project operation would not contribute to any effects of fluctuating water levels (i.e. fish stranding, reduction of spawning habitat) in the Penobscot River.

Fish that inhabit and spawn in near-shore areas of project impoundments can be susceptible to stranding as well as egg desiccation from project-related fluctuating water levels. Limiting impoundment fluctuations to 1 foot or less would reduce the chances of fish stranding and disruption of spawning habitat. Maintaining relatively stable impoundment levels would benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for feeding, spawning, and cover. Erosion and resultant turbidity are also reduced when impoundments are held at relatively stable levels.

c. Minimum flows in the bypassed reach.

Orono Project powerhouse flows would be discharged into the main stem Penobscot River downstream of the confluence with the Stillwater Branch bypassing the lowermost 1,000 feet of the Stillwater Branch. Without the release of an additional minimum flow, only leakage flows and spill flows would provide habitat for aquatic resources in the bypassed reach.

PPL Maine proposes to maintain a minimum flow of 200 cfs in the project's bypassed reach consistent with condition 1.B of the WQC. The WQC allows temporary modifications from the above specified operation for (1) approved maintenance activities, (2) hydrologic conditions beyond PPL Maine's control, (3) emergency electrical system conditions beyond PPL Maine's control, or (4) agreement between PPL Maine, the appropriate resource agencies, and the Penobscot.

NOAA Fisheries (10(j) recommendation 1) recommends a year-round minimum flow of 200 cfs, or inflow if less, in the bypassed reach consistent with condition 1.B. of the WQC.

PPL Maine based its minimum flow proposal on an Instream Flow Incremental Methodology Study (IFIM)[20] conducted in 1991. The study area included the 1,000-foot-long by 500-foot-wide bypassed reach. The reach is described as a flat channel with rock, cobble, and ledge substrate with three separate channels leading to the Penobscot River main stem. The study evaluated flow versus habitat relationships for six fish species life stages--Atlantic salmon juveniles; smallmouth bass young-of-year (YOY), juveniles, and adults; American shad spawning/incubation and larvae/juveniles--at flows ranging from leakage to 346 cfs (table 2 and figure 3).

Table 2. Weighted usable area (WUA) for six fish species life stages at flows ranging from leakage to 346 cfs in the Orono Project bypassed reach (bolded values indicate peak WUA values over the range of flows evaluated).

	WUA					
Species life stage	346 cfs	258 cfs	189 cfs	86 cfs	45 cfs	Leakage
Atlantic salmon juveniles (ASJ)	**206.2**	175.0	121.8	43.8	18.6	6.5
Smallmouth bass YOY (SMBY)	20.8	**40.5**	40.2	44.8	31.6	19.0
Smallmouth bass juveniles (SMBJ)	112.1	**118.5**	107.9	74.5	43.1	25.5
Smallmouth bass adults (SMBA)	**107.1**	97.3	67.9	33.2	22.6	20.1
American shad spawning/incubation (ASSI)	**82.9**	46.4	18.5	3.9	3.0	0.0
American shad larvae/juveniles (ASLJ)	**107.5**	67.0	34.5	23.9	19.9	15.6

[20] The IFIM is a tool developed by the FWS to evaluate the relationship between flow and habitat. PHABSIM software is used to develop the relationship between streamflow and physical habitat for various species life stages of aquatic organisms. Habitat suitable for a particular species life stage is often expressed in terms of weighted usable area (WUA). WUA is the wetted area of a stream weighted by its suitability for use by aquatic organisms or recreational activity. WUA is usually expressed in units of square feet or square meters of habitat per a specified length of stream.

Staff Analysis

Over the range of flows evaluated, WUA was highest at a flow of 346 cfs for all but two species life stages--smallmouth bass YOY and juveniles. However, for smallmouth bass YOY and juveniles, the WUA versus discharge curves are relatively flat over a range of flows from 86 to 258 cfs for YOY and 189 to 346 cfs for juveniles suggesting that similar habitat would be provided by PPL Maine's proposed 200-cfs flow. Although WUA continued to increase with increasing flow for smallmouth bass adults and Atlantic salmon juveniles over the range of flows evaluated, the rate of habitat improvement declined at flows above 189 cfs. On the other hand, the rate of habitat improvement for American shad spawning/incubation and larvae/juvenile life stages continued to increase as flows increased throughout the entire range of flows evaluated suggesting that the peak WUA for those life stages would be outside of the range of flows studied.

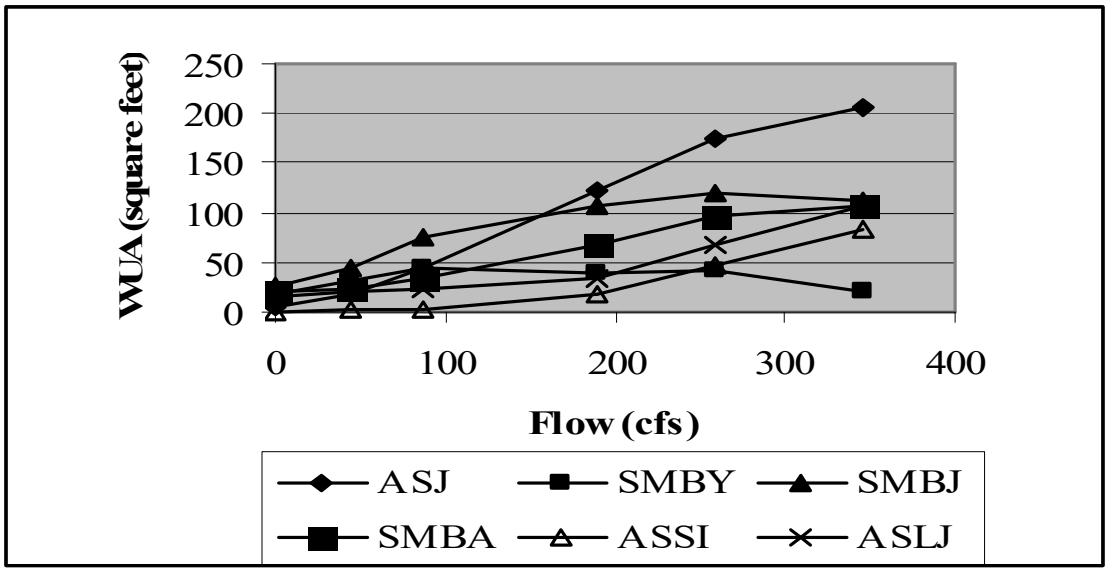

Figure 3. Habitat (WUA) for fish species life stages evaluated at flows (cfs) ranging from leakage to 346 cfs for the Orono bypassed reach instream flow study.

In addition to the IFIM study results, we considered how frequently spill flows would occur in the bypassed reach and what benefit, if any, these flows may have on the fish species life stages evaluated in the IFIM study. Based on the monthly flow duration curves, flows in the Stillwater Branch would exceed the project's maximum hydraulic capacity of 1,740 cfs between 70 and 100 percent of the time during the March through June period. Therefore, for species life stages potentially present during that time frame such as American shad spawning/incubation and larval/juvenile, spill flows would likely provide additional habitat above that provided by the 200-cfs minimum flow. Because

most of the WUA versus discharge curves show that habitat is beginning to level off or decline above 200 cfs for the remaining species life stages evaluated, we would expect the level of habitat improvements to be less noticeable for those species during spill periods.

d. Flow and water level monitoring plan.

Under condition 1.E. of the WQC, PPL Maine would develop and implement a plan for monitoring impoundment levels and minimum flows. The plan would be developed in consultation with FWS, Maine Fish and Wildlife, the Salmon Commission, Marine Resources, the Penobscot, and Maine DEP and would be subject to approval by the Maine DEP prior to implementation.

NOAA Fisheries (10(j) recommendation 2) recommends a minimum flow operations and monitoring plan. NOAA Fisheries (10(j) recommendation 4) also recommends that the timing of headpond drawdowns for maintenance and repair be coordinated with the resource agencies.

Staff Analysis

A plan to monitor impoundment levels and minimum flows developed in consultation with the relevant agencies that describes contingencies for emergencies (such as providing downstream flows during project shutdown), scheduled maintenance drawdowns, droughts, as well as reporting criteria, would minimize misunderstandings about operational compliance and help ensure that aquatic resources at the project are protected during the term of a license.

e. Downstream fish passage.

Anadromous species such as Atlantic salmon and alewife and the catadromous American eel that use the Stillwater Branch as a downstream migratory route would be subject to injury or mortality when spilling over the dam during high flow periods or passing through the project turbines on their way to the lower Penobscot River main stem.

In order to pass outmigrating fish, PPL Maine proposes to provide downstream fish passage measures consistent with the Settlement, the WQC, and Interior's section 18 fishway prescription dated May 20, 1997,[21] within 3 years of license issuance. NOAA

[21] Interior filed its preliminary prescription for fish passage facilities again on July 2, 2004.

Fisheries filed on April 20, 2005, under section 18 of the FPA, a prescription for downstream and upstream fish passage facilities and effectiveness monitoring consistent with the Settlement. NOAA Fisheries specifies operating periods depending upon which species is migrating at the time that span the general period from April 1 until December 31. Specifically, Interior's and NOAA Fisheries' prescription included the installation of trashracks with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass structure capable of discharging up to 70 cfs during the downstream migration period. In addition, PPL Maine would conduct effectiveness studies of the measures. If the studies show that the measures are not effective at passing American eel, PPL Maine would institute nightly shutdowns for a 2-week period during the downstream migration season. The shutdowns, however, would not be implemented prior to the expiration of the 10-year safe harbor period specified in Attachment A, section II(c) of the Settlement.

Staff Analysis

Although the emphasis for passage of anadromous fish species under the Settlement is at the main stem projects, downstream fish passage measures would facilitate the movement of anadromous fish such as Atlantic salmon and alewife that happen to use the Stillwater Branch as an outmigration route. Angled bar racks with 1-inch spacing and surface bypasses have been used at a number of hydroelectric facilities in the northeastern United States (Winchell et al., 1994). Typically, a maximum approach velocity of 2 feet per second and a bypass flow of 2 percent of the plant flow or 20 cfs, whichever is greater, are specified for the facility (Winchell et al., 1994). Nettles and Gloss (1987) found that angled racks significantly reduced entrainment of Atlantic salmon smolts into the project intakes of a hydroelectric facility on the Bouquet River, New York; out of 30 tagged smolts, 18 passed via the bypass and 12 passed via the spillway. Bypass effectiveness exceeded 95 percent at a similar study on Atlantic salmon smolts conducted at the Lower Saranac Hydroelectric Project on the Saranac River, New York (Simmons, 2000). Effectiveness testing has not been common to date for clupeid species such as alewife possibly due to their sensitivity to stress.

While an angled trash rack is not specifically proposed at the Orono Project, the intake is oriented at about 40 degrees to the main spillway of the project dam and should serve to guide fish to the bypass sluice and, therefore, protect fish from entrainment and turbine-induced mortality. The prescribed bypass flow of 70 cfs represents about 4 percent of the powerhouse flows when the project is operating at its hydraulic capacity and a greater percentage at lower seasonal flows during the April through December passage season.

Outmigrating sexually mature American eels known as silver eels are particularly vulnerable to direct effects at hydroelectric facilities such as migration delays, impingement, and turbine-induced mortality.[22] Turbine entrainment mortality of American eels has been estimated to range from 6 percent for Francis-type turbines to 37 percent for Kaplan turbines (Richkus and Whalen, 1999). However, the timing and distribution in the water column of downstream migrating eels is not well understood. Generally, the spawning migration of silver eels occurs in late summer through fall in New England (Facey and Van Den Avyle, 1987) although the magnitude of the movement can be highly variable. Peaks in eel movement have been shown to coincide with declining water temperatures, periods of increased discharge, and lunar phases (Richkus and Whalen, 1999). Additionally, the behavior of migrating eels when confronted with an obstacle such as a dam or turbine intake is poorly understood. Eels have been shown to occupy a variety of depths within a forebay intake (Haro and Castros-Santos, 1997), and to pass a hydroelectric facility via turbine entrainment even though spill flows were occurring (Euston et al., 1997; 1998). Impingement on trash racks can also affect downstream migrating eels and can ultimately lead to entrainment as eels force themselves through the bar racks. Adams and Schwevers (1997) found that eels were able to avoid angled racks having 20-millimeter (mm) spacing at velocities less than 50 cm per second, whereas at higher velocities, eels became impinged. Eels that became impinged ultimately were able to force themselves through the 20-mm spacing.

Therefore, due to the variable nature of downstream eel migration, effective fish passage would likely depend on providing a variety of measures for migrating eels and the ability to modify the measures depending on the results of effectiveness studies. The proposed fishway would provide a guidance mechanism in the form of trash racks with 1-inch clear spacing and two possible escape routes, the surface and bottom bypasses. If the above measures are not effective at passing eels, PPL Maine would, after the safe harbor time period, implement nightly shutdowns.

[22] Sexually immature “yellow eels” exhibiting general downstream movements not associated with spawning outmigrations would also be susceptible.

f. Upstream fish passage.

American eel

The Atlantic States Marine Fisheries Commission (ASMFC) cites structures that impede upstream and downstream passage as factors that may contribute to the population decline of the American eel (ASMFC, 2000). The Orono Project is the first dam on the Stillwater Branch and is located upstream of the lowermost dam on the main stem of the Penobscot River at the Veazie Project (FERC No. 2403). These dams and the facilities located upstream from Orono and Veazie on the Stillwater Branch and Penobscot River, respectively, act as barriers to a certain extent to American eel passage.[23]

In order to support state management goals for American eel, PPL Maine proposes to provide facilities for upstream eel passage at the project. The facilities would be consistent with the Settlement, the WQC, and Interior's and Commerce's section 18 fishway prescriptions. PPL Maine would consult with the fishery agencies and the Penobscot as to the appropriate location for the fishway, and upon approval of the location, complete installation and initial testing and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Settlement, June 22, 2004. The facilities would be operational for the period April 1 to November 30. As with the downstream fishway facilities, a plan to monitor the effectiveness of the upstream eel passage facility would be developed and implemented.

Staff Analysis

As demonstrated on the Penobscot and elsewhere, American eel do have the ability to migrate around or over instream barriers and colonize upstream areas (Richkus and Whalen, 1999). Elvers have been documented climbing near vertical, wet surfaces while yellow eels have been known to migrate around barriers via terrestrial routes (Tesch 1977). Because of this ability, upstream eel passage facilities are simple in design, consisting of some type of roughened surface such as small branches, wood shavings, aquatic vegetation, or nylon bristles and plastic tubing with minimal water flow to wet the surface.

[23] American eel have been found in the Veazie impoundment indicating that eels were able to move past the Veazie dam (FERC, 1997).

Neither the Settlement nor Interior or Commerce in their respective fishway prescriptions specified the type of upstream facility that would be constructed. However, based on installations elsewhere, we would expect that the facility would be some type of ramp structure fitted with a material enabling the eels to ascend the ramp from the toe of the dam to the project's impoundment. In addition, a small attraction flow would be provided to wet the ramp surface and facilitate eel movement. It would be preferable to locate the fishway in an area near the dam where eel congregate. It is expected that the details of placement, attraction flow, and design of the structure itself would be developed in consultation with the agencies and filed with the Commission for approval prior to final implementation. The effectiveness monitoring of the fishway would be helpful to ensure that the facility is in the best location and operating properly. Although eel do occur throughout the Penobscot River drainage despite the number of dams that impede movement, providing upstream eel passage at the Orono Project should increase the number of eel able to utilize upstream habitats for rearing and maturing.

Anadromous fish

A primary feature of the Settlement is to focus restoration efforts for anadromous fishes on the main stem of the Penobscot River while maintaining viable hydroelectric generation on the Stillwater Branch. At the same time, measures would be provided to protect fishes that happen to move downstream past the Stillwater Branch developments as well as enhance upstream American eel passage (see previous discussion). Although upstream fish passage for anadromous fishes at the Orono Project is not a primary goal at relicensing, the Settlement does provide for upstream passage considerations in the future depending upon the ultimate disposition of the Veazie, Howland, and Great Works projects.

Staff Analysis

Under the Settlement, if the above projects are acquired by the Trust and removed, PPL Maine would file an amendment for installation and operation of a fish trapping facility at the Orono Project spillway. PPL Maine would be responsible for transporting trapped fish a short distance to the tailwater of the Orono Project at the confluence of the main stem Penobscot and Stillwater rivers. Any long distance transport of trapped fish would be the responsibility of the resource agencies and Penobscot. Further, if any future modifications or new facilities are needed, PPL Maine would file an amendment for such modifications upon its receipt of the necessary funding. Both Interior and Commerce reserved their respective authorities to prescribe fishways including the fish trapping facility upon acquisition of the Veazie, Great Works, and Howland Projects.

Under the above scenario, the trap and haul process would be used to move anadromous fish that congregate below the Orono Project to the Penobscot River main stem or other as yet unidentified sites. With the majority of the total river flow residing in the main stem, we expect that most anadromous fish would use the main stem as a migration corridor rather than the Stillwater Branch. However, for those fish that stray into the Stillwater Branch, the trap and haul operation would serve to return fish to the main stem thus limiting migration delays. Additional evaluation of the trap and haul facility would be needed at the time PPL Maine files any license amendment and revised fishway prescriptions are submitted by Interior and Commerce.

If the above projects are not acquired, and therefore, not ultimately removed, PPL Maine would file an amendment for installation and operation of the upstream fish passage facilities prescribed by Interior and Commerce on May 20, 1997, and February 16, 1995, respectively, no later than June 25, 2010. Those fish passage facilities would consist of either a vertical slot fishway (with pools 8 feet wide by 10 feet long and a 9-inch drop per pool), denil fishway (4 feet wide with a 1-on-8 slope), or a fish lift with a 600-gallon hopper capacity at the Orono dam. A 50-cfs attraction flow would be provided representing about 2.5 percent of the anticipated 2,000-cfs average spillway discharge during the May to June portion of the upstream migration period. We expect that more detailed fishway prescriptions would be filed by Interior and Commerce at the time PPL Maine files its amendment.

Even though under the Settlement the emphasis for restoration activities for anadromous fishes would be the main stem of the Penobscot River, the relative importance of the Stillwater Branch for anadromous fish restoration would be elevated if the Veazie, Great Works, and Howland projects are not acquired and removed. In this instance, upstream passage facilities at the Orono Project would allow anadromous fish to access any suitable habitat in the Stillwater Branch and its tributaries including Pushaw Stream. The benefit of implementing upstream fish passage at the Orono Project would need to be evaluated at the time a license amendment is filed and a revised fish passage prescription is submitted by Interior and Commerce.

g. Contingent mitigation fund.

Under the Settlement and consistent with the WQC, PPL Maine would establish the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their respective dams not subsequently removed.[24] Under the Fund, the contributions due to the effects of

[24] If Veazie and Great Works are acquired by the Trust but the dams are not removed, the Trust would replace PPL Maine as the payor to the Fund.

redeveloping the Orono Project on the bypassed reach would be $1,000 per year for the term of the license. The disposition of the monies would be determined upon mutual agreement among the Penobscot, Bureau of Indian Affairs, FWS, NOAA Fisheries, and the state of Maine agencies for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensating for loss or degradation of fish and wildlife habitat due to habitat effects by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and the habitat on which these fisheries rely. The Settlement did not provide further specificity for any of the above uses of the Fund.

Cumulative Effects Analysis

The installation of downstream fish passage facilities at the Orono project would ensure that mortality of outmigrating fishes including Atlantic salmon and alewife is minimized. This, combined with the reduction in downstream mortality rates of outmigrating fishes at Veazie should Veazie be removed in the future, should contribute to significant positive benefits to anadromous fish within the Penobscot River Basin. 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 dam would also likely enhance eel stocks throughout the Penobscot River Basin. For resident species such as smallmouth bass and chain pickerel, the potential benefits of maintaining a minimum flow of 200 cfs in the Orono bypassed reach may be offset somewhat by the loss of impoundment habitat if and when the Veazie dam is removed. While smallmouth bass may benefit from maintaining minimum flows in the Orono bypassed reach and creating additional riverine habitat with the removal of Veazie dam, chain pickerel, a species that prefers slower moving waters, may be adversely affected by the removal of Veazie dam. However, the overall cumulative effects associated with the relicensing of the Orono Project together with the other planned activities under the Settlement would be beneficial to the restoration of anadromous and catadromous species (Atlantic salmon, American shad, alewife, American eel) to the Penobscot River Basin and to some resident species such as smallmouth bass.

Unavoidable Adverse Impacts

Some number of anadromous and resident fish and American eel that are not excluded or diverted from the project intake by the downstream fish passage facilities may suffer mortality due either to impingement on the trashracks or by contact with the turbines. This long-term effect is expected to be minor, given the largely beneficial effects of the Settlement on the restoration goals of the basin. There may be some minor short-term erosion and sedimentation effects resulting from construction activities associated with rehabilitating the project facilities.

2. Terrestrial Resources

Affected Environment

Botanical Species

Light residential development encompasses approximately 30 percent of the Orono Project area, mostly in the vicinity of the dam and powerhouse. In undeveloped areas, the predominant cover types include hardwood, mixed and bottomland forests (including forested wetlands). Approximately 11 acres of unforested wetlands occur in the Orono Project area, including scrub/shrub (4 acres), emergent (4 acres), and riverine aquatic beds (3 acres). There are no known threatened or endangered botanical species in the Orono Project area. The Maine Natural Heritage Program's database indicates two species of special concern, Orono sedge (*Carex oronensis*) and long-leaved bluet (*Houstonia longifolia*) that have been documented to occur along the Orono impoundment.

Wildlife Species

A variety of upland and wetland habitats occur in the project area. Because this area is about 30 percent light residential, the diversity of wildlife is limited. Species likely to occur in the project area include: (1) mammals such as the white-tailed deer, striped skunk, mink, raccoon, red and gray fox, bats such as the red bat, beaver, woodchuck, and grey squirrel; (2) birds such as wood duck, mallard, killdeer, and Coopers hawk; and (3) amphibians and reptiles such as the cricket frog, spring peeper, American toad, snapping turtle, and painted turtle

Environmental Impacts and Recommendations

Rehabilitation of the project would occur primarily at existing facilities minimizing the impact on vegetation and wildlife. Operation of the rehabilitated project is not expected to have any negative impacts on vegetation and wildlife, since the water levels in the impoundment would generally remain the same as under historic operation. An exception to terrestrial impacts is likely to occur with replacement of the penstocks. Minor, short-term impacts are expected to occur on vegetation growing in the vicinity of the proposed penstocks.

In addition, the project's 1,000-foot-long bypassed reach currently receives all flows (ranging from about 200 to 18,500 cfs, 80 percent to 2 percent of the time, respectively, with about 2,200 cfs 50 percent of the time) from the Stillwater Branch since the project stopped operating in June of 1996. Generally, the vegetation and

wildlife that presently occur in the bypassed reach have adapted to these flows. Rehabilitation of the project would change the bypassed flow to a continuous 200 cfs, during non-spill periods.

A change in bypassed reach flows to 200 cfs could cause an adverse effect on existing riparian vegetation and wildlife. The lower project operational flows would generally dewater some of the shoreline of the bypassed reach. This could reduce habitat for some wildlife species such as mink, raccoon, beaver, waterfowl, and amphibians and reptiles because of the net loss of riparian habitat with dewatering. Wildlife species expected to benefit are species such as the striped skunk, grey squirrel, red and gray fox, and woodchuck because the dewatered shoreline would provide additional habitat. Riparian vegetation is expected to expand because the dewatered shoreline would provide better habitat for plant establishment. Such an expansion would benefit a variety of wildlife.

Unavoidable Adverse Impacts

Construction of the new penstocks would cause a minor short-term impact on vegetation. Dewatering the shoreline with the 200 cfs minimum flow through the bypassed reach would have minor adverse effects on some wildlife species.

3. Threatened and Endangered Species

Affected Environment

Fish

No federally listed threatened or endangered fish species occur in the Orono Project area including the Penobscot River main stem above the Veazie dam. However, two endangered species--shortnose sturgeon and the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon-- are found in areas further downstream.

On March 11, 1967, shortnose sturgeon (*Acipenser brevirostrum*) was listed as endangered throughout its range. A population of shortnose sturgeon is recognized to exist in the Penobscot River (National Marine Fisheries Service, 1998) although collection efforts have not been met with much success. One shortnose sturgeon was captured in Northport, Maine in Penobscot Bay on June 30, 1987. No sturgeon were collected during surveys conducted during 1994 and 1995, however, the number of net hours (409 hours) was far below that of other surveys for shortnose sturgeon on the Merrimack River (11,396 hours) and Cape Fear River (21, 432 hours) where 25 and 3

shortnose sturgeon, respectively, were captured (National Marine Fisheries Service, 1998).

Kynard (1997) states that the upstream limit of the shortnose sturgeon population range for all northeast rivers supporting sturgeon except the Connecticut River is at the first dam on the river. Therefore, the most likely upstream extent of this species range in the Penobscot River is the area downstream from Veazie dam which is the first obstacle to fish passage.

On November 17, 2000, NOAA Fisheries and the FWS listed the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as endangered. The historic geographic range of the DPS includes tributaries to the lower Penobscot River (below the former site of Bangor dam). The DPS includes the Cove Brook population. Cove Brook is a tributary to the Penobscot River and is located downstream of the Orono Project. The listing deferred a decision regarding whether the DPS included the Penobscot main stem and its tributaries above the former site of Bangor dam. A status review of additional Atlantic salmon populations including the Penobscot River population is currently being conducted.

Wildlife

The FWS, in its December 16, 2004, letter, states that the bald eagle is the only federally listed species in the project area. FWS also states that the nesting population of the Lower Penobscot Basin in 2004 was about 325 pair. FWS notes it is not unusual to see eagles foraging in the Orono Project area year-round.

Environmental Impacts and Recommendations

Fish

By letter filed August 6, 2004, NOAA Fisheries indicated that the Settlement did not address ESA concerns for the listed Cove Brook Atlantic salmon and the shortnose sturgeon but did not recommend any specific protection or enhancement measures.

Staff Analysis

PPL Maine's proposal to operate the project in a run-of-river mode would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be due to operation of the Orono Project. Because the project would not affect habitat conditions in the lower Penobscot (i.e. below Veazie dam), we conclude

that there would be no affect on the federally listed shortnose sturgeon or Gulf of Maine DPS of Atlantic salmon.

Bald Eagle

The FWS notes that redeveloping the Orono Project is part of a Settlement that would result in improved conditions for fish and enhanced fish runs, thus benefiting eagles. The FWS further notes it is important to maintain existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future bald eagle nesting habitat. The FWS recommends that PPL Maine, to the extent possible, help protect or maintain such riparian forested habitat.

Staff Analysis

Redeveloping the Orono Project with a 200-cfs release into the bypassed reach is not likely to have an affect on bald eagles because feeding habitat should remain generally the same. Construction activities may cause perching eagles to temporarily relocate to nearby areas on the Stillwater Branch and Penobscot River, but this effect should be insignificant.

Protecting mature forested riparian vegetation at the project would protect eagle foraging and potential future nesting habitat. Based on our analysis, therefore, we conclude that redeveloping, operating and maintaining the project, as proposed, would not be likely to adversely affect the bald eagle.

4. Recreation Resources

Affected Environment

The project area is known for its recreation opportunities, especially fishing and boating, and state, local, private and non-governmental entities have identified the area as an area of recreational value. The project area offers a wide variety of recreation opportunities including fishing, canoeing, kayaking, biking, picnicking, sightseeing, snowmobiling, and waterfowl hunting. The University of Maine maintains a hand-carry (boat) access site, including a seasonal dock, on the east shore of the impoundment. The Town of Orono also maintains two day-use parks along the east shore. There are a number of trails used by a local land trust on the west shore of the impoundment. Boats can access the impoundment via a boat put-in and portage at PPL Maine's upstream Stillwater Project (FERC No. 2712). In addition, PPL Maine maintains a portage trail around the Orono dam via Water Street to a downstream put-in location on the main stem of the Penobscot River immediately below the Orono powerhouse. Canoeing, kayaking

and fishing are the most popular activities both upstream and downstream of the dam. Anglers are permitted to fish below the powerhouse near the canoe put-in site.

The most recent Commission Form 80 project recreation report (March 26, 2003) states that use of the Orono facilities is light. All recreation facilities were used less than 30 percent of their capacity. In addition, a 1996 Environmental and Public Use Inspection (EPUI), found all recreation facilities to be adequate. The project was not operating at that time.

Environmental Impacts and Recommendations

PPL Maine proposes to maintain the existing portage trail, signage, and parking area at the powerhouse. Condition 3 of the section 401 WQC would require PPL Maine to maintain a portage trail around the project. No other resource protection, mitigation or enhancement measures have been requested by resource agencies or are proposed by PPL Maine in connection with its proposal to redevelop the project.

Staff Analysis

The maintenance of existing facilities and recreation opportunities would continue valuable recreation opportunities in the project area and vicinity. Recreational use and facilities would be monitored by PPL Maine as part of the Commission's Form 80 report which is required to be filed every 6 years. In addition, the Commission would conduct periodic environmental and public use inspections that evaluate the adequacy of public use resources and facilities.

Unavoidable Adverse Impacts

None.

5. Land Use and Aesthetics

Affected Environment

The project area is in Penobscot County, a moderately populated county with primarily agricultural and timber land uses. Residential land use is concentrated in Bangor, Orono, and Old Town, and rural residences are mostly part of farms or are vacation homes. Other land uses in the region include recreation, utility corridors, and light industry.

The land bordering the Orono impoundment is predominantly forested with mixed urban residential and commercial development along the lower impoundment near the dam and powerhouse. There are no known domestic, irrigation or other consumptive uses of the river water in the project area. There are also no known industrial uses or discharges of water into the impoundment or tailrace.

Much of the river basin's topography is upland terrain, with low rolling hills rising above wide river valleys. The project area is viewed by neighborhood and University campus-related viewers (in addition to boaters and anglers). The scenic character of the project area is more a function of adjacent land uses than changes of topography. Most of the shoreline is heavily wooded. Transitory viewers, typically recreation users and residents have intermittent and filtered views of the river from roads, recreation areas and the University campus (primarily open with scattered trees along the shoreline), which is visible from much of the impoundment.

Environmental Impacts and Recommendations

Because the project site was used in the near past for hydroelectric power, and most of the needed facilities remain intact at the site, no significant change in land use would occur if the project is redeveloped and operated.

PPL Maine is not proposing any aesthetics-related measures nor have any recommendations been filed for these resources. However, PPL Maine's rehabilitation of the project would include construction activities at the powerhouse while upgrading the generating facilities and constructing new penstocks below the dam.

Staff Analysis

PPL Maine proposes no changes that would affect land use. Regarding project aesthetics, PPL Maine proposes construction at the powerhouse and replacement of the three penstocks downstream of the dam.

Construction at the powerhouse would involve delivery of machinery and equipment by trucks and other vehicles, but these activities would be infrequent and short-term with negligible adverse effects on aesthetics. There would be a short-term increase in noise, dust, and fumes but this effect should be negligible.

PPL Maine would rebuild or restore 800 to 900 feet of three penstocks that collapsed in 1996. The three 10-foot diameter penstocks would extend from the dam to the powerhouse and would run through sections of the river and along the embankment. PPL Maine also proposes to repair other project structures that have deteriorated during the last decade of non-use. Rebuilding the penstocks would take approximately 8 to 10 months to complete and would involve construction crews, large equipment, trucks and materials. Little or no construction would take place during the cold winter months. Reconstruction would take place in the open, would be highly visible to recreationists in the area, and would likely have a moderate, short-term adverse effect on project aesthetics. Reconstruction of the penstocks would create noise, some dust and fumes from trucks but this would be minor and of limited (8-10 month) duration. Upon completion of the construction, project aesthetics would be approximately the same as it was before the penstock collapse but could be improved by selecting a penstock color that blends with the general riverine environment.[25]

Regarding river flow aesthetics, PPL Maine proposes a 200 cfs flow release into the 1000-foot-long by 500-foot-wide bypassed reach. Currently, the bypassed reach carries natural flows that average between 8,615 cfs median flow in April to low median flows of 2,600, 1,450, 1250 and 1,533, respectively, from June through October (see table 1)(the hydraulic capacity of the turbines is 1,749 cfs). Since the hydraulic capacity of the turbines would exceed the median flows from approximately July through October, a 200-cfs minimum flow is what would be viewed during a large portion of the recreation season. A 200-cfs minimum flow in the bypassed reach would result in a lessening of the wetted perimeter and would expose boulders, rocks and gravel. Consequently, the 200-cfs minimum flow would have a moderate adverse effect on river aesthetics.

[25] About one-third of the original penstocks length were silver colored.

However, historically, during project operation, there was no minimum flows maintained in the bypassed reach during the dry period except that which occurred by dam leakage.

Unavoidable Adverse Impacts

A short-term, moderate adverse effect on project aesthetics due to the reconstruction of the penstocks and other construction activities would be unavoidable. A minor, short-term increase in noise and dust due to traffic and construction activities would also be unavoidable.

6. Cultural Resources

Affected Environment

The cultural history of Maine began during the Paleo-Indian Period, between 11,000 and 10,000 years ago. The earliest evidence of habitation in the Penobscot Basin area is from materials dated from more that 8,000 years ago. There were permanent, seasonal and temporary prehistoric encampments and activities such as tool making at sites that were flat and had easy access to water. Sites near or adjacent to falls, rapids, and stream confluences were especially attractive to early inhabitants. The Penobscot is the remaining tribe of several that were believed to be in the area. Today, there is a vital Penobscot community on Indian Island, located in Old Town above the Milford Project dam. Appropriately, the Penobscot community has been a part of this licensing process.

There has been considerable activity by Euro-Americans in the area above Bangor; most of the development occurred on the Penobscot and Stillwaters rivers. The first settlers altered the existing landscape by building dams and sawmills. Some of this development remains in the general project area.

Nevertheless, there are no known historical or archaeological properties within the project area listed or eligible for listing in the National Register of Historic Places.

Environmental Impacts and Recommendations

The Maine Historical Preservation Commission (State Historic Preservation Officer - SHPO), in its letter dated March 14, 2004, reported that there are no properties in the Orono Project area of prehistoric, historic, architectural or archaeological significance that would be adversely affected by project licensing. PPL Maine also consulted with the Penobscot Tribal Historic Preservation Officer (THPO) regarding the

project licensing to confirm that there are no additional cultural, historic or archaeological issues at this time.

Staff Analysis

We concur with the SHPO's determination that no historic properties would be affected by issuing a license to redevelop and operate the Orono Project. However, if PPL Maine undertakes land-disturbing maintenance or repair at the project in the future, and if archaeological or historic sites are discovered, consultation with the SHPO and THPO and mitigation measures would help protect the discovered sites.

Unavoidable Adverse Impacts

None.

D. No-Action Alternative

Under the no-action alternative, the project would remain in its inoperable state and no new environmental protection, mitigation, or enhancement measures would be implemented.

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the Stillwater Branch of the Penobscot River's available water resources to generate hydropower; estimate the economic benefits of the proposed project and alternatives; estimate the cost of various environmental measures; and estimate the effects of these measures on project operations.

A. Power and Economic Benefits of the Project

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in *Mead Corporation, Publishing Paper Division*,[26] the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and the costs of a project, and reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

[26] 72 FERC ¶ 61,027 (1995).

Our estimate of the energy and capacity value was developed from the most reasonable alternative generation available. We base our estimate of the comparable cost of energy generation on the fixed cost to construct and operate a combined-cycle combustion turbine plant fueled by natural gas in the New England region of the United States, and a regional energy cost of 43.15 mills per kWh. We estimate the energy cost based on information in Energy Information Administration, Annual Energy Outlook 2005.[27] We assume a capacity value of $96 per kilowatt (kW)-year. We estimate that the dependable capacity of the operating project would be 2.03 MW. Under these conditions, the total energy and capacity cost is 54.08 mills/kWh.

For our economic analysis of the alternatives, we use the parameters, values (2004$), and sources shown in table 3.

Table 3. Staff parameters for economic analysis of the Orono Project (Source: the staff).

Parameters	Values (2005$)	Sources
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Interest/cost of capital	8.0 percent	Staff
Escalation rate	0 percent	Staff
Federal tax rate	34 percent	Staff
Local tax rate	3.05 percent	Staff
Insurance rate	$0.25 percent of cost of construction	Staff
Net investment [1]	$831,000	PPL Maine
Operation and maintenance cost [2]	$20,000 and $170,000	Staff and PPL Maine
Energy and capacity value	54.08 mills/kWh	Staff

[27] See http://www.eia.doe.gov/oiaf/aeo/index.html.

[1] The net investment also includes the cost of relicensing, see pages B#9-1 and B#10-1 of the additional information filed on January 24, 2005.
[2] We assume the O&M cost of the non-operating project to be minimal. For O&M of the operating project, see page B#11-1 of the additional information filed on January 24, 2005.

1. Proposed Action (Settlement with the option to acquire other projects)

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures assuming the Trust does exercise its option to acquire the Howland, Great Works, and Veazie Projects. Under this alternative, PPL Maine would install and operate a fish trapping facility at the project spillway, but would not install and operate upstream fish passage facilities, or provide annual monetary compensation.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project, would be about $507,100 (30.40 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $395,130 (23.68mills/kWh).

2. Proposed Action (Settlement without the option to acquire other projects)

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures assuming the Penobscot River Restoration Trust (Trust) does not exercise its option to acquire the Howland, Great Works, and Veazie Projects. Under this alternative, PPL Maine would install and operate upstream fish passage facilities, and would provide annual monetary compensation, but would not install and operate a fish trapping facility at the project spillway.

Based on the parameters in table 3 and the cost of measures proposed by PPL Maine shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project would be about $544,660 (32.65 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh.[28] The resulting annual net benefit would be $357,570 (21.43 mills/kWh).

[28] This amount includes the 1,139 MWh of lost annual generation due to releasing 200-cfs year-round minimum flow in the bypassed reach.

3. Staff-Recommended Alternative

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures with staff-recommended measures but without including upstream fish passage facilities, the fish trapping facility, and the Fund.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project with environmental measures under the staff-recommended alternative would be about $487,700 (29.23 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $414,530 (24.85 mills/kWh).

4. Composite Alternative - Proposed Action (Settlement with the option to acquire other projects in the basin, additional staff-recommended measures, and mandatory conditions)[29]

In table 4, not all of the Settlement provisions, NOAA Fisheries and Interior's section 18 prescriptions, and Maine DEP's WQC Conditions are recommended by staff at this time. If the Settlement provisions (including future actions), section 18 prescriptions, and WQC conditions are included in any license issued for the Orono Project, the economic benefits of the project would differ from the staff-recommended alternative. The combination of the staff-recommended measures, the proposed action (Settlement with the option to acquire projects), NOAA Fisheries and Interior's section 18 prescriptions, and Maine DEP's WQC conditions represent a composite alternative.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of the Orono Project as proposed by PPL Maine (Settlement with the option to acquire projects) and with the additional staff-recommended measures, including the section 18 prescriptions, and WQC conditions, would be about $508,010 (30.45 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for

[29] If the Trust does not exercise its option to acquire the Howland, Great Works, and Veazie Projects and the dams are not removed, we estimate that the annual cost of PPL Maine's proposed Orono Project with additional staff-recommended measures, including the section 18 prescriptions and WQC conditions, would be about $545,570 (32.70 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $356,660 (21.38 mills/kWh).

the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $394,220 (23.63 mills/kWh)

Table 4. Summary of annual costs (2005$) of the proposed and recommended measures for the Orono Project (Source: the staff).

Measures	Recommending Entity	Capital Cost	Operation and Maintenance Cost	Annual Cost
Rehabilitate the project [a]	Applicant, Staff	2,600,000	170,000	341,410
* Operate project in run-of-river mode and limit impoundment fluctuations to 1 foot	Applicant, MDEP, NOAA Fisheries, Staff	0	0	0
* Release 200 cfs in the bypassed reach [b]	Applicant, MDEP, NOAA Fisheries, Staff	0	0	40,670
* Develop and implement a water level and flow monitoring plan [c]	MDEP, NOAA Fisheries, Staff	2,000	500	480
*# Install and operate upstream eel passage facilities [d]	Applicant, MDEP, NOAA Fisheries, Interior, Staff	45,000	7,500	8,330
*# Install and operate downstream fish passage facilities [d]	Applicant, MDEP, NOAA Fisheries, Interior, Staff	175,000	5,600	16,870
*#Install and operate upstream fish passage facilities [e]	Applicant, MDEP, NOAA Fisheries, Interior	340,000	47,900	57,210
*# Submit final design plans for upstream eel passage and downstream fish passage facilities	Applicant, MDEP, NOAA Fisheries, Interior, Staff	5,000	0	370
*# Implement a 2-week project shutdown for downstream eel passage [f]	Applicant, MDEP, NOAA Fisheries, Interior	0	0	0

Measures	Recommending Entity	Capital Cost	Operation and Maintenance Cost	Annual Cost
*# Install and operate a fish trapping facility	Applicant, MDEP, NOAA Fisheries, Interior	240,000	3,400	20,310
* Establish a contingency mitigation fund [g]	Applicant, MDEP	0	1,000	660
*# Submit plans and conduct fish passage effectiveness study	Applicant, MDEP, NOAA Fisheries, Interior, Staff	3,000	4,000	2,860
*# Report on the fish passage effectiveness study	Applicant, MDEP, NOAA Fisheries, Interior, Staff	1,000	0	70
* Maintain the portage trail around the project [h]	Applicant, MDEP, Staff	0	1,000	660
Develop and implement a soil erosion and control plan [i]	Staff	3,000	0	220
Maintain existing mature riparian vegetation at the project	Staff	0	0	0

[*] A condition of the WQC.
A section 18 fishway prescription.
[a] See capital and O&M costs in applicant's response to additional information filed on January 24, 2005, pages B#4-5 and B#11-1, respectively. Staff assumes the cost of replacement penstocks that blend with the surrounding is included.
[b] The rehabilitated project without a minimum flow would generate about 17,821 MWh annually; with the minimum flow, estimated annual lost generation would be 1,139 MWh.
[c] The estimated cost includes coordinating headpond drawdowns with the resource agencies.
[d] See the January 24, 2005 filing, page B#15-3 for capital cost, and the Lower Penobscot River Basin FEIS table 5-3 for O&M costs escalated to 2005$.
[e] See the Lower Penobscot River Basin FEIS table 5-3 for capital and O&M costs escalated to 2005$. Not required if other projects are acquired.
[f] Project shutdown is contingent on the results of a future effectiveness fish passage study, which may or may not require project shutdown. Therefore, we assume no cost of lost generation at this time.

[g] See page 31 of the explanatory statement of the Settlement filed on June 25, 2004. Not required if other projects are acquired.
[h] See the January 24, 2005 filing, page B#3-3 for the O&M cost.
[i] The cost to implement the soil erosion control plan is considered with the estimated cost to rehabilitate the project shown on page B#4-5 of the January 24,2005, filing.

5. No-Action Alternative

Under the no-action alternative, PPL Maine would continue to maintain the project, but the project would not be put back in operation, and no new environmental protection, mitigation, or enhancement measures would be implemented.

Since the Orono Project is not operating, there is no annual generation nor annual power value for the project. The annual cost of the no-action alternative includes the carrying cost of the project book value and annual maintenance costs, totaling about $75,760. The resulting annual net benefit would be -$75,760.

6. Cost of Environmental Measures and Economic Comparison of Alternatives

Table 5 presents a summary of the current annual net power benefits for PPL Maine's proposed action with the option for the Trust to acquire other projects; the proposed action without the option for the Trust to acquire other projects; the staff–recommended alternative; the composite alternative with the option to acquire other projects with measures under the staff-recommended alternative including section 18 prescriptions, and section 401 conditions; and the no-action alternative.

Table 5. Summary of annual net benefits of the alternatives for the Orono Project (Source: the staff).

Parameter	Proposed Action (Settlement with the option to acquire projects)	Proposed Action (Settlement without the option to acquire projects)	Staff-Recommended Alternative	Composite Alternative	No-Action Alternative
Annual generation (MWh)	16,682	16,682	16,682	16,682	0
Installed capacity (MW)	3.68	3.68	3.68	3.68	3.68
Annual power value ($)	902,230	902,230	902,230	902,230	0
Annual cost ($)	507,100	544,660	487,700	508,010	75,760
Annual net benefit ($)	395,130	357,570	414,530	394,220	-75,760

7. Pollution Abatement

The Orono Project would produce about 16,682 MWh of electricity annually. This amount of hydropower generation, when contrasted with the generation of an equal amount of energy by a fossil-fueled facility, avoids the emission of atmospheric pollutants. Assuming that the hydropower generation would be replaced by an equal amount of natural gas-fired generation, generating electrical power equivalent to what would be produced at the Orono Project would require combustion of about 172 million cubic feet of natural gas annually. Removal of pollutants (N0x and S0x) from the emissions produced by burning fossil fuels to those levels presently achievable by state-of-the-art technology would cost about $8,200 annually.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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 weigh the various economic and environmental tradeoffs involved in that decision.

This section contains the basis for, and a summary of, our recommendations for relicensing the Orono Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

A. Recommended Alternative

Based on our independent review and evaluation of the environmental and economic effects of the proposed action (Settlement with the option to acquire projects), the proposed action (Settlement without the option to acquire other projects), the staff-recommended alternative, the composite alternative; and no action, we recommend the staff alternative.

We recommend this alternative because: (1) issuing a new license would allow PPL Maine to rehabilitate and operate the project as a beneficial and dependable source of electric energy; (2) the project, with an installed capacity of 2.3 MW, would eliminate the need for an equivalent amount of fossil-fuel-produced energy and capacity, which helps conserve these nonrenewable resources and limits atmospheric pollution; and (3) the recommended environmental measures would protect water quality, enhance fish and wildlife resources, and improve public use of project recreation facilities and resources.

Our recommended alternative would include the following provisions of PPL Maine's proposed environmental measures with staff-recommended measures: (1) develop and implement a soil erosion and sedimentation control plan; (2) operate the project in a run-of-river mode with impoundment levels maintained within 1 foot of full pond or elevation 72.4 feet msl; (3) maintain a minimum flow of 200 cfs, or inflow if less, in the project's bypassed reach; (4) a flow and water level monitoring plan; (5) downstream fish passage facilities and effectiveness monitoring; (6) an upstream American eel passage facilities and effectiveness monitoring; (7) protect mature riparian vegetation at the project; (8) use a penstock color that blends with the surroundings; (9) maintain the existing canoe portage; and (10) consultation should any historic or cultural resources be discovered during project rehabilitation or ground-disturbing activity.

We discuss our rationale for the measures we are recommending below.

Erosion control plan

PPL Maine's proposal to replace previously demolished penstocks with new penstocks within the existing penstock right-of-way could cause some short-term erosion and sedimentation effects in the Stillwater Branch. PPL Maine estimates that total construction time for all of the remaining rehabilitation activities including penstock replacement would occur over an 8 to 10 month period (May through October). Because any construction activities needed to install the new penstock would occur within the existing right-of-way for the previous penstock, we anticipate that land-disturbing activities would be minor. However, because the right-of-way lies within or adjacent to the bypassed reach some short-term erosion and sedimentation could still affect aquatic habitats within the bypassed reach. A soil erosion control plan that specifies the measures that would be used during penstock installation to control erosion and sedimentation would help ensure that aquatic habitats are protected during rehabilitation activities. Therefore, we recommend that PPL Maine develop and implement a soil erosion and sedimentation control plan at an annual cost of $220.

Run-of-river operation

PPL Maine proposes to operate the project in a run-of-river mode. Under the WQC, the project would operate run-of-river with outflow approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement, and the Orono impoundment would be maintained within 1 foot of full pond or 72.4 feet msl. NOAA Fisheries recommends run-of-river operation consistent with the WQC. We recommend the Orono Project be operated in a run-of-river mode as proposed and specified in the WQC. Run-of-river operation would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be the result of project operations at the Orono Project. Therefore, the Orono Project operation would not contribute to any effects of fluctuating water levels in the Penobscot River such as fish stranding and reduction of spawning habitat. Maintaining a relatively stable impoundment level with fluctuations limited to 1 foot or less would benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for feeding, spawning, and cover. There would be no cost associated with operating in a run-of-river mode.

Minimum flows in the bypassed reach

PPL Maine proposes to maintain a minimum flow in the bypassed reach of 200 cfs at an annual cost of $40,670 consistent with the WQC and NOAA Fisheries' recommendation. This flow seems reasonable because the rate of habitat improvement for several of the important fish species life stages (smallmouth bass YOY, juveniles, adults; and Atlantic salmon juveniles) levels off or declines at flows above about 200 cfs. Although flows above 200 cfs would continue to benefit American shad

spawning/incubation and larvae/juvenile life stages, spill flows would provide additional habitat 70 to 100 percent of the time when those life stages are present in the river.

Flow and water level monitoring plan

As a condition of the WQC, PPL Maine would develop and implement a plan for monitoring impoundment levels and minimum flows. NOAA Fisheries recommends that the timing of headpond drawdowns for maintenance and repair be coordinated with the resource agencies. A monitoring plan developed in consultation with the relevant resource agencies that describes contingencies for emergencies (such as providing downstream flows during project shutdown), scheduled maintenance drawdowns, droughts, as well as reporting criteria, would minimize misunderstandings about operational compliance and help ensure that aquatic resources at the project are protected during the term of the license. Therefore, we recommend that a plan for monitoring impoundment levels and minimum flows be developed in consultation with the agencies at an annual cost of $480.

Downstream fish passage

In order to pass outmigrating fish, PPL Maine proposes to provide downstream fish passage measures consistent with the Settlement, the WQC, and Interior's and Commerce's section 18 prescriptions. The measures would include installing trashracks with 1-inch clear spacing at the powerhouse intake, and a gated surface and bottom bypass capable of discharging up to 70 cfs during the downstream migratory period. In addition, PPL Maine would perform effectiveness studies of the measures. Although the emphasis for passage of anadromous fish species under the Settlement is at the main stem Penobscot River projects, these downstream fish passage measures would facilitate movement of anadromous fish such as Atlantic salmon and alewife that happen to use the Stillwater Branch as an outmigration route. The measures would also address the variable nature of downstream passage of American eel by providing alternative passage routes (i.e. bottom and surface bypasses), effectiveness testing, and if the above measures are not effective, the potential for nightly shutdowns following expiration the safe harbor period established in the Settlement. We recommend that the license include these downstream fish passage measures and effectiveness monitoring for the benefit of anadromous fish and American eel in the Penobscot River Basin at an annual cost of $17,055 for the facilities and design plans and $1,465 for the effectiveness monitoring and reporting.

Upstream American eel passage

In support of state management goals for American eel, PPL Maine would provide upstream passage facilities consistent with the Settlement, the WQC, and Interior's and

Commerce's section 18 prescriptions. PPL Maine would consult with the fishery agencies and the Penobscot as to the appropriate location for the fishway, and upon approval of the location, complete installation and initial testing and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Agreement, June 22, 2004. The facilities would be operational for the April 1 to November 30 period. PPL Maine would also develop and implement a plan to evaluate the effectiveness of the facility. Although eel are found throughout the Penobscot River drainage despite the number of dams that impede their movements, providing upstream eel passage at the Orono Project would increase the number of eel that are able to reach upstream habitats for rearing and maturing. Therefore, to enhance restoration of American eel to the Penobscot River drainage we recommend PPL Maine develop and install upstream eel passage facilities in consultation with NOAA Fisheries, Fish and Wildlife, Marine Resources, Maine Fish and Wildlife, and the Penobscot at a cost of $8,515. To ensure that the facilities are properly located and effective at passing eel, we also recommend that PPL Maine conduct post-licensing effectiveness monitoring and reporting at an annual cost of $1,465.

Bald Eagle Habitat Protection

Bald eagles currently forage in the project area. The FWS recommends maintaining existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future nesting habitat for bald eagles. We recommend that PPL Maine, to the extent feasible, maintain existing mature riparian vegetation at the project to protect bald eagle habitat. No cost is anticipated for this measure.

Recreation and Aesthetics

Access to the project impoundment is currently provided by University of Maine and Town of Orono sites in addition to PPL Maine's portage and put-in facility at its upstream Stillwater Project. An existing canoe portage at the Orono Project site with parking at the powerhouse provides a route around the dam and access to the tailwater area for fishing. PPL Maine proposes and the WQC would require maintenance of the canoe portage. Maintaining the canoe portage would ensure public access to the project is available at an estimated annual cost of $660. We recommend that the canoe portage be shown on the project boundary map filed pursuant to any licensee issued for the project.

Regarding aesthetics, rebuilding the project penstocks would have a moderate long-term affect on aesthetics. Therefore, to mitigate this affect, we recommend that PPL

Maine use a penstock material or paint the penstock a color that blends with the surroundings. No cost is anticipated for this measure.

Cultural Resources

There are no known historic or archaeological properties within the project area that would be affected by issuing a license to redevelop and operate the Orono Project. However, PPL Maine will need to undertake repair and maintenance at the project in the future. Additionally, archaeological or historic sites could be discovered during project redevelopment or any future project modification other than routine maintenance. We, therefore, recommend PPL Maine consult with the SHPO, THPO, and the Commission if archaeological or historic sites are discovered during project redevelopment or during land-disturbing modification at the project during a new license term. There is no current cost associated with future consultation and potential mitigation measures.

B. Measures Not Recommended

Contingent mitigation fund

Under the Settlement and consistent with the WQC, PPL Maine would establish the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their respective dams not subsequently removed.[30] Under the Fund, the contributions due to the effects of redeveloping the Orono Project on the bypassed reach would be $1,000 per year for the term of the license. The disposition of the monies would be determined upon mutual agreement among the Penobscot, Bureau of Indian Affairs, FWS, NOAA Fisheries, and the state of Maine agencies for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensating for loss or degradation of fish and wildlife habitat due to habitat effects by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and the habitat on which these fisheries rely. The Settlement did not provide further specificity for any of the above uses of the Fund. We do not recommend including this measure in the new license. It is not clear what effects are not being addressed by other measures in the Settlement and proposed by PPL Maine nor does the Settlement identify specific uses of the fund for us to evaluate. Our analysis concludes that our recommended measures including operating the project in a run-of-river mode with an impoundment level fluctuation of 1 foot or less, maintaining a minimum flow of 200 cfs in the bypassed reach and providing downstream fish passage

[30] If Veazie and Great Works are acquired by the Trust but the dams are not removed, the Trust would replace PPL Maine as the payor to the Fund.

and upstream eel passage facilities would protect and enhance aquatic resources in the Stillwater Branch and the main stem of the Penobscot River.

Upstream fish passage

Condition 2.D. of the WQC would require upstream fish passage in accordance with the Settlement and Interior's May 20, 1997, section 18 prescription.

Specifically, if the Veazie, Great Works, and Howland projects are acquired by the Trust, the WQC would require that PPL Maine install a fish trapping facility at the Orono Project spillway. PPL Maine would be responsible for transporting trapped fish a short distance downstream to the tailwater of the Orono Project at the confluence of the main stem Penobscot and Stillwater rivers. If the above projects are not acquired by the Trust, the WQC would require PPL Maine to install the upstream fish passage facilities specified in the Settlement and prescribed by Interior on May 20, 1997. Those fish passage facilities would consist of either a vertical slot fishway (with pools 8 feet wide by 10 feet long and a 9-inch drop per pool), a denil fishway (4 feet wide with a 1-on-8 slope), or a fish lift with a 600-gallon hopper capacity at the Orono dam. A 50-cfs attraction flow would be provided representing about 2.5 percent of the anticipated 2,000-cfs average spillway discharge during the May to June portion of the upstream migration period.

Although both options could result in benefits to anadromous and catadromous fish resources and the ongoing fisheries restoration efforts in the Penobscot Basin, we do not recommend that upstream fish passage measures be included at this time in an Orono license. Both Interior and Commerce reserved their respective authorities to prescribe fishways including the fish trapping facility upon acquisition of the Veazie, Great Works, and Howland projects. If the Veazie, Great Works, and Howland projects are not acquired by the Trust, the Settlement states that Interior would submit fishway prescriptions consistent with Attachment A of the Settlement. Because the type of fish passage system that might ultimately be required at Orono has yet to be determined, and would require a license amendment filing followed by the filing of section 18 prescriptions, the appropriate time for Commission staff to conduct its environmental review would be in response to such action.

C. Conclusion

Based on our review of the agency and public comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Orono Project, with the environmental measures under the staff-recommended alternative, would be best adapted to a plan for improving or developing the Penobscot River waterway.

VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

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 the 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 finds 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 shall attempt to resolve such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

In a letter filed April 20, 2005, NOAA Fisheries submitted 4 recommendations pursuant to section 10(j) of the FPA.[31] Table 6 lists NOAA Fisheries recommendations submitted subject to section 10(j), and whether the recommendations are adopted under the staff-recommended alternative.

[31] In its April 25, 2005, filing, the Maine State Planning Office submitting comments on behalf of Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and the Atlantic Salmon Commission recommended as licensing conditions the terms and conditions submitted by NOAA Fisheries pursuant to section 10(j) of the FPA.

Table 6. Analysis of fish and wildlife agency recommendations for the Orono Project (Source: the staff).

Recommendation	Agency	Within the scope of section 10(j)?	Annual cost	Recommend Adopting
1. Maintain a continuous, year-round minimum flow of 200 cfs in the bypassed reach	NOAA Fisheries	Yes	$40,670	Yes
2. Develop a minimum flow operations and monitoring plan	NOAA Fisheries	Yes	$480	Yes
3. Operate run-of-river	NOAA Fisheries	Yes	$0	Yes
4. Coordinate headpond drawdowns with resource agencies	NOAA Fisheries	Yes	$0 [a]	Yes

[a] The annual cost of this measure is included in the above minimum flow operations and monitoring plan.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving waterways affected by the project. Accordingly, federal and state agencies filed comprehensive plans that address various resources in Maine. Of these, we identified and reviewed 11 comprehensive plans that address resources relevant to the Orono Project.[32] No inconsistencies were found.

[32] (1) Strategic plan for management of Atlantic salmon in the State of Maine, 1984, Maine Atlantic Sea-Run Salmon Commission, Augusta, Maine, 52 pp. and appendices; (2) Maine rivers study-final report, 1982, Maine Department of Conservation, Augusta, Maine, 181 pp; (3) State of Maine comprehensive rivers management plan, 1987, Maine State Planning Office, Augusta, Maine, three volumes; (4) Maine comprehensive rivers management plan, Volume 4, 1992, Maine State Planning Office, Augusta, Maine; (5) Atlantic Salmon (*Salmo salar*) - Amendment 1 to

X. FINDING OF NO SIGNIFICANT IMPACT

If the Orono Project is licensed with the environmental measures under the staff-recommended alternative, the project would operate while providing enhancements to fish resources, and improvements to recreation facilities, in the project area.

Based on our independent analysis, issuance of a license for the Orono Project, with the environmental measures under the staff-recommended alternative, would not constitute a major federal action significantly affecting the quality of the human environment.

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the New England Fishery Management Council's (NEFMC) Fish Management Plan (FMP) on Atlantic salmon (March 1988), 1998, National Marine Fisheries Service; Final Amendment #11 to the Northeast Multispecies Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan; Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic salmon Fishery Management Plan; and Components of the proposed Atlantic herring Fishery Management Plan for Essential Fish Habitat, Volume 1, 1998, National Marine Fisheries Service; (6) Fishery Management Report No. 36 of the Atlantic States Marine Fisheries Commission: Interstate Fishery Management Plan for American eel (*Anguilla rostrata*), prepared by the American Eel Plan Development Team, 2000, National Marine Fisheries Service, 78 pp; (7) Fishery Management Report No. 35 of the Atlantic States Marine Fisheries Commission: Shad and river herring [includes alewife (*Alosa pseudoharengus*), blueback herring (*Alosa aestivalis*), Alabama shad (*Alosa alabamae*), American shad (*Alosa sapidissima*), and Hickory shad (*Alosa mediocris*)] - Amendment 1 to the Interstate Fishery Management Plan for shad and river herring, 1999, National Marine Fisheries Service, 77 pages; (8) Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring, 2000, National Marine Fisheries Commission, 6 pp; (9) Final environmental impact statement - restoration of Atlantic salmon to New England Rivers, 1989, Department of the Interior, U.S. Fish and Wildlife Service, New Corner, Massachusetts, 88 pp. and appendices; (10) Recovery Plan for the Shortnose Sturgeon (*Acipenser brevirostrum*), 1998, prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland, 104 pages; and (11) Maine State Outdoor Recreation Plan, assessment policy plan, volume 1. Augusta, Maine, December 1993. 193 pp.

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XII. LIST OF PREPARERS

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John Hannula – Cultural, Recreation, and Land Use Resources (Landscape Architect; BLA, Landscape Architecture and Environmental Planning)

Tom Dean - Developmental Analysis (Civil Engineer; B.S., Civil Engineering)

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UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

PPL Maine, LLC

Project No. 2710-035
- ME

NOTICE OF AVAILABILITY OF ENVIRONMENTAL ASSESSMENT

(August 19, 2005)

In accordance with the National Environmental Policy Act of 1969 and the Federal Energy Regulatory Commission's regulations, 18 CFR Part 380 (Order No. 486, 52 F.R. 47879), the Office of Energy Projects has reviewed the application for a new license for the Orono Hydroelectric Project, located on the Stillwater Branch of the Penobscot River, in Penobscot County, Maine, and has prepared an Environmental Assessment (EA). In the EA, Commission staff analyze the potential environmental effects of relicensing the project and conclude that issuing a new license for the project, with appropriate environmental measures, would not constitute a major federal action that would significantly affect the quality of the human environment.

A copy of the EA is on file with the Commission and is available for public inspection. The EA may also be viewed on the Commission's website at http://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. For assistance, contact FERC Online Support at FERCOnlineSupport@ferc.gov or toll-free at 1-866-208-3676, or for TTY, (202) 502-8659.

Any comments should be filed within 30 days from the issuance date of this notice, and should be addressed to the Secretary, Federal Energy Regulatory Commission, 888 First Street, N.E., Room 1-A, Washington, D.C. 20426. Please affix "Orono Project No. 2710" to all comments. Comments may be filed electronically via Internet in lieu of paper. The Commission strongly encourages electronic filings. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's website under the "eFiling" link. For further information, contact Patrick Murphy (202) 502-8755.

Linda Mitry
Deputy Secretary

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PUBLIC

Environmental Assessment
PPL Maine, LLC
Orono Hydroelectric Project
Project No. 2710-035

ENVIRONMENTAL ASSESSMENT
FOR
NEW HYDROPOWER LICENSE

Orono Hydroelectric Project

FERC Project No. 2710-035

Maine

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

August 2005

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SUMMARY

PPL Maine, LLC (PPL Maine) filed an application for a new license on June 25, 2004, to rehabilitate, operate and maintain the 2.3-megawatt (MW) Orono Hydroelectric Project located on the Stillwater Branch of the Penobscot River in Penobscot County, Maine. The project is currently not operating. It does not occupy any federal land.

On the same day, PPL Maine also filed the Lower Penobscot River Basin Comprehensive Settlement Accord with Explanatory Statement (Settlement) on behalf of the Penobscot Indian Nation (Penobscot); the state of Maine agencies including the Maine State Planning Office, Maine Atlantic Salmon Commission (Salmon Commission), Maine Department of Inland Fisheries and Wildlife (Maine Fish and Wildlife), and Maine Department of Marine Resources (Marine Resources); the U.S. Department of the Interior (Interior); the Atlantic Salmon Federation (Salmon Federation); American Rivers, Inc. (American Rivers); Maine Audubon Society; the Natural Resources Council of Maine; Trout Unlimited; and the Penobscot River Restoration Trust (Trust). The Settlement calls for phased implementation of its provisions and would affect nine projects in the Penobscot River Basin and one project just outside the basin. One of the provisions included under Phase 1 of the Settlement is the relicensing of the Orono Project which is the action considered in this Environmental Assessment (EA).

A key element of the Settlement involves PPL Maine providing the Trust with a 5-year option (Option) to acquire the Veazie (FERC No. 2403), Howland (FERC No. 2721), and Great Works (FERC No. 2312) projects. Under later implementation phases of the Settlement, if the above projects are acquired by the Trust, the Veazie and Great Works dams would be removed and the Howland dam would be studied for potential removal. Because certain conditions of the section 401 water quality certification for the Orono Project relicensing depend on whether the above projects are acquired and ultimately removed, this EA considers alternatives for the Option being exercised and not exercised to the extent that information is available.

As such, this EA includes five alternatives: (1) the proposed action (Settlement with the option to acquire projects; (2) the proposed action (Settlement without the option to acquire projects); (3) a staff-recommended alternative - rehabilitating and operating the Orono Project with staff-recommended measures; (4) a composite alternative - the proposed action (Settlement with the option to acquire projects with staff-recommended measures including mandatory conditions); and (5) the no-action alternative.

Based on our analysis, we recommend alternative 3, licensing the project under the staff-recommended alternative. We do not recommend measures that are contingent upon whether the Option is exercised or not, since those measures depend on some future action that is not defined at this time. Our recommended measures include or are based in part on recommendations made by the federal and state resource agencies.

In section VI of the EA, we estimate the annual net benefits of operating and maintaining the project under the five alternatives identified above. Our analysis shows that the annual net benefit would be $395,130 under the proposed action (Settlement with the option to acquire projects), $357,570 under the proposed action (Settlement without the option to acquire projects), $414,530 under the staff-recommended alternative, $394,220 under the composite alternative, and -$75,760 under the no-action alternative.

On the basis of our independent analysis, we conclude that issuing a new license for the project with the environmental measures under the staff-recommended alternative, would not be 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 Licensing
Washington, D.C.

ORONO HYDROELECTRIC PROJECT
FERC No. 2710-035, Maine

I. APPLICATION

On June 25, 2004, PPL Maine, LLC (PPL Maine) filed an application with the Federal Energy Regulatory Commission (Commission) for a new major license for the redevelopment and operation of the 2.3-megawatt (MW) Orono Hydroelectric Project (Orono Project), located on the Stillwater Branch of the Penobscot River in Penobscot County, Maine (figures 1 and 2). The project is currently not operating. On June 25, 2004, PPL Maine also filed a comprehensive settlement agreement (discussed below). PPL Maine estimates that the project will produce an average annual energy generation of about 16,682 megawatt-hours (MWh). The project does not occupy any federal land.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

The Commission must decide whether to issue a license for the project, and what, if any, conditions should be placed in any license issued. Issuing a license would allow PPL Maine to generate electricity at the project, making electric power from a renewable resource available to the area. In this environmental

assessment (EA), we assess the effects of project redevelopment and operation, alternatives to the proposed project, and a no-action alternative, and recommend conditions to become a part of any new license issued. In deciding whether to issue a license for a hydroelectric project, the Commission must determine that the project will be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation; the protection of, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat); the protection of recreational opportunities; and the preservation of other aspects of environmental quality.

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Figure 1
Page 2

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Figure 2
Page 3

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B. Penobscot Settlement

PPL Maine filed the Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement) on behalf of the Penobscot Indian Nation (Penobscot); the state of Maine agencies including the Maine State Planning Office, Maine Atlantic Salmon Commission (Salmon Commission), Maine Department of Inland Fisheries and Wildlife (Maine Fish and Wildlife), and Maine Department of Marine Resources (Marine Resources); the U.S. Department of the Interior (Interior); the Atlantic Salmon Federation (Salmon Federation); American Rivers, Inc. (American Rivers); Maine Audubon Society; the Natural Resources Council of Maine; Trout Unlimited; and the Penobscot River Restoration Trust (Trust). The Settlement includes two attachments: Attachment A containing details regarding fish passage provisions applicable to the Penobscot River hydroelectric projects, and Attachment B representing the establishment and funding of a Contingent Mitigation Fund (Fund). The Settlement also includes two additional agreements, the Lower Penobscot River Option Agreement (Option),[1] and the Comprehensive Settlement Agreement between the Penobscot, PPL Maine, and the Bureau of Indian Affairs.

The Settlement calls for phased implementation of its provisions and would affect nine projects in the Penobscot River Basin and one project just outside the basin.[2] Under phase 1, the parties requested that the Commission approve amendment applications for the Milford (FERC No. 2534), Veazie, Stillwater (FERC No. 2712), Medway (FERC No. 2666), and West Enfield (FERC No. 2600) projects;[3] issue a new 40-year license for the Orono Project (FERC No. 2710), the subject of this EA; suspend processing of the relicensing applications for the Howland and Great Works projects; and to extend certain requirements of the licenses for the Veazie and Milford projects. The remaining three phases of the Settlement include, the withdrawal of pending

requests for rehearing from the parties in the Basin Mills (FERC No. 10981), Milford, Stillwater, and Veazie licensing proceedings and withdrawal of Interior's section 4(e) and 10(e) requests for the Milford Project (Phase 2); the transfer and surrender of three licenses if the Option is exercised (Phase 3),[4] and the potential for increased generating capacity at several projects (Phase 4).[5]

C. Need for Power

To assess the need for project power, we reviewed PPL Maine's anticipated future use of project power, together with that of the operating region in which the project is located. The Orono Project, when rehabilitated, would generate an average of 16,682 MWh annually. PPL Maine would sell the project's power for wholesale purchase through Independent System Operator New England, if issued a new license for the project.

The Orono Project is located in the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Council (NERC). According to NERC, a 1.3 percent compound annual growth rate is expected over the 2004-2013 period, and compared to last year's load forecast, peak loads have increased by 0.18 percent (NERC, 2004).

By producing hydroelectricity, the Orono Project would displace the need for other power plants, primarily fossil-fueled facilities, to operate, thereby avoiding some power plant emissions and creating an environmental benefit. The future use of the Orono Project power, its displacement of nonrenewable fossil-fired generation, and contribution to a resource diversified generation mix, support a finding that the power from the project would help meet both the short- and long-term need for power in the NPCC region.

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III. PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action

1. Project Description

The Orono Hydroelectric Project would consist of the following facilities: (1) an existing 1,174-foot-long by 15-foot-high dam with 2.4-foot-high flashboards; (2) an existing 2.3-mile-long reservoir, which has a surface area of 175 acres at the normal full pond elevation of 72.4 feet above mean sea level (msl); (3) three new 10-foot-diameter penstocks; (4) a restored powerhouse containing four existing generating units with a total installed generating capacity of 2.3 MW; and (5) appurtenant facilities. The dam and existing project facilities are owned by the applicant. The current project boundary encloses the dam, the entire reservoir up to the 73.0-foot msl elevation, the powerhouse, and the penstocks except for a section beneath the Maine Central railroad bridge.

PPL Maine estimates the project's total average annual generation, when redeveloped, would be 16,682 MWh.

2. Past and Proposed Project Operation

Historically, prior to the June 1996 penstock failure and project shutdown, PPL operated the project in a run-of-river mode, with a normal reservoir surface elevation of 72.4 feet msl. The normal 72.4-foot msl reservoir elevation was maintained when river flows were at or below the hydraulic capacity of the turbines. At 72.4 feet elevation, the reservoir has a gross storage capacity of 1,300 acre-feet.

PPL Maine proposes to rehabilitate the existing turbines. The current bypassed reach is 1,000 feet long and as much as 500 feet wide. Flows through the bypassed reach during past operation consisted of leakage flows and unplanned spillage. PPL Maine proposes to operate in a run-of-river mode and maintain a 200-cfs minimum flow release in the bypassed reach.

1. Proposed Project Rehabilitation

The following project facilities are proposed to be replaced

or rehabilitated:

* Replacement of the three failed wood-stave penstocks within the existing penstock right-of-way;

* Rehabilitation of the concrete surge tank that is integral to the powerhouse;

* Replacement of the wood-planked wheelpit floors with new concrete floors;

* Rehabilitation of the four triple-runner horizontal turbines by removal and alignment, and the replacement of two waterwheels.;

* Debris removal from the tailraces of each turbine discharge flume;

* Rehabilitation of the four generators and associated ancillary equipment (wicket gate pins, bushings, weak links, gateshaft bearings, push-pull arms, etc);

* Replacement of the generator controls and switchgear; and

* Rehabilitation of the powerhouse structure by replacement of windows, plank decking above the wheelpits, wheelpit gates, access doors, and roofing as needed.

4. Proposed Environmental Measures

In addition to PPL Maine's proposed project operation and rehabilitation measures discussed above, PPL Maine proposes, consistent with Phase 1 of the Settlement to:

* Install and operate upstream eel passage facilities;

* Develop and implement a plan to monitor the effectiveness of the upstream eel passage facilities;

* Install and operate a fish trapping facility if the Veazie and Great Works projects are acquired by the Trust and their dams subsequently removed, or install and operate upstream fish passage facilities if the projects are not acquired and their dams not removed;

* Install and operate a downstream fish passage facility that includes a trash rack with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass sluice capable of discharging 70 cfs during the downstream migration period;
* Conduct effectiveness studies of the downstream fish passage facility;[6]

* Establish and contribute to the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their dams not subsequently removed; and

* Maintain the existing canoe portage trail around the project.

B. Staff-Recommended Alternative

In addition to PPL Maine's proposed measures under Phase 1 of the Settlement, excluding the Fund, fish trapping facility, and upstream fish passage facilities, we recommend the following environmental measures:

* a soil erosion and sedimentation control plan;
* an impoundment level and minimum flow monitoring plan;
* maintaining mature riparian vegetation at the project;
* using a penstock color that blends with the surrounding; and
* protecting historic properties that may be discovered during the license term.

Specific measures recommended under each plan are discussed under the appropriate resource sections and summarized in section

VII of the EA.

C. No-Action Alternative

Under the no-action alternative, the project would remain in its inoperable state and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish the baseline environmental condition for comparison with other alternatives.

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D. Alternatives Considered but Eliminated from Detailed Study

We have considered, but eliminated from detailed study, several alternatives to the proposed project, because they are not reasonable under the circumstances of this case. These alternatives include: (1) federal takeover; (2) issuing a non-power license; and (3) project retirement via partial or total project removal.

1. Federal Takeover

We don't consider federal takeover a reasonable alternative. Federal takeover and operation of the project would require congressional approval. While that fact alone would not preclude further consideration of this alternative, there is currently no evidence showing that a federal takeover should be recommended to Congress. No agency has suggested federal takeover would be appropriate, and no federal agency has expressed an interest in operating the project.

2. Non-power License

A non-power license is a temporary license that would be in effect until the licensee either surrenders the license or the Commission determines that another government agency will assume regulatory authority and supervision over the lands and facilities covered by the non-power license. No entity has recommended a non-power license, and there is no basis for concluding that the Orono Project should not produce power. Therefore, issuing a non-power license is not a reasonable alternative to relicensing the Orono Project.

3. Project Retirement

Project retirement could be accomplished with or without dam removal. Either alternative would require denial of the relicense application and surrender or termination of the existing license with appropriate conditions. No party has suggested project decommissioning and thus there is no basis for recommending it. Rehabilitation of the project would provide a clean, renewable source of power to the region and contribute to the local economy by providing a source of revenue to PPL Maine and by providing recreation and aquatic resource enhancements. Thus removal is not a reasonable alternative to relicensing the project with appropriate enhancement measures.

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IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation and Interventions

The Commission's regulations require that applicants consult with appropriate state and federal agencies, tribes, and the public before filing a license application. This consultation is required to comply with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, and other federal statutes. Pre-filing consultation must be complete and documented in accordance with Commission regulations.

A. Comments and Interventions

On February 25, 2005, the Commission issued a public notice accepting the application and soliciting motions to intervene. The deadline for filing was April 26, 2005. The following entities filed a motion to intervene. None of the interventions

were in opposition to the project.

Intervenor	Date Filed
Conservation Interests (American Rivers, Inc., Atlantic Salmon Federation, Maine Audubon Society, Natural Resources Council of Maine, and Trout Unlimited)	April 20, 2005
Penobscot Indian Nation	April 22, 2005
Maine State Planning Office/Maine Agencies (Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and Atlantic Salmon Commission)	April 26, 2005

On February 23, 2005 the Commission issued a public notice that the application was ready for environmental analysis and soliciting comments, recommendations, terms and conditions, and prescriptions. The filing deadline was April 25, 2005. The following entities filed comments.

Commenting Entity	Date Filed
Department of the Interior	April 13, 2005
Conservation Interests (American Rivers, Inc., Atlantic Salmon Federation, Maine Audubon Society, Natural Resources Council of Maine, and Trout Unlimited)	April 20, 2005
National Oceanographic and Atmospheric Administration (NOAA Fisheries)	April 20, 2005
Penobscot Indian Nation	April 22, 2005
Maine State Planning Office/Maine Agencies (Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and Atlantic Salmon Commission)	April 25, 2005

C. Scoping

By public notice issued February 23, 2005, the Commission waived three-stage consultation requirements in response to a request from the Settlement parties and substituted the prefiling consultation that occurred during preparation of the Settlement for our standard NEPA scoping process.

D. Compliance

1. Water Quality Certification

Under Section 401(a)(1) of the Clean Water Act (CWA), license applicants must obtain either state certification that any discharge from a project would comply with applicable provisions of the CWA, or a waiver of certification by the appropriate state agency.

The Maine Department of Environmental Protection (Maine DEP) received PPL Maine's request for water quality certification (WQC) for the Orono Project on June 14, 2004. Maine DEP issued the WQC on December 15, 2004. The WQC contains conditions for water levels and flows, upstream and downstream fish passage, and recreational facilities, along with several administrative conditions. The substantive conditions are summarized below according to its WQC number.

Water levels and flows

Condition 1.A. would require the project to operate 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 1 foot of the full pond elevation of 72.4 feet above msl. During times of flashboard failure, PPL Maine would maintain water levels at or above the spillway crest. During flashboard replacement activities, PPL Maine would maintain water levels within 1 foot of the spillway crest.

Condition 1.B.would require a minimum flow of 200 cfs in the bypassed reach except as temporarily modified by approved

maintenance activities, agreement between PPL Maine and the state or federal resource agencies, or extreme hydrologic conditions or emergency electrical system conditions as defined in the WQC. Conditions 1.C. and 1.D. define "Extreme Hydrologic Conditions" and "Emergency Electric System Conditions," respectively.

Condition 1.E would require a plan for providing and monitoring the water levels and flows described above in consultation with the U.S. Fish and Wildlife Service (FWS), Maine Fish and Wildlife, Salmon Commission, Marine Resources, Penobscot, and Maine DEP.

Fish Passage

Conditions 2.A. through 2.D. pertain to fish passage and the establishment of the Fund.

Condition 2.A. would require installation and operation of an upstream fishway for eels in accordance with the terms of the Settlement.

Condition 2.B. would require installation and operation of downstream fish passage facilities in accordance with the Settlement and Interior's fishway prescription dated May 20, 1997. The fish passage facilities would be operational concurrent with the commencement of project operation.

Condition 2.C. would require 2-week nightly shutdowns for downstream eel migration if shown to be necessary by effectiveness studies. The shutdown would not be required to occur earlier than the expiration of the Safe Harbor period described in the Settlement.[7]

Condition 2.D. would require, depending upon whether the Veazie, Great Works, and Howland projects are purchased by the Trust as detailed in the Settlement, either, installation and operation of a fish trapping facility at the Orono spillway, or installation of upstream fish passage facilities at the Orono Project in accordance with the Settlement and Interior's fishway prescription.

If the Veazie and Great Works projects are not purchased by the Trust, or if purchased, are not subsequently removed, Condition 2.E. would require PPL Maine to contribute to the Fund in accordance with the terms of the Settlement. According to the Settlement, the Fund would be used for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensations for loss or degradation of fish and wildlife habitat due to habitat effected by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and habitat in which these fisheries rely.

Condition 2 F. would require all final design and operation plans and schedules for fish passage facilities to be submitted to Maine DEP for review and approval prior to construction.

Condition 2.G. would require a study or studies to determine the effectiveness of all interim and permanent upstream and downstream fish passage facilities and operational measures. The study plans would be subject to review and approval of the Maine DEP prior to implementation. PPL Maine would file the results of the studies and any recommendations for changes in the design or operation of the facilities with the Maine DEP.

Recreation Facilities

Condition 3 would require maintenance of a portage trail around the project.

2. Section 18 Fishway Prescription

Section 18 of the FPA states that the Commission shall require the construction, maintenance, and operation by a licensee of such fishways as the Secretaries of Interior and Department of Commerce may prescribe.

Interior and Commerce's NOAA Fisheries filed preliminary prescriptions for upstream and downstream fishways, pursuant to section 18 of the FPA, on July 2, 2004, and April 20, 2005, respectively. Interior and NOAA Fisheries also included requests for reservation of their respective authorities to prescribe the

construction, operation, and maintenance of fishways, to be consistent with the Settlement.[8]

The preliminary prescriptions are similar and include provisions for downstream passage of all fish species, upstream passage for American eel, and effectiveness monitoring. The prescription for downstream facilities specifies the installation of trash racks with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass discharging up to 70 cfs during the downstream migration period.[9] The prescription specifies operating periods and protocols, and would require the development of maintenance and operational plans, and detailed design drawings and schedules. For upstream passage of American eel, the licensee is to assess the appropriate location for the siting of a new upstream eel fishway, and upon approval of its proposed location by the FWS, Marine Resources, and the Penobscot, would complete installation and initial testing, and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Settlement. The prescription defines the upstream migration period as April 1 to November 30. As with the downstream passage facilities, the prescription specifies operating periods and protocols, and requires the development of maintenance and operational plans, and detailed design drawings and schedules. Lastly, the preliminary prescriptions require the development and implementation of plans to monitor the effectiveness of the downstream and upstream facilities.

Whether upstream fish passage for other species is required depends upon the disposition of the Veazie, Great Works, and Howland projects in accordance with the Settlement. If the above projects are acquired by the Trust and removed, PPL Maine would file an amendment for installation and operation of a fish trapping facility at the Orono Project spillway. Trapped fish would be transported a short distance to the tailwater of the Orono Project at the confluence of the main stem Penobscot River and Stillwater Branch. If the above projects are not acquired, the licensee would implement the fishway prescriptions for upstream facilities previously filed by Interior and NOAA Fisheries on May 20, 1997, and February 16, 1995, respectively, no later than June 25, 2010.

3. Section 10 (j) Recommendations

Under section 10(j) of the Federal Power Act (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. Four section 10(j) recommendations were timely filed by NOAA Fisheries on April 20, 2005.[10]

Recommendation 1 - maintain a continuous, year-round minimum flow of 200 cubic feet per second (cfs), or inflow if less, in the bypassed reach below the dam.

Recommendation 2 - develop a minimum flow operations and monitoring plan.

Recommendation 3 - maintain the project as a run-of-river operation so that, at any given time, flows downstream of the project would approximate the sum of inflows to the project reservoir.

Recommendation 4 - coordinated with the resource agencies the timing of headpond drawdowns for maintenance and repair to ensure adequacy of water flows and downstream passage for all species of concern.

Table 6 in section VIII lists each of the recommendations subject to section 10(j) and whether the recommendations are recommended for adoption under the staff alternative. All recommendations are addressed in the

specific resource sections of the EA.

4. 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 threatened and endangered species or detrimentally affect the critical habitat of such species.

By letter filed August 6, 2004, NOAA Fisheries indicated that the Settlement did not address ESA concerns for the federally listed Cove Brook Atlantic salmon and the shortnose sturgeon.

Cove Brook Atlantic salmon are included in the Gulf of Maine Distinct Population Segment (DPS) and occur downstream of the former site of the Bangor dam. Shortnose sturgeon are believed to occupy habitats in the lower Penobscot River drainage most likely downstream of the Veazie dam. Because the project would be operated run-of-river, the project would not affect habitat conditions in the lower Penobscot drainage below Veazie dam. We, therefore, conclude that redeveloping and operating the project, as proposed by PPL Maine, and in accordance with the Settlement, would not affect the Gulf of Maine DPS of Atlantic salmon or shortnose sturgeon.

The FWS, in its letter dated December 16, 2004,[11] states that the bald eagle is the only federally listed species in the project area. The FWS notes that it is not unusual to see eagles foraging in the Orono project area year-round. FWS states that it is important to maintain the existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future eagle nesting habitat. In this regard, FWS recommends that PPL Maine help protect and maintain riparian forested habitat adjacent to the Orono project to provide a long-term benefit for eagles.

Because project rehabilitation will be of short duration with limited ground disturbance, much of which would be within the project powerhouse, no significant adverse effect is anticipated on bald eagles that may be foraging in the project area. Construction noise, activity, and traffic may cause eagles to temporarily relocate to nearby feeding areas, but any such effects should be insignificant. Currently, all flows at the project dam are released into the 1,000-foot-long bypassed reach. After project rehabilitation, project operation would release 200 cfs of flow through this bypassed reach. The proposed 200-cfs flow release through the project bypassed reach should protect habitat for fish that eagles may use for food. Therefore, based on our analysis, the redevelopment of the Orono Project is not likely to adversely affect the bald eagle. Concurrent with issuance of this EA we will be seeking FWS's concurrence with our effects determination.

5. Coastal Zone Management Act

The Coastal Zone Management Act (CZMA) of 1972, as amended, requires review of the project's consistency with the state's Coastal Management Program. The Maine State Planning Office is responsible for reviewing hydroelectric projects for consistency with the state's Coastal Zone Management Program (CZMP). In a letter dated March 17, 2004, the Maine State Planning Office states that the Orono Project is not located in Maine's designated coastal zone. The Maine State Planning Office notes that any issues regarding coastal resources or uses will be addressed through pertinent state license and permitting processes, as applicable.

6. Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act)[12] requires federal agencies to consult with NOAA Fisheries on all actions that may adversely affect Essential Fish Habitat (EFH).[13] EFH has been designated for Atlantic salmon in the Penobscot River and its tributaries (NEFMC, 1998).

On December 15, 2004, PPL Maine filed an EFH assessment with the Commission that was prepared in consultation with NOAA Fisheries, FWS, the Salmon Commission, and the Penobscot. The

purpose of the EFH assessment was to evaluate the effects of the Settlement on EFH for Atlantic salmon. PPL Maine's assessment indicates that the relicensing of the Orono Project and the requested modifications to the West Enfield, Stillwater, Medway, Milford, and Veazie Projects[14] are part of an overall Penobscot River restoration project that would ultimately result in significant net and cumulative improvements to areas designated as Atlantic salmon EFH, as well as improve access for Atlantic salmon to areas containing EFH not directly involved with these projects. We have incorporated PPL Maine's assessment into this EA as it pertains to the Orono Project, and conclude that licensing the project, as proposed by PPL Maine, in accordance with the Settlement, would not adversely affect EFH. As such, no consultation is required with NOAA Fisheries.

V. ENVIRONMENTAL ANALYSIS

In this section, the general environmental setting in the project area and the scope of our cumulative effects analysis are described. An analysis of the environmental effects of the proposed action and action alternatives is also included. Sections are organized by resource area (aquatic and terrestrial, etc.). Under each resource area, historic and current conditions are first described. The existing condition is the baseline against which the environmental effects of the proposed action and alternatives are compared, including an assessment of the effects of proposed mitigation, protection and enhancement measures, and any potential cumulative effects of the proposed action and alternatives. Staff conclusions and recommendations are discussed in section VII of the EA.

Unless noted otherwise, the sources of our information are the license application and Settlement (PPL Maine, 2004), additional information filed by PPL Maine (PPL Maine, 2005), and the Final Environmental Impact Statement for the Lower Penobscot River Basin, Maine (FERC, 1997).

A. General Description of the Area

The Orono Project is located on the Stillwater Branch of the Penobscot River. The Stillwater Branch is 10.5 miles long and is a channel of the Penobscot River as it flows around the west side of Orson and Marsh Islands. The Orono Project's powerhouse discharges into the main stem Penobscot River downstream of the confluence of the Stillwater Branch and the main stem resulting in a 1,000-foot-long bypassed reach.

The Penobscot River and Stillwater Branch drainages above the project encompass approximately 7,602 square miles. The surface geology of the Penobscot River Basin ranges from high hills of resistant rock to wide, flat river valleys.

B. Scope of Cumulative Effects Analysis

According to the Council on Environmental Quality's regulations for implementing NEPA (40 CFR, Section 1508.7), an action may cause cumulative impacts on the environment if its impacts overlap in time and/or space with the impacts of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time, including hydropower and other land and water development.

Based on our review of PPL Maine's license application, the Settlement and explanatory material, and agency and public comments, we have identified anadromous, catadromous and resident fish because of their potential to be cumulatively affected by the continued operation of the Orono Project in combination with other hydroelectric projects and future planned activities under the Settlement.

Under the Settlement, the focus for anadromous and catadromous fish restoration activities is the main stem Penobscot River. The Stillwater Branch, on the other hand, would be managed primarily for enhanced power production and the protection of any anadromous or catadromous fishes that happen to be using it as a migration corridor; the primary migration corridor being the main stem Penobscot River. In addition to the Orono Project, two other dams are located on the Stillwater Branch; the Gilman Falls dam which is part of the Milford Project

and the Stillwater Project dam.

1. Geographic Scope

The geographic scope of our cumulative effects analysis defines the physical limits or boundaries of the proposed action's effects on aquatic resources. The scope of analysis for these resources encompasses the Stillwater Branch of the Penobscot River from the Gilman Falls dam of the Milford Project to the confluence of the Penobscot River. We chose this geographic scope because of the potential effect the project has 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 the effects associated with the relicensing of the Orono Project that would contribute to the overall fish restoration efforts occurring in the Penobscot Basin. We anticipate that the cumulative effects associated with the future phased-activities of the Settlement would be addressed in later Commission proceedings.

2. Temporal Scope

The temporal scope of our cumulative effects analysis includes a discussion of past, present, and future actions and their effect on aquatic and recreation resources. Based on the potential new license term, the temporal scope looks 30 to 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions. The historical discussion of past actions and effects is, by necessity, limited to the amount of available information for the resource. The quality and quantity of information diminishes as we analyze the resource further away in time from the present.

C. Proposed Action and Action Alternatives

Only the resources that would be affected, or about which comments have been received, are included in detail in this EA and discussed in this section. Based on this, we have determined that aquatic resources, terrestrial, recreation, land use, aesthetics, and cultural resources may be affected by the proposed action and action alternatives. Geology and soils and socioeconomics are not discussed in detail in this EA. However, the effects of temporary land-disturbing activities associated with the rehabilitation of the Orono Project are discussed in the aquatics, terrestrial, and land use and aesthetics resource sections. Because rehabilitating the project would not likely create increases in the permanent labor force, be completed within 8 to 10 months, and as an operating unmanned station would not generate additional full time employment, socioeconomics are not addressed in the EA.

1. Aquatic Resources

Affected Environment

Hydrologic information

A 1911 court decree specifies flow proportions for the Stillwater Branch and the main stem Penobscot River at the Milford and Gilman Falls dams, both part of the Milford Project. The flow proportion is 30 percent and 70 percent, for the Stillwater and Penobscot, respectively, for average flow conditions; as flows decrease, the required proportion of flow to the Stillwater Branch decreases, reaching 9 percent (216 cfs) at a Penobscot River flow of 2,400 cfs. Monthly and annual median flows for the period of record from 1968 through 1990 at the Orono Project are listed in table 1. The average, highest, lowest, and 7Q10[15] flows for the Stillwater Branch at Orono dam are 4,000, 47,000, 320, and 530 cfs, respectively (FERC, 1997).

Table 1. Monthly and annual median flows (cfs) for the Orono Project for the period of record 1968 through 1990 as stipulated by the 1911 Court Decree for flows at Gilman Falls.

Month	Median flow (cfs)
January	1,933
February	2,133

March	2,593
April	8,615
May	7,200
June	2,600
July	1,450
August	1,250
September	1,240
October	1,533
November	2,733
December	2,700
Annual	2,200

Water quality standards

The Maine DEP rates the Stillwater Branch of the Penobscot River including the project's reservoir as Class B waters. Designated uses for Class B waters include drinking water supply after treatment, fishing, recreation in and on the water, industrial process and cooling water supply, hydroelectric power generation, navigation, and habitat for fish and other aquatic life.

The water quality standards for Class B waters require that dissolved oxygen (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, in order to ensure spawning and egg incubation of indigenous fish species, the 7-day mean DO concentration shall not be less than 9.5 ppm and the 1-day minimum DO concentration shall not be less than 8.0 ppm in identified spawning areas.

Maine DEP conducted ambient water quality sampling in the Stillwater Branch and Penobscot River main stem as recent as the summer of 2001 (Maine DEP, 2002). The 2001 data were used in conjunction with 1997 data for the calibration and verification of a water quality model for the Penobscot River Basin. DO sampling was performed for a 3-day period from August 7 through August 9; readings were taken in the morning and afternoon. Morning readings at the Orono site ranged from 6.1 to 6.5 ppm (74.6 to 80.3 percent saturation) and stream temperatures ranged from 25.6 degrees Celsius (*C) to 26.1 *C. Afternoon DO readings ranged from 7.9 to 8.7 ppm (greater than 100 percent saturation) and stream temperatures ranged from 28.2 to 29.1*C. The diurnal range in DO at the Orono site averaged 2.1 ppm and was attributed to the presence of algal activity and a productive system (Maine DEP, 2002). Based on the 2001 sampling and modeling studies, Maine DEP concluded that the project waters attain Maine's DO standard for Class B waters under critical water quality conditions (Maine DEP, 2002).

Fisheries

The Stillwater Branch of the lower 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, fallfish, and several other minnow species. The two most important gamefish in the lower Penobscot River include smallmouth bass and chain pickerel. Smallmouth bass are the most abundant gamefish species present, inhabiting both riverine reaches and impoundments. Chain pickerel occupy backwater areas where stream velocities are low and there is submerged aquatic vegetation. 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 as dropdowns from upstream reaches.

Anadromous species present in the Penobscot River include alewife, Atlantic salmon, and sea lamprey. 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 possible prior to the 1800's. The catadromous American eel occurs throughout the Penobscot River Basin and supports a commercial fishery primarily for juvenile eels known as elvers.[16] Historically, the Penobscot River supported 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 historic range, which includes appropriate habitat upstream from the Orono Project.

Atlantic salmon and alewife are believed to use the Stillwater Branch as a secondary downstream migration route. Radio-telemetry studies conducted by Bangor Hydro-Electric Company and the Atlantic Sea-Run Salmon Commission found that 30 to 40 percent of hatchery-reared smolts[17] and kelts[18] when 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 Penobscot main stem and the Stillwater Branch. Additionally, Atlantic salmon parr[19] have been observed resting and holding in the Orono Project bypassed reach and tailrace areas.

Atlantic salmon EFH

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 New England Fishery Management Council's (NEFMC) Essential Fish Habitat 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.

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 (cm) and 61 cm, and water velocities between 30 and 92 cm 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 dissolved oxygen above 5ppm. 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 cm and 61 cm, water velocities around 61 cm 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, including all 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).

Environmental Impacts and Recommendations

a. Short-term construction effects.

PPL Maine's proposal to replace previously demolished penstocks with new penstocks within the existing penstock right-of-way could cause some short-term erosion and sedimentation effects in the Stillwater Branch.

No agency has recommended any measures to address the project rehabilitation efforts and the 401 WQC did not contain any conditions on instream construction activities. PPL Maine estimates that total construction time for all of the remaining rehabilitation activities including penstock replacement would occur over an 8 to 10 month period (May through October).

Staff Analysis

Because any construction activities needed to install the new penstock would occur within the existing right-of-way for the previous penstock, we anticipate that land-disturbing activities would be minor. However, because the right-of-way lies within or adjacent to the bypassed reach some short-term erosion and sedimentation could still affect aquatic habitats within the bypassed reach. A soil erosion control plan that specifies the measures that would be used during penstock installation to control erosion and sedimentation would help ensure that aquatic habitats are protected during rehabilitation activities.

b. Run-of-river operation.

PPL Maine proposes to operate the Orono Project in a run-of-river mode. Under condition 1.A of the WQC, the Orono Project would 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 the Orono Project impoundment would be maintained within 1 foot of full pond or elevation 72.4 feet msl. During periods of flashboard failure, PPL Maine would maintain water levels at or above the spillway crest. During flashboard replacement, PPL Maine would be required to hold water levels within 1 foot of the spillway crest. The WQC allows temporary modifications from the above specified operation for (1) approved maintenance activities, (2) hydrologic conditions beyond PPL Maine's control, (3) emergency electrical system conditions beyond PPL Maine's control, or (4) agreement between PPL Maine, the appropriate resource agencies, and the Penobscot. Run-of-river operation would be required within 60 days of Commission approval of a plan for monitoring water levels and flows. The monitoring plan would be developed in consultation with FWS, Maine Fish and Wildlife, the Salmon Commission, Marine Resources, the Penobscot, and Maine DEP within 6 months of any license issuance.

NOAA Fisheries (10(j) recommendation 3) recommends run-of-river operation consistent with condition 1.A. of the WQC.

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Staff Analysis

The Orono Project discharges powerhouse flows directly into the Penobscot River just below the confluence with the Stillwater Branch. Operating the project in a run-of-river mode would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be due to operation of the Orono Project. Therefore, Orono Project operation would not contribute to any effects of fluctuating water levels (i.e. fish stranding, reduction of spawning habitat) in the Penobscot River.

Fish that inhabit and spawn in near-shore areas of project impoundments can be susceptible to stranding as well as egg desiccation from project-related fluctuating water levels.

Limiting impoundment fluctuations to 1 foot or less would reduce the chances of fish stranding and disruption of spawning habitat. Maintaining relatively stable impoundment levels would benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for feeding, spawning, and cover. Erosion and resultant turbidity are also reduced when impoundments are held at relatively stable levels.

c. Minimum flows in the bypassed reach.

Orono Project powerhouse flows would be discharged into the main stem Penobscot River downstream of the confluence with the Stillwater Branch bypassing the lowermost 1,000 feet of the Stillwater Branch. Without the release of an additional minimum flow, only leakage flows and spill flows would provide habitat for aquatic resources in the bypassed reach.

PPL Maine proposes to maintain a minimum flow of 200 cfs in the project's bypassed reach consistent with condition 1.B of the WQC. The WQC allows temporary modifications from the above specified operation for (1) approved maintenance activities, (2) hydrologic conditions beyond PPL Maine's control, (3) emergency electrical system conditions beyond PPL Maine's control, or (4) agreement between PPL Maine, the appropriate resource agencies, and the Penobscot.

NOAA Fisheries (10(j) recommendation 1) recommends a year-round minimum flow of 200 cfs, or inflow if less, in the bypassed reach consistent with condition 1.B. of the WQC.

PPL Maine based its minimum flow proposal on an Instream Flow Incremental Methodology Study (IFIM)[20] conducted in 1991. The study area included the 1,000-foot-long by 500-foot-wide bypassed reach. The reach is described as a flat channel with rock, cobble, and ledge substrate with three separate channels leading to the Penobscot River main stem. The study evaluated flow versus habitat relationships for six fish species life stages--Atlantic salmon juveniles; smallmouth bass young-of-year (YOY), juveniles, and adults; American shad spawning/incubation and larvae/juveniles--at flows ranging from leakage to 346 cfs (table 2 and figure 3).

Table 2. Weighted usable area (WUA) for six fish species life stages at flows ranging from leakage to 346 cfs in the Orono Project bypassed reach (bolded values indicate peak WUA values over the range of flows evaluated).

			WUA			
Species life stage	346 cfs	258 cfs	189 cfs	86 cfs	45 cfs	Leakage
Atlantic salmon juveniles (ASJ)	206.2	175.0	121.8	43.8	18.6	6.5
Smallmouth bass YOY (SMBY)	20.8	40.5	40.2	44.8	31.6	19.0
Smallmouth bass juveniles (SMBJ)	112.1	118.5	107.9	74.5	43.1	25.5
Smallmouth bass adults (SMBA)	107.1	97.3	67.9	33.2	22.6	20.1
American shad spawning/incubation (ASSI)	82.9	46.4	18.5	3.9	3.0	0.0
American shad larvae/juveniles (ASLJ)	107.5	67.0	34.5	23.9	19.9	15.6

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Staff Analysis

Over the range of flows evaluated, WUA was highest at a flow of 346 cfs for all but two species life stages--smallmouth bass

YOY and juveniles. However, for smallmouth bass YOY and juveniles, the WUA versus discharge curves are relatively flat over a range of flows from 86 to 258 cfs for YOY and 189 to 346 cfs for juveniles suggesting that similar habitat would be provided by PPL Maine's proposed 200-cfs flow. Although WUA continued to increase with increasing flow for smallmouth bass adults and Atlantic salmon juveniles over the range of flows evaluated, the rate of habitat improvement declined at flows above 189 cfs. On the other hand, the rate of habitat improvement for American shad spawning/incubation and larvae/juvenile life stages continued to increase as flows increased throughout the entire range of flows evaluated suggesting that the peak WUA for those life stages would be outside of the range of flows studied.

Figure 3. Habitat (WUA) for fish species life stages evaluated at flows (cfs) ranging from leakage to 346 cfs for the Orono bypassed reach instream flow study.

In addition to the IFIM study results, we considered how frequently spill flows would occur in the bypassed reach and what benefit, if any, these flows may have on the fish species life stages evaluated in the IFIM study. Based on the monthly flow duration curves, flows in the Stillwater Branch would exceed the project's maximum hydraulic capacity of 1,740 cfs between 70 and 100 percent of the time during the March through June period. Therefore, for species life stages potentially present during that time frame such as American shad spawning/incubation and larval/juvenile, spill flows would likely provide additional habitat above that provided by the 200-cfs minimum flow. Because most of the WUA versus discharge curves show that habitat is beginning to level off or decline above 200 cfs for the remaining species life stages evaluated, we would expect the level of habitat improvements to be less noticeable for those species during spill periods.

d. Flow and water level monitoring plan.

Under condition 1.E. of the WQC, PPL Maine would develop and implement a plan for monitoring impoundment levels and minimum flows. The plan would be developed in consultation with FWS, Maine Fish and Wildlife, the Salmon Commission, Marine Resources, the Penobscot, and Maine DEP and would be subject to approval by the Maine DEP prior to implementation.

NOAA Fisheries (10(j) recommendation 2) recommends a minimum flow operations and monitoring plan. NOAA Fisheries (10(j) recommendation 4) also recommends that the timing of headpond drawdowns for maintenance and repair be coordinated with the resource agencies.

Staff Analysis

A plan to monitor impoundment levels and minimum flows developed in consultation with the relevant agencies that describes contingencies for emergencies (such as providing downstream flows during project shutdown), scheduled maintenance drawdowns, droughts, as well as reporting criteria, would minimize misunderstandings about operational compliance and help ensure that aquatic resources at the project are protected during the term of a license.

e. Downstream fish passage.

Anadromous species such as Atlantic salmon and alewife and the catadromous American eel that use the Stillwater Branch as a downstream migratory route would be subject to injury or mortality when spilling over the dam during high flow periods or passing through the project turbines on their way to the lower Penobscot River main stem.

In order to pass outmigrating fish, PPL Maine proposes to provide downstream fish passage measures consistent with the Settlement, the WQC, and Interior's section 18 fishway prescription dated May 20, 1997,[21] within 3 years of license issuance. NOAA Fisheries filed on April 20, 2005, under section 18 of the FPA, a prescription for downstream and upstream fish passage facilities and effectiveness monitoring consistent with the Settlement. NOAA Fisheries specifies operating periods depending upon which species is migrating at the time that span

the general period from April 1 until December 31. Specifically, Interior's and NOAA Fisheries' prescription included the installation of trashracks with 1-inch clear spacing at the powerhouse turbine intake, and a gated surface and bottom bypass structure capable of discharging up to 70 cfs during the downstream migration period. In addition, PPL Maine would conduct effectiveness studies of the measures. If the studies show that the measures are not effective at passing American eel, PPL Maine would institute nightly shutdowns for a 2-week period during the downstream migration season. The shutdowns, however, would not be implemented prior to the expiration of the 10-year safe harbor period specified in Attachment A, section II(c) of the Settlement.

Staff Analysis

Although the emphasis for passage of anadromous fish species under the Settlement is at the main stem projects, downstream fish passage measures would facilitate the movement of anadromous fish such as Atlantic salmon and alewife that happen to use the Stillwater Branch as an outmigration route. Angled bar racks with 1-inch spacing and surface bypasses have been used at a number of hydroelectric facilities in the northeastern United States (Winchell et al., 1994). Typically, a maximum approach velocity of 2 feet per second and a bypass flow of 2 percent of the plant flow or 20 cfs, whichever is greater, are specified for the facility (Winchell et al., 1994). Nettles and Gloss (1987) found that angled racks significantly reduced entrainment of Atlantic salmon smolts into the project intakes of a hydroelectric facility on the Bouquet River, New York; out of 30 tagged smolts, 18 passed via the bypass and 12 passed via the spillway. Bypass effectiveness exceeded 95 percent at a similar study on Atlantic salmon smolts conducted at the Lower Saranac Hydroelectric Project on the Saranac River, New York (Simmons, 2000). Effectiveness testing has not been common to date for clupeid species such as alewife possibly due to their sensitivity to stress.

While an angled trash rack is not specifically proposed at the Orono Project, the intake is oriented at about 40 degrees to the main spillway of the project dam and should serve to guide fish to the bypass sluice and, therefore, protect fish from entrainment and turbine-induced mortality. The prescribed bypass flow of 70 cfs represents about 4 percent of the powerhouse flows when the project is operating at its hydraulic capacity and a greater percentage at lower seasonal flows during the April through December passage season.

Outmigrating sexually mature American eels known as silver eels are particularly vulnerable to direct effects at hydroelectric facilities such as migration delays, impingement, and turbine-induced mortality.[22] Turbine entrainment mortality of American eels has been estimated to range from 6 percent for Francis-type turbines to 37 percent for Kaplan turbines (Richkus and Whalen, 1999). However, the timing and distribution in the water column of downstream migrating eels is not well understood. Generally, the spawning migration of silver eels occurs in late summer through fall in New England (Facey and Van Den Avyle, 1987) although the magnitude of the movement can be highly variable. Peaks in eel movement have been shown to coincide with declining water temperatures, periods of increased discharge, and lunar phases (Richkus and Whalen, 1999). Additionally, the behavior of migrating eels when confronted with an obstacle such as a dam or turbine intake is poorly understood. Eels have been shown to occupy a variety of depths within a forebay intake (Haro and Castros-Santos, 1997), and to pass a hydroelectric facility via turbine entrainment even though spill flows were occurring (Euston et al., 1997; 1998). Impingement on trash racks can also affect downstream migrating eels and can ultimately lead to entrainment as eels force themselves through the bar racks. Adams and Schwevers (1997) found that eels were able to avoid angled racks having 20-millimeter (mm) spacing at velocities less than 50 cm per second, whereas at higher velocities, eels became impinged. Eels that became impinged ultimately were able to force themselves through the 20-mm spacing.

Therefore, due to the variable nature of downstream eel migration, effective fish passage would likely depend on providing a variety of measures for migrating eels and the ability to modify the measures depending on the results of effectiveness studies. The proposed fishway would provide a

guidance mechanism in the form of trash racks with 1-inch clear spacing and two possible escape routes, the surface and bottom bypasses. If the above measures are not effective at passing eels, PPL Maine would, after the safe harbor time period, implement nightly shutdowns.

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f. Upstream fish passage.

American eel

The Atlantic States Marine Fisheries Commission (ASMFC) cites structures that impede upstream and downstream passage as factors that may contribute to the population decline of the American eel (ASMFC, 2000). The Orono Project is the first dam on the Stillwater Branch and is located upstream of the lowermost dam on the main stem of the Penobscot River at the Veazie Project (FERC No. 2403). These dams and the facilities located upstream from Orono and Veazie on the Stillwater Branch and Penobscot River, respectively, act as barriers to a certain extent to American eel passage.[23]

In order to support state management goals for American eel, PPL Maine proposes to provide facilities for upstream eel passage at the project. The facilities would be consistent with the Settlement, the WQC, and Interior's and Commerce's section 18 fishway prescriptions. PPL Maine would consult with the fishery agencies and the Penobscot as to the appropriate location for the fishway, and upon approval of the location, complete installation and initial testing and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Settlement, June 22, 2004. The facilities would be operational for the period April 1 to November 30. As with the downstream fishway facilities, a plan to monitor the effectiveness of the upstream eel passage facility would be developed and implemented.

Staff Analysis

As demonstrated on the Penobscot and elsewhere, American eel do have the ability to migrate around or over instream barriers and colonize upstream areas (Richkus and Whalen, 1999). Elvers have been documented climbing near vertical, wet surfaces while yellow eels have been known to migrate around barriers via terrestrial routes (Tesch 1977). Because of this ability, upstream eel passage facilities are simple in design, consisting of some type of roughened surface such as small branches, wood shavings, aquatic vegetation, or nylon bristles and plastic tubing with minimal water flow to wet the surface.

Neither the Settlement nor Interior or Commerce in their respective fishway prescriptions specified the type of upstream facility that would be constructed. However, based on installations elsewhere, we would expect that the facility would be some type of ramp structure fitted with a material enabling the eels to ascend the ramp from the toe of the dam to the project's impoundment. In addition, a small attraction flow would be provided to wet the ramp surface and facilitate eel movement. It would be preferable to locate the fishway in an area near the dam where eel congregate. It is expected that the details of placement, attraction flow, and design of the structure itself would be developed in consultation with the agencies and filed with the Commission for approval prior to final implementation. The effectiveness monitoring of the fishway would be helpful to ensure that the facility is in the best location and operating properly. Although eel do occur throughout the Penobscot River drainage despite the number of dams that impede movement, providing upstream eel passage at the Orono Project should increase the number of eel able to utilize upstream habitats for rearing and maturing.

Anadromous fish

A primary feature of the Settlement is to focus restoration efforts for anadromous fishes on the main stem of the Penobscot River while maintaining viable hydroelectric generation on the Stillwater Branch. At the same time, measures would be provided to protect fishes that happen to move downstream past the Stillwater Branch developments as well as enhance upstream

American eel passage (see previous discussion). Although upstream fish passage for anadromous fishes at the Orono Project is not a primary goal at relicensing, the Settlement does provide for upstream passage considerations in the future depending upon the ultimate disposition of the Veazie, Howland, and Great Works projects.

Staff Analysis

Under the Settlement, if the above projects are acquired by the Trust and removed, PPL Maine would file an amendment for installation and operation of a fish trapping facility at the Orono Project spillway. PPL Maine would be responsible for transporting trapped fish a short distance to the tailwater of the Orono Project at the confluence of the main stem Penobscot and Stillwater rivers. Any long distance transport of trapped fish would be the responsibility of the resource agencies and Penobscot. Further, if any future modifications or new facilities are needed, PPL Maine would file an amendment for such modifications upon its receipt of the necessary funding. Both Interior and Commerce reserved their respective authorities to prescribe fishways including the fish trapping facility upon acquisition of the Veazie, Great Works, and Howland Projects.

Under the above scenario, the trap and haul process would be used to move anadromous fish that congregate below the Orono Project to the Penobscot River main stem or other as yet unidentified sites. With the majority of the total river flow residing in the main stem, we expect that most anadromous fish would use the main stem as a migration corridor rather than the Stillwater Branch. However, for those fish that stray into the Stillwater Branch, the trap and haul operation would serve to return fish to the main stem thus limiting migration delays. Additional evaluation of the trap and haul facility would be needed at the time PPL Maine files any license amendment and revised fishway prescriptions are submitted by Interior and Commerce.

If the above projects are not acquired, and therefore, not ultimately removed, PPL Maine would file an amendment for installation and operation of the upstream fish passage facilities prescribed by Interior and Commerce on May 20, 1997, and February 16, 1995, respectively, no later than June 25, 2010. Those fish passage facilities would consist of either a vertical slot fishway (with pools 8 feet wide by 10 feet long and a 9-inch drop per pool), denil fishway (4 feet wide with a 1-on-8 slope), or a fish lift with a 600-gallon hopper capacity at the Orono dam. A 50-cfs attraction flow would be provided representing about 2.5 percent of the anticipated 2,000-cfs average spillway discharge during the May to June portion of the upstream migration period. We expect that more detailed fishway prescriptions would be filed by Interior and Commerce at the time PPL Maine files its amendment.

Even though under the Settlement the emphasis for restoration activities for anadromous fishes would be the main stem of the Penobscot River, the relative importance of the Stillwater Branch for anadromous fish restoration would be elevated if the Veazie, Great Works, and Howland projects are not acquired and removed. In this instance, upstream passage facilities at the Orono Project would allow anadromous fish to access any suitable habitat in the Stillwater Branch and its tributaries including Pushaw Stream. The benefit of implementing upstream fish passage at the Orono Project would need to be evaluated at the time a license amendment is filed and a revised fish passage prescription is submitted by Interior and Commerce.

g. Contingent mitigation fund.

Under the Settlement and consistent with the WQC, PPL Maine would establish the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their respective dams not subsequently removed.[24] Under the Fund, the contributions due to the effects of redeveloping the Orono Project on the bypassed reach would be $1,000 per year for the term of the license. The disposition of the monies would be determined upon mutual agreement among the Penobscot, Bureau of Indian Affairs, FWS, NOAA Fisheries, and the state of Maine agencies for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensating for loss or degradation

of fish and wildlife habitat due to habitat effects by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and the habitat on which these fisheries rely. The Settlement did not provide further specificity for any of the above uses of the Fund.

Cumulative Effects Analysis

The installation of downstream fish passage facilities at the Orono project would ensure that mortality of outmigrating fishes including Atlantic salmon and alewife is minimized. This, combined with the reduction in downstream mortality rates of outmigrating fishes at Veazie should Veazie be removed in the future, should contribute to significant positive benefits to anadromous fish within the Penobscot River Basin. 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 dam would also likely enhance eel stocks throughout the Penobscot River Basin. For resident species such as smallmouth bass and chain pickerel, the potential benefits of maintaining a minimum flow of 200 cfs in the Orono bypassed reach may be offset somewhat by the loss of impoundment habitat if and when the Veazie dam is removed. While smallmouth bass may benefit from maintaining minimum flows in the Orono bypassed reach and creating additional riverine habitat with the removal of Veazie dam, chain pickerel, a species that prefers slower moving waters, may be adversely affected by the removal of Veazie dam. However, the overall cumulative effects associated with the relicensing of the Orono Project together with the other planned activities under the Settlement would be beneficial to the restoration of anadromous and catadromous species (Atlantic salmon, American shad, alewife, American eel) to the Penobscot River Basin and to some resident species such as smallmouth bass.

Unavoidable Adverse Impacts

Some number of anadromous and resident fish and American eel that are not excluded or diverted from the project intake by the downstream fish passage facilities may suffer mortality due either to impingement on the trashracks or by contact with the turbines. This long-term effect is expected to be minor, given the largely beneficial effects of the Settlement on the restoration goals of the basin. There may be some minor short-term erosion and sedimentation effects resulting from construction activities associated with rehabilitating the project facilities.

2. Terrestrial Resources

Affected Environment

Botanical Species

Light residential development encompasses approximately 30 percent of the Orono Project area, mostly in the vicinity of the dam and powerhouse. In undeveloped areas, the predominant cover types include hardwood, mixed and bottomland forests (including forested wetlands). Approximately 11 acres of unforested wetlands occur in the Orono Project area, including scrub/shrub (4 acres), emergent (4 acres), and riverine aquatic beds (3 acres). There are no known threatened or endangered botanical species in the Orono Project area. The Maine Natural Heritage Program's database indicates two species of special concern, Orono sedge (Carex oronensis) and long-leaved bluet (Houstonia longifolia) that have been documented to occur along the Orono impoundment.

Wildlife Species

A variety of upland and wetland habitats occur in the project area. Because this area is about 30 percent light residential, the diversity of wildlife is limited. Species likely to occur in the project area include: (1) mammals such as the white-tailed deer, striped skunk, mink, raccoon, red and gray fox, bats such as the red bat, beaver, woodchuck, and grey squirrel; (2) birds such as wood duck, mallard, killdeer, and Coopers hawk; and (3) amphibians and reptiles such as the cricket frog, spring peeper, American toad, snapping turtle, and painted turtle

Environmental Impacts and Recommendations

Rehabilitation of the project would occur primarily at existing facilities minimizing the impact on vegetation and wildlife. Operation of the rehabilitated project is not expected to have any negative impacts on vegetation and wildlife, since the water levels in the impoundment would generally remain the same as under historic operation. An exception to terrestrial impacts is likely to occur with replacement of the penstocks. Minor, short-term impacts are expected to occur on vegetation growing in the vicinity of the proposed penstocks.

In addition, the project's 1,000-foot-long bypassed reach currently receives all flows (ranging from about 200 to 18,500 cfs, 80 percent to 2 percent of the time, respectively, with about 2,200 cfs 50 percent of the time) from the Stillwater Branch since the project stopped operating in June of 1996. Generally, the vegetation and wildlife that presently occur in the bypassed reach have adapted to these flows. Rehabilitation of the project would change the bypassed flow to a continuous 200 cfs, during non-spill periods.

A change in bypassed reach flows to 200 cfs could cause an adverse effect on existing riparian vegetation and wildlife. The lower project operational flows would generally dewater some of the shoreline of the bypassed reach. This could reduce habitat for some wildlife species such as mink, raccoon, beaver, waterfowl, and amphibians and reptiles because of the net loss of riparian habitat with dewatering. Wildlife species expected to benefit are species such as the striped skunk, grey squirrel, red and gray fox, and woodchuck because the dewatered shoreline would provide additional habitat. Riparian vegetation is expected to expand because the dewatered shoreline would provide better habitat for plant establishment. Such an expansion would benefit a variety of wildlife.

Unavoidable Adverse Impacts

Construction of the new penstocks would cause a minor short-term impact on vegetation. Dewatering the shoreline with the 200 cfs minimum flow through the bypassed reach would have minor adverse effects on some wildlife species.

3. Threatened and Endangered Species

Affected Environment

Fish

No federally listed threatened or endangered fish species occur in the Orono Project area including the Penobscot River main stem above the Veazie dam. However, two endangered species--shortnose sturgeon and the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon-- are found in areas further downstream.

On March 11, 1967, shortnose sturgeon (Acipenser brevirostrum) was listed as endangered throughout its range. A population of shortnose sturgeon is recognized to exist in the Penobscot River (National Marine Fisheries Service, 1998) although collection efforts have not been met with much success. One shortnose sturgeon was captured in Northport, Maine in Penobscot Bay on June 30, 1987. No sturgeon were collected during surveys conducted during 1994 and 1995, however, the number of net hours (409 hours) was far below that of other surveys for shortnose sturgeon on the Merrimack River (11,396 hours) and Cape Fear River (21, 432 hours) where 25 and 3 shortnose sturgeon, respectively, were captured (National Marine Fisheries Service, 1998).

Kynard (1997) states that the upstream limit of the shortnose sturgeon population range for all northeast rivers supporting sturgeon except the Connecticut River is at the first dam on the river. Therefore, the most likely upstream extent of this species range in the Penobscot River is the area downstream from Veazie dam which is the first obstacle to fish passage.

On November 17, 2000, NOAA Fisheries and the FWS listed the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as endangered. The historic geographic range of the DPS includes tributaries to the lower Penobscot River (below the former site of Bangor dam). The DPS includes the Cove Brook

population. Cove Brook is a tributary to the Penobscot River and is located downstream of the Orono Project. The listing deferred a decision regarding whether the DPS included the Penobscot main stem and its tributaries above the former site of Bangor dam. A status review of additional Atlantic salmon populations including the Penobscot River population is currently being conducted.

Wildlife

The FWS, in its December 16, 2004, letter, states that the bald eagle is the only federally listed species in the project area. FWS also states that the nesting population of the Lower Penobscot Basin in 2004 was about 325 pair. FWS notes it is not unusual to see eagles foraging in the Orono Project area year-round.

Environmental Impacts and Recommendations

Fish

By letter filed August 6, 2004, NOAA Fisheries indicated that the Settlement did not address ESA concerns for the listed Cove Brook Atlantic salmon and the shortnose sturgeon but did not recommend any specific protection or enhancement measures.

Staff Analysis

PPL Maine's proposal to operate the project in a run-of-river mode would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be due to operation of the Orono Project. Because the project would not affect habitat conditions in the lower Penobscot (i.e. below Veazie dam), we conclude that there would be no affect on the federally listed shortnose sturgeon or Gulf of Maine DPS of Atlantic salmon.

Bald Eagle

The FWS notes that redeveloping the Orono Project is part of a Settlement that would result in improved conditions for fish and enhanced fish runs, thus benefiting eagles. The FWS further notes it is important to maintain existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future bald eagle nesting habitat. The FWS recommends that PPL Maine, to the extent possible, help protect or maintain such riparian forested habitat.

Staff Analysis

Redeveloping the Orono Project with a 200-cfs release into the bypassed reach is not likely to have an affect on bald eagles because feeding habitat should remain generally the same. Construction activities may cause perching eagles to temporarily relocate to nearby areas on the Stillwater Branch and Penobscot River, but this effect should be insignificant.

Protecting mature forested riparian vegetation at the project would protect eagle foraging and potential future nesting habitat. Based on our analysis, therefore, we conclude that redeveloping, operating and maintaining the project, as proposed, would not be likely to adversely affect the bald eagle.

4. Recreation Resources

Affected Environment

The project area is known for its recreation opportunities, especially fishing and boating, and state, local, private and non-governmental entities have identified the area as an area of recreational value. The project area offers a wide variety of recreation opportunities including fishing, canoeing, kayaking, biking, picnicking, sightseeing, snowmobiling, and waterfowl hunting. The University of Maine maintains a hand-carry (boat) access site, including a seasonal dock, on the east shore of the impoundment. The Town of Orono also maintains two day-use parks along the east shore. There are a number of trails used by a local land trust on the west shore of the impoundment. Boats can access the impoundment via a boat put-in and portage at PPL Maine's upstream Stillwater Project (FERC No. 2712). In addition, PPL Maine maintains a portage trail around the Orono dam via Water Street to a downstream put-in location on the main

stem of the Penobscot River immediately below the Orono powerhouse. Canoeing, kayaking and fishing are the most popular activities both upstream and downstream of the dam. Anglers are permitted to fish below the powerhouse near the canoe put-in site.

The most recent Commission Form 80 project recreation report (March 26, 2003) states that use of the Orono facilities is light. All recreation facilities were used less than 30 percent of their capacity. In addition, a 1996 Environmental and Public Use Inspection (EPUI), found all recreation facilities to be adequate. The project was not operating at that time.

Environmental Impacts and Recommendations

PPL Maine proposes to maintain the existing portage trail, signage, and parking area at the powerhouse. Condition 3 of the section 401 WQC would require PPL Maine to maintain a portage trail around the project. No other resource protection, mitigation or enhancement measures have been requested by resource agencies or are proposed by PPL Maine in connection with its proposal to redevelop the project.

Staff Analysis

The maintenance of existing facilities and recreation opportunities would continue valuable recreation opportunities in the project area and vicinity. Recreational use and facilities would be monitored by PPL Maine as part of the Commission's Form 80 report which is required to be filed every 6 years. In addition, the Commission would conduct periodic environmental and public use inspections that evaluate the adequacy of public use resources and facilities.

Unavoidable Adverse Impacts

None.

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5. Land Use and Aesthetics

Affected Environment

The project area is in Penobscot County, a moderately populated county with primarily agricultural and timber land uses. Residential land use is concentrated in Bangor, Orono, and Old Town, and rural residences are mostly part of farms or are vacation homes. Other land uses in the region include recreation, utility corridors, and light industry.

The land bordering the Orono impoundment is predominantly forested with mixed urban residential and commercial development along the lower impoundment near the dam and powerhouse. There are no known domestic, irrigation or other consumptive uses of the river water in the project area. There are also no known industrial uses or discharges of water into the impoundment or tailrace.

Much of the river basin's topography is upland terrain, with low rolling hills rising above wide river valleys. The project area is viewed by neighborhood and University campus-related viewers (in addition to boaters and anglers). The scenic character of the project area is more a function of adjacent land uses than changes of topography. Most of the shoreline is heavily wooded. Transitory viewers, typically recreation users and residents have intermittent and filtered views of the river from roads, recreation areas and the University campus (primarily open with scattered trees along the shoreline), which is visible from much of the impoundment.

Environmental Impacts and Recommendations

Because the project site was used in the near past for hydroelectric power, and most of the needed facilities remain intact at the site, no significant change in land use would occur if the project is redeveloped and operated.

PPL Maine is not proposing any aesthetics-related measures nor have any recommendations been filed for these resources.

However, PPL Maine's rehabilitation of the project would include construction activities at the powerhouse while upgrading the generating facilities and constructing new penstocks below the dam.

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Staff Analysis

PPL Maine proposes no changes that would affect land use. Regarding project aesthetics, PPL Maine proposes construction at the powerhouse and replacement of the three penstocks downstream of the dam.

Construction at the powerhouse would involve delivery of machinery and equipment by trucks and other vehicles, but these activities would be infrequent and short-term with negligible adverse effects on aesthetics. There would be a short-term increase in noise, dust, and fumes but this effect should be negligible.

PPL Maine would rebuild or restore 800 to 900 feet of three penstocks that collapsed in 1996. The three 10-foot diameter penstocks would extend from the dam to the powerhouse and would run through sections of the river and along the embankment. PPL Maine also proposes to repair other project structures that have deteriorated during the last decade of non-use. Rebuilding the penstocks would take approximately 8 to 10 months to complete and would involve construction crews, large equipment, trucks and materials. Little or no construction would take place during the cold winter months. Reconstruction would take place in the open, would be highly visible to recreationists in the area, and would likely have a moderate, short-term adverse effect on project aesthetics. Reconstruction of the penstocks would create noise, some dust and fumes from trucks but this would be minor and of limited (8-10 month) duration. Upon completion of the construction, project aesthetics would be approximately the same as it was before the penstock collapse but could be improved by selecting a penstock color that blends with the general riverine environment.[25]

Regarding river flow aesthetics, PPL Maine proposes a 200 cfs flow release into the 1000-foot-long by 500-foot-wide bypassed reach. Currently, the bypassed reach carries natural flows that average between 8,615 cfs median flow in April to low median flows of 2,600, 1,450, 1250 and 1,533, respectively, from June through October (see table 1)(the hydraulic capacity of the turbines is 1,749 cfs). Since the hydraulic capacity of the turbines would exceed the median flows from approximately July through October, a 200-cfs minimum flow is what would be viewed during a large portion of the recreation season. A 200-cfs minimum flow in the bypassed reach would result in a lessening of the wetted perimeter and would expose boulders, rocks and gravel. Consequently, the 200-cfs minimum flow would have a moderate adverse effect on river aesthetics.

However, historically, during project operation, there was no minimum flows maintained in the bypassed reach during the dry period except that which occurred by dam leakage.

Unavoidable Adverse Impacts

A short-term, moderate adverse effect on project aesthetics due to the reconstruction of the penstocks and other construction activities would be unavoidable. A minor, short-term increase in noise and dust due to traffic and construction activities would also be unavoidable.

6. Cultural Resources

Affected Environment

The cultural history of Maine began during the Paleo-Indian Period, between 11,000 and 10,000 years ago. The earliest evidence of habitation in the Penobscot Basin area is from materials dated from more that 8,000 years ago. There were permanent, seasonal and temporary prehistoric encampments and activities such as tool making at sites that were flat and had easy access to water. Sites near or adjacent to falls, rapids, and stream confluences were especially attractive to early

inhabitants. The Penobscot is the remaining tribe of several that were believed to be in the area. Today, there is a vital Penobscot community on Indian Island, located in Old Town above the Milford Project dam. Appropriately, the Penobscot community has been a part of this licensing process.

There has been considerable activity by Euro-Americans in the area above Bangor; most of the development occurred on the Penobscot and Stillwaters rivers. The first settlers altered the existing landscape by building dams and sawmills. Some of this development remains in the general project area.

Nevertheless, there are no known historical or archaeological properties within the project area listed or eligible for listing in the National Register of Historic Places.

Environmental Impacts and Recommendations

The Maine Historical Preservation Commission (State Historic Preservation Officer - SHPO), in its letter dated March 14, 2004, reported that there are no properties in the Orono Project area of prehistoric, historic, architectural or archaeological significance that would be adversely affected by project licensing. PPL Maine also consulted with the Penobscot Tribal Historic Preservation Officer (THPO) regarding the project licensing to confirm that there are no additional cultural, historic or archaeological issues at this time.

Staff Analysis

We concur with the SHPO's determination that no historic properties would be affected by issuing a license to redevelop and operate the Orono Project. However, if PPL Maine undertakes land-disturbing maintenance or repair at the project in the future, and if archaeological or historic sites are discovered, consultation with the SHPO and THPO and mitigation measures would help protect the discovered sites.

Unavoidable Adverse Impacts

None.

D. No-Action Alternative

Under the no-action alternative, the project would remain in its inoperable state and no new environmental protection, mitigation, or enhancement measures would be implemented.

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the Stillwater Branch of the Penobscot River's available water resources to generate hydropower; estimate the economic benefits of the proposed project and alternatives; estimate the cost of various environmental measures; and estimate the effects of these measures on project operations.

A. Power and Economic Benefits of the Project

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division,[26] the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The basic purpose of the Commission's economic analysis is to provide a general estimate of the potential power benefits and the costs of a project, and reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

Our estimate of the energy and capacity value was developed from the most reasonable alternative generation available. We base our estimate of the comparable cost of energy generation on the fixed cost to construct and operate a combined-cycle combustion turbine plant fueled by natural gas in the New England region of the United States, and a regional energy cost of 43.15 mills per kWh. We estimate the energy cost based on information in Energy Information Administration, Annual Energy Outlook 2005.[27] We assume a capacity value of $96 per kilowatt (kW)-

year. We estimate that the dependable capacity of the operating project would be 2.03 MW. Under these conditions, the total energy and capacity cost is 54.08 mills/kWh.

For our economic analysis of the alternatives, we use the parameters, values (2004$), and sources shown in table 3.

Table 3. Staff parameters for economic analysis of the Orono Project (Source: the staff).

Parameters	Values (2005$)	Sources
Period of analysis	30 years	Staff
Term of financing	20 years	Staff
Interest/cost of capital	8.0 percent	Staff
Escalation rate	0 percent	Staff
Federal tax rate	34 percent	Staff
Local tax rate	3.05 percent	Staff
Insurance rate	$0.25 percent of cost of construction	Staff
Net investment 1	$831,000	PPL Maine
Operation and maintenance cost 2	$20,000 and $170,000	Staff and PPL Maine
Energy and capacity value	54.08 mills/kWh	Staff

1 The net investment also includes the cost of relicensing, see pages B#9-1 and B#10-1 of the additional information filed on January 24, 2005.
2 We assume the O&M cost of the non-operating project to be minimal. For O&M of the operating project, see page B#11-1 of the additional information filed on January 24, 2005.

1. Proposed Action (Settlement with the option to acquire other projects)

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures assuming the Trust does exercise its option to acquire the Howland, Great Works, and Veazie Projects. Under this alternative, PPL Maine would install and operate a fish trapping facility at the project spillway, but would not install and operate upstream fish passage facilities, or provide annual monetary compensation.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project, would be about $507,100 (30.40 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $395,130 (23.68mills/kWh).

2. Proposed Action (Settlement without the option to acquire other projects)

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures assuming the Penobscot River Restoration Trust (Trust) does not exercise its option to acquire the Howland, Great Works, and Veazie Projects. Under this alternative, PPL Maine would install and operate upstream fish passage facilities, and would provide annual monetary compensation, but would not install and operate a fish trapping facility at the project spillway.

Based on the parameters in table 3 and the cost of measures proposed by PPL Maine shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project would be about

$544,660 (32.65 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh.[28] The resulting annual net benefit would be $357,570 (21.43 mills/kWh).

3. Staff-Recommended Alternative

In this section, we present the annual cost of the proposed action that includes rehabilitating and operating the Orono Project with PPL Maine's proposed environmental measures with staff-recommended measures but without including upstream fish passage facilities, the fish trapping facility, and the Fund.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of PPL Maine's proposed Orono Project with environmental measures under the staff-recommended alternative would be about $487,700 (29.23 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $414,530 (24.85 mills/kWh).

4. Composite Alternative - Proposed Action (Settlement with the option to acquire other projects in the basin, additional staff-recommended measures, and mandatory conditions)[29]

In table 4, not all of the Settlement provisions, NOAA Fisheries and Interior's section 18 prescriptions, and Maine DEP's WQC Conditions are recommended by staff at this time. If the Settlement provisions (including future actions), section 18 prescriptions, and WQC conditions are included in any license issued for the Orono Project, the economic benefits of the project would differ from the staff-recommended alternative. The combination of the staff-recommended measures, the proposed action (Settlement with the option to acquire projects), NOAA Fisheries and Interior's section 18 prescriptions, and Maine DEP's WQC conditions represent a composite alternative.

Based on the parameters in table 3 and the cost of measures shown in table 4, we estimate that the annual cost of the Orono Project as proposed by PPL Maine (Settlement with the option to acquire projects) and with the additional staff-recommended measures, including the section 18 prescriptions, and WQC conditions, would be about $508,010 (30.45 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $394,220 (23.63 mills/kWh)

Table 4. Summary of annual costs (2005$) of the proposed and recommended measures for the Orono Project (Source: the staff).

Measures	Recommending Entity	Capital Cost	Operation and Maintenance Cost	Annual Cost
Rehabilitate the project a	Applicant, Staff	2,600,000	170,000	341,410
* Operate project in run-of-river mode and limit impoundment fluctuations to 1 foot	Applicant, MDEP, NOAA Fisheries, Staff	0	0	0
* Release 200 cfs in the bypassed reach b	Applicant, MDEP, NOAA Fisheries, Staff	0	0	40,670
* Develop and implement a water level and flow monitoring plan c	MDEP, NOAA Fisheries, Staff	2,000	500	480
*# Install and operate	Applicant, MDEP, NOAA	45,000	7,500	8,330

upstream eel passage facilities d	Fisheries, Interior, Staff			
*# Install and operate downstream fish passage facilities d	Applicant, MDEP, NOAA Fisheries, Interior, Staff	175,000	5,600	16,870
*#Install and operate upstream fish passage facilities e	Applicant, MDEP, NOAA Fisheries, Interior	340,000	47,900	57,210
*# Submit final design plans for upstream eel passage and downstream fish passage facilities	Applicant, MDEP, NOAA Fisheries, Interior, Staff	5,000	0	370
*# Implement a 2-week project shutdown for downstream eel passage f	Applicant, MDEP, NOAA Fisheries, Interior	0	0	0
*# Install and operate a fish trapping facility	Applicant, MDEP, NOAA Fisheries, Interior	240,000	3,400	20,310
* Establish a contingency mitigation fund g	Applicant, MDEP	0	1,000	660
*# Submit plans and conduct fish passage effectiveness study	Applicant, MDEP, NOAA Fisheries, Interior, Staff	3,000	4,000	2,860
*# Report on the fish passage effectiveness study	Applicant, MDEP, NOAA Fisheries, Interior, Staff	1,000	0	70
* Maintain the portage trail around the project h	Applicant, MDEP, Staff	0	1,000	660
Develop and implement a soil erosion and control plan i	Staff	3,000	0	220
Maintain existing mature riparian vegetation at the project	Staff	0	0	0

* A condition of the WQC.
# A section 18 fishway prescription.
a See capital and O&M costs in applicant's response to additional information filed on January 24, 2005, pages B#4-5 and B#11-1, respectively. Staff assumes the cost of replacement penstocks that blend with the surrounding is included.
b The rehabilitated project without a minimum flow would generate about 17,821 MWh annually; with the minimum flow, estimated annual lost generation would be 1,139 MWh.

c The estimated cost includes coordinating headpond drawdowns with the resource agencies.
d See the January 24, 2005 filing, page B#15-3 for capital cost, and the Lower Penobscot River Basin FEIS table 5-3 for O&M costs escalated to 2005$.
e See the Lower Penobscot River Basin FEIS table 5-3 for capital and O&M costs escalated to 2005$. Not required if other projects are acquired.
f Project shutdown is contingent on the results of a future effectiveness fish passage study, which may or may not require project shutdown. Therefore, we assume no cost of lost generation at this time.
g See page 31 of the explanatory statement of the Settlement filed on June 25, 2004. Not required if other projects are acquired.
h See the January 24, 2005 filing, page B#3-3 for the O&M cost.
i The cost to implement the soil erosion control plan is considered with the estimated cost to rehabilitate the project shown on page B#4-5 of the January 24,2005, filing.

5. No-Action Alternative

Under the no-action alternative, PPL Maine would continue to maintain the project, but the project would not be put back in operation, and no new environmental protection, mitigation, or enhancement measures would be implemented.

Since the Orono Project is not operating, there is no annual generation nor annual power value for the project. The annual cost of the no-action alternative includes the carrying cost of the project book value and annual maintenance costs, totaling about $75,760. The resulting annual net benefit would be -$75,760.

6. Cost of Environmental Measures and Economic Comparison of Alternatives

Table 5 presents a summary of the current annual net power benefits for PPL Maine's proposed action with the option for the Trust to acquire other projects; the proposed action without the option for the Trust to acquire other projects; the staff-recommended alternative; the composite alternative with the option to acquire other projects with measures under the staff-recommended alternative including section 18 prescriptions, and section 401 conditions; and the no-action alternative.

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Table 5. Summary of annual net benefits of the alternatives for the Orono Project (Source: the staff).

Parameter	Proposed Action (Settlement with the option to acquire projects)	Proposed Action (Settlement without the option to acquire projects)	Staff-Recommended Alternative	Composite Alternative	No-Action Alternative
Annual generation (MWh)	16,682	16,682	16,682	16,682	0
Installed capacity	3.68	3.68	3.68	3.68	3.68

	(MW)				
	Annual power value ($)	902,230	902,230	902,230	902,230 0
	Annual cost ($)	507,100	544,660	487,700	508,010 75,760
	Annual net benefit ($)	395,130	357,570	414,530	394,220 -75,760

7. Pollution Abatement

The Orono Project would produce about 16,682 MWh of electricity annually. This amount of hydropower generation, when contrasted with the generation of an equal amount of energy by a fossil-fueled facility, avoids the emission of atmospheric pollutants. Assuming that the hydropower generation would be replaced by an equal amount of natural gas-fired generation, generating electrical power equivalent to what would be produced at the Orono Project would require combustion of about 172 million cubic feet of natural gas annually. Removal of pollutants (N0x and S0x) from the emissions produced by burning fossil fuels to those levels presently achievable by state-of-the-art technology would cost about $8,200 annually.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

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 weigh the various economic and environmental tradeoffs involved in that decision.

This section contains the basis for, and a summary of, our recommendations for relicensing the Orono Project. We weigh the costs and benefits of our recommended alternative against other proposed measures.

A. Recommended Alternative

Based on our independent review and evaluation of the environmental and economic effects of the proposed action (Settlement with the option to acquire projects), the proposed action (Settlement without the option to acquire other projects), the staff-recommended alternative, the composite alternative; and no action, we recommend the staff alternative.

We recommend this alternative because: (1) issuing a new license would allow PPL Maine to rehabilitate and operate the project as a beneficial and dependable source of electric energy; (2) the project, with an installed capacity of 2.3 MW, would eliminate the need for an equivalent amount of fossil-fuel-produced energy and capacity, which helps conserve these nonrenewable resources and limits atmospheric pollution; and (3) the recommended environmental measures would protect water quality, enhance fish and wildlife resources, and improve public use of project recreation facilities and resources.

Our recommended alternative would include the following provisions of PPL Maine's proposed environmental measures with staff-recommended measures: (1) develop and implement a soil

erosion and sedimentation control plan; (2) operate the project in a run-of-river mode with impoundment levels maintained within 1 foot of full pond or elevation 72.4 feet msl; (3) maintain a minimum flow of 200 cfs, or inflow if less, in the project's bypassed reach; (4) a flow and water level monitoring plan; (5) downstream fish passage facilities and effectiveness monitoring; (6) an upstream American eel passage facilities and effectiveness monitoring; (7) protect mature riparian vegetation at the project; (8) use a penstock color that blends with the surroundings; (9) maintain the existing canoe portage; and (10) consultation should any historic or cultural resources be discovered during project rehabilitation or ground-disturbing activity.

We discuss our rationale for the measures we are recommending below.

Erosion control plan

PPL Maine's proposal to replace previously demolished penstocks with new penstocks within the existing penstock right-of-way could cause some short-term erosion and sedimentation effects in the Stillwater Branch. PPL Maine estimates that total construction time for all of the remaining rehabilitation activities including penstock replacement would occur over an 8 to 10 month period (May through October). Because any construction activities needed to install the new penstock would occur within the existing right-of-way for the previous penstock, we anticipate that land-disturbing activities would be minor. However, because the right-of-way lies within or adjacent to the bypassed reach some short-term erosion and sedimentation could still affect aquatic habitats within the bypassed reach. A soil erosion control plan that specifies the measures that would be used during penstock installation to control erosion and sedimentation would help ensure that aquatic habitats are protected during rehabilitation activities. Therefore, we recommend that PPL Maine develop and implement a soil erosion and sedimentation control plan at an annual cost of $220.

Run-of-river operation

PPL Maine proposes to operate the project in a run-of-river mode. Under the WQC, the project would operate run-of-river with outflow approximately equal to inflow on an instantaneous basis except for flashboard failure or replacement, and the Orono impoundment would be maintained within 1 foot of full pond or 72.4 feet msl. NOAA Fisheries recommends run-of-river operation consistent with the WQC. We recommend the Orono Project be operated in a run-of-river mode as proposed and specified in the WQC. Run-of-river operation would ensure that any flow fluctuations occurring in the Penobscot River downstream of the Stillwater Branch would not be the result of project operations at the Orono Project. Therefore, the Orono Project operation would not contribute to any effects of fluctuating water levels in the Penobscot River such as fish stranding and reduction of spawning habitat. Maintaining a relatively stable impoundment level with fluctuations limited to 1 foot or less would benefit aquatic vegetation beds near the shoreline, as well as fish and other aquatic organisms that rely on near-shore habitat for feeding, spawning, and cover. There would be no cost associated with operating in a run-of-river mode.

Minimum flows in the bypassed reach

PPL Maine proposes to maintain a minimum flow in the bypassed reach of 200 cfs at an annual cost of $40,670 consistent with the WQC and NOAA Fisheries' recommendation. This flow seems reasonable because the rate of habitat improvement for several of the important fish species life stages (smallmouth bass YOY, juveniles, adults; and Atlantic salmon juveniles) levels off or declines at flows above about 200 cfs. Although flows above 200 cfs would continue to benefit American shad spawning/incubation and larvae/juvenile life stages, spill flows would provide additional habitat 70 to 100 percent of the time when those life stages are present in the river.

Flow and water level monitoring plan

As a condition of the WQC, PPL Maine would develop and implement a plan for monitoring impoundment levels and minimum flows. NOAA Fisheries recommends that the timing of headpond

drawdowns for maintenance and repair be coordinated with the resource agencies. A monitoring plan developed in consultation with the relevant resource agencies that describes contingencies for emergencies (such as providing downstream flows during project shutdown), scheduled maintenance drawdowns, droughts, as well as reporting criteria, would minimize misunderstandings about operational compliance and help ensure that aquatic resources at the project are protected during the term of the license. Therefore, we recommend that a plan for monitoring impoundment levels and minimum flows be developed in consultation with the agencies at an annual cost of $480.

Downstream fish passage

In order to pass outmigrating fish, PPL Maine proposes to provide downstream fish passage measures consistent with the Settlement, the WQC, and Interior's and Commerce's section 18 prescriptions. The measures would include installing trashracks with 1-inch clear spacing at the powerhouse intake, and a gated surface and bottom bypass capable of discharging up to 70 cfs during the downstream migratory period. In addition, PPL Maine would perform effectiveness studies of the measures. Although the emphasis for passage of anadromous fish species under the Settlement is at the main stem Penobscot River projects, these downstream fish passage measures would facilitate movement of anadromous fish such as Atlantic salmon and alewife that happen to use the Stillwater Branch as an outmigration route. The measures would also address the variable nature of downstream passage of American eel by providing alternative passage routes (i.e. bottom and surface bypasses), effectiveness testing, and if the above measures are not effective, the potential for nightly shutdowns following expiration the safe harbor period established in the Settlement. We recommend that the license include these downstream fish passage measures and effectiveness monitoring for the benefit of anadromous fish and American eel in the Penobscot River Basin at an annual cost of $17,055 for the facilities and design plans and $1,465 for the effectiveness monitoring and reporting.

Upstream American eel passage

In support of state management goals for American eel, PPL Maine would provide upstream passage facilities consistent with the Settlement, the WQC, and Interior's and Commerce's section 18 prescriptions. PPL Maine would consult with the fishery agencies and the Penobscot as to the appropriate location for the fishway, and upon approval of the location, complete installation and initial testing and have the fishway fully operational prior to the beginning of the third upstream eel migration season (approximately May 1) following the effective date of the Agreement, June 22, 2004. The facilities would be operational for the April 1 to November 30 period. PPL Maine would also develop and implement a plan to evaluate the effectiveness of the facility. Although eel are found throughout the Penobscot River drainage despite the number of dams that impede their movements, providing upstream eel passage at the Orono Project would increase the number of eel that are able to reach upstream habitats for rearing and maturing. Therefore, to enhance restoration of American eel to the Penobscot River drainage we recommend PPL Maine develop and install upstream eel passage facilities in consultation with NOAA Fisheries, Fish and Wildlife, Marine Resources, Maine Fish and Wildlife, and the Penobscot at a cost of $8,515. To ensure that the facilities are properly located and effective at passing eel, we also recommend that PPL Maine conduct post-licensing effectiveness monitoring and reporting at an annual cost of $1,465.

Bald Eagle Habitat Protection

Bald eagles currently forage in the project area. The FWS recommends maintaining existing forested riparian areas, especially mature white pines, along the Stillwater Branch for perching, roosting, and future nesting habitat for bald eagles. We recommend that PPL Maine, to the extent feasible, maintain existing mature riparian vegetation at the project to protect bald eagle habitat. No cost is anticipated for this measure.

Recreation and Aesthetics

Access to the project impoundment is currently provided by University of Maine and Town of Orono sites in addition to PPL Maine's portage and put-in facility at its upstream Stillwater

Project. An existing canoe portage at the Orono Project site with parking at the powerhouse provides a route around the dam and access to the tailwater area for fishing. PPL Maine proposes and the WQC would require maintenance of the canoe portage. Maintaining the canoe portage would ensure public access to the project is available at an estimated annual cost of $660. We recommend that the canoe portage be shown on the project boundary map filed pursuant to any licensee issued for the project.

Regarding aesthetics, rebuilding the project penstocks would have a moderate long-term affect on aesthetics. Therefore, to mitigate this affect, we recommend that PPL Maine use a penstock material or paint the penstock a color that blends with the surroundings. No cost is anticipated for this measure.

Cultural Resources

There are no known historic or archaeological properties within the project area that would be affected by issuing a license to redevelop and operate the Orono Project. However, PPL Maine will need to undertake repair and maintenance at the project in the future. Additionally, archaeological or historic sites could be discovered during project redevelopment or any future project modification other than routine maintenance. We, therefore, recommend PPL Maine consult with the SHPO, THPO, and the Commission if archaeological or historic sites are discovered during project redevelopment or during land-disturbing modification at the project during a new license term. There is no current cost associated with future consultation and potential mitigation measures.

B. Measures Not Recommended

Contingent mitigation fund

Under the Settlement and consistent with the WQC, PPL Maine would establish the Fund to provide mitigation for habitat effects of certain PPL Maine activities if the Veazie and Great Works projects are not acquired by the Trust and their respective dams not subsequently removed.[30] Under the Fund, the contributions due to the effects of redeveloping the Orono Project on the bypassed reach would be $1,000 per year for the term of the license. The disposition of the monies would be determined upon mutual agreement among the Penobscot, Bureau of Indian Affairs, FWS, NOAA Fisheries, and the state of Maine agencies for replacing the fish and wildlife habitat lost or degraded by habitat effects, compensating for loss or degradation of fish and wildlife habitat due to habitat effects by means other than replacement, and supporting efforts directed at restoring to the Penobscot River fisheries and the habitat on which these fisheries rely. The Settlement did not provide further specificity for any of the above uses of the Fund. We do not recommend including this measure in the new license. It is not clear what effects are not being addressed by other measures in the Settlement and proposed by PPL Maine nor does the Settlement identify specific uses of the fund for us to evaluate. Our analysis concludes that our recommended measures including operating the project in a run-of-river mode with an impoundment level fluctuation of 1 foot or less, maintaining a minimum flow of 200 cfs in the bypassed reach and providing downstream fish passage and upstream eel passage facilities would protect and enhance aquatic resources in the Stillwater Branch and the main stem of the Penobscot River.

Upstream fish passage

Condition 2.D. of the WQC would require upstream fish passage in accordance with the Settlement and Interior's May 20, 1997, section 18 prescription.

Specifically, if the Veazie, Great Works, and Howland projects are acquired by the Trust, the WQC would require that PPL Maine install a fish trapping facility at the Orono Project spillway. PPL Maine would be responsible for transporting trapped fish a short distance downstream to the tailwater of the Orono Project at the confluence of the main stem Penobscot and Stillwater rivers. If the above projects are not acquired by the Trust, the WQC would require PPL Maine to install the upstream fish passage facilities specified in the Settlement and prescribed by Interior on May 20, 1997. Those fish passage facilities would consist of either a vertical slot fishway (with

pools 8 feet wide by 10 feet long and a 9-inch drop per pool), a denil fishway (4 feet wide with a 1-on-8 slope), or a fish lift with a 600-gallon hopper capacity at the Orono dam. A 50-cfs attraction flow would be provided representing about 2.5 percent of the anticipated 2,000-cfs average spillway discharge during the May to June portion of the upstream migration period.

Although both options could result in benefits to anadromous and catadromous fish resources and the ongoing fisheries restoration efforts in the Penobscot Basin, we do not recommend that upstream fish passage measures be included at this time in an Orono license. Both Interior and Commerce reserved their respective authorities to prescribe fishways including the fish trapping facility upon acquisition of the Veazie, Great Works, and Howland projects. If the Veazie, Great Works, and Howland projects are not acquired by the Trust, the Settlement states that Interior would submit fishway prescriptions consistent with Attachment A of the Settlement. Because the type of fish passage system that might ultimately be required at Orono has yet to be determined, and would require a license amendment filing followed by the filing of section 18 prescriptions, the appropriate time for Commission staff to conduct its environmental review would be in response to such action.

C. Conclusion

Based on our review of the agency and public comments filed on the project and our independent analysis pursuant to sections 4(e), 10(a)(1), and 10(a)(2) of the FPA, we conclude that licensing the Orono Project, with the environmental measures under the staff-recommended alternative, would be best adapted to a plan for improving or developing the Penobscot River waterway.

VIII. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

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 the 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 finds 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 shall attempt to resolve such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of the agency.

In a letter filed April 20, 2005, NOAA Fisheries submitted 4 recommendations pursuant to section 10(j) of the FPA.[31] Table 6 lists NOAA Fisheries recommendations submitted subject to section 10(j), and whether the recommendations are adopted under the staff-recommended alternative.

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Table 6. Analysis of fish and wildlife agency recommendations for the Orono Project (Source: the staff).

Recommendation	Agency	Within the scope of section 10(j)?	Annual cost	Recommend Adopting
1. Maintain a continuous, year-round minimum flow of 200 cfs in the bypassed reach	NOAA Fisheries	Yes	$40,670	Yes
2. Develop a minimum flow operations and monitoring plan	NOAA Fisheries	Yes	$480	Yes

3. Operate run-of-river	NOAA Fisheries	Yes	$0	Yes
4. Coordinate headpond drawdowns with resource agencies	NOAA Fisheries	Yes	$0 a	Yes

a The annual cost of this measure is included in the above minimum flow operations and monitoring plan.

IX. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, or conserving waterways affected by the project. Accordingly, federal and state agencies filed comprehensive plans that address various resources in Maine. Of these, we identified and reviewed 11 comprehensive plans that address resources relevant to the Orono Project.[32] No inconsistencies were found.

X. FINDING OF NO SIGNIFICANT IMPACT

If the Orono Project is licensed with the environmental measures under the staff-recommended alternative, the project would operate while providing enhancements to fish resources, and improvements to recreation facilities, in the project area.

Based on our independent analysis, issuance of a license for the Orono Project, with the environmental measures under the staff-recommended alternative, would not constitute a major federal action significantly affecting the quality of the human environment.

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Footnotes

[1] A key element of the Settlement involves PPL Maine providing the Trust with a 5-year option (Option) to acquire the Veazie (FERC No. 2403), Howland (FERC No. 2721), and Great Works (FERC No. 2312) projects from PPL Maine.

[2] The Ellsworth Project (FERC No. 2727) is located on the Union River in the Union River Basin to the east of the Penobscot River.

[3] By Orders Modifying and Approving Amendment of License 111 FERC *62,061, 111 FERC *62,062, 111 FERC *62,063, 111 FERC *62,064, 111 FERC *62,065, the Commission approved the amendment requests for increased headpond levels, decreased minimum flows, and modified fishway prescriptions.

[4] The Veazie and Great Works projects would be decommissioned and their dams removed; the Howland Project would be decommissioned and studied for potential dam removal.

[5] The final phase of the Settlement calls for additional generation at Milford, Orono, Stillwater, Medway, and Ellsworth.

[6] If the studies show that the measures are not effective at passing American eel, PPL Maine would institute nightly shutdowns for a 2-week period during the downstream migration season. The shutdowns, however, would not be implemented prior to the expiration of the 10-year safe harbor provision specified in Attachment A, section II(c) of the Settlement.

[7] Under the Safe Harbor provision, major changes to fish passage facilities constructed by PPL Maine in accordance with the Settlement would not be required for a period of 10 years after installation and certification that the facilities are operated properly.

[8] Interior's and NOAA Fisheries' reservations include the authority to prescribe a fish trap, as specified in the Settlement, upon acquisition by the Trust of the Veazie, Great Works, and Howland projects.

[9] If shown to be necessary by studies of the effectiveness of these measures, but in no case before the expiration of the safe harbor period delimited in Attachment A, section II(c) of the Settlement, PPL Maine would institute nightly shutdowns for downstream eel passage for a 2-week period during the downstream eel migration season.

[10] In its April 25, 2005, filing, the Maine State Planning Office submitting comments on behalf of Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and the Atlantic Salmon Commission recommended as licensing conditions the terms and conditions submitted by NOAA Fisheries pursuant to section 10(j) of the FPA.

[11] The FWS letter is included in PPL Maine's additional information filed January 24, 2005.

[12] 16 U.S.C. * 1855(b)(2).

[13] EFH is defined under the Magnuson-Stevens Act as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity."

[14] See Orders Modifying and Approving Amendment of License 111 FERC *62,061, 111 FERC *62,062, 111 FERC *62,063, 111 FERC *62,064, 111 FERC *62,065.

[15] The lowest streamflow for 7 consecutive days that occurs on average once every 10 years.

[16] Elvers are a life stage of American eel that occur when juveniles move from ocean waters to fresh waters and begin an upstream migration, although some remain in the estuarine waters until maturation (Helfman et al., 1987).

[17] A smolt is a juvenile life stage ready to emigrate to the ocean.

[18] A kelt is a post-spawn Atlantic salmon adult.

[19] A parr is a juvenile life stage that rears in freshwater.

[20] The IFIM is a tool developed by the FWS to evaluate the relationship between flow and habitat. PHABSIM software is used to develop the relationship between streamflow and physical habitat for various species life stages of aquatic organisms. Habitat suitable for a particular species life stage is often expressed in terms of weighted usable area (WUA). WUA is the wetted area of a stream weighted by its suitability for use by aquatic organisms or recreational activity. WUA is usually expressed in units of square feet or square meters of habitat per a specified length of stream.

[21] Interior filed its preliminary prescription for fish passage facilities again on July 2, 2004.

[22] Sexually immature "yellow eels" exhibiting general downstream movements not associated with spawning outmigrations would also be susceptible.

[23] American eel have been found in the Veazie impoundment indicating that eels were able to move past the Veazie dam (FERC, 1997).

[24] If Veazie and Great Works are acquired by the Trust but the dams are not removed, the Trust would replace PPL Maine as the payor to the Fund.

[25] About one-third of the original penstocks length were silver colored.

[26] 72 FERC * 61,027 (1995).

[27] See http://www.eia.doe.gov/oiaf/aeo/index.html.

[28] This amount includes the 1,139 MWh of lost annual generation due to releasing 200-cfs year-round minimum flow in the bypassed reach.

[29] If the Trust does not exercise its option to acquire the Howland, Great Works, and Veazie Projects and the dams are not removed, we estimate that the annual cost of PPL Maine's proposed

Orono Project with additional staff-recommended measures, including the section 18 prescriptions and WQC conditions, would be about $545,570 (32.70 mills/kWh). The annual power value would be $902,230 (54.08 mills/kWh) for the estimated annual generation of 16,682 MWh. The resulting annual net benefit would be $356,660 (21.38 mills/kWh).

[30] If Veazie and Great Works are acquired by the Trust but the dams are not removed, the Trust would replace PPL Maine as the payor to the Fund.

[31] In its April 25, 2005, filing, the Maine State Planning Office submitting comments on behalf of Maine Departments of Conservation, Inland Fisheries and Wildlife, Marine Resources, and the Atlantic Salmon Commission recommended as licensing conditions the terms and conditions submitted by NOAA Fisheries pursuant to section 10(j) of the FPA.

[32] (1) Strategic plan for management of Atlantic salmon in the State of Maine, 1984, Maine Atlantic Sea-Run Salmon Commission, Augusta, Maine, 52 pp. and appendices; (2) Maine rivers study-final report, 1982, Maine Department of Conservation, Augusta, Maine, 181 pp; (3) State of Maine comprehensive rivers management plan, 1987, Maine State Planning Office, Augusta, Maine, three volumes; (4) Maine comprehensive rivers management plan, Volume 4, 1992, Maine State Planning Office, Augusta, Maine; (5) Atlantic Salmon (Salmo salar) - Amendment 1 to the New England Fishery Management Council's (NEFMC) Fish Management Plan (FMP) on Atlantic salmon (March 1988), 1998, National Marine Fisheries Service; Final Amendment #11 to the Northeast Multispecies Fishery Management Plan; Amendment #9 to the Atlantic sea scallop Fishery Management Plan; Amendment #1 to the monkfish Fishery Management Plan; Amendment #1 to the Atlantic salmon Fishery Management Plan; and Components of the proposed Atlantic herring Fishery Management Plan for Essential Fish Habitat, Volume 1, 1998, National Marine Fisheries Service; (6) Fishery Management Report No. 36 of the Atlantic States Marine Fisheries Commission: Interstate Fishery Management Plan for American eel (Anguilla rostrata), prepared by the American Eel Plan Development Team, 2000, National Marine Fisheries Service, 78 pp; (7) Fishery Management Report No. 35 of the Atlantic States Marine Fisheries Commission: Shad and river herring [includes alewife (Alosa pseudoharengus), blueback herring (Alosa aestivalis), Alabama shad (Alosa alabamae), American shad (Alosa sapidissima), and Hickory shad (Alosa mediocris)] - Amendment 1 to the Interstate Fishery Management Plan for shad and river herring, 1999, National Marine Fisheries Service, 77 pages; (8) Technical Addendum 1 to Amendment 1 of the Interstate Fishery Management Plan for shad and river herring, 2000, National Marine Fisheries Commission, 6 pp; (9) Final environmental impact statement - restoration of Atlantic salmon to New England Rivers, 1989, Department of the Interior, U.S. Fish and Wildlife Service, New Corner, Massachusetts, 88 pp. and appendices; (10) Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum), 1998, prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland, 104 pages; and (11) Maine State Outdoor Recreation Plan, assessment policy plan, volume 1. Augusta, Maine, December 1993. 193 pp.

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