UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Penobscot River Restoration Trust | Project Nos. 2403-056, 2312-019, & 2721-020

NOTICE OF AVAILABILITY OF FINAL ENVIRONMENTAL ASSESSMENT

(May 18, 2010)

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 prepared an Final Environmental Assessment (FEA) for an application filed by the Penobscot River Restoration Trust (licensee) on November 7, 2008, requesting Commission approval to surrender the project licenses for the Veazie, Great Works, and Howland Hydroelectric Projects, located on the Penobscot and Piscataquis Rivers in Penobscot County, Maine. The licensee proposes to surrender the project licenses and remove the Veazie and Great Works Dams, and construct a nature-like fish bypass around the Howland Dam. Surrender of the projects' licenses is a component of the Lower Penobscot River Basin Comprehensive Settlement Agreement.

The FEA evaluates the environmental impacts that would result from approving the licensee's proposed surrenders. The FEA finds that approval of the application would not constitute a major federal action significantly affecting the quality of the human environment. A copy of the FEA is on file with the Commission and is available for public inspection. The FEA may also be viewed on the Commission's website at http://www.ferc.gov using the "eLibrary" link. Enter the docket number (P-2403, P-2312, or P-2721) 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 1-866-208-3372, or for TTY, (202) 502-8659.

For further information, contact Christopher Yeakel at (202) 502-8132.

Kimberly D. Bose,
Secretary.

FINAL ENVIRONMENTAL ASSESSMENT

Application for Surrender of License

Veazie, Great Works, and Howland Projects
FERC Project Nos. 2403-056, 2312-019 and 2721-020

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Hydropower Administration and Compliance
Washington, DC

May 2010

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LIST OF ABBREVIATIONS

APEA	Applicant Prepared Environmental Assessment
ASC	Atlantic Salmon Commission
BMPs	Best Management Practices
BO	Biological Opinion
BOD	Biochemical Oxygen Demand
cfs	cubic feet per second
Commission	Federal Energy Regulatory Commission
CRA	Charles Ritzi Associates
CRMP	Cultural Resources Management Plan
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DEA	Draft Environmental Assessment
DO	dissolved oxygen
EFH	Essential Fish Habitat
ERL	Effects Range Low
ERM	Effects Range Median
ESA	Endangered Species Act
IWWBH	Inland Waterfowl and Wading Bird Habitat
Maine DOC	Maine Department of Conservation
Maine DEP	Maine Department of Environmental Protection
Maine DEP	Maine Department of Environmental Protection
Maine DIFW	Maine Department of Inland Fisheries and Wildlife
Maine DMR	Maine Department of Marine Resources
Maine DMR	Maine Department of Marine Resources
Maine DOT	Maine Department of Transportation
Maine HPC	Maine Historic Preservation Commission
Maine GIS	Maine Office of GIS
Maine NAP	Maine Natural Areas Program
Maine SPO	Maine State Planning Office
mL	milliliters
MOA	Memorandum of Agreement
MW	megawatts
MWh	megawatt hours
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NWI	National Wetlands Inventory
PCBs	Polychlorinated biphenyls

PIN	Penobscot Indian Nation
PPL	PPL Maine, LCC and PPL Great Works, LLC
Ppm	parts per million
Restoration Project	Penobscot River Restoration Project
RTE	Rare Threatened or Endangered Species
Settlement Agreement	Lower Penobscot River Basin Comprehensive Settlement Accord
SGCN	species of greatest conservation needs
SHPO	State Historic Preservation Officer
THPO	Tribal Historic Preservation Officer
TNC	The Nature Conservancy
Trust	Penobscot River Restoration Trust
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WQC	Water Quality Certification

EXECUTIVE SUMMARY

On November 7, 2008, the Penobscot River Restoration Trust (Trust) filed an application to surrender the licenses for the Veazie (FERC No. 2403), Great Works (FERC No. 2312) and Howland (FERC No. 2721) Hydroelectric Projects. The Veazie and Great Works Projects are located on the Penobscot River in Penobscot County, Maine. The Howland Project is located on the Piscataquis River in Penobscot County, Maine. The projects do not occupy any federal lands.

Proposed Action

The Veazie Project has an installed capacity of 8.4 megawatts (MW) and generates 57,388,000 kilowatt hours (kWh) annually. The Great Works Project has an installed capacity of 7.9 MW and generates 23,875,000 kWh annually. The Howland Project has an installed capacity of 1.875 MW and generates 7,585,000 kWh annually. The total installed capacity of all three projects is 18.175 MW with a total annual generation of 88,848,000 kWh.

The Trust's application is one phase of the larger Penobscot River Restoration Project which is a collaborative effort resulting from the Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement Agreement), filed with the Federal Energy Regulatory Commission (Commission) on June 25, 2004, among: PPL Maine, LLC; PPL Great Works, LLC; federal, state, and tribal governments; and conservation groups. The goal of the restoration project is to restore native sea-run fish and their habitat in the Penobscot watershed while also providing the opportunity to maintain hydropower production.

In its application, the Trust proposed to surrender and remove the dams at the Veazie and Great Works Projects. In addition, the Trust proposed to decommission the powerhouse, generating units, and existing fish ladder at the Howland Project, keeping the Howland dam in place but removing the flashboards to lower the reservoir by about 3.8 feet. Finally, the Trust proposed to create a nature-like fish bypass around the south end of the Howland dam. Under the Trust's proposal the Commission would oversee decommissioning of all three Projects, dam removals at Veazie and Great Works, and construction of the fish bypass at Howland. Because the Trust proposes a 15-year monitoring and evaluation period for the fish bypass, if approved as proposed, the Commission's surrender orders for the Howland license would not likely be effective until about 2029.

The Proposed Action would likely improve access to nearly 1,000 miles of river habitat in the Penobscot River and its tributaries, restore the river to a natural system (with related water quality and river-based recreation benefits), restore runs of 11 sea-run

fish species (some are Endangered Species Act [ESA] listed), and retain greater than 90 percent of power generation in the region. Although some effects to ESA listed species would be expected because the projects would be removed from federal jurisdiction, Commission staff has completed formal consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) to address those effects.[1] In order to address adverse affects to cultural resources, a Memorandum of Agreement among the Commission and SHPO, with the Penobscot Indian Nation, Trust and NMFS as concurring parties, was executed on January 14, 2010.

Action Alternatives

In addition to examing the Trust's proposal, the Commission staff also analyzed three alternatives. Each of the action alternatives are summarized below.

Action Alternative 1 – Removal of All Three Dams

In Action Alternative 1, we analyze the impacts of the surrender and decommission of the Veazie, Great Works and Howland dams without the addition of a nature-like fish bypass. We consider this alternative because, if the resource agencies did not determine that the proposed bypass could provide safe, timely and effective fish passage, the removal of the Howland dam would be required by the Settlement Agreement. We assume the environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. Based on the sequence of construction and removals provided by the Trust, but adding an extra year for the removal of Howland dam, the surrender orders would not likely be effective until around 2015.

This alternative would provide similar environmental benefits and effects as the Proposed Action. Removal of the Howland dam, however, would cause a loss of reservoir-based recreation activities that are important to the Town of Howland.

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[1] Regarding ESA listed species, the Commission sent a letter dated August 12, 2009, to the FWS and NMFS requesting formal consultation pursuant to section 7 of the ESA to determine the effects of the three license surrenders on ESA-listed species. On December 23, 2009, the NMFS issued its biological opinion (BO), which found that the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or Atlantic salmon. Furthermore, the BO states that the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In its BO, the NMFS issued an incidental take statement, four reasonable and prudent measures, and five terms and conditions to minimize and monitor incidental take.

Action Alternative 2 – Removal of Veazie and Great Works Dams and Surrender In Place of Howland Project

In Action Alternative 2, we analyze the impacts of surrendering the Veazie, Great Works and Howland Projects, removing Veazie and Great Works dams, and surrendering in place the Howland Project, excluding construction of the nature-like fish bypass. It can be assumed that the Trust, under its agreement with the signatories of the Settlement Agreement, would eventually construct the nature-like fish bypass after surrendering the project. The resource agencies and signatories of the Settlement Agreement would have oversight of the construction and evaluation of the effectiveness of the nature-like fish bypass. We consider this alternative because the Settlement Agreement, of which the Commission is not a signatory, provides for adequate oversight of the construction and evaluation of the bypass including the input of local experts. We assume the environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. Because the Commission would not have oversight over the construction and monitoring of the fish bypass at Howland, the surrender orders would likely be effective around 2014.

This alternative would provide similar environmental benefits and effects as the Proposed Action, because the measures stipulated in the Settlement Agreement (i.e., construction of the Howland fish bypass) would be implemented after Howland was surrendered. One notable difference is that instead of the Commission having authority over the construction and effectiveness monitoring of the Howland fish bypass, ultimate authority would be given to signatories of the Settlement Agreement to oversee these activities.

Action Alternative 3 - Surrender In Place of All Three Projects

We considered the alternative of retaining the existing Veazie, Great Works, and Howland dams and surrendering them in place. It can be assumed that the Trust would eventually construct the nature-like fish bypass after surrendering the project, since the Settlement Agreement is legally-binding. The resource agencies and signatories of the Settlement Agreement would oversee the eventual deconstruction of Veazie and Great Works dams and the construction and evaluation of the effectiveness of the Howland fish bypass. We consider this alternative because the Settlement Agreement, of which the Commission is not a signatory, provides for adequate oversight of the removal of the Veazie and Great Works dams as well as the construction and evaluation of the Howland fish bypass including the input of local experts. Because the Commission would not have oversight over the Veazie or Great Works dam removals, or construction and monitoring of the fish bypass at Howland, the surrender orders would likely be effective around 2010.

This alternative would provide similar environmental benefits and effects as the Proposed Action, because the measures stipulated in the Settlement Agreement (i.e., removal of Veazie and Great Works dams and construction of the Howland fish bypass) would be implemented after the three project licenses were surrendered. One notable difference is that instead of the Commission having authority over dam removals at Veazie and Great Works and the construction and monitoring of the Howland fish bypass, ultimate authority would be given to signatories of the Settlement Agreement to oversee these activities.

Public Involvement and Areas of Concern

On January 26, 2009, the Commission issued a notice that the Trust's application for surrender of licenses was accepted for filing, and soliciting comments, protests and motions to intervene on this application. Many comments were received in support of the application. Protest comments were filed regarding fisheries issues such as the potential introduction of the northern pike into the Upper Penobscot Watershed, specifically the Piscataquis River, if the Howland bypass reach were in place. One commenter disputed the historic ranges of striped bass and shortnose sturgeon as reported in the Applicant Prepared Environmental Assessment. These comments are addressed in the Fisheries and Aquatic Resources section of this Final Environmental Assessment (FEA). Other protest comments were filed in regard to the loss of the renewable energy currently produced by the three projects. These comments are addressed in the Socioeconomics section of this FEA.

On August 4, 2009, the Commission issued a notice of availability of the Draft Environmental Assessment (DEA), which set a deadline of September 3, 2009, for filing comments. Comments were received from the U.S. Army Corps of Engineers, National Marine Fisheries Service, U.S. Department of the Interior, Office of Environmental Policy and Compliance (Interior), the State of Maine, Maine Department of Marine Resources, Atlantic Salmon Commission, Maine State Planning Office, Maine Department of Inland Fisheries and Wildlife, Natural Resources Council of Maine, Trout Unlimited, Maine Audubon, Nature Conservancy, Trust, Atlantic Salmon Federation, PPL Maine, PPL Great Works, Fin and Feather Club of Maine, Town of Millinocket, Kenneth Fletcher, Craig Gordon, Diane Walter. General comments supporting the proposal were received from numerous other individuals. Appendix A summarizes the comments that were filed and our responses to the comments. As appropriate, we have modified the text of this FEA in response to comments received on the DEA.

Conclusions

On the basis of our independent analysis, we find that the proposed surrender of the licenses for the Veazie, Great Works and Howland Projects, as modified by staff,

would not constitute a major federal action significantly affecting the quality of the human environment. In addition, we find that none of the three action alternatives, with our recommended environmental measures, would constitute a major federal action significantly affecting the quality of the human environment.

1.0 INTRODUCTION

1.1 APPLICATION

On November 7, 2008, the Penobscot River Restoration Trust (Trust)[2] filed an application to surrender the licenses for the Veazie (FERC No. 2403), Great Works (FERC No. 2312) and Howland (FERC No. 2721) Hydroelectric Projects. In its application, the Trust proposes to decommission and remove the dams at the Veazie and Great Works Projects. In addition, the Trust proposes to decommission the powerhouse, generating units, and existing fish ladder at the Howland Project, keeping the Howland dam in place but removing the flashboards to lower the reservoir by about 3.8 feet. Finally, the Trust proposed to create a nature-like fish bypass around the south end of the Howland dam.

The Veazie and Great Works Projects are located on the Penobscot River in central Maine (Figure 1). The Howland Project is located on the Piscataquis River, just above the confluence with the Penobscot River, in northern Maine. All three projects are located in Penobscot County, Maine and none of the projects occupy any federal lands. The Veazie Project has an installed capacity of 8.4 MW and generates 57,388,000 kWh annually. The Great Works Project has an installed capacity of 7.9 MW and generates 23,875,000 kWh annually. The Howland Project has an installed capacity of 1.875 MW and generates 7,585,000 kWh annually. The total installed capacity of all three projects is 18.175 MW with a total annual generation of 88,848,000 kWh.

The Trust's application is one phase of the larger Penobscot River Restoration Project (restoration project) which is a collaborative effort resulting from the Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement Agreement), filed with the Commission on June 25, 2004, among: PPL Maine, LLC; PPL Great Works, LLC; federal, state, and tribal governments; and conservation groups.[3] The goal of the

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[2] Pursuant to the transfer orders issued January 6, 2009, the Trust is to become the licensee once the instruments of conveyance are signed. Pursuant to the Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement Agreement) filed on June 25, 2004, the transfer of ownership from PPL Maine, LCC and PPL Great Works, LCC (PPL) to the Trust is contingent upon the issuance of the license surrender order. Section 7.1(b) of The Lower Penobscot River Option Agreement, as attached as Exhibit 1 to the Settlement Agreement, as well as section V sub paragraphs (a) and (b) of the Settlement Agreement require Commission approval of those plans as well as the transfer applications before closing of the project transfer can occur. By letter filed January 12, 2009, PPL expressed its support for the Trust's application.

[3] The Lower Penobscot River Basin Comprehensive Settlement Accord (Settlement Agreement) was designed to resolve numerous environmental and other

restoration project is to restore native sea-run fish and their habitat in the Penobscot watershed while also providing the opportunity to maintain hydropower production. PPL Maine, LCC currently owns and operates the Veazie and Howland Projects. PPL Great Works, LCC (a wholly-owned subsidiary of PPL Maine, LLC) currently owns and operates the Great Works Project.

The restoration project, as outlined in the Settlement Agreement, is divided into phases. Other applications on which to be acted by the Commission related to the restoration project phases one and two include: 1) amendments to the Milford (FERC No. 2536)[4], Stillwater (FERC No. 2712)[5] and West Enfield (FERC No. 2600)[6] licenses in order to incorporate certain fish passage and flow requirements; 2) amendments to the West Enfield, Medway[7] and Stillwater licenses to increase the maximum elevation of their project reservoirs by one foot each to increase generation; and 3) issue a new license for the Orono Project (FERC No. 2710)[8] (previously out of service since 1996 due to penstock failure). Figure 1 shows the location of these projects in the Penobscot River watershed.

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issues that had been extensively litigated for many years in connection with the licensing and operation of the PPL Maine, LCC-owned hydroelectric projects on the Lower Penobscot River in Maine. The following are the signatories to the Settlement Agreement: PPL Maine, the U.S. Department of the Interior (acting through its Fish and Wildlife Service, Bureau of Indian Affairs, and the National Park Service), four State of Maine natural resource agencies (the Maine State Planning Office, Department of Marine Resources, Department of Inland Fisheries and Wildlife, and Atlantic Salmon Commission), the Penobscot Indian Nation, American Rivers, Atlantic Salmon Federation, Maine Audubon, Natural Resources Council of Maine, Trout Unlimited, and the Penobscot River Restoration Trust.

[4] *See* Order Modifying and Approving Amendment of License, 111 FERC ¶62,061 (Issued April 18, 2005).

[5] *See* Order Modifying and Approving Amendment of License, 111 FERC ¶62,065 (Issued April 18, 2005)

[6] *See* Order Modifying and Approving Amendment of License, 111 FERC ¶62,064 (Issued April 18, 2005)

[7] *See* Order Modifying and Approving Amendment of License, 111 FERC ¶62,063 (Issued April 18, 2005).

[8] *See* Order Issuing Offer of Settlement and Issuing New License, 113 FERC ¶62,181 (Issued December 8, 2005)

Phase three of the Settlement Agreement provides the Trust the option to purchase from PPL and decommission the Great Works, Veazie, and Howland Projects. The Trust has chosen to exercise this option and has filed this application to fulfill this part of the Settlement Agreement. Finally, phase four of the Settlement Agreement permits PPL to pursue energy enhancements at other hydropower projects in the Penobscot River basin. This would allow PPL to retain 90 percent of the hydropower generating capacity of the Veazie, Great Works, and Howland Projects by re-using the generating units from Veazie, Great Works and Howland in the Milford, Stillwater, Orono, Medway and Ellsworth (FERC No. 2727) Projects, all owned by PPL.

1.2 PURPOSE OF ACTION

The Commission must decide whether to approve the Trust's application for surrender and decommission of the Veazie, Great Works and Howland Projects and what conditions should be placed on any surrender order issued. In deciding whether to approve the Trust's application, the Commission must determine that the Proposed Action will be best adapted to a comprehensive plan for improving or developing a waterway. In addition to power and development, the Commission must give equal consideration to the purposes of energy conservation, the protection, 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.

In accordance with the National Environmental Policy Act (NEPA) of 1969 and the Commission's regulations (18 CFR Part 380), this final environmental assessment (FEA) assesses the effects associated with the surrender and decommissioning of the projects, alternatives to the Proposed Action, and makes recommendations to the Commission on whether to approve the Trust's application, and if so recommends terms and conditions to become part of any surrender order issued.

In this FEA we assess the environmental and economic effects of the Proposed Action, three Action Alternatives and the No-Action Alternative. Important issues that

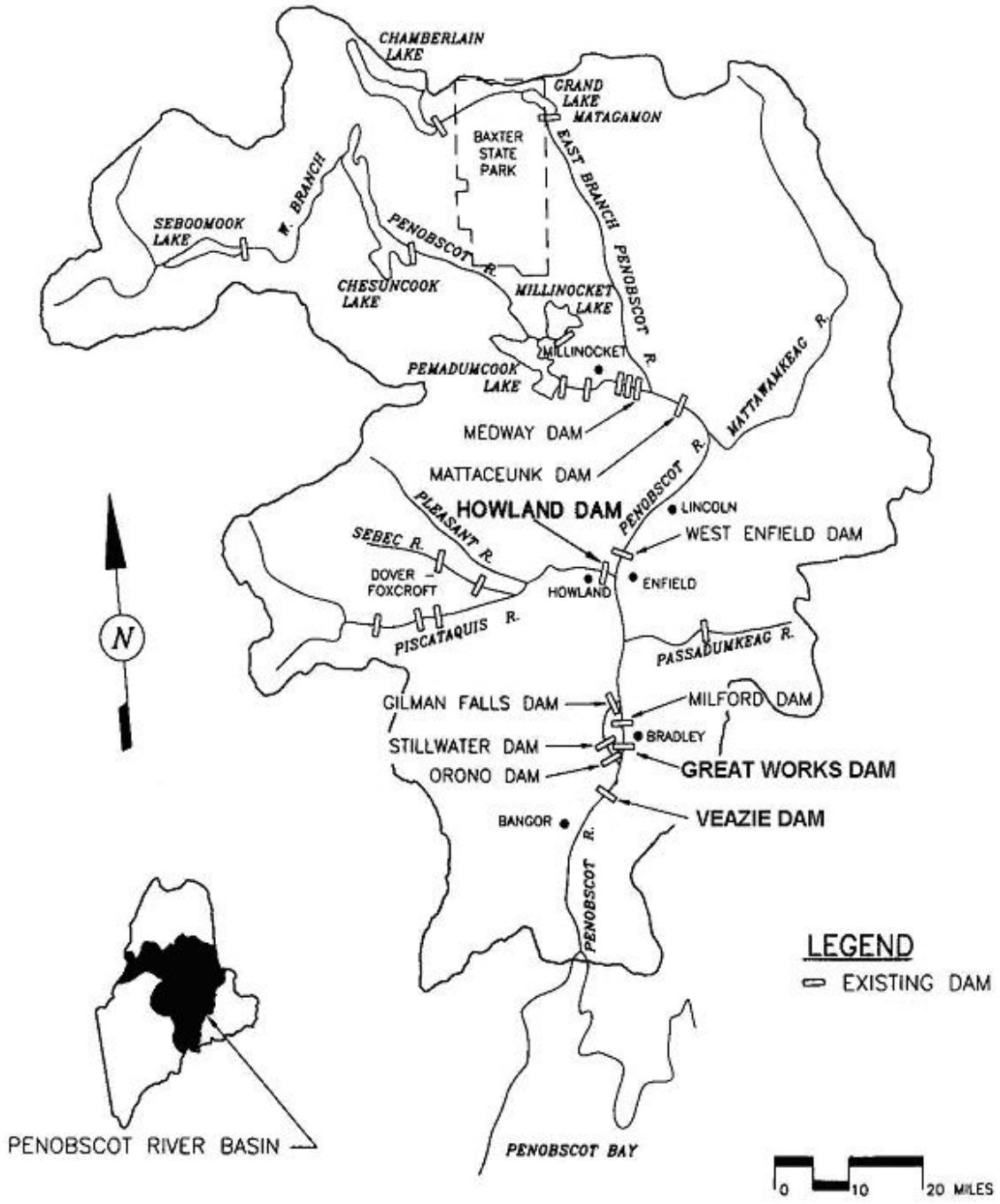

Figure 1. Location of dams in the Penobscot River watershed
(Source: Trust, 2008, modified by Staff)

are addressed include fish passage, impacts to rare, threatened or endangered species (RTE), protection of water quality, changes to wildlife habitat and wetlands, and access to recreation.

1.3 STATUTORY AND REGULATORY REQUIREMENTS

1.3.1 Clean Water Act

Under section 401 of the Clean Water Act (CWA), a license applicant must obtain certification from the appropriate state pollution control agency certifying compliance with the CWA. On November 7, 2008, the Trust applied to the Maine Department of Environmental Protection (Maine DEP) for 401 water quality certification (WQC) for the surrender of the Veazie, Great Works and Howland Project. By letter dated February 13, 2009, Maine DEP waived the issuance of the WQC.[9]

1.3.2 Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.

Atlantic salmon Gulf of Maine Distinct Population Segment (Atlantic salmon DPS) is classified as endangered under the ESA, and the Penobscot and Piscataquis Rivers are designated as critical habitat for the Atlantic salmon DPS. Shortnose sturgeon is classified as endangered under the ESA, whereas Atlantic sturgeon is classified as a species of concern (thus, ESA consultation is not needed). By letter dated August 12, 2009, the Commission requested formal consultation with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) pursuant to section 7 of the ESA regarding the effects of the three license surrenders on these ESA-listed species and their habitat. Attached to that letter was a biological assessment (BA) of those potential effects. On December 23, 2009, the NMFS issued its biological opinion (BO), which found that the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or Atlantic salmon. Furthermore, the BO states that the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In its BO, the NMFS issued an incidental take statement, four reasonable and prudent measures, and five terms and

[9] Maine DEP indicated that it would issue a WQC that would be included with the section 404 permit issued by the USACE. Under section 404 of the CWA, a permit is required from the USACE for the permanent or temporary discharge of dredged or fill material into waterways and wetlands. On September 26, 2008, the Trust applied to the USACE for its permits under section 404.

conditions to minimize and monitor incidental take.

1.3.3 Coastal Zone Management Act

Under section 307(c)(3)(A) of the Coastal Zone Management Act (CZMA), 16 U.S.C.§ 1456(3)(A), the Commission cannot issue a license for a project within or affecting a state's coastal zone unless the state CZMA agency concurs with the license applicant's certification of consistency with the state's CZMA program, or the agency's concurrence is conclusively presumed by its failure to act within 180 days of its receipt of the applicant's certification.

The coastal zone area along the Penobscot River ends below Bangor, Maine, which is approximately four miles downstream of the Veazie Project. Therefore, the action area is not located within the state-designated Coastal Management Zone. By electronic mail dated May 11, 2009, the Maine State Planning Office (Maine SPO) stated that the Veazie Project does not lie within the coastal area as defined by the CZMA.

1.3.4 National Historic Preservation Act

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

By letter dated January 13, 2009, the Commission designated the Trust as the Commission’s non-federal representative for informal consultation with the Maine State Historic Preservation Officer (SHPO), and the Penobscot Indian Nation’s (PIN) Tribal Historic Preservation Officer (THPO). By letter dated December 8, 2009, the Commission requested that the Advisory Council on Historic Preservation (Advisory Council) review the draft Memorandum of Agreement (MOA) developed for the undertaking, and indicate if intends to participate pursuant to Part 800.6 of the NHPA. The Advisory Council did not respond. A Memorandum of Agreement among the Commission, PIN, SHPO, with the Trust and NMFS as concurring parties, was executed on January 14, 2010.

1.3.5 Wild and Scenic Rivers Act

Section 7(a) of the Wild and Scenic Rivers Act requires federal agencies to make a determination as to whether the operation of the project under a new license would invade the area or unreasonably diminish the scenic, recreational, and fish and wildlife values present in the designated river corridor. Neither the Penobscot, nor the Piscataquis

Rivers are currently protected under this act.

1.3.6 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act requires federal agencies to consult with the NMFS on all actions that may adversely affect Essential Fish Habitat (EFH). EFH has been designated for Atlantic salmon in the Penobscot River and its tributaries (NEFMC, 1998). By letter dated September 11, 2009, the Commission provided to the NMFS its EFH assessment, which stated that the proposed action would have some minor short-term adverse effects on Atlantic salmon EFH but would generally benefit Atlantic salmon EFH in the long-term. By letter dated October 7, 2009, the NMFS states that further consultation is not required and EFH conservation recommendations are not necessary.

1.4 PUBLIC REVIEW AND COMMENT

The Commission's regulations (18 CFR sections 4.38 and 6.1) require that applicants consult with appropriate resource agencies, tribes, and other entities before filing an application for surrender of license. Pre-filing consultation must be complete and documented according to the Commission's regulations. The section below describes the public outreach and resource agency consultation conducted by the Trust prior to filing their application with the Commission.

1.4.1 Pre-filing Consultation

On March 22, 2007, the Trust held a meeting to discuss potential study requests in advance of the 2007 field season. Several agencies and organizations were in attendance, including the Atlantic Salmon Commission (ASC), Maine DEP, Maine Department of Marine Resources (Maine DMR), Maine Historic Preservation Commission (Maine HPC), Maine Department of Inland Fisheries and Wildlife (Maine DIFW), Maine SPO, NMFS, PIN, PPL, The Nature Conservancy (TNC), U.S. Army Corps of Engineers (USACE), and U.S. Fish and Wildlife Service (USFWS). During this meeting, it was determined that the Trust would perform the following studies: 1) a sediment survey to characterize and quantify sediment in affected impoundments and the effect of the Proposed Action on sediment transport; 2) a mussel survey to determine the potential effects on mussels by the Proposed Action; 3) a shoreline survey to determine the effect of the Proposed Action on botanical and wetland resources, rare, threatened, and endangered species, invasive species, potential erosion and infrastructure; 4) a recreation study; and 5) an ice jam study.

On November 16, 2007, the Trust’s scoping document was distributed to

interested stakeholders and was made available online at the Trust's website.[10] Further, hard copies were provided at town offices in the region and at scoping meetings. Three public scoping meetings were held by the Trust in order to describe the proposed project and to solicit verbal comments for use in development of the environmental report and the surrender applications. Two of these meetings were held in Brewer, Maine, on December 5, 2007, one in the afternoon and one in the evening and a third evening meeting was held in Howland, Maine, on December 6, 2007. Written comments on the scoping document were received by the Trust through December 18, 2007. Additionally, the Trust engaged in a series of meetings with the resource agencies and the Town of Howland for the Howland dam removal and bypass design process. The Trust held meetings on February 20 and 21, March 17 and 18, April 22 and 23 and May 29, 2008. Table 1 summarizes the issues identified during these meetings.

On May 7, 2008, the Draft Application for Surrender of Licenses for the three projects was distributed by the Trust to interested stakeholders and was made available online at the Trust's website. Written comments were received by the Trust through June 6, 2008.

[10] http://www.penobscotriver.org

Table 1. Summary of Issues Identified by Resource

	Issues Identified
Water Quality and Quantity	Update flood plain mapping Identify changes in water levels Model ice formation/jamming potential Sediment • Characterization • Quantification • Identify contaminants Sediment transport Identify changes to groundwater Anticipated actions at Orono and Stillwater Dams on the Stillwater River Effects of Veazie Dam removal on Town of Orono wastewater and storm water outfalls Confirmation that project will not affect three significant sand and gravel aquifers that border the river in Orono
Cultural Resources	Review National Register Eligibility (NRE) status for Great Works and Howland Develop post-removal mitigation plan and maps Develop Memoranda of Agreement to cover removal activities
Terrestrial Resources	Perform qualitative shoreline survey of: • wetlands -plants, hydrology, functions, and values • invasive species • erosion sites • infrastructure Effects of the project decommissioning on the disposition of project lands and the potential for those lands to provide for and be managed for fish and wildlife habitat.
Aquatics Resources	Develop fish habitat mapping (pre- and post-removal), including shortnose sturgeon Develop removal/construction plan, including sequencing, timing, and Howland bypass design ESA consultation on shortnose sturgeon and Atlantic salmon Effect of removal on fish passage at tributaries Mussels • Identify impacted habitat and existing conditions (i.e., mussel species present) • Obtain take permit • Develop relocation/mitigation plan Effects to the river flow in the Penobscot and Stillwater Rivers (i.e. behavior of migratory fish; water quality, etc)
Soils/Geology Resources	Identify changes to soils and substrates
Recreation	Identify existing and expected recreation access Identify changes to angling opportunities Identify impacts to existing bass fishery
Land Use and Aesthetics	Identify land use changes Ownership, operation and maintenance of the Howland bypass. Effects of the project decommissioning on the disposition of project lands and the potential for those lands to provide for and be managed for fish and wildlife habitat.
Infrastructure	Identify impacts to infrastructure Effects of the long-term maintenance of the dam and related structures on the feasibility of the bypass channel at the Howland Project
Socio-Economics	Identify expected changes in land value Identify expected economic benefits of removal Identify changes to property tax

(Source: Kleinschmidt, 2008a)

1.4.2 Responses to Public Notice

On January 26, 2009,[11] the Commission issued a notice that the Trust's application for surrender of licenses was accepted for filing, and soliciting comments, protests and motions to intervene on this application. This notice set February 26, 2009,[12] as the deadline for filing protests, comments and motions to intervene. Table 2 summarizes the entities and types of filing received in response to the public notice.

Table 2. Responses to Public Notice

Commenting Entity	Date Filed	Type of Comment
PPL Maine, LLC and PPL Great Works, LLC	January 12, 2009	Intervention
Penobscot Indian Nation	January 21, 2009	Support
Ray A. Campbell, Jr.	January 22 and March 30, 2009	Protest
Town of Millinocket	January 23, 2009	Protest
Anna Corvi	February 5, 2009	Support
Carol Fleishman	February 5, 2009	Support
Andrew A. Cadot	February 5, 2009	Support
Lisa Panepinto	February 5, 2009	Support
E.G. Ewing	February 6, 2009	Support
Sharon Cunningham	February 6, 2009	Support
Greg Moser	February 6, 2009	Support
Tom Rumpf	February 6, 2009	Support
Florence Reed	February 6, 2009	Support
Justin Lamkin	February 6, 2009	Support
Lawernce Fischman	February 6, 2009	Support
Phil Larson	February 8, 2009	Support
Alan And Victoria Adams	February 9, 2009	Support
John D. Gibson III	February 10, 2009	Support
Cathy Morgan	February 11, 2009	Support
Brian Guzzetti	February 11, 2009	Support
Andy Walsh	February 12, 2009	Support
Ken Spalding	February 12, 2009	Support
Clinton B. Townsend	February 13, 2009	Support

[11] The notice was originally issued on January 21, 2009, but did not include an issuance date and was rescinded and re-issued on January 26, 2009. Comments received before January 26, 2009, were considered in this FEA.

[12] Many comments were received after the filing deadline, but were still considered in this FEA.

Commenting Entity	Date Filed	Type of Comment
Bruce Freamont Leavitt	February 13, and 26, 2009	Protest
Scott Roy	February 16, 2009	Protest
National Marine Fisheries Service	February 19, 2009	Support
Stan Moody	February 20, 2009	Support
Allen Zimmerman	February 20, 2009	Support
Paul A. Liebo	February 23, 2009	Support
John M. Rohman	February 23, 2009	Support
Evan Richert	February 23, 2009	Support
U.S. Department of the Interior	February 23, 2009	Intervention
Susan F. Choma	February 24, 2009	Support
Paul Johnson	February 24, 2009	Protest
U.S. Department of the Interior	February 25, 2009	Support
Atlantic Salmon Federation	February 25, 2009	Support
The Nature Conservancy	February 25, 2009	Support
Trout Unlimited	February 25, 2009	Intervention
Maine State Planning Office	February 25, 2009	Intervention
Scott Phillips	February 25, 2009	Support
David Clement	February 25, 2009	Support
Rob Duchense	February 25, 2009	Support
Hames Houghton	February 25, 2009	Support
Aaron Dority	February 25, 2009	Support
Town of Orono	February 25, 2009	Support
Town of East Millinocket	February 25, 2009	Protest
Jeannine M. Rabinowitz	February 27, 2009	Support
Town of Sangerville	February 27, 2009	Protest
Douglas H. Watts	February 27, 2009	Protest
Marian F. McAleenan	March 2, 2009	Support
Diane Walker	March 2, 2009	Support
Jeffery and Better Roberts	March 2, 2009	Support
Evelyn S. Kitterdge	March 2, 2009	Support
Laura Pope	March 2, 2009	Support
George C. Schelling	March 3, 2009	Support
John Albertini	March 4, 2009	Support
Mariana Tipper	March 6, 2009	Support
Wendy Rowland	March 6, 2009	Support
Town of Sherman	March 13, 2009	Protest
Town of Dover-Foxcroft	March 23, 2009	Protest
Town of Lake View Plantation	March 23, 2009	Protest
Town of Stacyville	March 25, 2009	Protest
Town of Enfield	March 30, 2009	Protest
Red Shield Acquistion, LLC	August 11, 2009	Late Intervention Denied

Many of the protest comments regarding the Proposed Action were filed about fisheries issues such as the potential introduction of the northern pike (*Esox lucius*) into the Upper Penobscot Watershed, specifically the Piscataquis River, if the Howland bypass reach were in place. One comment disputed the historic ranges of striped bass and shortnose sturgeon as reported in the Applicant Prepared Environmental Assessment (APEA). These comments will be addressed in the Fisheries and Aquatic Resources section of this FEA. Other protest comments were filed in regard to the loss of the renewable energy currently produced by the three projects. These comments will be addressed in the Socioeconomics section of this FEA. Finally, the NMFS filed comments with their Motion to Intervene discussing procedures regarding threatened and endangered species consultation which will be addressed in the Rare, Threatened and Endangered Species and Statutory Requirements sections of this FEA.

1.4.3 Comments on the DEA

On August 4, 2009, the Commission issued a notice of availability of the DEA, which set a deadline of September 3, 2009, for filing comments. Comments were received from the USACE, NMFS, U.S. Department of the Interior, Office of Environmental Policy and Compliance (Interior), the State of Maine, Maine DMR, ASC, Maine SPO, Maine DIFW, Natural Resources Council of Maine, Trout Unlimited, Maine Audubon, Nature Conservancy, Trust, Atlantic Salmon Federation, PPL Maine, PPL Great Works, Fin and Feather Club of Maine, Town of Millinocket, Red Shield Acquisition, LLC, Kenneth Fletcher, Craig Gordon, Diane Walter. General comments in support of the Trust's proposal were filed by numerous other individuals. Appendix A summarizes the comments that were filed and our responses to the comments. As appropriate, we have modified the text of this FEA in response to comments received on the DEA.

2.0 PROPOSED ACTION AND ALTERNATIVES

The following table (Table 3) displays the major action that would take place at each project under the Proposed Action and each of the alternatives.

Table 3. Overview of Proposed Action and Alternatives

	Veazie	Great Works	Howland
No-Action Alternative	Continue to operate as licensed	Continue to operate as licensed	Continue to operate as licensed
Proposed Action	Removal	Removal	Add nature-like fish bypass
Action Alternative 1	Removal	Removal	Removal
Action Alternative 2	Removal	Removal	Surrender in place
Action Alternative 3	Surrender in place	Surrender in place	Surrender in place

2.1 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, the Veazie and Great Works dams would not be removed, and the Howland nature-like fish bypass would not be constructed, nor the flashboards removed under the terms of the Settlement Agreement. The Veazie Project would stay with PPL Maine, LLC under the terms of the existing Commission license and continue operations of existing fishways. The Great Works and Howland Projects would stay with PPL Great Works, LLC and PPL Maine, LLC respectively and resume relicensing proceedings, which include the preparation of environmental assessments or impact statements pursuant to NEPA. Existing fishways at Great Works and Howland would continue to be operated during relicensing proceedings.

2.1.1 Exiting Project Facilities and Operation

2.1.1.1 Veazie Project

The Veazie Project is located on the Penobscot River in Veazie and Eddington, Maine, near the head of tide at river mile 3.25. The project operates under the terms of a Commission license which expires on March 31, 2038.[13] The project has two powerhouse buildings with a total installed capacity of 8.4 megawatts (MW). The station A powerhouse contains 15 turbine-generator units with a total installed capacity of 5.4 MW. The station B powerhouse is located immediately south of station A and contains two turbine-generator units with a total installed capacity of approximately 3.0 MW (See Figure 2).

The project works consist of a 30-foot-high, 842-foot-long concrete gravity dam with 4.5-foot-high Obermeyer inflatable flashboards. The spillway portion of the dam consists of a 64-foot-long gravity concrete segment near its left abutment and a main 487-foot-long concrete buttress segment. Other structural features include a 230-foot-long masonry forebay wall, an abandoned concrete fishway at the eastern end of the dam, a vertical slot fishway and trap facility located in the middle of the dam, a river crossing cableway, and a 65-foot-long radial gate structure. The impoundment area is 390 acres extending approximately 3.8 miles upstream at a full pond elevation of 34.8 feet mean sea level.

The Veazie Project is operated in run-of-river mode and the dam is not used for flood control or water supply. When inflows are less than 7,500 cubic feet per second (cfs), the station A and B powerhouses are operated based on available flows, fish passage considerations, and maintenance requirements. At inflows of less than 7,500 cfs, all water passes through the powerhouse, and the spillway crest and adjacent channel run

[13] Order Issuing New License, 83 FERC ¶ 61,040 (Issued April 20, 1998).

dry. When inflows are more than 7,500 cfs, all units are on-line and water in excess of the total turbine capacity passes over the spillway.

2.1.1.2 Great Works Project

The Great Works Project is located on the Penobscot River approximately seven miles upstream of the Veazie Project in Old Town and Bradley, Maine. The project currently operates under an annual license[14] since the original license expired on March 31, 2002.[15] The project consists of a dam and powerhouse with a total installed capacity of approximately 7.917 MW (Figure 3).[16]

The project works consist of 20-foot-high, 1,086 foot-long timber crib and concrete dam with six-foot-high wooden flashboards, a powerhouse containing 11 turbine-generator units (eight horizontal Leffel and S. Morgan Smith Companies horizontal units and three horizontal Kaplan units), a non-overflow section with two operating fishways and three gated outlet pipes (one six-foot-square, two nine-foot-diameter). The tailrace is separated from the main river channel by an earthen dike, and the powerhouse discharges to the tailrace creating a 1,200-foot long bypass reach. The two operating fishways are Denil-type fish ladders, one located in the tailrace, the other at the west end of the spillway and a third, abandoned fish ladder located near the center of the spillway. The impoundment area is 160 acres extending approximately 1.7 miles upstream at a full pond elevation of 81.7 feet mean sea level.

The Great Works Project is operated as a run-of-river facility with minimum impoundment fluctuation. Based on the past eight years of record, average annual generation for the project is 23,875 MWh. Penobscot Hydro, LLC distributes flow to the project using the Milford Project and Gilman Falls dam (located on the Stillwater River branch of the Penobscot River) in accordance with a 1911 Federal Circuit Court decree.[17]

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[14] Notice of Authorization for Continued Project Operation (Issued April 8, 2002).

[15] Order Issuing License, 30 FPC 1465 (Issued December 9, 1963).

[16] Order Amending License, 95 FERC ¶ 62,058 (Issued April 18, 2001).

[17] The decree established that the Penobscot River flow is divided between the river's mainstem (two-thirds) and the Stillwater Branch (one third).

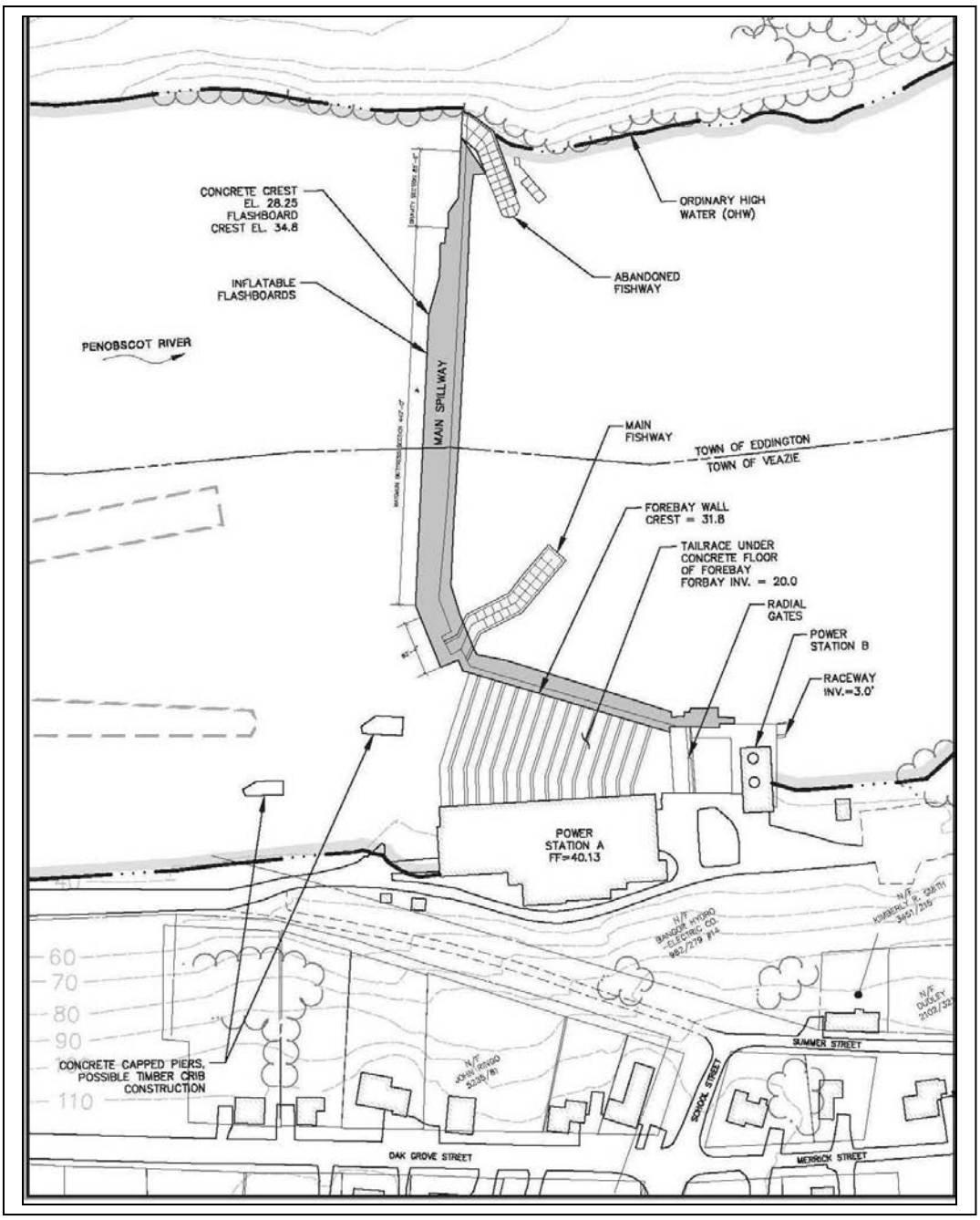

Figure 2. Project works at Veazie Project
(Source: Trust, 2008)

2.1.1.3 Howland Project

The Howland Project is located on the Piscataquis River approximately 500 feet upstream of its confluence with the Penobscot River in Howland, Maine. The project currently operates under an annual license[18] since the original license expired on

[18] Notice of Authorization for Continued Project Operation (Issued November 21,

September 30, 2000.[19] The project consists of a dam and powerhouse with a total installed capacity of 1.875 MW (Figure 4).

The project works consist of three vertical Francis turbines, a 114.5-foot-long concrete cutoff wall at the north embankment of the dam, a six-foot-long non-overflow abutment, a 570-foot-long concrete overflow spillway, an 85-foot-long section containing a gated spillway section with four nine-by-nine-foot steel roller flood gates, a 20-foot-long non-overflow section, and a 76-foot-long forebay entrance deck located immediately upstream of the powerhouse. Other project features include an abandoned fishway, a functioning upstream denil fish ladder with wooden baffles located adjacent to the powerhouse, and a functioning downstream bellmouth weir[20] passage through the trash sluice located adjacent to the trashracks. The impoundment has a surface area of 270 acres extending approximately 4.7 miles upstream at a full pond elevation of 148.2 feet mean sea level with 3.8-foot-high flashboards in place.

The Howland Project is operated as a run-of-river facility with a hydraulic capacity of approximately 1,710 cfs. On an annual basis, this turbine capacity is exceeded approximately 47 percent of the time, while the capacity of the turbines and the gates (5,310 cfs) is exceeded approximately 16 percent of the time. Average annual generation for the project is 7,585 MWh. The normal impoundment elevation is maintained when river flows are at or below the hydraulic capacity of the units and the gates. When river flows exceed the hydraulic capacity of the units and the gates, water spills over the flashboards. Flashboard failure begins when the water reaches a height of two feet over the top of the flashboards. When the gates are closed and river flow is at 2,500 cfs (average annual flow), the impoundment elevation is 148.6 feet mean sea level. The total hydraulic capacity of the gated and ungated spillway is 55,100 cfs before the deck of the gated spillway becomes inundated at elevation 154.2 (Milone and MacBroom, 2008c).

2000).

[19] Order Issuing License, 12 FERC ¶ 62,207 (Issued September 12, 1980).

[20] A modification made to the trash sluice exit designed to provide a velocity transition for downstream migrating fish.

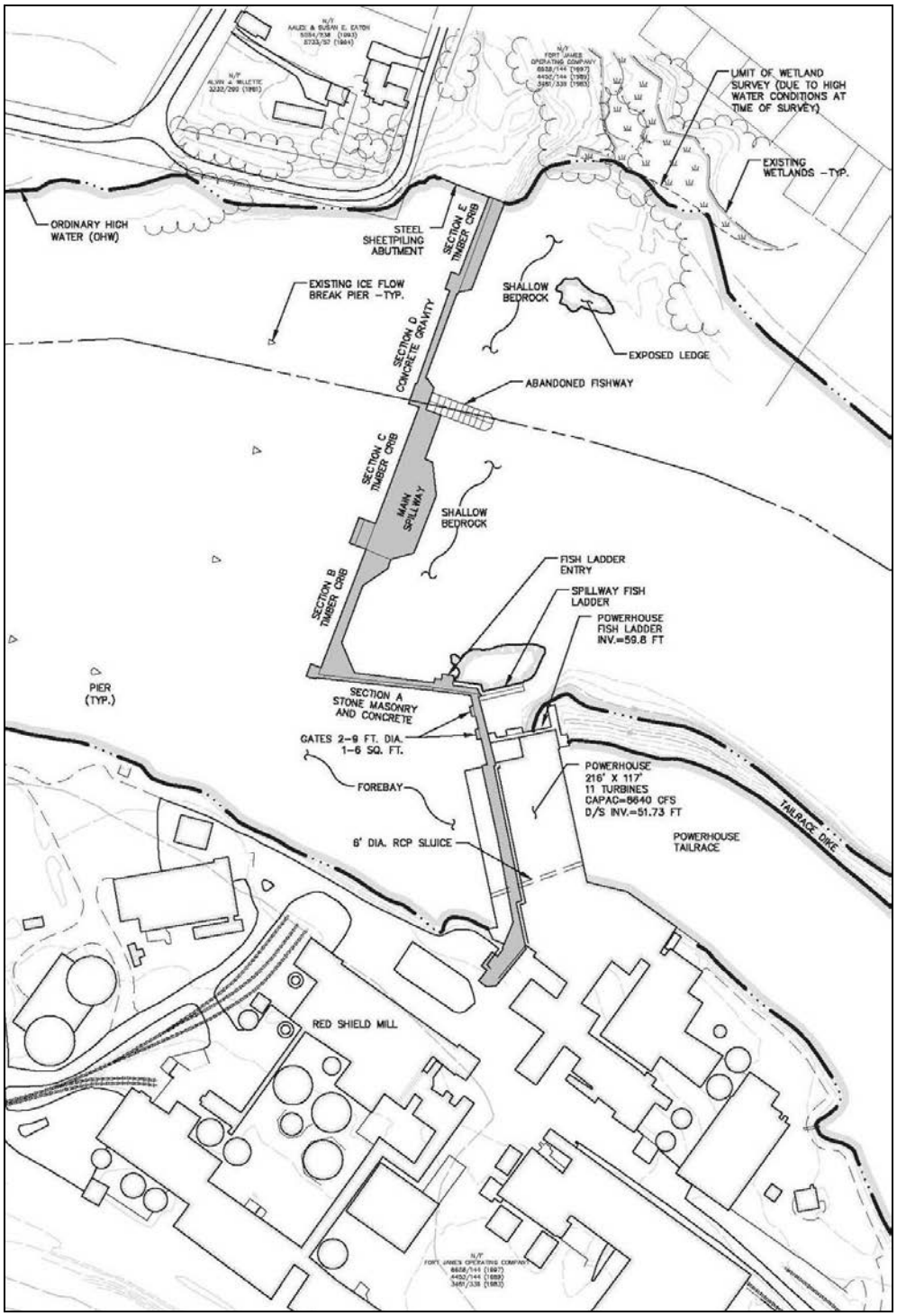

Figure 3. Project works at Great Works Project
(Source: Trust, 2008)

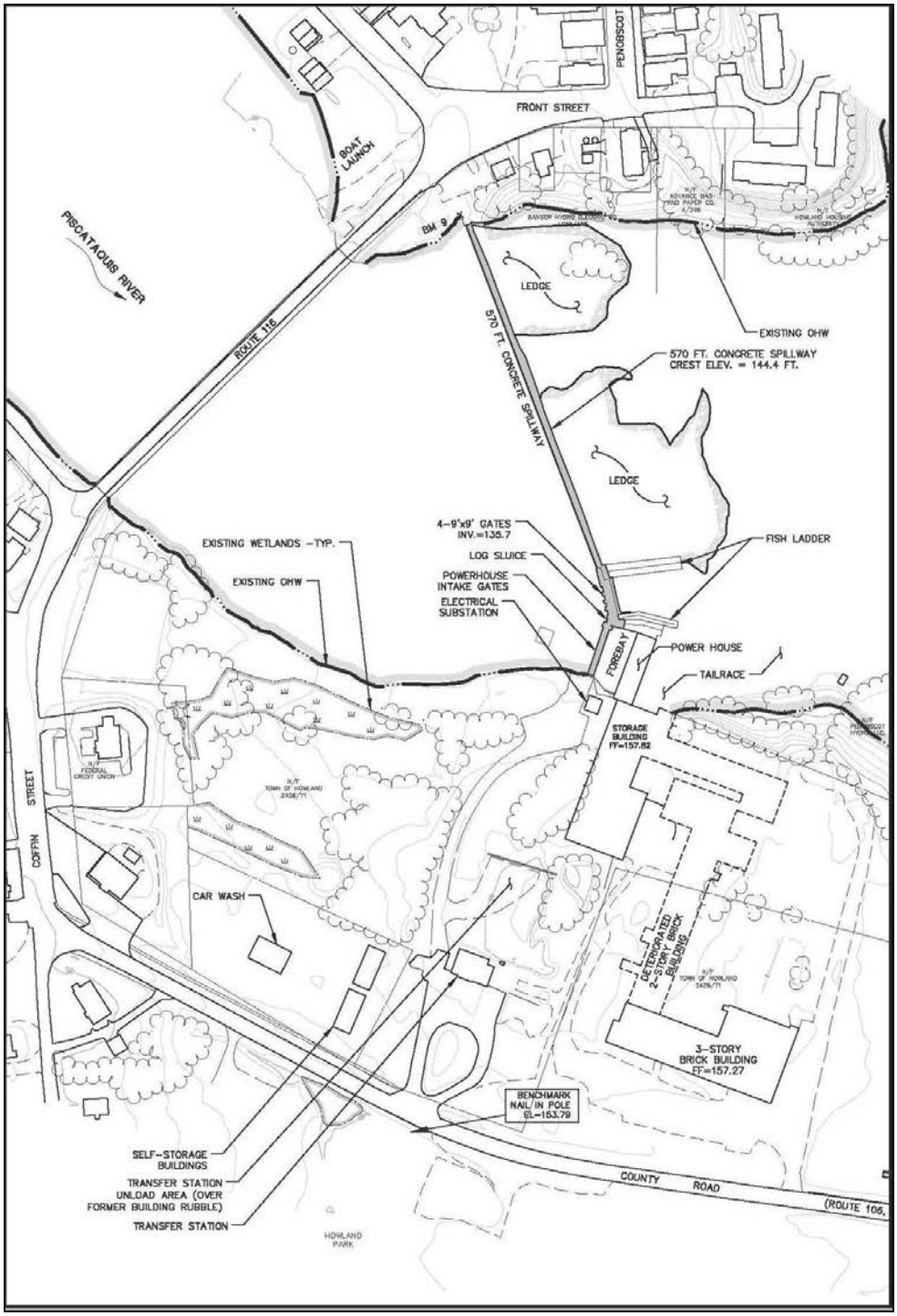

Figure 4. Project works at the Howland Project
(Source: Trust, 2008)

2.2 PROPOSED ACTION

The Trust proposes to surrender the licenses for the Veazie, Great Works and Howland Hydroelectric Projects and remove the dams at the Veazie and Great Works Projects. Further, the Trust proposes to decommission the powerhouse, generating units, and existing fish ladder at the Howland Project, keep the Howland dam in place but remove the flashboards to lower the reservoir by about 3.8 feet and create a nature-like fish bypass around the south end of the dam. More details of the specific actions proposed for each project are listed in the sections below.

As discussed in section 1.1, this application is part of a four-phase restoration project. The goals of the restoration project and the Proposed Action are:

- Restore self-sustaining populations of six species of native sea-run fish (alewife, blueback herring, American shad, American eel, sea lamprey, and Atlantic salmon), through improved access to nearly 1,000 miles of historic habitat;
- Restore unimpeded access to historically accessible habitat for five species of native sea-run fish (Atlantic sturgeon, shortnose sturgeon, striped bass, rainbow smelt, and Atlantic tomcod);
- Renew opportunities for the PIN to exercise sustenance fishing rights;
- Create new opportunities for tourism, business and communities;
- Maintain hydropower production on the Penobscot River; and
- Resolve longstanding disputes and avoid future uncertainties over the regulation of the river.

The Trust has filed three surrender applications as a single, indivisible Proposed Action.[21] According to the Settlement Agreement, if any element of the Proposed Action is substantially altered or removed by the Commission's action on the three surrender applications, any party may ultimately terminate the Settlement Agreement.

[21] If any element of the Proposed Action is substantially altered or removed by the Commission's action on the three surrender applications, the terms of the Settlement Agreement provide that any party prejudiced thereby may ultimately terminate the Settlement Agreement.

2.2.1 Veazie Project

The Trust proposes to surrender its license and decommission the Veazie Project. Specifically, the Trust proposes to disconnect the turbine-generator units from the grid, remove the spillway section of the dam, the eastern fishway, the concrete forebay and tailrace tunnels associated with powerhouse A, the cableway system, and powerhouse B Additionally, the Trust proposes to remove several piers and the remnants of a wing dam submerged in the Veazie impoundment. Finally, the Trust proposes to leave the powerhouse in place and retrofit it for an alternative purpose.

2.2.2 Great Works Project

The Trust proposes to surrender its license and decommission the Great Works Project. Specifically, the Trust proposes to disconnect the turbine-generator units from the grid, remove the gate and spillway sections of the dam, the vegetated embankment adjacent to the powerhouse, and both existing fishways. The Trust also proposes to partially fill and grade the forebay channel immediately upstream of the powerhouse and the fishway at the tailrace dike. Finally, the Trust proposes to keep the powerhouse and the tailrace dike in place. The powerhouse may be retrofitted for an alternative use.

2.2.3 Howland Project

The Trust proposes to surrender its license and decommission the Howland Project. Specifically, the Trust proposes to disconnect the turbine-generator units from the grid, remove the flashboards, remove the former project tannery buildings, move the electrical substation, and remove some buildings associated with the municipal recycling facility. The Trust proposes to keep the powerhouse and dam in place and as well as the gates which will be modified to facilitate downstream fish passage. Finally, the Trust proposes to construct a 924-foot long, 170-foot wide nature-like fish bypass channel on the south bank of Piscataquis River.

2.2.4 Proposed Construction Schedule

To ensure safe, timely and effective fish passage and to reduce impacts to endangered fish species, the Trust proposes to wait to remove the Veazie dam until the Milford fish passage and trapping facilities are constructed. [22] It is expected that a minimum of two years will pass after the Trust takes over the projects before the Veazie dam can be removed due to the schedule imposed by the Commission's order amending

[22] The Milford Project fish lift and trapping facility will be installed to replace the fish lift and trapping facility located at the Veazie Project, owned and operated by the Maine DIWF, which would be removed under the Proposed Action.

the Milford Project License.[23] The Trust proposes to remove the Great Works dam during the previous year. Based on similar projects in Maine, the Trust anticipates a summer and early fall window for in-river construction.

The Trust reports that the sequencing of construction of the Howland nature-like fish bypass may be delayed because the Maine Department of Transportation (Maine DOT) is preparing to replace a bridge in Howland that is immediately upstream of the dam. Maine DOT plans to issue a design/build contract in October 2009, and anticipates approximately 20 months of work. Until the design is complete and the construction schedule is more certain, the Trust does not know whether it will be feasible for construction of the Howland nature-like fish bypass to occur simultaneously with the bridge project, or whether construction activities will need to wait until after the bridge project is completed.

With these factors in mind, the Trust has prepared the following sequence for permit approval and dam removals. This represents a schedule the Trust believes to be realistic, but allows for some unexpected delays.

Fall 2009 - Anticipated receipt of state and federal permits. Upon receipt of final permits and Commission's approval of license surrenders, Trust will take ownership of the projects.

May 2010 - Deadline for PPL to file plans and a schedule for Milford upstream fish lift, 6 months after Trust takes ownership of the Veazie, Great Works and Howland Projects.

Summer 2011 - Great Works dam removal.

November 2011 - Deadline for Milford fish lift to be operational, 18 months after approval of fishway designs.

Summer 2012 - Veazie dam removal, after Milford fish lift is operational

2010-2012 - Howland dam bypass channel construction, depending on coordination with bridge replacement.

The Commission's jurisdiction over the projects' licenses would not end until the surrender becomes effective (after all conditions of any surrender order are met). If the

[23] The Settlement Agreement and the April 18, 2005 Commission Order state that within six months after the issuance of a surrender order, PPL must file design drawings for the fish list and trapping facility at Milford for Commission approval then complete construction with 18 months after approval of the design.

Proposed Action were authorized by the Commission and the above schedule was followed, upon completion of any required mitigation measures, we would expect the surrender of the Great Works license to become effective around 2012 and expect the surrender of the Veazie license to become effective around 2013.

Additionally, the Trust proposes a 15-year monitoring schedule to determine the effectiveness of the Howland fish bypass in passing migratory fish. Under the Proposed Action, Commission oversight would continue until the construction and monitoring of the Howland fish bypass is complete. Thus, the surrender would not become effective until around 2029.

2.3 ACTION ALTERNATIVE 1 – REMOVAL OF ALL THREE DAMS

In Action Alternative 1, we analyze the impacts of the surrender and removal of the Veazie, Great Works and Howland dams (without the addition of the nature-like fish bypass at Howland). We consider this alternative because, if the resource agencies do not determine that the proposed bypass does provide safe, timely and effective fish passage, the removal of the Howland dam would be required by the Settlement Agreement. We assume the environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. Based on the sequence of removals provided by the Trust for Great Works and Veazie, license surrenders could become effective for Great Works around 2013 and for Veazie around 2014. Adding an extra year for the removal of Howland dam, the license surrender for Howland would not likely be effective until around 2015.

2.4 ACTION ALTERNATIVE 2 – REMOVAL OF VEAZIE AND GREAT WORKS DAMS AND SURRENDER IN PLACE[24] OF HOWLAND PROJECT

In Action Alternative 2, we analyze the impacts of surrendering the Veazie, Great Works and Howland Projects, removing Veazie and Great Works dams, and surrendering in place the Howland Project (excluding construction of the nature-like fish bypass). We consider this alternative because the Settlement Agreement, of which the Commission is not a signatory, provides for adequate oversight of the construction and evaluation of the effectiveness of the bypass by the signatories to the agreement. We assume the environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. Based on the sequence of removals provided by the Trust for Great Works and Veazie, license surrenders could become effective for Great Works around 2013 and for Veazie around 2014. Because the Commission would not have

[24] Surrendering in place means that the Commission would accept the Trust's application for license surrender, disconnecting the powerhouse from the grid, and allowing the dam to remain intact.

oversight over the construction and monitoring of the fish bypass at Howland, the license surrender for Howland could likely become effective around 2010.

2.5 ACTION ALTERNATIVE 3 – SURRENDER IN PLACE OF ALL THREE PROJECTS

In Action Alternative 3, we analyze the impacts of surrendering the Veazie, Great Works, and Howland licenses and leaving the dams in place. We consider this alternative because the Settlement Agreement, of which the Commission is not a signatory, provides for adequate oversight of the implementation of the Settlement Agreement (including removal of Great Works and Veazie dams and construction of the Howland bypass) by the signatories to the agreement. Because the Commission would not have oversight over the Veazie or Great Works dam removals, or construction and monitoring of the fish bypass at Howland, the license surrenders for all three could likely be effective around 2010.

3.0 ENVIRONMENTAL ANALYSIS

In this section, we describe the environmental setting for the Proposed Action and the scope of our cumulative effects analysis. We also present our analysis of the environmental effects of the Proposed Action and Action Alternatives. Sections are organized by resource area (water resources, recreation, etc.). Under each resource area, we first describe the current conditions. 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. Our conclusions and recommended measures are discussed in section 4.0 Conclusions and Recommendations of the FEA.[25]

3.1 GENERAL DESCRIPTION OF THE RIVER BASIN

The Veazie and Great Works Projects are located on the Penobscot River in central Maine (Figure 1). The Howland Project is located on the Piscataquis River, just above the confluence with the Penobscot River, in northern Maine.

3.1.1 Penobscot River

The Penobscot River Basin, which covers 8,750 square miles, is the largest river basin in Maine and the second largest, after the Connecticut River Basin, in the Northeast (FERC, 1997b). Major subbasins are those of the East and West Branches, Piscataquis River, and Mattawamkeag River. Headwaters arise at elevations of between 800 and 1,200 feet (Baum, 1983). The basin, which is 95 percent forested, is in central Maine and empties into Penobscot Bay about 20 miles south of Bangor (FERC, 1997b). The average annual precipitation is approximately 42 inches including snowfall, which averages 95 inches (FERC, 1997b). More than 40 percent of the runoff occurs in the months of March, April, and May; the remainder is distributed uniformly throughout the rest of the year. The average annual runoff throughout the basin is about 1.7 cfs per square mile of watershed; this is equivalent to about 22 inches of precipitation per year or 52 percent of the average annual precipitation (FERC, 1997b).

The majority of the Penobscot River Basin falls within the Laurentian Plains and Hills Ecoregion which is described as being mostly forested with a dense concentration of continental glacial lakes (USEPA, 2007). The vegetation in this ecoregion is mostly spruce-fir with some patches of maple, beech birch, and the soils are predominantly Spodisols (USEPA, 2007). A principal feature of the northern part of the Penobscot basin is 5,267-foot-high Mt. Katahdin, the state's highest peak, located in the 200,000-

[25] Unless otherwise noted, the sources of our information are the Trust's application (Trust, 2008) and additional Information filed by the Trust (Trust, 2009).

acre Baxter State Park. In addition, there are several large impoundments and a variety of headwaters that feed the Penobscot River in the basin (FERC, 1997b). The river is tidal from the base of the Veazie dam and is brackish to the town of Hampden (Maine Rivers, 2007).

For thousands of years, members of the PIN living along the river and its tributaries sought the migratory fish of the Penobscot River as did the European explorers and settlers. Commercial harvest of the river's migratory fish began soon after the settlement of Bangor and Bucksport in the 1760's. The Penobscot River commercial fishery was radically altered in 1830's with the construction of the Veazie dam at McMahon's Falls which was the first to completely span the width of the river and completely block upstream and downstream passage of migrating fish (Maine DMR and Maine DIFW, 2008). Other dams constructed on the mainstem of the Lower Penobscot include the Great Works dam constructed just after 1830 and the Milford dam built in the mid-1820's at Old Town Falls (FERC, 1997b). The Veazie dam is the lowermost dam on the mainstem of the river, with the Great Works dam located approximately 7 miles upstream from Veazie.

Throughout the 19th and 20th centuries, lumber and paper industries and other industries such as shoe manufacturing, leather tanning, and fishing, used the basin. These industries used water resources for industrial processes and to transport materials and products (FERC, 1997b). The growth of towns paralleled the growth of mills and factories beginning in the late 1700's. The 2000 census reported about 150,000 people living in the drainage area (Maine SPO, 2006), and the city of Bangor (population 31,008) is the major population center. The region is still the home to the PIN, much of whose cultural heritage is closely associated with the river and its resources.

The section of the Penobscot River from the former Bangor Dam to Veazie Dam is classified by the State of Maine as an "outstanding" river.[26] This designation recognizes the aesthetic, recreational, cultural, historical, and environmental value of the state's natural resources. River segments so designated under this act are afforded special protections from development and other impacts.

3.1.2 Piscataquis River

The Piscataquis River, a major tributary to the Penobscot, represents approximately 17 percent of the Penobscot River watershed (BHEC, 1998). The Piscataquis River sub-basin comprises a drainage area of approximately 1,500 square miles. The sub-basin is approximately 65 miles long and 40 miles wide (BHEC, 1998) and is located in the western central portion of the Penobscot River basin.

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[26] MRSA Title 38 §480

The Piscataquis River originates in the hilly and mountainous area to the south and east of Moosehead Lake and Greenville, Maine. The headwaters of the West and East Branch of the River converge to form the mainstem in Blanchard, Maine. The mainstem flows in a generally east direction to the confluence with the Penobscot River in Howland, Maine. The mainstem is approximately 62 miles long (Maine DEP, 1999). Due to steep topography and lack of storage reservoirs, Piscataquis river flows are highly variable. The major tributaries of the Piscataquis River include the Pleasant and Sebec Rivers, as well as Seboeis and Schoodic streams, which are outlets of larger lakes of the same names (BHEC, 1998). The Howland Project is located near the mouth of the Piscataquis, slightly upstream of its confluence with the Penobscot River, and approximately 33 miles north of Bangor.

The Piscataquis River from the confluence of the Penobscot River to the Monson and Blanchard Plantation town line is likewise classified as an "outstanding" river.[27] The watershed is primarily undeveloped, forested, and rural. Two communities, Dover-Foxcroft (4,657) and Milo (2,600), have populations greater than 2,000 people. Agriculture and forestry are the main land uses in the Piscataquis River drainage basin (Maine DEP, 2000). The climate in the area is generally described as cool, humid, continental type and exhibits large temperature ranges, both daily and annually. The total precipitation at Millinocket (just outside the basin) averages 42 inches annually. This total includes snowfall, which averages 95 inches per year (BHEC, 1998).

3.2 SCOPE OF CUMULATIVE EFFECTS ANALYSIS

According to the Council on Environmental Quality's regulations for implementing NEPA, a cumulative effect is the effect on the environment that results from the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time to include hydropower and other land and water development activities. Based on the Trust's pre-filing consultation and request for public comments, Commission staff have identified three cumulatively affected resources for analysis: 1) water quality (including DO, water temperature, and sediment transport), 2) water quantity (potential for changes in ice jamming), and 3) aquatic resources (migratory fish species).

3.2.1 Geographic Scope

The geographic scope of the environmental analysis defines the physical limits or boundaries of the Proposed Action's effect on the resources. The geographic scope of the

[27] MRSA Title 38 § 480

effects analysis broadly includes the Penobscot River and its contributing watershed(s), lands on and adjacent to the river and the tailrace/spillway areas, and the Stillwater and Piscataquis River confluences through the hydropower developments.

3.2.2 Temporal Scope

The temporal scope of the environmental analysis includes a discussion of the past, present, and reasonably foreseeable future actions and their effects on affected resources. The cumulative effects analysis in section 3.8 focuses on the effects of reasonably foreseeable future actions on environmental resources at each project. In addition, we examine the historical impacts to the Penobscot River Watershed. This discussion is limited, by necessity, to the amount of available information.

3.3 PROPOSED ACTION

The Trust proposes to surrender the licenses for the Veazie, Great Works and Howland Hydroelectric Projects. In addition, the Trust proposes to decommission and remove the dams at the Veazie and Great Works Projects. Further, the Trust proposes to decommission the powerhouse, generating units, and existing fish ladder at the Howland Project. The Trust proposes to keep the Howland dam in place but remove the flashboards to lower the reservoir by about 3.8 feet and create a nature-like fish bypass around the south end of the dam. This application is part of the restoration project, designed to restore native sea-run fish through improved access to 1,000 miles of their historic habitat in the Penobscot River watershed while also accommodating the continued generation of hydroelectric power at specified locations.

3.3.1 Veazie Project

The Veazie Project is the lowermost dam on the Penobscot River and impounds the river for a 3.8 mile length reach or 390 surface acres (Figure 5). The maximum hydraulic capacity of the project is 7,500 cfs, which is operated as run-of-river. Lands surrounding the Veazie Project are a mix of residential development and undeveloped forestlands with the western side of the river being predominantly developed and the eastern side of the river being undeveloped forest lands interspersed with pastures (FERC, 1998; NDT, 1990). The project is located in the towns of Veazie and Orono on the western shore and Eddington and Bradley on the eastern shore (Figure 6). Population density is higher on the western shore with Orono being the second most populated town in the project areas and Eddington and Bradley being among the least populated towns in the project areas (US Census, 2008b). The project provides opportunities for motorized and non-motorized boating and angling (FERC, 1998; NDT, 1990). The project currently has a state owned and operated fish ladder and trapping facility which is accessed by a cable way (Figure 7).

Figure 5. Veazie Project Powerhouse B and view of impoundment from west bank of the Penobscot River.
(Source: Staff)

Figure 6. View of Veazie Project from downstream on the east bank of the Penobscot River.
(Source: Staff)

Figure 7. View of Veazie fish lift and trapping facility accessed by cableway from west bank of the Penobscot River.
(Source: Staff)

3.3.1.1 Geologic and Soil Resources

AFFECTED ENVIRONMENT

The Veazie Project is situated within the Laurentian Plains and Hills ecoregion, which is predominantly forested with numerous glacial lakes (USEPA, 2007). The majority of this region is characterized by low relief, but rolling hills commonly occur. The area surrounding the Veazie Project is relatively flat, but drops sharply along the banks of the river, which confines the river to its channel under most flow conditions (Kleinschmidt, 2008a).

Surficial geologic materials adjacent to the Veazie impoundment and dam primarily consist of stream alluvium and elevated stream terrace deposits, and some areas of artificial fill (Maine GS, 2008). Bedrock outcrops occur along the entire impoundment, and the right abutment of the dam is founded on a massive bedrock outcrop that extends well above the river channel. Large stones and boulders are also common along the shoreline (Stantec, 2008). Some significant areas of the Presumpscot Formation, which is composed of deposits of fine-grained marine silts and clays, also exist along the project's impoundment (MGS, 2008).

Predominant soil series that occur adjacent to the project impoundment include Suffield, Stetson, Colton, and Adams, with some areas of Rockland soils with thorndike material, Podunk and Limerick soils (NRCS, 2008). The Adams, Stetson, Colton, and Suffield series are comprised of deep, well-drained to excessively-drained soils; Podunk soils are deep and moderately well-drained and Limerick soils are deep and poorly-drained. Rockland series soils with thorndike material are excessively drained. With exception of the Suffield soils, which formed in marine or lake-like sediments, Colton and Stetson soils formed in glacio-fluvial materials, and Adams in glacio-fluvial or glacio-lacustrine sand. Podunk soils are derived from recently deposited alluvial materials on flood plains. Limerick soils are formed in loamy alluvium on flood plains. Rockland soils with thorndike material are developed in colluvium from rotational landslides comprised of Thorndike soils which are formed in loamy till (NRCS, 2008).

Bathymetric and sediment surveys of the Veazie impoundment were conducted in 2007 by CR Environmental, Inc. As reported in the APEA included with the Trust's application, these surveys indicate that the substrate within the Veazie impoundment consists primarily of bedrock, boulders and cobble (Kleinschmidt, 2008a). It is estimated that over 95 percent of the riverbed is armored with these substrates. Many man-made features, such as "crib-works" and the remnants of a historic dam, were also identified in the lower section of the impoundment (CR Environmental, 2008).

Fine sediments identified consisted of sand which occurred in thin veneers atop larger substrates, along shallow shoreline reaches, and in a large deposit along the western river bank approximately one mile upstream of the dam. The large sand deposit was observed to include timbers and submerged aquatic vegetation, and is estimated to be 1 to 2 feet thick. Overall, it is estimated that 20 to 58 thousand cubic yards of erodible materials are present in the Veazie impoundment, with 60 to 90 percent concentrated in the large sand deposit (CR Environmental, 2008). The remainder of the potentially erodible material is limited to the small deposits along the shoreline and material located interstitially between other substrates. Active erosion and deposits of alluvial material were observed at locations where gullies, culverts, and streams discharge into the impoundment. Bank erosion is also present along the impoundment, but is limited (Stantec, 2008).

Two sediment samples were taken from the Veazie impoundment and analyzed for inorganic and organic pollutants and compared with established National Oceanic and Atmospheric Administration (NOAA) guidelines. The sediment samples were taken along the shoreline of the impoundment where fine sand and some silt-sized sediment capable of adsorbing pollutants were present. The results of the analysis indicated that silver was present at a level higher than the effects-range-low (ERL) NOAA criteria in both samples. The ERL reflects the concentration below which effects to biota are rarely observed. None of the organic pollutants for which there are established NOAA

guidelines exceeded the ERL or Effects Range Median (ERM) (CR Environmental, 2008).

Coal tar deposits are located in a roughly 10-acre area at Dunnett's Cove, along the Bangor waterfront redevelopment area and approximately 3 miles below Veazie Dam in a tidal section of the river.

ENVIRONMENTAL EFFECTS

Approval of the Trust's proposal would result in erosion of shoreline sediments and substrates and the potential release of some contaminated sediment. Dewatering the impoundment could result in the erosion of sediments that have accumulated along the shorelines and elsewhere behind the dam, particularly if the rate of the drawdown is too fast. One area of particular concern is the large sand deposit along the western bank upstream of the dam. Though sand is generally a well-drained material, rapid drawdown of the reservoir could mobilize portions of this deposit. However, this is unlikely given its location along the shoreline where water velocities are lower than in the rest of the river channel. After removal of the dam, water velocity in the river would increase and there would be potential for erosion of newly exposed substrates and sediments, particularly at high flows, until vegetation is fully established.

The majority of fine sediments in the Veazie impoundment are located in the large sand deposit, along shoreline areas, and in the voids between larger river substrates rather than accumulated behind the dam. Therefore it is not likely that drawdown of the impoundment would result in a large input of fine sediments into the river. Further, since the majority of the soils adjacent to the impoundment are well-drained, and much shoreline is covered with established vegetation and free of excessive human disturbances, drawdown of the impoundment is not likely to cause slope movement or erosion along the present river banks (Stantec, 2008). The proposed gradual drawdown would ensure that shoreline soils are able to drain at rates comparable to the reduction in impoundment level, which would minimize soil slumping and mass wasting.

Increased erosion could occur in the areas where existing gullies, tributary streams, and culverts enter the river channel. Substantial fluvial deposits were observed at the outfalls of many of these structures, and incision through these deposits would occur as the gullies, streams, and culverts re-establish gradients as they flow into the river channel. Construction of the coffer dams and access roads, and the removal of the Veazie dam and remnant dam structure would temporarily increase sediment loads in the river.

Chemical analysis of fine sediments in the Veazie impoundment indicates that silver is present at levels higher than the ERL established by NOAA. Erosion and sediment mobilization caused by removal of the dam would not result in the mobilization of a large volume of polluted sediments since the total volume of sediments in the

impoundment smaller than sand size is extremely low. Further, sediments within this size fraction are located primarily along the margins of the river along the shorelines and, as discussed above, sediments in these areas are not likely to mobilize during drawdown. While there is a potential for increased erosion of exposed shoreline sediments after dam removal, natural and planned revegetation efforts would help to minimize the risk for contaminated sediments to be eroded and enter the river. Once the area of the former impoundment is stabilized, contaminated sediments would be sequestered within the new riverbanks.

It is not expected that the Proposed Action will have any effect on the coal tar deposits because hydraulic model results, which extended downstream to the Bangor Dam site, indicate no change in water surface elevations or water velocities downstream of the Veazie dam. Furthermore, no appreciable sediment releases are expected with these dam removals. The remains of the breached Bangor dam, a significant hydraulic feature, are between the Veazie dam and Dunnett's Cove. In addition, comments received from the USACE on the DEA indicate that the highest concentrations of coal tar will be dredged and removed and the remaining deposits capped and contained in place by the end of December 2009. For these reasons, approval of the Trust's application would not affect the coal tar deposits.

In order to minimize the impacts associated with its proposal, the Trust has proposed various measures that would be implemented before, during, and after construction and dam removal activities. Specifically, the predominant sand deposit would be stabilized with a temporary erosion control blanket while native seed mix germinates and becomes established (Milone and MacBroom, 2008a). The entire shoreline would be monitored during dam removal activities and bank stabilization measures, such as placement of geotextile fabric, selective plantings, and stone-toe revetments, would be used at locations prone to or actively eroding (Milone and MacBroom, 2008a). The Trust proposes to monitor these and other shoreline features susceptible to erosion following dam removal to determine the need for remedial measures for each feature. In instances where fluvial deposits are significantly eroding or obstructing the flow of water into the river, the deposits would be removed and the shoreline graded. In addition, the Trust proposes to extend outfall pipes and culverts as necessary in order to minimize the potential for such erosion. The Trust proposes to revegetate much of the newly exposed shoreline with native plants and monitor the area for one year following dam removal in order to ensure that newly exposed sediments are adequately stabilized. It is also expected that natural revegetation would begin to occur as soon as the impoundment is drawn down and is expected to be rapid in areas with finer sediments.

Given this information, approval of the Trust's proposal would have some minor, temporary, adverse impacts on geology and soil resources in the project area. These impacts would be minimized by implementation of the measures proposed by the Trust,

as discussed above, and the implementation of Best Management Practices (BMPs), such as silt fencing and screens and settling basins, to control erosion and sedimentation during dam removal activities.

3.3.1.2 Water Resources

AFFECTED ENVIRONMENT

Water Quantity

The upper reaches of the West Branch Penobscot River contain a number of storage impoundments that help regulate water flow throughout the lower Penobscot River Basin. About 10 percent of the watershed in this basin is regulated by those storage impoundments and a 2,000 cfs minimum flow maintained at Millinocket on the West Branch Penobscot River. This flow regulation usually results in greater flows during the summer than would occur under natural conditions. Under normal flow conditions, and in accordance with a 1911 Federal Circuit court decree, approximately one-third of the Penobscot River flow is diverted to the Stillwater River and the remaining two-thirds continues down the mainstem of the Penobscot River.

The Veazie Project has an existing reservoir with a surface area of 390 acres, a storage capacity of 4,800 acre-feet, and a normal water surface elevation of 34.8 feet National Geodetic Vertical Datum (NGVD). Table 4 below presents the average, maximum, and minimum monthly flows, from April 1979 to September 1996, on the Penobscot River below Veazie dam. The Maine DEP has determined that the 7Q10[28] flow at Veazie dam is approximately 3,178 cfs (Mitnik, 2003; as cited by the Trust, 2008).

As mapped by Maine Office of GIS (Maine GIS) and included with the Trust's application, in the Veazie impoundment, sand and gravel aquifers were identified on Ayer's Island and along the western shore, approximately 2,800 feet upstream of Veazie Dam. The aquifer on the western shore extends as high as 180 feet NGVD in elevation, which is higher than the existing normal water level on the Penobscot River (Maine GIS, 2008; as cited by the Trust, 2008).

[28] The streamflow that occurs over 7 consecutive days and has a 10-year recurrence interval period, or a 1 in 10 chance of occurring in any one year. Daily streamflows in the 7Q10 range are general indicators of prevalent drought conditions which normally cover large areas.

Table 4. Average, Maximum and Minimum Monthly Flows (cfs) at the Veazie Project (1979-1996)

Month	Mean Monthly Flow (cfs)	Maximum Monthly Flow (cfs)	Minimum Monthly Flow (cfs)
January	9,995	66,500	4,210
February	10,159	52,100	3,640
March	13,251	57,200	3,500
April	36,927	155,000	12,500
May	23,018	112,000	6,630
June	13,354	132,000	3,650
July	8,669	66,000	3,380
August	7,611	24,900	3,040
September	7,883	97,900	2,690
October	11,221	63,000	2,910
November	15,430	77,400	3,760
December	13,806	81,600	4,470
Annual	14,277	155,000	2,690

(Source: USGS, 2009a)

Water Quality

Historically, discharge of untreated industrial and municipal wastewater into the Penobscot River and the use of the river for log drives caused severe deterioration in water quality up until the early 1970's. Since the 1970's, all of the large industries and most municipalities in the Penobscot River Basin installed wastewater treatment facilities and log driving activities have ceased. Both of these factors significantly improved overall water quality throughout this segment of the river, and in 1989 the Maine DEP proposed reclassification from Class C to Class B[29] of the mainstem of the Penobscot

[29] Class B waters must have a dissolved oxygen (DO) concentration of not less than 7 parts per million (ppm) or 75 percent oxygen saturation, whichever is higher, and must be suitable for the designated uses of drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply, hydropower, navigation, and habitat for fish and other aquatic life. Class B waters must also meet state standards for *Escherichia coli* (*E. coli*) bacteria where the number may not exceed maximum concentrations of 236 per 100 milliliters (mL) or may not exceed a mean concentration of 64 per 100 mL. Class C waters must have a DO concentration not less than 5 parts per million or 60 percent of saturation, whichever is higher and must be of such quality that they are suitable for the designated uses of drinking water supply after treatment, fishing, agriculture, recreation in and on the water, industrial process and cooling water supply and hydroelectric power generation. Class C waters must also meet state standards for *E. coli* bacteria where the number may not exceed a geometric mean of

River, from its confluence with the Piscataquis River to the Veazie Dam, including the Stillwater branch (FERC, 1997).

Maine DEP has classified a 14.51 mile segment of the Penobscot River upstream of Veazie Dam and a 10.1 mile segment in the watershed that includes the tailwaters at Veazie as Class B, Category 4-B[30] due to pollutants, such as dioxin, Polychlorinated biphenyls (PCBs), and *Escherichia coli* (*E. coli*). New dioxin sources have been removed from sections of the river and these sections are expected to attain state water quality standards by the year 2020. Another 19 mile segment of the river upstream of Veazie Dam has been designated by Maine DEP as Class B, Category 5-D due to PCB contamination (Maine DEP, 2006; Maine DEP, 2008).

In 2007, Maine DEP conducted sampling for DO, biological oxygen demand (BOD), *E. coli* levels, water temperature, nutrient concentrations, Chlorophyll-a content, and water clarity above the Veazie dam as part of their basin-wide water quality sampling program. All sampling was conducted during the typical low flow period (when low flow conditions were less than 4400 cfs) in July and August 2007 in order to assess worst case conditions (Albert, 2007). The results of this sampling showed that average daily, and daily maximum DO levels met state water quality standards. The daily minimum dissolved oxygen concentrations were slightly below state standards at a DO concentration of 6.5 ppm. The observed biochemical oxygen demand (BOD) for all Penobscot River sampling stations, including the Veazie Project area, was typical of rivers with low-levels of pollution. The *E. coli* levels at most Penobscot River locations on the mainstem were considered low. The three-day average water temperature for all Penobscot River sampling stations, including the Veazie Project area, ranged from 24 to 27.4 degrees Celsius (Albert, 2007). The minimum, maximum, and average water temperatures at this project ranged from 25.9 to 28.5 degrees Celsius (Albert, 2007). Phosphorus levels for the majority of the Penobscot River sampling stations, including at Veazie Project, were of moderate nutrient enrichment and observed nitrogen levels were considered low. Chlorophyll-a levels from some of the Penobscot River sampling stations were relatively high, but levels above the Veazie Dam were moderate at just about 5 parts per billion (Albert, 2007). Additionally, the Maine DEP's sampling station above Veazie Dam indicated that water clarity was high (Albert, 2007).

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126 per 100 milliliters or an instantaneous level of 236 per 100 milliliters (Maine statute 38 MRSA § 465).

[30] Category 4 refers to those waters that are impaired or threatened for one or more designated uses by a pollutant(s) but does not require a total maximum daily load report.

ENVIRONMENTAL EFFECTS

Water Quantity

Based on HEC-RAS hydraulic modeling conducted by the Trust's consultant, the Proposed Action of dam removal at the Veazie Project is expected to reduce water surface elevation by a maximum of 20.7 feet (at median August flows) at the front of the dam (Milone and MacBroom, 2008d, as cited by the Trust, 2008). At the upstream end of the existing impoundment, approximately 3.8 miles from the dam, the change in water surface elevation is expected to be less than 1 foot (Milone and MacBroom, 2008d, as cited by the Trust, 2008). Hydraulic modeling also indicates that water levels in the newly created riverine reach, at the dam and head of the impoundment, will be lower than existing water levels during high flow or flooding events. Hydraulic modeling results further indicate that river width may decrease by approximately 343 feet at the front of the dam, due to dewatering both the western and eastern shoreline, and river width may change by less than 200 feet at other locations along the impoundment (Milone and MacBroom, 2008d, as cited by the Trust, 2008). Upstream of the impoundment, near Ayer's Island, shoreline may be exposed in excess of 475 feet (Milone and MacBroom, 2008d, as cited by the Trust, 2008).

In 2008, USACE analyzed the effects of dam removal at the Veazie Project on ice cover formation and ice jamming in the Penobscot River. As reported by the USACE included with the Trust's application, historical review of ice jam events indicates that December ice jams on the Penobscot River have become less frequent in the last half-century and that mid-winter ice breakups appear to have become more commonplace since 1978. Hydraulic modeling of worst-case freezeup conditions indicate that removal of Veazie Dam will likely consolidate the three existing freezeup ice covers within the study reach into a single freezeup ice accumulation extending from Hampden to Orono (USACE, 2008). This conclusion relies on the assumption that the ice cover will be able to stage its way up through fast water in the vicinity of the removed Veazie Dam. The changes are likely to increase the total ice freezeup volume within the study reach from about 320 to 340 million cubic feet (USACE, 2008). Therefore, the USACE study and the hydraulic model simulation both demonstrate that removal of the Veazie Dam will not likely have a significant effect on the frequency or severity of ice jams in the vicinity of Bangor.

For the sand and gravel aquifer mapped and found on Ayer's Island by Maine GIS and included in the Trust's application, ledge has been identified around Ayer's island, suggesting that this aquifer is perched on top of bedrock and, therefore, has a low hydraulic conductivity and may separate the aquifer from the Penobscot River. In addition, for the aquifer on the western shore, apart from the portion of the aquifer immediately adjacent to the river, most of the flow into the aquifer would be from upland areas with water flowing through the aquifer towards the Penobscot River. Therefore, it

is unlikely that removal of Veazie Dam will negatively impact either of the identified aquifers.

There are two public supply wells within a mile upstream of the Veazie Dam and within a half mile of the Penobscot River connected to the mapped aquifers. According to information from the Maine Department of Health and Human Services, one of the public supply wells that is 40 feet deep in the mapped sand and gravel aquifer and owned by Greystone Trailer Park is offline because the park is closed. The other public supply well is approximately 130 feet deep and is active; however, its depth relative to the land surface indicates that it draws water from an elevation below the proposed water surface elevation of the adjacent Penobscot River

Water Quality

Although water quality in the Penobscot River at the Veazie Project is generally adequate for all current and designated uses, the return to a natural flowing riverine environment would most likely benefit water quality of the project area. The removal of Veazie Dam would allow for increased turbulence and aeration in the water flow, which would provide enhancement to DO levels and eliminate large water temperature variations associated with impounded waters. Removal of the impoundment and the dam will also allow for non-point sources of pollution and nutrient concentrations to more likely flush through the water system, which will reduce the potential for eutrophication and anoxic conditions to occur in the water system within the project area.

The removal of Veazie Dam would temporarily affect water clarity from increased turbidity due to potential sedimentation and erosion events during dam removal activities. However, as part of the Proposed Action, the licensee intends to use best management practices, such as standard streambank stabilization techniques, and standard erosion control techniques, such as revegetation, rip-rap, and other bioengineering techniques, to reduce the input of fine sediment and erosion of soils into the water stream. The implementation of these control practices will help minimize the temporary, negative effects on water clarity in the project area.

As noted previously, sediment samples from the Veazie impoundment indicated that a heavy metal—silver and several organic compounds were found in concentrations exceeding the identified criteria listed in the NOAA guidance (CR Environmental, 2008). However, little if any accumulation of fine grained sediments and organic material has occurred behind the Veazie Dam. The lack of accumulated fine grain sediments and organic material behind the dam limits the potential for pollutants, such as heavy metals and organic compounds, to become bound to substrate particles and for their presence and resuspension during dam removal activities (Stantec, 2008). The Trust also stated that they intend to use best management practices to further minimize the mobilization of sediments during dam removal activities. In effect, because the Trust intends to use best

management practices and there are limited amounts of pollutants behind the dam due to a lack of accumulated fines and organic material, it is not likely that the heavy metal and organic compounds will result in major, negative effects to water quality at this project area.

3.3.1.3 Fisheries and Aquatic Resources

AFFECTED ENVIRONMENT

Habitat

The Veazie Project impoundment extends 3.8 miles upstream from the dam in Veazie to Ayer's Island, just downstream from the confluence of the Stillwater Branch and the Penobscot River in Orono, Maine. The impoundment is narrow and riverine with no significant wetlands or embayments. The lower portion of the impoundment is characterized by slower velocities and deeper water. The substrates consist primarily of coarse material with cobble and gravel mixed with some larger boulders (CR Environmental, 2008). The impoundment also has remnants of a former wing dam structure which may present an impediment to fish passage if left in place after dam removal thus the Trust proposes to remove it also. Based on recent surveys (Yoder *et al.*, 2006) fish resources are dominated by warmwater fish such as smallmouth bass (*Micropterus dolomieui)*, but also occupied transiently by migratory fish species.

Atlantic salmon (*Salmo salmar*) ascending the river rely on cover, such as pools and other deep depressions greater than three feet deep, as resting and shelter sites often referred to as "lies" (Moreau and Moring 1993). Charles Ritzi Associates (CRA) identified the number and distribution of fishing lies specific to salmon in riverine habitat below the Milford, Great Works and Veazie Dams (Kleinschmidt, 2008c). CRA formed a study team comprised of biologists from state and federal fisheries agencies, the PIN, Bangor Hydro and experienced anglers from three local salmon clubs. The study located existing lies in the reach of the Penobscot River in the vicinity of the Veazie Project. The Veazie impoundment is currently home to an estimated 44 salmon lies. Downstream of the Veazie impoundment, the Penobscot River provides approximately 40 lies, depending on flow conditions (Kleinschmidt, 2008c).

Fish Assemblages

Fish assemblages in the project impoundment and tailwaters were surveyed by Yoder, *et al*. (2005) during the summer of 2004 by boat electrofishing. A total of 3,281 feet (approximately 1 kilometer) of shoreline was sampled in the project impoundment and 9,843 feet (approximately 3 kilometers) of riverine habitat shoreline was sampled below the project. This survey was part of a quantitative fish assemblage survey conducted throughout the Penobscot River basin using standardized methods (Yoder, *et*

al., 2005).

The impoundment is comprised of warmwater habitat generalists. A total of seven species comprise the fish assemblage with smallmouth bass being the most abundant species both in biomass and numeric abundance (Table 5). Smallmouth bass, chain pickerel (*Esox niger)* and American eel (*Anguilla rostrata*) collectively comprised over 90 percent of the fish assemblage by weight, however chain pickerel and eel were not numerically dominant. Redbreast (*Lepomis auritus)* and pumpkinseed (*Lepomis gibbosus)* were the next most numerically abundant species after smallmouth bass. Biomass was indexed at 6.1 kilograms per kilometer of shoreline, and numeric abundance was indexed at 79 fish per kilometer.

Table 5. Composition of Fish Assemblage from the Veazie Project Impoundment, Summer 2004

Species	Biomass (kg/km)	Biomass (%)	Abundance (Number/km)	Percent abundance (%)
Smallmouth Bass	3.57	58.4	45	57.0
Chain Pickerel	1.25	20.5	1	1.3
American Eel	0.91	14.9	3	3.8
Redbreast Sunfish	0.27	4.4	12	15.2
Pumpkinseed	0.09	1.5	11	13.9
Fallfish	0.01	0.2	5	6.3
Eastern Banded Killifish	0.01	0.2	2	2.5
Grand Total	6.11		79	

Note: Data are normalized in units per kilometer of shoreline
(Source: Yoder, *et al.*, 2005)

The tailwater area was comprised of a more diverse species assemblage, with warmwater habitat generalists, riverine and migratory fish species (Table 6). A total of fifteen species comprise the fish assemblage, with white sucker (*Catostomus commersonii)*, American eel and Atlantic salmon and smallmouth bass the most dominant and collectively comprising over 90 percent of the fish assemblage by weight. American eel were numerically dominant and accounted for 73 percent of the catch. Smallmouth bass, common shiner (*Luxilus cornutus)*, and fallfish (*Semotilus corporalis)* were the next most numerically abundant species. Atlantic salmon are a migratory species that presently inhabits the project tailwaters transiently during late spring through summer during upstream spawning migrations (Baum, 1997). Most salmon are captured in the Veazie fish trap as they migrate and are either released upstream or transported to hatcheries. However, some may remain in the river below Veazie throughout the summer and early fall. Biomass was indexed at 25.86 kilograms per kilometer of shoreline, and numeric abundance was indexed at 493 fish per kilometer.

The 2004 survey indices show that the contiguous riverine reach below the Veazie Project has greater fish species diversity, numbers and biomass of fish per linear distance of shoreline than does the Veazie impoundment. The species composition below Veazie also has migratory fish that import marine nutrients into the riverine ecosystem that are presently absent from the impoundment, although the catadromous American eel provides that trophic function and is present in both parts of the Veazie project area. Smallmouth bass, an important freshwater resident game species, has similar biomass in the downstream riverine habitat but fewer numbers in the impoundment suggesting a preponderance of larger fish in the tailwater than the impoundment.

Table 6. Composition of Fish Assemblage from the Veazie Project Tailwater, Summer 2004

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (Number/km)	Percent Abundance (%)
White Sucker Total	9.39	36.3	18	3.6
American Eel Total	7.09	27.4	358	72.7
Atlantic Salmon Total	4.45	17.2	9	1.8
Smallmouth Bass	2.93	11.3	31	6.2
Striped Bass Total	0.7	2.7	1	0.1
Redbreast Sunfish Total	0.59	2.3	15	3.1
Largemouth Bass Total	0.3	1.2	1	0.2
Chain Pickerel Total	0.13	0.5	0	0.1
Brown Bullhead Total	0.11	0.4	1	0.2
Common Shiner Total	0.06	0.2	25	5.0
Fallfish Total	0.06	0.2	21	4.3
Golden Shiner Total	0.03	0.1	6	1.2
Yellow Perch Total	0.01	0.1	0	0.1
American Shad Total	0.01	0.0	4	0.8
Eastern Banded Killifish Total	0	0.0	3	0.6
Grand Total	25.86		493	

Note: Data are normalized in units per kilometer of shoreline
(Source: Yoder, *et al.*, 2005)

Mussels

Normandeau Associates performed a SCUBA survey to identify mussel populations in the Veazie impoundment and tailrace during August 2007. A total of 28 areas within the Veazie impoundment were surveyed and three cross channel transect surveys were conducted in the Veazie tailrace.

Results of the surveys indicated a total of eight mussel species were observed in the Veazie impoundment: eastern elliptio (*Elliptio complanata*), eastern lampmussel

(*Lampsilis radiata radiata*), eastern floater (*Pyganodon cataracta*), triangle floater (*Alasmidonta undulata*), as well as the following four state-listed rare, threatened or endangered species: yellow lampmussel (*Lampsilis cariosa*), tidewater mucket (*Leptodea ochracea*), creeper (S*trophitus undulatus*), and brook floater (*Alasmidonta varicosa*). Eastern elliptio was the overwhelmingly dominant species observed accounting for more than 90 percent of the observations in the Veazie impoundment study areas. Following eastern elliptio, other species observed in decreasing order of abundance were eastern lampmussel, eastern floater, triangle floater, yellow lampmussel, brook floater, tidewater mucket, and creeper. The state rare, threatened or endangered species were generally less abundant accounting for less than 0.5 percent of all observations. Substrates in the impoundment survey areas included ledge, boulder, cobble, gravel, sand and silt, and water depths ranged from 0 to 17 feet. There did not appear to be any trends in the abundance or diversity of mussel species observed in the substrate type or depth of water in which the observations were made (Noramandeau Associates, 2007).

Only five species of freshwater mussels were observed during the cross channel transect surveys of the Veazie tailrace: eastern elliptio, eastern lampmussel, eastern floater, triangle floater, and a single individual yellow lampmussel. The number and diversity of mussel species observed in the tailrace transects appeared to be substantially less than observations in the impoundment areas. Again, eastern elliptio was the dominant species observed, while only a few eastern lampmussel, eastern floater, and triangle floater individuals were observed over the tailrace transects. Eastern elliptio was observed at both nearshore and mid-river transects with water depths ranging from 0 to 10 feet, while eastern lampmussel, eastern floater, and triangle floater were only observed at distances ranging from 160 to 190 feet from shore. In general, state rare, threatened or endangered species were very rare in the Veazie tailrace with only a single yellow lampmussel observed during the August 2007 survey. This individual was located approximately 180 feet from shore where substrate types included cobble, gravel and sand, and water depths ranged from 2 to 4 feet (Noramandeau Associates, 2007).

ENVIRONMENTAL EFFECTS

Following decommissioning, physical habitat for migratory and resident fish will change from a lake-like to riverine environment and will result in improved access for upstream and downstream migrating fish. Much of the following discussion is derived from the Commission's 1997 Lower Penobscot River Basin Final Environmental Impact Statement (FEIS) in which the removal of Veazie dam was analyzed as an alternative to an expansion and continued operation of the project.

Physical Habitat Changes

It is expected that the dewatered impoundment will gradually assume habitat characteristics and thus fish community composition similar to those found in the existing

contiguous riverine tailwater areas. Dam removal will restore free-flowing conditions in 3.8 miles of river above the Veazie spillway. Substrates between Veazie and Great Works are generally armored with bedrock, boulders, cobble and gravel, and are similar to what exists now between the Veazie dam and the site of the former Bangor Dam (CR Environmental, 2008). The removal of the Veazie dam will result in changes in water depth and velocity and will create new pools, riffles and runs similar to what is found now in the unimpounded portions of the Penobscot River below Veazie. These hydrologic changes will positively affect habitat quantity and quality for migratory and resident fish species.

In the FEIS, the Commission calculated that dam removal will result in the creation of about five percent of both new nursery habitat for Atlantic salmon smolts and spawning habitat for American Shad (FERC, 1997b). Dam removal is also expected to increase spawning opportunities for endangered shortnose sturgeon (*Acipenser brevirostrum)* and Atlantic sturgeon (*Acipenser oxyrinchus*). Because Atlantic salmon, shortnose sturgeon, and Atlantic sturgeon are protected under the ESA, they will be more thoroughly addressed in the Rare, Threatened and Endangered Species section (section 3.3.1.6).

Atlantic salmon ascending the river rely on cover, such as pools and other deep depressions greater than three feet deep, as resting and shelter sites often referred to as "lies" (Moreau and Moring, 1993). To assess the expected changes to the hydrology of the Veazie impoundment area after dam removal, the Trust's consultant conducted hydraulic modeling using the USACE's Hydrologic Engineering Center-River Analysis System (HEC-RAS). In the immediate vicinity of the existing dam and powerhouse, dam removal will remove the concentration of discharge from the existing powerhouse and distributing it more evenly across the entire river. It will also change the number or location of salmon lies in the area (Milone and MacBroom, 2008d).

After the Veazie dam is removed, under high flow conditions (May mean flow) the former Veazie impoundment will provide a total of seven boat-accessible lies and several shoreline accessible lies (Kleinschmidt, 2008c). These lies will be located between at the downstream tip of Ayers Island and also at numerous points along the Eddington shoreline. Under low flow conditions (August median flow) the footprints of the two main channel lies near Ayers Island and the five isolated boat-accessible lies expand and merge to form a single long lie. The remaining shoreline accessible lies downstream of Ayers Island are expected to remain unchanged and a small wadable lie is expected to be created at the midpoint along the Eddington shoreline between the island and the dam (Kleinschmidt, 2008c).

Additionally, migrating Atlantic salmon depend on access to cool-water tributary streams during warmer conditions (Holbrook, 2007). Dam removal will improve access to these upstream temperature refuges in a timely manner and will increase successful

migration and survival.

After dam removal, fish communities would be expected to gradually increase in biomass, gain riverine species, and potentially recruit additional migratory species as barriers to habitat connectivity between the currently segregated river segments are removed to permit free passage.

Water Quality Improvements

Removal of the Veazie Dam would alter the flow characteristics from slow deep water in the Veazie impoundment to a more natural sequence of shallower pools, riffles and runs. This would potentially increase the aeration and DO of the river. Additionally, the diurnal temperature variation would increase. Both migratory and resident fish species would benefit from these changes in DO and temperature patterns.

During in-water construction activities, there may be short-term effects on water quality, including sedimentation and increased turbidity which could be harmful to aquatic life. Due to the limited amount of fine, mobile sediment in the construction area, these effects are expected to be minor and temporary. The Trust proposes to employ BMPs, including erosion and sediment control measures, to limit the extent and duration of any increase in turbidity or sedimentation.

Fish Passage

Upstream migrating species such as Atlantic salmon, Atlantic and shortnose sturgeon, striped bass (*Morone saxatilis)*, rainbow smelt (*Osmerus mordax),* Atlantic tomcod (*Microgadus tomcod),* American shad (*Alosa sapidissima)*, alewife (*Alosa pseudoharengus)*, blueback herring (*Alosa aestivalis)*, sea lamprey (*Petromyzon marinus)* and American eel will benefit greatly from the proposed removal of the Veazie and Great Works dams and wing dam remnants in the impoundment. In addition, the new upstream fish passage facilities at the Milford Project and the proposed Howland bypass will allow these species to access their entire historic habitat in the Penobscot watershed. Studies on fish passage effectiveness on lower dams in the river indicate that the removal of a dam such as Great Works or Veazie could enhance upstream movements by 10 to 20 percent (FERC, 1997b). As concluded in the National Academy of Sciences Report on Atlantic salmon in Maine (NRC, 2004), removal of lower river dams will provide the greatest improvement in access to upstream spawning and rearing habitats for these species and will greatly improve overall chances for successful restoration of migratory species in the watershed.

Dam removal will also eliminate current downstream passage mortality. Most downstream mortality occurring now at Veazie is associated with the existing turbines but fish currently passing over the dam or via conduits are likely experiencing some

mortality. The FEIS estimated a 0.75 percent mortality rate of Atlantic salmon smolts and 10 percent loss of juvenile American shad and alewife due to downstream migration at the Veazie Project (FERC, 1997b). The improvement in passage for downstream migrating fish will be significant because the Veazie dam is the lowermost dam on the river and all out-migrating fish must pass it. Dam removal will greatly increase the numbers of out-migrating fish reaching the ocean and will enhance overall chances for successful restoration of migratory species in the Penobscot River (Holbrook, 2007).

The Trust's consultant used limited bathymetric studies and the HEC-RAS hydraulic model to determine if sufficient minimum water depth for fish passage would exist during low flow conditions after the dam is removed. According to the model, the river would be approximately 620-feet wide at this point with an approximately 350-foot contiguous width of 1 foot-deep or more. At this flow, the river would have a 150-foot-wide thalweg approximately 4 foot-deep with an average channel velocity of approximately 4 feet per second (fps) (Milone and MacBroom, 2008d). This depth and width should provide an adequate zone of passage for adult-sized migratory fish (Bovee, 1982) and this velocity would not exceed a threshold that would impair upstream swimming of adult migratory fish (Haro, *et al.*, 2004).

The proposed decommissioning and removal of the Veazie dam will disrupt current trapping and trucking of Atlantic salmon broodstock conducted by the Maine DMR at the project. As described in the Settlement Agreement and required by the Milford Project license, PPL will construct a fish lift and trapping facility at Milford to replace the trap at Veazie. The current fish lift and trapping facility at Veazie is not accessible during high flows but the new Milford fish trap will be shore-based and accessible during spill conditions. As outlined in the April 2005 Commission Order, the Milford fish lift and trapping facility will be operational approximately 2 years after the Trust takes ownership of the Veazie, Great Works and Howland Projects.

One commenter, Douglas Watts, by letter filed February 27, 2009, disputed the Trust's discussion of the historic range of the striped bass and shortnose sturgeon. The commenter claimed that they were historically found above the natural barrier created by what was once Old Town Falls and is now the location of the Milford dam. Although the historical information about the distribution of these two species is limited, for the purposes of management, the Maine DMR and Maine DIFW assume that Old Town Falls was the historical limit of shortnose sturgeon's upstream range in the Penobscot basin (Maine DMR and Maine DIFW, 2009). However, the Maine DMR and Maine DIFW maintain that striped bass probably migrated above the Milford dam although there is no evidence that they historically or currently spawn in the Penobscot River. The commenter also expressed concerns that the Maine DMR would not allow striped bass to pass upriver once they were caught at the new Milford fish trapping and sorting facility. Maine DMR and Maine DIFW state in their Operational Plan for the Restoration of Diadromous Fishes to the Penobscot River that they plan to create a recreational striped

bass fishery above Milford and conduct daily counts of striped bass at Milford (Maine DMR and Maine DIFW, 2009).

Once the Milford fish lift is operational, the Trust proposes to remove the Veazie and Great Works dams in sections and provide zones of passage through the breached sections. The Trust proposes to remove the Great Works dam first to allow for fish to be trapped at the Veazie dam and transported upstream of the Great Works dam. After the east bank of Great Works dam breach has been sufficiently widened to provide the depth and velocity conditions necessary for upstream migration, trapping activities at Veazie could be halted and the removal of the west bank of the Great Works dams can then continue.

During removal of the Veazie dam, the Trust proposes to keep the fishway operational until the initial drawdown of the impoundment. During drawdown, upstream migration past the Veazie dam will be limited. Once the Veazie dam has been fully breached from the east bank, velocities and flow depths through the breach will be conducive to fish passage (i.e., less than six feet per second and greater than one foot, respectively). The window of non-passage at Veazie dam during the removal is also expected to be approximately three to four weeks long, from the start of the drawdown until the breach is fully developed, but is also contingent upon any necessary mussel relocation efforts. The Trust proposes to coordinate the timing of dam removal activities with the resource agencies to ensure minimal impacts to migrating fish. By breaching the dam in sections, maintaining zones of passage and utilizing alternative fish ladders as dam removal progresses, upstream passage disruptions should be minimized.

Impacts to Resident Fisheries

Removal of the Veazie dam would have both adverse and beneficial impacts on resident fisheries resources, depending on individual species. Species that prefer lake conditions, such as yellow perch (*Perca flavescens)* and chain pickerel, will experience a decline in habitat following dam removal. However, the FEIS found that any reduction in pickerel populations will help to reduce in-river predation of Atlantic salmon smolts (FERC, 1997b). Species that prefer riverine conditions will experience improved habitat after dam removal. Popular sport fish such as smallmouth bass can thrive under both riverine and lake-like conditions (Scott and Crossman, 1973) and should continue to be a dominant presence in the aquatic community after the dam is gone (Kleinschmidt, 2008b).

It is expected that the diversity of the fish community in the area of the former Veazie impoundment would be similar to that found in area below the project. The contiguous riverine reach below the Veazie Project has greater fish species diversity, numbers and biomass of fish per linear distance of shoreline than does the Veazie impoundment (Yoder, *et al*., 2005). Yoder, *et al.* (2006) found that quantitative fish

abundance and biomass data collected in the Kennebec, Androscoggin and Penobscot showed that the biomass of un-impounded riverine reaches is higher than that of rivers with multiple contiguous impoundments. After the removal of the Edwards Dam on the Kennebec (formerly positioned at the head of tide), seasonal biomass increased partially from the influx of marine protein from migratory species. This increase in protein would move through the food web increasing the productivity of all trophic levels. A similar increase in the macroinvertebrate community abundance, biomass and species richness was recorded in this reach subsequent to removal of the dam (David Courtemanch, Maine DEP, personal correspondence, April 2005; as cited in Trust, 2008).

After dam removal, the lowering of the water level in the former impoundment may reveal sediment bars that have built up at the confluences of tributary streams. These sediment bars could create barriers to resident fish traveling into and out of these tributaries. There may be short term effects to resident fish passage into and out of tributaries to the former impoundment. The Trust proposes to monitor tributary deltas following dam removal and to take remedial measures to remove barriers that are affecting fish passage. Additionally, the Trust proposes to drawdown the impoundment slowly to help reduce adverse impacts on resident fish and catadromous American eel.

Mussels

Many mussels in the project area will potentially be dewatered under the Proposed Action, including four State of Maine listed rare, threatened or endangered species (brook floater, yellow lampmussel, creepers, and tidewater mucket). The Proposed Action will have direct, short-term impacts on individual mussels located in the drawdown area. The Trust proposes to reduce this impact by drawing down the impoundment gradually, in stages, allowing mussels to move to deeper water and facilitating relocation efforts. The Trust proposes to consult with the resource agencies to develop a mussel relocation plan.

Other Ecological Effects

Other ecological benefits will result from removing Veazie dam such as increasing the abundance of river herring to: 1) provide prey for predatory fish; 2) serve as prey buffers for fish such as Atlantic salmon smolts; 3) provide an uncontaminated food for fish-eating birds and mammals and; 4) renew the historical nutrient exchange between the river and marine environment. Potential benefits to near-shore stocks of cod and other groundfish in the Gulf of Maine as a result of restored migratory fish runs could also be realized as an indirect effect of dam removal.

3.3.1.4 Botanical Resources

AFFECTED ENVIRONMENT

Shoreline surveys were completed by Stantec in summer 2007 to identify existing wetlands and other botanical communities within 500 feet of the project impoundment's normal high water line. The shoreline survey investigated wetland boundaries and habitats in the project impoundment area using National Wetlands Inventory (NWI) maps and the Cowardin Classification System, in accordance with the guidance of the 1987 Corps of Engineers Wetland Delineation Manual.[31] The following information in this affected environment desriptioin for the botanical resources section is based on Stantec's shoreline surveys, unless otherwise noted.

The Veazie impoundment extends approximately 3.8 miles upstream from the dam and ends near the southern extent of Ayer's Island. According to the shoreline surveys, wetlands within this impoundment area are primarily concentrated in the upper reach of the Penobscot River at Ayers Island. In the lower section of the Veazie impoundment, wetlands are less common and those that are present are located typically along sloping hillsides conveying flows to the river. Adjacent to the river, upland oak and pine forests are located upslope of the steep embankments.

According to NWI maps and the wetland surveys, existing wetlands classified as palustrine[32] forested wetlands, palustrine emergent marsh, palustrine scrub-shrub wetlands, palustrine unconsolidated bottom and riverine upper perennial unconsolidated bottom are found in and adjacent to the Veazie impoundment. Table 7 below identifies acreage of each wetland type at the Veazie Project that are within 200 feet and 500 feet of the Penobscot River.

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[31] The Cowardin wetlands classification system is hierarchical, progressing from systems and subsystems at the most general levels to the classes, subclasses, and modifying terms.

[32] According to the U.S. Geological Survey (2006), palustrine systems includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent.

Table 7. Acres of each wetland type at the Veazie Project within 200 and 500 feet of the Penobscot River

Wetland Type	Acres within 200 feet	Acres within 500 feet
Palustrine Emergent Marsh Wetland	3.3	3.4
Palustrine Emergent Marsh/ Forested Wetland	0	1.5
Palustrine Emergent Marsh/ Scrub-Shrub Wetland	0	0
Forested Wetland	5.1	12.9
Scrub-Shrub Wetland	1	1.7
Scrub-Shrub/ Forested Wetland	0	0
Uncon. Bottom/Emergent Marsh Wetland	1	2.9
Uncon. Bottom/ Forested Wetland	1	3.1
Uncon. Bottom Wetland	0.1	1.2

(Source: Stantec, 2008)

Palustrine forested wetlands are the dominant wetland type found within the impoundment and the vegetation characteristics of these areas primarily consist of a silver maple floodplain forest community. The forested wetland areas are dominated by silver maple (*Acer saccharinum*) and sometimes contain red maple (*Acer rubrum*) or green ash (*Fraxinus pennsylvanica*) within the Veazie impoundment. Shrub layers within the forested wetlands are not well developed, but may include speckled alder (*Alnus incana*), wild raisin (*Viburnum nudum*) and arrowwood (*Viburnum dentatum*). The herbaceous layer within the forested wetland is well developed and is primarily dominated by white snakeroot (*Ageratina altissima*), false nettle (*Boehmeria cylindrica*), purple stem beggar's tick (*Bidens connata*), sensitive fern (*Onoclea sensibilis*) and ostrich fern (*Matteuccia struthiopteris*). Invasive species such as purple loosestrife (*Lythrum salicaria*) and reed canary grass (*Phalaris arundinacea*) are also present at low densities within these communities.

Palustrine emergent marsh wetlands also occur adjacent to the northern and central sections of the Veazie impoundment. These wetlands include a number of narrow emergent marshes with macrophytes, including emergent, submergent and floating plants. Emergent wetlands located on the northern sections of the impoundment function as transitional wetland communities and the wetlands on the central sections of the impoundment include emergent backwater areas that are connected to the river through intermittent drainage channels. The emergent marsh wetlands within the Veazie impoundment are dominated by tussock sedge (*Carex stricta*), blue-joint (*Calamagrostis Canadensis*), spotted joe-pye weed (*Eupatorium maculatum*), wool grass (*Scirpus cyperinus*), reed canary grass, marsh fern (*Thelypteris palustris*), arrowhead (*Sagittaria latifolia*), pickerelweed (*Pontederia cordata*), broadleaf cattail (*Typha latifolia*) and yellow water lily (*Nuphar variegata*). Other vegetation present in these wetland areas include: three-way sedge (*Dulichium arundinaceum*), common arrowhead, softstem bulrush (*Schoenoplectus tabernaemontanii*), scouring rush horsetail (*Equisetum*

hyemale), and the invasive purple loosestrife.

Palustrine scrub-shrub wetlands are rare in the project area, but do occur as small patches on the west-central and southwest sections of the Veazie impoundment. The vegetation community is dominated by woody vegetation typically less than six meters in length. The scrub-shrub wetland areas within the impoundment also include steeple-bush (*Spiraea tomentosa*), meadowsweet (*Spiraea alba var latifolia*), speckled alder, and sweet gale (*Myrica gale*). The palustrine unconsolidated (uncon.) bottom wetlands are located at the northern section of the impoundment, on the east side of Ayers Island. The vegetative cover is less than 30 percent in these areas.

Exotic and invasive plant species are currently present in limited numbers along the impoundment at the Veazie Project, as noted above. Additionally, in general, non-native, invasive plant species that are commonly found within the Penobscot River watershed include: Norway maple (*Acer platanoides*), black locust (*Robinia pseudoacacia*), tree-of-heaven (*Ailanthus altissima*), autumn olive (*Elaeagnus umbellate*), Japanese barberry (*Berberis thunbergii*), morrow honeysuckle (*Lonicera morrowii*), tartarian honeysuckle (*Lonicera tartarica*), multiflora rose (*Rosa multiflora*), common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), common reed (*Phragmites australis*), purple loosestrife, Japanese knotweed (*Fallopia japonica*), garlic mustard (*Alliaria petiolata*), Japanese stilt grass (*Microstegium vimineum*), asiatic bittersweet (*Celastrus orbiculata*), black swallowwort (*Cynanchum louiseae*), Japanese honeysuckle (*Lonicera japonica*), and porcelainberry (*Ampelopsis brevipedunculata*) (Milone and MacBroom, Inc., 2009).

ENVIRONMENTAL EFFECTS

As mentioned previously under the water resources section, the proposed dam removal at the Veazie Project is expected to reduce water surface elevation and river width by varying degrees at locations along the impoundment. The reduction in water levels following dam removal may result in the development of approximately 31 acres of new wetlands in areas where the impoundment currently resides. After dam removal, newly exposed areas of fine-textured sediment are expected to rapidly develop into a variety of functioning wetland and riparian habitats, such as palustrine emergent wetlands, scrub shrub wetlands, forested wetlands, forested floodplain upland communities, and early successional upland forest communites.

Changes in vegetation compositions and wetland type designations are likely to occur to some existing wetlands near the lower west shoreline, immediately downstream, and southwest of Ayers Island after dam removal. Such changes that are likely to occur include conversion from palustrine unconsolidated bottom wetlands to palustrine emergent marsh wetlands and palustrine scrub shrub wetlands or conversion from palustrine emergent marsh wetlands to palustrine scrub shrub wetlands and palustrine

forested wetlands. Although there is also potential for these wetland resources to become dewatered from receding water levels after dam removal, it is not likely because of secondary hydrologic inputs (such as groundwater) that may help sustain these wetland features. The relatively large wetland areas on the upper west shore of the Penobscot River at the Veazie Project are also unlikely to become dewatered due to inputs from a small stream source. Based on hydraulic modeling, surface water elevations on and across from Ayers Island and at the head of the impoundment are expected to change minimally and, therefore, are unlikely to affect wetland resources in those areas. Overall, removal of Veazie Dam may result in the conversion of 3.1 acres from one wetland designation to another and the conversion of 1.1 acres of palustrine wetland areas into upland communities.

Following dam removal, invasive species currently present along the impoundment and along the Penobscot River are likely to compete with native species and may rapidly spread during colonization of the newly created terrestrial and wetland areas, resulting in lower biodiversity. As part of the Proposed Action, the Trust intends to initially plant native herbaceous and shrub species in select newly exposed riverbank areas immediately following dam removal activities, as well as conduct soil testing, repeated seed broadcasting, and fertilizer application. The Trust also intends to conduct monitoring and control activities of invasive species, such as hand removal, herbicide treatment, and when necessary biological control activities, for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the project area.

3.3.1.5 Wildlife

AFFECTED ENVIRONMENT

The riverine habitat of the lower Penobscot River supports a wide array of birds, mammals, amphibians, reptiles, and invertebrates that are associated with the various habitat areas along each impoundment. Northern Waterthrush (*Seiurus noveboracensis*), Barred Owl (*Strix varia*), Belted Kingfisher (*Ceryle alcyon*), Bank Swallow (*Riparia riparia*), and Green Heron (*Butorides virescens*) are frequently associated with silver maple floodplain forest, the dominant land cover type along the Veazie impoundment shoreline (Maine DIFW, 2005). Other wildlife species known to occur at or around the Veazie Project are listed in Table 8.

In Maine's Comprehensive Wildlife Conservation Strategy, the Maine DIFW and the Maine DMR (2005) identified 213 "species of greatest conservation needs" (SGCN) whose primary and/or secondary habitat is located within at least one of 21 key habitat areas in the state. Of these 213 species, 63 percent of the primary invertebrate habitat and 100 percent of the primary herpetofauna habitat were associated with freshwater.

Several of the key freshwater habitats selected by the Maine DIFW and Maine DMR are present at the Veazie development, as described in detail in the botanical resources section. Table 9 outlines the distribution of species present within the habitat areas located within 500 feet of the Veazie, Great Works and/or Howland Project impoundments. Forested wetlands, the dominant wetland type at Veazie, are the primary habitat of the Hessel's hairstreak butterfly (*Callophrys hesseli*), swamp darner dragonfly (*Epiaeschna heros*) and precious underwing moth (*Catocala pretiosa pretiosa*). However, a number of SGCN bird, turtle, and snail species utilize this wetland-type as secondary habitat.

Approximately five miles upstream of the proposed dam removal activities, the northern section of Ayers Island was designated as "significant wildlife habitat" by the state of Maine for waterfowl and wading bird habitat. As listed in Table 8, the Barrow's goldeneye (a state species of special concern) is known to utilize the project area as part of its winter range (PPL Great Works LLC, 2000). However, the Trust states in its letter filed February 23, 2009, that no mapped habitat areas are present where deconstruction activities or a significant change in water levels will occur. Two Bald Eagle (*Haliaeetus leucocephalus*) nests were identified on the east bank of the Penobscot River, a mile downstream from the Veazie dam. A third nest was also located two and a half miles upstream of the dam.

Table 8. Representative List of Species Common to the Veazie Project

Taxon	Species
Reptiles and Amphibians	Gray tree frog (*Hyla versicolor*)
	Wood frog (*Rana sylvatica*)
	Green frog (*Rana clamitans*)
	Spotted salamander (*Ambystoma maculatum*)
	Redback salamander (*Plethodon cinereus*)
	American toad (*Bufo americanus*)
	Common snapping turtle (*Chelydra serpentina*)
	Eastern garter snake (*Thamnophis sirtalis*)
Birds	Red Winged Black Bird (*Agelaius phoeniceus*)
	Belted King Fisher (*Ceryle alcyon*)
	Wood Duck (*Aix sponsa*)
	Hooded Merganser (*Lophodytes cucullatus*)
	Double-crested Cormorant (*Phalacrocorax vociferous*)
	Great Blue Heron (*Ardea herodius*),
	Tree Swallow (*Tachycineta bicolor*)
	Yellow Warbler (*Dendroica petechia*)
	Barrow's Goldeneye (*Bucephala islandica*)
	Downy Woodpecker (*Picoides pubescens*)
	Black-capped Chickadee (*Poecile atricapillus*)

	American Goldfinch (*Carduelis tristas*)
Mammals	Beaver (*Castor canadensis*)
	River otter (*Lutra canadensis*)
	Raccoon (*Procyon lotor*)
	Eastern chipmunk (*Tamias striatus*)
	Gray squirrel (*Sciurus cardimensus*)
	Snowshoe hare (*Lepus americanus*)
	White tailed deer (*Odocoilus virginianus*)
	Moose (*Alces alces*)

(Source: NDT, 1990)

Table 9. Number of SGCN Taxa in Freshwater Key Habitats (Primary/Secondary Habitat)

Key Habitat	Birds	Herpetofauna	Invertebrates	Mammals	Total
Lakes and Ponds	4/8	0/2	11/3	0/0	15/13
Emergent Marsh & Wet Meadows	11/7	0/3	1/6	0/0	12/16
Forested Wetlands	0/4	0/5	3/4	0/0	3/13
Shrub-scrub Wetlands	2/4	3/1	1/3	0/0	6/8
Rivers and Streams	3/3	1/3	21/4	0/0	25/10
Total	20/26	4/14	37/20	0/0	61/60

(Source: Modified from Maine DIFW, 2005)

ENVIRONMENTAL EFFECTS

As the Trust anticipates that the proposed removal of the Veazie dam would permanently lower the August median water surface elevations by approximately 20.7 feet, many species that depend upon wetland areas and lake-like conditions could potentially be adversely affected by habitat loss. The composition and distribution of the wildlife community along the shoreline closest to the dam would change as the impoundment is lowered and ecological succession begins. However, Stantec's (2008) preliminary analysis of wetlands found that there would be opportunities for development of new wetland areas as the water recedes and riverine conditions are restored.

The effects of the change in water level would impact reptiles, amphibians, waterfowl, wading birds, and other water-dependant species most readily. Yet, the magnitude of the impacts to wildlife habitat from the change in water surface elevation will dissipate significantly at the head of the impoundment. Based on the maps provided, no designated waterfowl or "state significant" habitat should be impacted by this change due to their distance from the Veazie dam. Overall, the impacts of the change in water quantity would be minor and short-term, given the temporary loss of habitat and/or redistribution of species. Most species affected by this change should adapt over time or find more suitable habitat conditions nearby. Further, many of the species at the Veazie Project are generalists that can survive in a variety of habitat areas.

Passerine birds and other upland species should be relatively unaffected by the change in water elevation, though the increase in ambient noise and vibrations during the removal of project facilities may cause temporary displacement and/or nest failure in sensitive bird species. The Bald Eagles' nests identified in the vicinity of the project are located a mile or more away from the dam, though we agree with the Trust's proposal to survey the area for new bald eagle nests prior to the start of construction. The Barrow's Goldeneye could also benefit from the removal of the dam, if faster flows reduce icing in some areas.

It is unclear, based on the information provided, if the Trust plans to restrict certain construction activities during the sensitive nesting season of important avian species. Any potential impacts, however, could be mitigated by reducing or eliminating the use of loud machinery, blasting, or similar techniques until the end of summer or early fall. Any adverse impact on bald eagles and other nesting bird populations would be minor and short-tem.

Several species at the Veazie Project could also benefit from the creation of new upland, riparian and riverine habitat. Soon after the dam is removed, shorebirds could utilize any newly exposed sandy and gravel substrate. Small herbivorous mammals could also use these areas for foraging and protection from predators as new vegetation grows. Various edge species (e.g., white-tailed deer, gray squirrel), furbearers, wading birds, waterfowl, and herpetofauna would also benefit from the later development of new riparian habitat. Additionally, removal of the dam would create four miles of unobstructed open water with increased fish passage that would provide a long-term benefit for bald eagles and other birds of prey.

3.3.1.6 Rare, Threatened and Endangered Species

AFFECTED ENVIRONMENT

In 2006, letters of inquiry were sent to the Maine Natural Areas Program (Maine NAP), Maine DIFW[33] and USFWS[34] to update rare, threatened and endangered (RTE) species and essential or significant habitat occurrences for the project area. Table 111

[33] By letters dated July 25 and August 2, 2006, Maine DWIF provided information about Essential or Significant Wildlife Habitat in the Proposed Action area as designated under the State's Natural Resource Protection Act (38 MRSA 480-B).

[34] By letters dated August 6, 2006 and October 1, 2007, USFWS provided a list of federally listed species in the State of Maine and whether they are known to occur in the Proposed Action area.

summarizes the wildlife species that are both state and federally listed and within proximity to the project areas.

The Maine NAP[35] and the USFWS provided information on botanical critical areas and RTE species potentially occurring in the project areas. Six plant species are listed as occurring within a four-mile radius of the project areas. Table 10 summarizes the listed plants identified by the Maine NAP within a four-mile radius of the project areas.

According to correspondence in 2006, state and federal agencies had documented three RTE wildlife species in the project areas. These species included the Bald Eagle, wood turtle (*Clemmys insculpta*), and a species of dragonfly, the extra-striped snaketail (*Ophiogomphus anomalus*). In addition, it was noted that Barrow's Goldeneye is thought to be present in the project areas. However, correspondence from the state and federal agencies did not identify this species as an RTE species in this area.

Table 10. State and Federally Listed Plants Found Near the Project Areas

Common Name	Scientific Name	State Rarity	State/Federal Legal Status	Habitat Description
Nantucket shadbush	Amelanchier nantucketensis	S2		Pine barrens, ponds and lake margins, fields and thickets. Last seen in 2003.d
Orono sedge	Carex ornonesis	S2	E	Upland fields, meadows and clearings. Last observed in 2006.
Purple clematis	Clematis occidentalis	S2		Rocky and calcareous slopes and open woods. Last observed in 1991.
Hyssop-leaved fleabane	Erigeron hyssopifolius	S2		Calcareous rocks, talus slopes, and gravelly river shores. Last observed 1990.
Long-leaved bluet	Houstonia longifolia	S2		Slately ledges or river shore gravel with weak or calcareous substrates. Last observed 1994.
New England violet	Viola novae-angliae	S2		Gravels, wet rocks, shorelines and meadows. Last observed in 1990.

Notes: S1 = Critically Imperiled; S2 = Imperiled in Maine; S3 = Rare in Maine; S4 = Apparently Secure in Maine; S5 = Demonstrably secure in Maine; SH = Occurred historically in Maine and could be rediscovered; E = Endangered; T = Threatened; NA = Not Applicable. (Source: Stantec, 2008 and USFWS letters)

[35] By letter dated September 11, 2007.

Table 11. State and Federally Listed Wildlife Species Found Near the Project Areas

Common Name	Scientific Name	State of Maine	Federal	Habitat Description
Atlantic salmon	Salmo salar		Endangered[36]	Grows to maturity in ocean and returns to rivers to spawn and rear
Shortnose sturgeon	Acipenser brevirostrum		Endangered	Prefers large rivers
Atlantic sturgeon	Acipenser oxyrhynchus		Species of Concern[37]	Inhabits ocean during adult stages and spawns within rivers
American eel	Anquilla rostrata	Special Concern		Inhabit lakes and rivers with mud and silt substrate
Sea-run brook trout	Salvelinus frontinalis	Special Concern		Inhabits cold water rivers and ponds
Yellow lampmussel	Lampsilis cariosa	Threatened		Prefers medium to large rivers
Tidewater mucket	Leptodea ochracea	Threatened		Inhabits lakes, ponds, and slow moving rivers
Brook floater	Alasmidonta varicose	Threatened		Inhabits streams and rivers, often avoids extremely high or low flow conditions.
Creeper	Stophitus undulates	Special Concern		Inhabits small to large rivers. Prefers sand and fin gravel substrate.
Bald Eagle	Haliaeetus leucocephalus	Threatened		Large open costal and inland waters; Lakes, river and reservoirs
Barrow's Goldeneye	Bucephala islandica	Threatened		Coastal and inland open waters
Wood Turtle	Clemmys inscultpa	Special Concern		Moderate gradient rivers and streams with adjacent wetland complexes
Extra-striped snaketail	Ophiogomphus anomalus		Special Concern	Flowing waters of moderate gradient rivers and streams; adjacent shoreline area during emergence

(Source: Stantec, 2008 and USFWS letters)

[36] On June 19, 2009, NMFS and USFWS published a Final Rule in the Federal Register expanding the geographic range for the listing of Atlantic salmon to include the Penobscot River upstream of the former Bangor Dam.

[37] Currently undergoing status review by NMFS

State listed species

The lower Penobscot watershed contains up to ten species of freshwater mussels (Nedeau *et al.*, 2000). Of these species, three are Maine State Threatened and Maine DIFW lists one as being of Special Concern. The state threatened yellow lampmussel, tidewater mucket, and brook floater are known to occur within the Penobscot, as is another mussel listed as Special Concern, the creeper. Maine DIFW identifies the potential for all rare threatened and endangered mussel species to occur within the project areas (Normandeau Associates, 2007). In addition, the Maine DIFW's latest list of Species of Special Concern (March 11, 2008) includes the American eel and anadromous brook trout, also known as salters or sea-run brook trout.

The Bald Eagle, while delisted federally on August 9, 2007, is still listed as endangered in the state of Maine and is also protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. In the summer of 2007, the Maine DIFW added the Barrow's Goldeneye to the Maine Endangered and Threatened Species List with the enactment of Public Law 2003 c.166 H.P. 296 – L.D. 366 (Maine State Legislature, 2007). The extra-striped snaketail, not presently listed in Maine, was recommended to be added to the list of species of Special Concern maintained by the Maine DIFW (Brunelle and deMaynadier, 2005) following completion of the Maine Dragonfly and Damselfly Survey. It is also a federal species of concern.

According to Maine DIFW, one Bald Eagle nest is on the western shore of the Veazie impoundment. Two Bald Eagle nests are located more than 1 mile south of the Veazie dam on the eastern shoreline of the Penobscot River. Several Bald Eagle nests occur near the other impoundment areas. One wood turtle occurrence is reported in the Stillwater River. One extrastriped snaketail occurrence is documented 2 miles south of the Howland dam on the Penobscot River. Barrow's Goldeneye may occur within the area mapped by Maine DIFW as Significant Wildlife Habitat near Ayers Island at the tail of the Veazie impoundment. It is also possible that Barrow's Goldeneye over-winters in other areas of the river outside of the three impoundment areas where flow is continuous (i.e., where flow prevents freezing during the winter) (Stantec, 2008).

The Maine NAP has documented occurrences of Nantucket shadbush at two locations on the western shoreline of the Veazie impoundment, and at one location on the eastern shoreline. Purple clematis, New England violet, hyssopleaved fleabane, and long-leaved bluet have been documented to occur approximately 0.3 miles south of the Veazie Dam, along the western shore. Orono sedge has only one documented occurrence along western shoreline of the Veazie impoundment, but this occurrence is ranked as "fair to poor" and was last observed in 2006 (Stantec, 2008). Likely habitats and directed searches for the six species identified as potentially present in the project areas were surveyed in 2007 at the appropriate times of the year for species occurrence. The identification of any other noteworthy botanical features or communities was also an

objective when conducting the field survey. Although all three impoundment shorelines have a limited potential to support localized populations of Nantucket shadbush, purple clematis, New England violet, hyssop-leaved fleabane, long-leaved bluet and Orono sedge, no observations of these species near the impoundment areas were made during the field survey and directed searches (Stantec, 2008).

Several rare communities were identified by Maine NAP as being within a four-mile radius of the Great Works and Howland Projects. Bluebell-Balsam Ragwort Shoreline Outcrop is characterized by calcerous rock outcrops with sparse vegetation and are ranked S3 (rare in Maine), indicating 20 to 100 occurrences statewide and is identified within vicinity of the Great Works and Howland Projects. Silver Maple Floodplain Forest is also ranked S3 and is characterized by floodplain forests dominated by silver maple and alluvial mineral soils that may be dry much of the growing season. Domed bog ecosystem, ranked S3, is also identified as being within a four-mile radius of the Great Works Project and is described as having raised concentric bogs with convex surfaces. Eccentric bog ecosystem, classified as S3, has been documented within four miles of the Howland Project and is characterized by sloping raised bogs with ridges of dwarf shrub (Stantec, 2008).

ESA listed species

The lower Penobscot watershed contains shortnose sturgeon, listed as endangered under the ESA. It is thought that shortnose sturgeon migrate between freshwater and saltwater regularly during their life cycle, but this not for the purpose of spawning (Fernandez 2008). Until recently, population characteristics and distribution of shortnose and Atlantic sturgeon in the Penobscot River were largely unknown. Fernandes (2008) collected 151 shortnose sturgeon in the Penobscot River below Veazie Dam from May to November 2006 and 2007. The study confirms that shortnose sturgeon use the Penobscot River for feeding and overwintering but no spawning by this species in the Penobscot River has been documented to date (Fernandes, 2008). Shortnose sturgeon in other large New England rivers usually spawn during the spring. Seasonal movement patterns of shortnose sturgeon in the Penobscot River have recently been observed. Fernandes (2008) observed spring downstream movement, summer upstream movement, and spring and fall immigration or emigration. Fernandes (2008) also found that shortnose sturgeon, including females carrying late-stage eggs, overwintered in lower estuarine portion of the Penobscot River, a location that may provide spawning habitat.

Atlantic sturgeon, listed as a candidate species under the ESA, use the Penobscot River for a substantial part of the year, but no spawning has been documented for this species either (Fernandes, 2008). Atlantic sturgeon is anadromous throughout its range, meaning that it uses freshwater rivers for spawning purposes. Juveniles spend from two to six years in riverine and estuarine habitats before migrating to the marine environment (Bain, 1997, as cited by Fernandes, 2008). In the same study mentioned above,

Fernandes (2008) collected 35 Atlantic sturgeon in the Penobscot River below Veazie Dam. While existing spawning locations for sturgeons between the former Bangor Dam and Veazie are still unknown, both species would experience an increase in access to potential spawning habitat in the 3.8-mile segment of the river currently impounded by Veazie Dam, in addition to the 3.6-mile free-flowing reach between the Veazie impoundment and the Great Works dam. Historically, both species of sturgeons were thought to exist as far upstream as the Milford Dam.

The Atlantic salmon DPS is listed as endangered. The geographic extent of the Atlantic salmon DPS currently includes the waters of the Veazie, Great Works, and Howland Projects. Atlantic salmon spawning occurs in freshwater rivers during late-fall, eggs incubate during winter, and then larvae hatch during early-spring. Young salmon remain in the river for approximately two years, after which they migrate to the ocean as smolts. Salmon typically spend two years in the ocean as adults before returning to spawn in the rivers where they were born. As such, rivers such as the Penobscot serve as critical migration corridors for Atlantic salmon, and the Penobscot River hosts the largest returning run of adult Atlantic salmon in the United States (Holbrook, 2007). In order to support and supplement upstream migration of adult salmon, young salmon (fry, parr, and smolts) are raised in hatcheries and stocked into the Penobscot River at various locations upstream of Veazie Dam (Maine DMR, 2008). These stocked fish likely migrate downstream during spring.

ENVIRONMENTAL EFFECTS

State listed species

It is not expected that any state listed species will be adversely impacted by the Proposed Action. However, some species or their habitat may benefit from the Proposed Action. Some species may experience temporary minor impacts during dam removal activities.

The lowering of water levels at the Veazie impoundment may increase flow rates and prevent freezing in some reaches of the river benefitting both the Bald Eagle and the Barrow's Goldeneye. Bald Eagles may also benefit from increased availability of prey due to fish passage improvements. The wood turtle may benefit from the creation of new habitats following re-vegetation of newly exposed sediments which may provide food resources and nesting habitat. The extra-striped snaketail prefers fast-flowing and clean medium-sized rivers in forested watersheds that have gravel bottoms. The availability of this habitat could increase after dam removal.

Areas of Inland Waterfowl and Wading Bird Habitat (IWWBH)[38] may be become dewatered as a result of dam removal. Two areas identified as IWWBH are located within the Veazie impoundment, one near the northern portion of Ayers Island and a second associated with an emergent marsh along the western shoreline. Although some losses can be expected, new areas of open water and emergent wetland may develop following restoration after dam removal.

Nantucket shadbush prefers pine barrens, ponds and lake margins, fields and thickets while Orono sedge prefers fields, roadsides, and clearings with a regular disturbance regime (Stantec, 2008). Newly exposed shorelines resulting from dam removal may provide suitable habitat for these plants if exposed substrates provide favorable conditions (Stantec, 2008). Purple clematis, hyssop-leaved Fleabane, long-leaved bluet, and New England violet are capable of inhabiting seasonally wet river shorelines (Stantec, 2008). If suitable habitat conditions develop over newly exposed shorelines following dam remosal, new habitat for these species could also develop.

Areas of Silver Maple Floodplain Forest were identified as the dominant forested wetland in portions of the impoundment. The silver maple flood plain forest is listed S3 by the Maine NAP which defines the community as rare within Maine. The Silver Maple Floodplain Forests within the Veazie impoundment are small and narrow and occur mostly at the northern-most extent of the impoundment (Stantec, 2008). Therefore these communities are expected to experience minimal if any impact.

Many mussels in the project area will potentially be dewatered under the Proposed Action, including four State of Maine listed species (brook floater, yellow lampmussel, creepers, and tidewater mucket). The Proposed Action will have direct, short-term impacts on individual mussels located in the drawdown area. The Trust proposes to attempt to reduce this impact by drawing down the impoundment gradually, allowing mussels to move to deeper water and facilitating relocation efforts. The Trust further proposes to consult with the resource agencies to develop a mussel relocation plan.

ESA listed species

The Proposed Action may have a positive effect on the population of Penobscot River shortnose sturgeon. Although existing spawning locations for shortnose sturgeon on the Penobscot River are unknown, dam removal is likely to increase access to potential spawning habitat in the 3.8-mile segment of the river currently impounded by Veazie Dam and the 3.6-mile free-flowing reach between the Veazie impoundment and the Great Works Dam. Additionally, shortnose sturgeon would likely use the portion of river upstream of the Veazie Dam for certain activities (i.e., feeding, overwintering).

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[38] A type of Significant Wildlife Habitat designated by Maine's Natural Resources Protection Act (38 MRSA 480-B).

Migrating sturgeon are currently unable to migrate upstream of Veazie Dam and may congregate below the project where a large coal tar deposit is located. Prolonged exposure to coal tar could be detrimental to shortnose sturgeon eggs and larvae (Kocan, *et al.*, 1996). Dam removal would open up areas away from the coal tar deposits and other potential pollutants (Stantec, 2008). NMFS issued the final recovery plan for the shortnose sturgeon in December 1998 (NMFS, 1998). The plan identifies reasonable measures that are believed necessary to recover, protect and prevent extinction of the shortnose sturgeon. One of these measures is to eliminate barriers to movement (NMFS, 1998). Removal of the Veazie dam would directly address this priority action item.

Atlantic sturgeon, a species similar to and often co-occurring with shortnose sturgeon, would likely experience the same beneficial effects as shortnose sturgeon if the Veazie dam were removed. Open access to upper sections of the Penobscot River would likely be beneficial for adult spawning habitat, as well as larval and juvenile nursery habitat. Since they historically occurred at least as far upstream as the Milford Dam, and no sturgeons are currently known to pass upstream of the Veazie Dam, it is reasonable to expect Atlantic sturgeon populations to benefit from dam removal. Since movement patterns of Atlantic and shortnose sturgeons in the Penobscot River are complicated (spring downstream movement, summer upstream movement, and spring/fall immigration/emigration) dam removal scheduling will likely require careful planning so as not to adversely affect sturgeons downstream of the dam.

Atlantic salmon rely heavily on unrestricted access to large stretches of rivers such as the Penobscot for many parts of their life cycle. Dam removal would likely benefit this species because upstream and downstream access would be restored, increasing access to nursery, feeding, and spawning habitat for all life stages of Atlantic salmon. Because stocked smolts would likely be migrating downstream during spring, and spawning adults would likely be migrating upstream during fall, these two specific timeframes would likely need to be avoided when scheduling the dam removal.

By letter dated August 12, 2009, the Commission requested formal consultation with the NMFS pursuant to section 7 of the ESA regarding the effects of removing the Veazie dam on these three ESA-listed species and their habitat. Attached to that letter was a BA discussing those potential effects and providing further life history information for the three ESA-listed species. During dam removal activities, a three week period would occur when fish would not be able to pass at the project which, depending on timing, may adversely impact shortnose and Atlantic sturgeon as well as Atlantic salmon. On December 23, 2009, the NMFS issued its BO, which found that the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or Atlantic salmon. Furthermore, the BO states that the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In its BO, the NMFS issued an incidental take statement, four reasonable and prudent measures, and five terms and conditions to minimize and monitor incidental take.

3.3.1.7 Cultural Resources

AFFECTED ENVIRONMENT

The Veazie Project is located near the Eddington Bend on the Penboscot River, and was used for industrial purposes and was the location of the Veazie Lumber Company Mills, also known as Corporation Mills (Kleinschmidt, 2008). Bathymetric surveys conducted in preparation of the Trust's application identified the existence of a linear structure upstream, which are the remnants of the Company Mills complex, and part of the existing Veazie dam (Kleinschmidt, 2008). The present dam was constructed in 1918, and has been modified over time. The history of the project was researched by PPL to assess its eligibility for listing in the National Register, and a report on the findings was prepared and submitted to the SHPO. The SHPO responded on June 22, 2007, that it determined that the Veazie Project and associated structures are not eligible for listing in the National Register (Kleinschmidt, 2008).

According to the current Cultural Resources Management Plan (CRMP) for the Veazie project, 16 archaeological sites were identified during phase I surveys of the project area (ARC, 1999). Seven of those sites were recommended for additional phase II analysis to determine their eligibility for listing in the National Register. As a result of the phase II analysis of the seven sites, two sites were determined to be significant: the Eddington Bend site and the Meadow Brook site (ARC, 1999).

The Eddington Bend site is considered to be one of the best-known prehistoric sites in Maine and is listed on the National Register. The site covers approximately 16,000 square-meters adjacent to the east abutment of the Veazie dam and contains stratified archaeological deposits up to two meters below the surface. Erosion is occurring along the shoreline, adjacent to this site and is believed to be the result of slope movement of the steep slope of the riverbank.

The Meadow Brook site contains archaeological deposits buried in alluvial material to more than one meter below the surface (ARC, 1999). A National Register nomination form was prepared for the Meadow Brook site, and it has been determined not to be eligible for listing (Kleinschmidt, 2008). Though this site was determined to not be National Register eligible, its characteristics are important to archaeological knowledge in Maine and of interest and importance to the PIN. Erosion is present at the Meadow brook site and is attributed to impoundment elevations and project operations (Kleinschmidt, 2008).

ENVIRONMENTAL EFFECTS

Removal of the Veazie dam could affect historic and cultural resources in the

project area. Lowering of the impoundment level has the potential to expose cultural materials along the shoreline. The Trust proposes to remove the Corporation Mills dam remnant from the river channel to ensure fish passage. Removal of the dam would increase water velocity in that river reach, which could lead to increased erosion along the shoreline. The Meadow Brook site is known to be actively eroding, and construction activities associated with the dam removal could affect the Eddington Bend site.

The Eddington Bend site would be impacted by activities associated with removal of the dam including construction of the access road on the east riverbank and removal of the dam segment around the east abutment. As proposed, construction of access roads from the staging area to the east abutment of the dam would cross portions of the Eddington Bend site and would involve the placement of geotextile fabric and fill to create the grade for the road. No cutting or grading of the natural contours is proposed, in order to minimize the potential for disturbance of cultural materials. Further, the contractor would not be permitted to deviate from the alignment established for the road in order to protect sensitive cultural resources (Milone and MacBroom, 2008a). Shoreline erosion adjacent to this site is likely natural, given the steep slope of the shoreline and the shallow profile of the soils overlaying the bedrock outcrop; however, this erosion has the potential to adversely affect the site. Removal of the dam would increase water velocity in this vicinity, and the area of shoreline subject to these higher velocities would increase. However, large substrates such as boulders and cobbles are extremely common along the shoreline and likely help to armor the toe of the riverbank from erosion.

Removal of the dam, and the subsequent lowered impoundment level, could adversely affect the Meadow Brook site by exposing the eroded portions. However, active erosion at this site is likely the result of impoundment fluctuations, and removal of the dam would eliminate these fluctuations and lower the average water elevation. This would likely benefit the site by significantly reducing the potential for water level fluctuations at the shoreline interface of the site. Lowered water levels would allow exposed sediments to revegetate and stabilize, which would help to minimize erosion. It is a possibility that the increased water velocity in the river could exacerbate erosion of the site, but this is unlikely since water levels would be at a lower elevation than the site components and within the river channel where natural substrates would help to minimize erosion.

Removal of the submerged remnant dam within the Veazie impoundment would adversely affect the historical integrity of the dam remnant. Though the SHPO has determined that none of the Veazie Project or its associated structures is eligible for listing in the National Register, the Trust proposes to complete documentation of the dam remnant in accordance with Historic Architectural Building Survey and Historic Architectural Engineering Survey (HABS/HAER) standards prior to its removal.

Pursuant to the PA among the Commission, Advisory Council on Historic Preservation, and the SHPO developed for the Veazie Project relicensing, a CRMP was developed by Penobscot Hydro, LLC, a previous licensee.[39] As required by the PA, the CRMP sets forth the principles and procedures to address the protection of historic properties, mitigation of unavoidable adverse effects, treatment of human remains discovered on non-tribal or non-federal lands, discovery of previously unidentified properties, public interpretation of the historic and archaeological values of the project, and coordination with the SHPO, PIN and the U.S. Department of the Interior.

With regard to the Eddington Bend site, the CRMP indicates that data recovery was initiated to mitigate adverse effects associated with a past proposal to construct additional generating facilities at the Veazie Project. According to the 2007 Annual Report on CRMP Activities at the Veazie Project, work is being conducted to complete the cataloguing and classification of the artifacts recovered from the site pursuant to the plan. In addition to completing those tasks, the CRMP requires annual inspections of the site by the Maine Archaeological Society, Inc. and the submittal of annual reports to the Commission documenting activities concerning the CRMP. Though the Meadow Brook site is not National Register eligible, the CRMP includes a recovery plan for the site. According to the 2007 Annual CRMP report, recovery and cataloguing the collection has been completed and analysis and preparation of the final report is underway.

While the CRMP includes measures to protect historic and cultural resources at the project, it was developed to address impacts associated with the relicensing and continued operation of the project. In order to address affects that would occur from the proposed undertaking, a MOA among the Commission, and SHPO, with the ACHP, Trust, PIN, and NMFS as concurring parties was executed on January 14, 2010. The MOA sets forth measures to be carried out regarding the treatment of historic structures, treatment of archaeological sites, resolving disputes, and amending or terminating the agreement.

The MOA indicates that, though the SHPO previously determined that none of the three projects contain buildings or structures that are eligible for inclusion in the National Register, the submerged dam remnant in the Veazie impoundment may be eligible for inclusion in the National Register. In order to mitigate the potential adverse effect of removing the dam remnant, the MOA requires that the Trust document the remnant for the Maine Historic Engineering Record (MHER) in accordance with the standards of HABS/HAER recordation. The documentation would be carried out after the removal of the Veazie Dam, and will include, at a minimum: (1) MHER documentation of the site using a combination of photography, measurements, and a narrative; and (2)

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[39] The CRMP was filed on May 28, 1999, and approved by the Commission on November 29, 1999. *See* Order Approving Cultural Resources Management Plans (89 FERC ¶ 62,161).

dissemination of the documentation to the SHPO and any other repository as designated by the SHPO. Evidence that the SHPO has accepted the documentation would be filed with the Commission.

Regarding the treatment of archaeological sites, the MOA indicates that measures would be implemented for the protection of archaeological sites, subject to the financial limitation indicated. For the Veazie Project, these measures include: (1) development of a construction access plan for the Veazie Project, in consultation with the SHPO and THPO, to avoid adverse effects to the Eddington Bend site; (2) post-removal monitoring of the Veazie impoundment after dam removal, including the Eddington Bend Site, to identify any archaeological sites exposed by the lowered impoundment levels, collect and report artifacts, and perform any necessary mitigation approved by the SHPO and THPO; (3) grant a preservation agreement pursuant to 33 M.R.S.A. sections 1551-1555 for the site to the Maine Historic Preservation Commission prior to transfer of the land containing the Eddington Bend site to any other owner;[40] (4) provide artifact curation fees for any artifacts recovered from sites related to the Veazie, Great Works, or Howland hydroelectric projects; and (5) in the event that an unanticipated discovery of human remains occurs, work would cease within 10 meters of the area of discovery during notification of local law enforcement and consultation with the PIN and SHPO.

The Trust would not be required to expend more than $150,000 in connection with completing the archaeological work for the license surrenders as identified, exclusive of the cost of the documentation of the Veazie Lumber Company Mills and associated structures as outlined above. Archaeological monitoring, any artifacts recovered from eroded contexts and any data recovery excavation would be reported in a technical report to the SHPO and THPO within 3 years of the completion of any archaeological monitoring associated with the Howland impoundment. All of the resulting documentation and any artifacts would be forwarded to the SHPO and THPO, and/or any other repository designated by the SHPO and THPO.

3.3.1.8 Recreation

AFFECTED ENVIRONMENT

Recreational use of the Veazie impoundment is relatively low in comparison with other recreational areas in the region. PPL (2004) estimated annual recreational use of the project at 730 recreation days.[41] The reasons for such low recreational use are: 1)

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[40] If part or all of the property in Eddington becomes Tribal Trust or Reservation land, any Preservation Agreement under this statute would be terminated.

[41] A recreation day is defined as each visit by a person to a project for recreation during a 24-hour period.

limited recreational access to the project impoundment; and 2) the availability of more desirable areas for fishing and boating in the region. Although recreation is generally important to the public in this area, other recreational opportunities and facilities are more popular elsewhere in the region.

Recreation at the Veazie impoundment consists mostly of fishing, but some recreational boating also occurs. Fishing opportunities are most popular for smallmouth bass, but also exist for chain pickerel, white perch (*Morone Americana*), brown bullhead (*Ameiurus nebulosus*), and various sunfishes (*Lepomis spp.*). Recreational boating includes both motor boating and flatwater paddling (canoeing and kayaking). Access to the impoundment for fishing and boating includes both boat launches for motorized boaters and a hand-carry boat launch for flatwater paddlers.

Three formal public access areas exist within the project boundary at the Veazie Project, and are currently owned by PPL. As stated above, use of these recreation sites are relatively low, ranging from between 10 percent and 37 percent of full capacity (PPL, 2004). These access areas are further characterized below.

Veazie Dam Hand-Carry Boat Launch - This facility provides roadside parking and a short, narrow trail leading to the impoundment. Although the boat launch is located just upstream of the dam on the eastern shore, there is no delineated canoe portage trail.

Penobscot River Public Boat Launch - This site is open year-round, providing a paved parking area that can accommodate six vehicles without trailers and eight vehicles with trailers. The single-lane boat launch is paved and includes an area for boat preparation. The site is less than one mile upstream from the Veazie dam in the town of Eddington.

Union Street Boat Launch - This site is open year-round, providing a paved parking area for three vehicles without trailers and six vehicles with trailers, a concrete picnic table and shoreline fishing access. The single-lane boat launch is paved and served by a paved area for boat preparation. The facility is located on the western shore of the river in the town of Orono, just downstream of Ayers Island.

Many opportunities for recreation, especially for fishing and boating, exist outside of the project boundary but in the vicinity of the project. Opportunities for camping, snowmobiling, and hunting also exist in the project vicinity. There are several local parks such as Binette Park and Old Town Riverfront Park; Fort Halifax, Baxter, and Swan Lake State Parks; and Acadia National Park; within driving distance of the project.

Some unique fishing opportunities exist downstream of the Veazie dam. For example, the waters downstream of the dam provide the only opportunity for Atlantic salmon fishing in Maine, where a limited, experimental catch-and-release fishing season for Atlantic salmon is in place (Maine ASC, 2009). Three local salmon fishing clubs

have private river access downstream of the dam. Alewife, American shad, striped bass, and American eel fishing opportunities also exist downstream of the dam.

Whitewater boating opportunities are generally located outside of the project area, such as at Basin Mill Rips located upstream of the project. The mainstem of the Penobscot River downstream of Old Town to the Veazie dam provides some whitewater opportunities and is classified as a Class I – III River (American Whitewater, 2009). There are also three boat launches downstream of Veazie dam on the eastern shore of the river which provide vehicle-assisted portage opportunities around Veazie dam.

ENVIRONMENTAL EFFECTS

Removing the Veazie dam would have both positive and negative effects on recreation opportunities at the project, as the affected area would be changed from a slow-moving impoundment to a riverine environment. These effects mainly concern fishing and boating, which are the two most popular recreational activities at the project.

Fishing opportunities would switch from reservoir-based to river-based, thus changing the type of anglers that access the river. Opportunities for shoreline fishing as well as fishing from canoes and kayaks would likely increase, whereas opportunities for fishing from motorized boats would likely decrease. Increased fishing opportunities for migratory species such as Atlantic salmon, striped bass, and American shad would be expected to occur post-removal (See fisheries and aquatic resources section for more details on changes to the fishery).

Boating opportunities would change from a mix of paddling and motor-boating at the former impoundment to mostly paddling at the unimpounded river with limited motor-boating opportunities. Motor boating opportunities would likely still occur in the upstream portion of the river because the expected minimum depth would be at least four feet. In the downstream portion, non-motorized boating activities would predominate. There are four rapids accessible by current boat launches that could provide significant whitewater features when dewatered. Opportunities for whitewater paddling and rafting would increase because exposed boulders, ledges, and other features would provide whitewater opportunities in the free-flowing river under low- and high-flow conditions.

Dam removal could change the viability of recreation sites at the project because of the dewatering that would be expected, but the changes would be relatively minor. The Veazie dam Hand-Carry Boat Launch would likely be dewatered by over 300 feet if the dam were removed. The trail leading from the parking area to the water (which is approximately 30 feet long under current conditions) would likely still be usable, except that the walk from the road to the river would be much longer. The Trust states that they have no intention of changing ownership of or access to this facility post-surrender, so public access would presumably continue into the future.

The Penobscot River Public Boat Launch would likely experience approximately 75 feet of dewatering if the dam were removed. Because motor-boating would likely be an undesirable recreational activity if the dam were removed, this facility may require modification to accommodate hand-carried boats. The Trust proposes to consult with the Town of Eddington, Maine Department of Conservation (Maine DOC), and Maine DIFW to design and implement improvements to the facility during or following dam removal. The Trust plans to transfer the facility to the Town of Eddington post-surrender.

The Union Street Boat Launch would likely be dewatered by approximately 75 feet if the dam were removed. As with the Penobscot River Boat Launch, the Trust would consult with the Town of Orono, Maine DOC, and Maine DIFW to design and implement any needed improvements, particularly extending the concrete launch pad to reach the new river channel. The Trust plans to transfer the facility to the Town of Orono post-surrender.

The recreation facilities at the Veazie Project would continue to function as they did before the surrender, however, Commission jurisdiction over the project lands would end once the license was surrendered. A free-flowing river would provide beneficial recreation opportunities to an otherwise underutilized area. Because many people currently use or would like to use the river for passive recreation (i.e., relaxing, picnicking, and walking; Fusselman and Tynon, 1995), it is reasonable that these recreational activities may increase if the river were restored to its free-flowing state. Overall recreational use at the Veazie Project is currently very low. Thus, Commission staff expects major, long-term, beneficial impacts on recreational activities at the project if the dam were removed. Additionally, Commission staff expects minimal impacts on public access to the Penobscot River with the implementation of the proposed mitigation to public and Trust owned boat launches.

3.3.1.9 Land Use and Aesthetics

AFFECTED ENVIRONMENT

The Veazie Project is located between the population centers of Bangor and Orono, Maine, though most of the land in the immediate project area is forested and relatively undeveloped. The majority of the shoreline on the eastern side of the impoundment is comprised of mature oak and pine forests upslope of steep embankments, as well as some agricultural/open land. Wetland areas occur directly adjacent to the river in more gently sloping areas (Stantec, 2008). Residential development exists along the west side of the impoundment, extending up to a mile upstream of the dam; while the eastern shore is predominantly forested from the dam to the headwaters. The Maine Central Railroad also runs along the shoreline of the Veazie Project and crosses over the Stillwater River at the head of the impoundment.

The project impoundment is visible along Route 178 which follows the river along the east bank. Heavy foliage, however, prohibits most views of the river during the spring and summer. Riverfront access is limited in this area, and the Maine Rivers Study did not consider the Penobscot River (from Veazie dam to Medway) to have significant aesthetic value (Maine DOC, 1982). The viewing corridor is dominated by trees and open-space, though a direct view of the river and the dams can be seen from roads alongside the impoundment, as well as the Union Street and Penobscot River Boat Launches in Orono. Several residential and industrial structures can also be seen.

ENVIRONMENTAL EFFECTS

The Trust proposes to remove the 64-foot-long project spillway, forebay, portions of the cable system, both fishways, and other structures to promote fish migration upstream. Removal of these structures would convert the existing lake-like environment to a riverine system. A significant amount of previously submerged shoreline would be exposed due to a lower mean surface elevation and all lands rights currently held by PPL Maine would be transferred to the Trust.[42] The dewatered impoundment would also expose a large linear structure 240 feet north of the dam that extends an additional 1,700 feet, parallel to the shoreline. This structure would also be removed.

The use of previously submerged areas owned by adjacent property owners would be determined based on local zoning laws, topography and the will of the owner. However, it is unlikely that the future use of these lands would vary greatly from existing uses in the vicinity of the project. The future use of project lands may vary as the Trust plans to develop partnerships with other entities to assume ownership of project lands once decommissioning activities are complete. The Trust would explore a variety of commercial, residential, or recreational options for developed parcels and in the case of undeveloped parcels the Trust would limit land use through conservation easements, or similar conveyance instruments. If successful, such covenants would provide long-term protection of these parcels for purposes including, but to limited to education, fish and wildlife management, recreation and community development.

Removal of the above structures would lower the water surface elevation by approximately 21 feet at the dam, 12 feet at the midpoint of the impoundment, and by four feet at the downstream end of Ayers Island. Based on the information provided by the Trust, the flows downstream of the dam will remain virtually unchanged. The Proposed Action would have short-term, negative impacts on the aesthetic resources of the project due to exposure of the dewatered shoreline, demolition activities, and some localized increase in turbidity and/or erosion. These impacts would be temporary and

[42] This includes seven parcels of land that total 42 acres in Veazie and Eddington, Maine.

cease with the completion of the dam removal and related facilities. The dewatered impoundment would also expose a large linear structure 240 feet north of the dam that extends an additional 1,700 feet, parallel to the shoreline. This structure would also be removed.

Long-term, the impoundment would become a free flowing river with a series of rapids, riffles, pools, and runs. The majority of the dewatered areas would expose rocky substrates, with limited areas of gravel and sand. An unobstructed view of the river would improve the natural aesthetic of the area. Conversely, depending on the distance to the shoreline, removal of the project features could potentially reduce the visibility of the Penobscot River in some viewing corridors based on the steepness of the bank and the severity of the drop in water surface elevation.

3.3.1.10 Socioeconomics

AFFECTED ENVIRONMENT

Demographics and Population

The Veazie Project is located in Penobscot County, Maine and affects approximately 12 miles of shoreline at the towns of Eddington, Orono, and Veazie. Based on the 2006 U.S. Census estimate, the population of Penobscot County is 147,180, with a population density of 42.7 persons per square mile. The estimated growth for the county since 2000 was 1.6 percent, while the estimated growth for the state of Maine for the same period was 3.7 percent (US Census, 2008a).

As taken from 2000 census data, the population of Eddington was 2,052 persons. The town occupies 25.11 square miles which gives a population density of 81.71 persons per square mile. Orono had a population of 9,112 persons and occupied 18.21 square miles giving a density of 500.21 persons per square mile. Veazie was the least populous town with 1,744 persons and an area of 2.92 square miles, with a population density within the project area of 596.92 persons per square mile (US Census, 2008b).

Employment

The median annual income in Penobscot County in 2000 was $34,274, while that for the United States was $41,994 (US Census, 2008a). Within the towns, the median annual income varies greatly. Eddington's median annual income was $40,250 with a poverty rate of 6.7 percent and unemployment rate of 3.4 percent. Orono had a median income of $30,619, a poverty rate of 25 percent and an unemployment rate of 6.1 percent. Veazie's median annual income was $44,519, its poverty rate was 7.6 percent and its unemployment was 1.5 percent (US Census, 2008b).

In Penobscot County, the largest sector of employment was education services, health care and social assistance, employing 22,588 people. The next most prevalent sector was retail trade employing 9,326 people followed by the tourism industries (arts, entertainment, restaurants, etc.) which employed about 6,000 individuals (US Census, 2008a).

Tax Base

The Veazie Project provides taxes to the three towns within the project area. These towns reported the project related tax information for 2007. Eddington collected 1.1 percent of its tax base from the project which amounts to $15,418, Orono received $1,672, a negligible addition to their tax base, and the town of Veazie collected 5.5 percent of their total tax revenue from the project which equates to $145,411.

Property Values

Property around the Veazie Project is generally a mixture between residential and undeveloped lands. The west shore including the towns of Orono and Veazie is residential with some light industrial while the opposite shore is woodland interspersed with agricultural areas.

The median values for owner occupied homes as recorded in 2000 in the area of the Veazie Project span a broad range. The value in Eddington was $86,400; in Veazie it was $105,700; and in Orono the value was $108,300. For comparison, the median home value in the state of Maine was $98,700 while that of the United States was $119,600 (US Census, 2000).

ENVIRONMENTAL EFFECTS

Power Generation

Under the Proposed Action, about 57,388 MWh of energy generated at the project each year, would no longer be available once the license is surrendered. Additionally, this project, like hydropower projects in general, provides a source of renewable energy that would no longer be available after surrender of the license. However, the Settlement Agreement includes Proposed Actions to mitigate this loss of power.

In expectation of the decommissioning of this project, the signatories to the Settlement Agreement provided for the increase of headpond elevation by one foot at the nearby Stillwater, West Enfield, and Medway Projects. This has already resulted in 9,068 MWh of additional annual energy generation. Additionally, the inoperative Orono Project on the Stillwater Branch of the Penobscot River was relicensed in conjunction with the Settlement Agreement, providing an additional 16,682 MWh of annual energy

generation.

Following the surrender and decommission of the Veazie Project, the Trust proposes to sell units from this project to PPL to be installed in other nearby projects such as the Milford, Orono, Stillwater, Medway, and Ellsworth Projects to increase their installed capacity. This would increase the installed capacity of hydroelectric plants in the area by about 10.7 MW. In aggregate, these enhancements are predicted to restore about 90 percent of the generation capacity lost in the Proposed Action.

Although the generation capabilities at this project would cease, the Trust would be required to pay annual charges based upon the installed capacity of the Veazie Project until the surrender becomes effective. Since a great deal of time would be required to perform the activities under the Proposed Action, the Trust would be paying annual charges to the Commission for several years, even following cessation of generation at the project.

Employment

The Proposed Action would not directly affect the number of workers employed in the energy industry within the affected environment. The activities associated with the decommissioning of the dam would result in the temporary employment of construction workers within the area. The decommissioning would create an estimated 76 jobs equivalent to one year of full time employment with benefits. Using information from the Maine Department of Labor, these jobs would have a direct economic value of $3,344,000. The Proposed Action would have a moderate, beneficial, short term impact on employment within the project area.

Tax Base

The Veazie Project currently provides about $162,501 of annual tax revenue to the towns of Eddington, Orono, and Veazie. The surrender and decommissioning of the project would terminate this source of tax revenue for the three towns. However, redevelopment of the land associated with the project may help mitigate this loss to the tax bases. Since the larger Veazie powerhouse A is not being demolished, it may be redeveloped as has been done with the downstream, decommissioned Bangor powerhouse. Decommissioning of the project may also result in a temporary increase of tax revenue for the affected area. Most notably this increase would be through personal income taxes from construction workers employed for the demolition as well as sales and lodging taxes.

Property Values

Property values along the Veazie Project impoundment are not expected to decline

as a result of the Proposed Action. Several studies, including d'Arge and Shogren (1989; study of Okoboji Lakes, Iowa); David (1968; study of property values in Wisconsin); Feather et al. (1992; study of lakefront property values in Orange County, Florida); and Young and Teti (1984; study of St. Albons Bay in Vermont), suggest that the Proposed Action may have a positive effect on property values in the project area. In these studies, the rise in value was attributed to improved water quality and enhanced wildlife habitat. The effect of the Proposed Action on property values is expected to be minor, beneficial and long term.

Fishery and Recreational Industries

The Proposed Action would help restore sea run fisheries within the area of the project. This would likely result in an increase in the value of both inland and coastal commercial fisheries. Coastal commercial fisheries would benefit from the increase of migratory forage-fish species such as shad and alewives. An increase in the number of these fish may improve the commercially valuable groundfish populations which contributed over $10 million to Maine's economy in 2007. The result of the Proposed Action may also benefit community based commercial fisheries. Alewife, a common target of these fisheries, is frequently used as bait in the lobster industry, a fishery that contributed about $300 million to Maine's economy in 2006.

The removal of the dam will return the Veazie impoundment to a more natural, free flowing river. In this condition, the river would be less navigable by power boats but would likely be more highly utilized by recreational canoers, kayakers, and rafters. Additionally, based on historic maps, removal of the Veazie project should reveal several rapids, features that would increase the availability of whitewater recreation on the river (Trust 2008). The improved habitat may also attract more birdwatchers and wildlife viewers to the area. These "eco-tourists" along with recreational boaters and fishermen would increase direct expenditures for transportation, food and lodging, as well as income through jobs in tourism related fields. The Proposed Action would likely have a moderate beneficial impact on this affected environment over the long term.

3.3.1.11 Infrastructure

AFFECTED ENVIRONMENT

Infrastructure within the area of the Veazie Project was inventoried by the Trust in 2007 and is listed in Table 122 below. Additionally, Bangor Water District identified a pipeline crossing the river approximately half a mile downstream of the Veazie Dam.

Table 12. Veazie Project Infrastructure

Structure	Location in Feet Upstream of Dam
Overhead electrical	West Bank, 930
Stormwater outfall	West Bank, 2,190
Stormwater outfall	West Bank, 5,610
Stormwater outfall	West Bank, 5,668
Stormwater outfall	West Bank, 5,741
Stormwater outfall	West Bank, 10,321
Water Withdrawal point	West Bank, 10,500
Concrete culvert	West Bank, East Branch at Ayers Island, 17,770
Orono WWTP outfall pipe	West Bank, East Branch at Ayers Island, 19,539
Orono WWTP outfall	West Bank, East Branch at Ayers Island, 19,539
Riprap wall	West Bank, East Branch at Ayers Island, 19,861

(Source: Trust, 2008)

ENVIRONMENTAL EFFECTS

The Proposed Action would reduce the elevation and increase the flow speed of the former impoundment which may affect related infrastructure. The magnitude of the changes would decrease progressing upstream with an accordingly smaller impact on infrastructure. After decommissioning of the dam, some structures may be higher than the banks of the river while those that are still submerged in the river would be subjected to increased flow speeds. As the pipeline identified by the Bangor Water District is downstream of the project, modeling has shown that the Proposed Action would have no impact on it.

To prevent damage to infrastructure in the project area, the Trust has proposed specific actions to modify particular structures affected by the Proposed Action. The overhead electrical structure just upstream of the dam would be maintained and actively protected from damage during demolition activities. To prevent excessive erosion at the several storm water outfalls and culverts, the Trust proposes to place or extend riprap to the proposed edge of the water. For the single water withdrawal structure in the project area, the Trust intends to coordinate with the owner to adjust the pump settings and placement of the withdrawal hose. The facilities associated with the Orono wastewater treatment plant are a considerable distance upstream of the dam, and will not be significantly affected by the proposal. Finally, the riprap wall located at the head of the existing impoundment would not likely be affected by the drop in water level but may need to be repaired due to its deteriorated condition.

The Proposed Action would have an adverse impact on structures indicated in Table 122 that are in the project area. The impact may be exacerbated by proximity to the dam and age of the structure. However, these modifications proposed by the Trust and previously listed in this environmental effects section would help mitigate the

Proposed Action's impact on the affected infrastructure.

3.3.2 Great Works Project

The Great Works Project is located approximately seven miles above Veazie Dam and approximately two miles downstream of the Milford Project. The drainage area at the project is 7,680 square miles, 90 percent of the total watershed drainage. The project is operated as a run-of-river facility with a maximum hydraulic capacity of 8,640 cfs and a 128 acre project impoundment which extends 1.7 miles upstream to the Milford Project tailrace (Figure 8). The project is contained within the towns of Bradley and Milford, which are predominantly comprised of residential development on the eastern shore (Figure 9), and Old Town, which is a mix of residential and commercial/industrial development on the western shore (PPL Great Works, 2000). Though Bradley, Milford and Old Town are among the least densely populated towns in the project areas, the densely populated French Island lies within the upper reaches of the impoundment (US Census, 2008b). There is no motorized access to the project but the impoundment provides opportunities for non-motorized boating and angling (PPL Great Works, 2000).

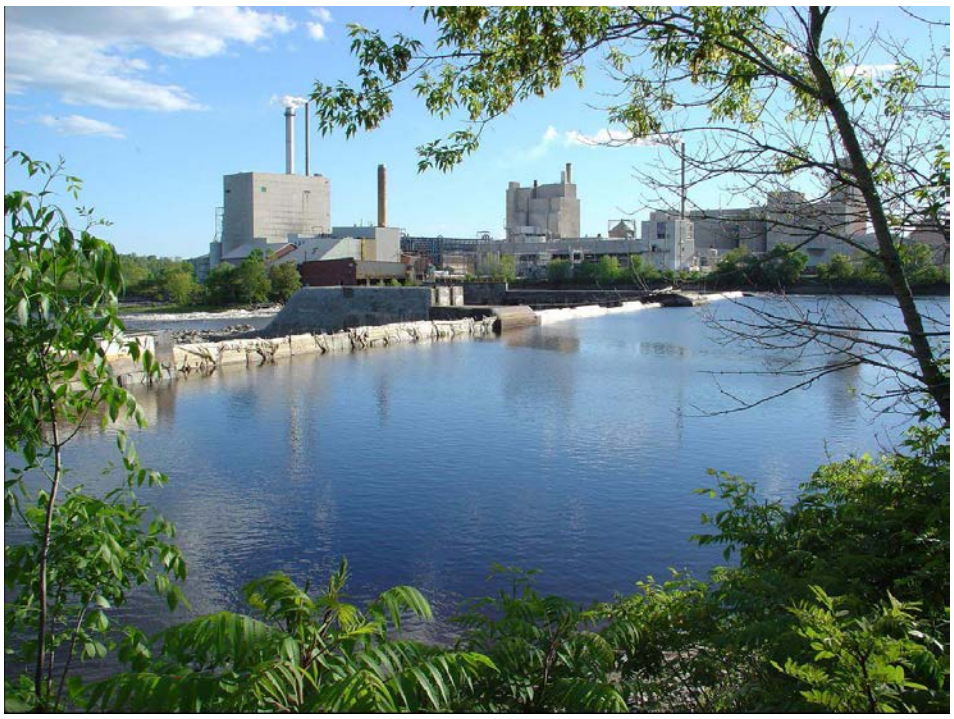

Figure 8. View of Great Works Project and impoundment from the east bank of the Penobscot River.
(Source: Trust, 2008)

Figure 9. View of Bradley, Maine and the spillway from the Great Works powerhouse on the west bank of the Penobscot River.
(Source: Staff)

3.3.2.1 Geologic and Soil Resources

AFFECTED ENVIRONMENT

The Great Works project is situated within the Laurentian Plains and Hills ecoregion which is predominantly forested with numerous glacial lakes (USEPA, 2007). The majority of this region is characterized by low relief, but rolling hills commonly occur. The area surrounding the Great Works Project is relatively flat but drops sharply along the banks of the river which confines the river to its channel under most flow conditions (Kleinschmidt, 2008a).

Surficial geologic materials adjacent to the Great Works impoundment and dam primarily consist of stream alluvium and elevated stream terrace deposits, glacial till and some areas of artificial fill (Maine GS, 2008). Bedrock outcrops occur immediately downstream of the dam (Kleinschmidt, 2008a). Large stones and boulders are also common along the shoreline (Stantec, 2008). A significant area of the Presumpscot Formation, which is composed of deposits of fine-grained marine silts and clays, exists along the project impoundment's eastern shoreline between the dam and French Island (Maine GS, 2008).

Predominant soils that occur adjacent to the project impoundment include Colton

loamy fine sand, Made land, Mixed alluvial land and Bangor silt loam. Colton loamy find sand is a deep, excessively-drained soil that forms in sandy glacio-fluvial deposits. Bangor silt loam is a medium-deep, well-drained soil that forms in coarse-loamy supraglacial-meltout tills derived from phyllite or slate (NRCS, 2008). Mixed alluvial land consists of poorly-drained alluvial deposits on floodplains, and made land consists of moderately well-drained fill purposefully deposited by humans to create useable land areas.

Bathymetric and sediment surveys of the Great Works impoundment were conducted in 2007 by CR Environmental, Inc. As reported in the APEA, these surveys indicate that the substrate within the Great Works impoundment consists primarily of bedrock, boulders and cobble (Kleinschmidt, 2008a). It is estimated that over 97 percent of the riverbed in the Great Works impoundment is armored by these substrates. Many man-made features, such as "crib-works" and concrete pillars were also identified in the lower section of the impoundment (CR Environmental, 2008).

Fine sediments identified consisted of sand and one small unit of silty sand and organic matter. The fine sediments occurred in thin veneers atop larger substrates, along shallow shoreline reaches, and the unit of silty sand and organic matter occurred at the southern tip of French Island in a small cove. Overall, it is estimated that 1.3 to 10 thousand cubic yards of potentially erodible materials are present in the Great Works impoundment with 56 to 91 percent concentrated in the mapped areas of sand and gravel and up to 10 percent in the unit at the southern tip of French Island (CR Environmental, 2008). The remainder of the potentially erodible material is limited to material located interstitially between other substrates. Active erosion was limited along the Great Works impoundment, and much of the shoreline is comprised of vegetated or unvegetated rip-rap. Deposits of alluvial material were observed at locations where gullies, culverts and streams discharge into the impoundment (Stantec, 2008).

Two sediment samples were taken from the Great Works impoundment and analyzed for inorganic and organic pollutants and compared with established NOAA guidelines. One sediment sample was taken along the shoreline of the impoundment where fine sand and some silt-sized sediment capable of adsorbing pollutants were present, and the other was taken from the unit of silty sand and organic matter at the southern tip of French Island. The results of the analysis indicated that silver was present at a level higher than the ERM NOAA criteria in both samples, and nickel exceeded the ERL for both samples. The ERM reflects the 50th percentile above which effects were always observed or predicted among most species. None of the organic pollutants for which there are established NOAA guidelines exceeded the ERL or ERM (CR Environmental, 2008).

ENVIRONMENTAL EFFECTS

Approval of the Trust's proposal would result in erosion of shoreline sediments and substrates and the potential release of some contaminated sediment. Dewatering the impoundment would result in the erosion of sediments that have accumulated along the shorelines and elsewhere behind the dam, particularly if the rate of the drawdown is too fast. After removal of the dam, water velocity in the river would increase and there would be potential for erosion of newly exposed substrates and sediments, particularly at high flows, until vegetation is fully established.

The majority of fine sediments in the Great Works impoundment are located along the southern tip of French Island, downstream of a bedrock outcrop along the eastern shorline, along shoreline areas and in the voids between larger river substrates rather than accumulated behind the dam. Therefore, it is not likely that drawdown of the impoundment would result in a large input of fine sediments into the river. Further, since the majority of the soils adjacent to the impoundment are well-drained, and much of the shoreline is covered with vegetated and unvegetated rip-rap, drawdown of the impoundment is not likely to cause slope movement or erosion along the present river banks. The proposed gradual drawdown would ensure that shoreline soils are able to drain at rates comparable to the reduction in impoundment level, which would minimize soil slumping and slope movement.

Increased erosion could occur in the areas where existing gullies, tributary streams and culverts enter the river channel. Substantial fluvial deposits were observed at the outfalls of many of these structures, and incision through these deposits would occur as the gullies, streams, and flow from culverts re-establish gradients as they flow into the river channel. Most of these features were concentrated along the upper portion of the impoundment where the change in water levels would be the least. Construction of the coffer dams and access roads, and the removal of the Great Works dam would temporarily increase sediment loads in the river.

Chemical analysis of fine sediments in the Great Works impoundment indicates that silver and nickel are present at levels higher than the ERM and ERL, respectively, established by NOAA. Erosion and sediment mobilization caused by removal of the dam would not result in the mobilization of a large volume of polluted sediments since the total volume of sediments in the impoundment smaller than sand size is extremely low. Further, sediments within this size fraction are located primarily along the margins of the river along the shorelines and, as discussed above, sediments in these areas are not likely to mobilize during drawdown. While there is a potential for increased erosion of exposed shoreline sediments after dam removal, natural and planned revegetation efforts would help to minimize the risk for contaminated sediments to be eroded and enter the river. Once the area of the former impoundment is stabilized, contaminated sediments would be sequestered within the new riverbanks.

In order to minimize the impacts associated with its proposal, the Trust has proposed various measures that would be implemented before, during, and after construction and dam removal activities. The entire shoreline would be monitored during dam removal activities and bank stabilization measures, such as placement of geotextile fabric, selective plantings and stone-toe revetments, would be used at locations prone to or actively eroding (Milone and MacBroom, 2008b). The Trust proposes to monitor these and other shoreline features susceptible to erosion following dam removal to determine the need for remedial measures for each feature (Kleinschmidt, 2008a). In instances where fluvial deposits are significantly eroding or obstructing the flow of water into the river, the deposits would be removed and the shoreline graded. In addition, the Trust proposes to extend outfall pipes and culverts as necessary in order to minimize the potential for such erosion. The Trust proposes to revegetate much of the newly exposed shoreline with native plants and monitor the area for one year following dam removal in order to ensure that newly exposed sediments are adequately stabilized. It is also expected that natural revegetation would begin to occur as soon as the impoundment is drawn down and is expected to be rapid in areas with finer sediments (Kleinschmidt, 2008a).

Given this information, approval of the Trust's proposal would have some minor, temporary, adverse impacts on geology and soil resources in the project area. These effects would be minimized by implementation of the measures proposed by the licensee, as discussed above, and the implementation of BMPs to control erosion and sedimentation during construction activities.

3.3.2.2 Water Resources

AFFECTED ENVIRONMENT

Water Quantity

As mentioned previously under the Veazie Project, the upper reaches of the West Branch Penobscot River contain a number of storage impoundments that help regulate water flow throughout the lower Penobscot River Basin, where the Great Works Project is located. Also, approximately one-third of the Penobscot River flow is diverted to the Stillwater River and the remaining two-thirds continues down the mainstem of the Penobscot River.

Table 13 presents the average, maximum, and minimum monthly flows, from the period 1902 through 1999, on the Penobscot River at the Great Works Project. The Maine DEP has determined that the 7Q10 flow at this Project is approximately 2,802 cfs (Mitnik, 2003; as cited by Trust, 2008).

Table 13. Average, Maximum, and Minimum Monthly Flows (cfs) at the Great Works Project (1902-1999)

Month	Mean Monthly Flow (cfs)	Maximum Monthly Flow (cfs)	Minimum Monthly Flow (cfs)
January	7,005	48,353	2,118
February	6,623	36,264	1,832
March	9,261	98,317	1,917
April	23,755	113,629	4,114
May	19,370	122,493	5,114
une	9,881	88,646	3,061
July	6,832	55,122	3,272
August	5,814	32,477	2,968
September	5,942	71,642	1,810
October	7,293	48,353	1,774
November	9,874	74,544	1,892
December	8,951	80,588	2,426
Annual	10,064	122,493	1,774

(Source: USGS, 2009b and Trust, 2008)

In the Great Works impoundment, as mapped by Maine GIS and included with the Trust's application, an aquifer was identified along the western shore of the river beginning at the dam and extending 1,600 feet upstream along the shore. Its shape and position indicate that it may have been an old side channel or formed by deposition after a large flood. Currently, the Old Town Mill, including several buildings and impermeable surfaces lie on top of this mapped aquifer (Maine GIS, 2008; as cited by the Trust, 2008).

Water Quality

Maine DEP classified waters within this Project area as Class B under its water quality standards. A segment of the Penobscot River at Old Town and Milford was designated by Maine DEP as Class B Category 5-B[43] due to contamination by *E. coli* bacteria (Maine DEP, 2006; Maine DEP, 2008).

In 2007, the Maine DEP conducted sampling for DO and water temperature above the Great Works dam as part of their basin-wide water quality sampling program. All sampling was conducted during the typical low flow period (when low flow conditions were less than 4400 cfs) in July and August 2007, in order to assess worst case conditions (Albert, 2007). The results of this sampling showed that the average daily, daily

[43] Category 5 refers to those waters that are impaired or threatened for one or more designated uses by a pollutant(s) and requires a total maximum daily load report.

minimum, and daily maximum DO levels met state water quality standards for Class B waters (seven ppm). In 2007, the three-day average water temperature for all Penobscot River sampling stations, including the Great Works Project area, ranged from 24 to 27.4 degrees Celsius (Albert, 2007). The minimum, maximum, and average values for water temperature at this project ranged from 26 to 28 degrees Celsius (Albert, 2007)

In 1999, as part of the relicensing process, PPL conducted a macroinvertebrate study in the Great Works Project area to assess if water quality was meeting established aquatic life standards. The results of this study showed that the Great Works Project bypass reach and impoundment met Class B water quality standards for aquatic life. The Maine DEP verified and concurred with this assessment in January 2000 (PPL Great Works, 2000; as cited by the Trust, 2008).

ENVIRONMENTAL EFFECTS

Water Quantity

Based on HEC-RAS hydraulic modeling conducted by the Trust's consultant, the Proposed Action of dam removal at the Great Works Project is expected to reduce water surface elevation by a maximum of 19.0 feet (at median August flow) at the face of the dam (Milone and MacBroom, 2008d, as cited by the Trust, 2008). At the upstream end of the existing impoundment, approximately 1.7 miles from the dam, the change in water surface elevation is expected to be around 3.4 feet (Milone and MacBroom, 2008d, as cited by the Trust, 2008). Hydraulic modeling also indicates that water levels in the newly created riverine reach, at the dam and head of the impoundment, will be lower than existing water levels during high flow or flooding events (Milone and MacBroom, 2008d, as cited by the Trust, 2008).

Under the Proposed Action of dam removal, HEC-RAS hydraulic modeling results by the Trust's consultant indicate that river width may decrease by approximately 52 feet near the head of the existing impoundment in the vicinity of French Island. Also, exposed shoreline near Great Works Dam is expected to increase by approximately 367 feet, due to dewatering of both the western and eastern shoreline (Milone and MacBroom, 2008d, as cited by the Trust, 2008). It is important to note that the hydraulic model conducted builds in the assumption of anticipated energy enhancements to be implemented at the Orono and Stillwater Projects pursuant to the Settlement Agreement. This Settlement Agreement allows for a 10 percent change in the allocation of flows between the Penobscot River mainstem and the Stillwater Branch during periods of moderate flow. The reallocation will only affect flows between 3,800 cfs and 15,000 cfs that occur between November 1 and April 30. The Trust stated that this built-in assumption for the hydraulic model allows for more conservative estimates regarding effects on water quantity from the proposed removal of Great Works dam.

In 2008, the USACE analyzed the effects of dam removal at the Great Works Project on ice cover formation and ice jamming in the Penobscot River. As reported by the USACE included with the Trust's application, historical review of ice jam events indicates that December ice jams on the Penobscot River have become less frequent in the last half-century and that mid-winter ice breakups appear to have become more commonplace since 1978. Ice modeling of worst-case freeze-up conditions indicate that removal of the Great Works dam will likely consolidate the three existing freezeup ice covers within the study reach into a single freezup ice accumulation extending from Hampden to Orono (USACE, 2008). The changes are likely to increase the total ice freezeup volume within the study reach from about 320 to 340 million cubic feet (USACE, 2008). Therefore, the USACE study and the hydraulic model simulation both demonstrate that removal of the Great Works dam will not likely have a significant effect on the frequency or severity of ice jams in the vicinity of Bangor, which is located downstream of the dam and Orono.

The alluvial aquifer located in the Great Works impoundment area is suspected to be hydraulically connected with the river and, therefore, the aquifer head on the upstream end may be lowered as a result of the impoundment level lowering after dam removal. However, it is not likely that this lowering of the aquifer head will affect riparian habitats because the land use on top of this mapped aquifer has been altered and is dominated by industrial uses. Also, this aquifer is suspected to contain no known public or private supply wells or industrial wells to be affected by dam removal at the Great Works Project.

Water Quality

Although water quality in the Penobscot River at the Great Works Project is generally adequate for all current and designated uses, the return to a natural flowing riverine environment would most likely benefit water quality of the project area. The removal of Great Works Dam would allow for increased turbulence and aeration in the water flow, which would provide enhancement to DO levels and eliminate large water temperature variations associated with impounded waters. Removal of the impoundment and the dam will also allow for non-point sources of pollution and nutrient concentrations to more likely flush through the water system which will reduce the potential for eutrophication and anoxic conditions to occur in the water system within the project area.

The removal of Great Works dam would temporarily affect water clarity from increased turbidity due to potential sedimentation and erosion events during dam removal activities. However, as part of the Proposed Action, the Trust intends to use BMPs, such as revegetation, rip-rap, and other bioengineering techniques, to reduce the input of fine sediment and erosion of soils into the river. The implementation of these control practices will help minimize the temporary, negative effects on water clarity in the project area.

As noted previously, sediment samples from the Great Works impoundment indicated that two heavy metals, silver and nickel, and several organic compounds were found in concentrations exceeding the identified criteria listed in the NOAA guidance (CR Environmental, 2008). However, little if any accumulation of fine grained sediments and organic material has occurred behind the Great Works dam. The lack of accumulated fine grain sediments and organic material behind the dam limits the potential for pollutants, such as heavy metals and organic compounds, to become bound to substrate particles and for their presence and resuspension during dam removal activities (Stantec, 2008). Because the Trust intends to use BMPs and there are limited amounts of pollutants behind the dam, we expect only minor, short-term, negative effects to water quality at this project area during dam removal activities.

3.3.2.3 Fisheries and Aquatic Resources

AFFECTED ENVIRONMENT

Habitat

The Great Works Project impoundment extends approximately 1.7 miles upstream from the Great Works Dam in Old Town/Bradley to below the Milford Project tailrace. It is a relatively small, 128-acre impoundment with approximately 1,280 acre-feet of storage. There are no significant tributaries entering this section of the Penobscot River. French Island, a highly residential 50-acre, 2,300 feet long island, separates the upper reach of the impoundment into two channels.

A qualitative shoreline habitat survey was conducted in the impoundment on May 4, 1999, during the low-water level that occurred when the project's flashboards were being replaced (PPL Great Works, LLC, 2000). This reconnaissance-level survey was repeated on June 9, 1999, following flashboard replacement and a return to more normal impoundment water levels.

The results of this survey showed that the western shoreline reflects a highly industrialized use with variously-sized rip-rap over a moderate to steep slope. A single section of shoreline about mid-impoundment is dominated by fines (mud/sand/silt) and a gradual slope. The potential for aquatic vegetation establishment in this area is limited by the steep increase in depth about 20 to 25 feet offshore. The eastern shoreline of the lower impoundment reflects a more natural state. The shoreline and near shore area are dominated by cobble and boulder with small sections of sand and cobble. There is a long section dominated by silt, sand, and mud about mid-impoundment. This section has a more gradual slope near shore with some scattered submerged aquatic vegetation, but then depth increases quickly. Outcrops of ledge and rocky substrates, variously embedded with sand, again dominate as the river shoreline bends further upstream, around French Island. This habitat continues up the eastern shoreline to the Milford tailrace (PPL Great Works, LLC, 2000).

The west side of French Island is dominated by shear cliff ledges and boulder substrate. This west river channel is narrow with relatively rapid flows around bridge piers, ledge outcrops, and channel constrictions. Habitat on the east side of French Island alternates between ledge and boulders to sand and gravel. The east channel has moderate current with a deep-water section at the channel bend. A large, shallow cobble/gravel bar, which becomes partially exposed at low-water levels, is located near the southeast corner of the island. Both river channels have areas of rapids near the southern end of French Island during low impoundment water levels. Although river current slows in the middle and lower impoundment, the project's run-of-river operation maintains a

noticeable current here. This was evidenced by the lay of the scattered vegetation, water current pull on buoy lines, and lack of depositional sediment in the middle to lower impoundment (PPL Great Works, LLC, 2000).

There are several man-made features in the Great Works impoundment including tall concrete pillars and large debris likely associated with a former bridge crossing (CR Environmental, 2008). These structures are generally not visible at the water's surface during low water which would imply that these structures are sufficiently submerged so as not to present an impediment to fish passage.

The impoundment contains limited fish cover provided by shoreline riparian vegetation, and near shore boulders and ledge. Some scattered submerged aquatic vegetation was observed near shore during subsequent site visits in the summer growing season, but dense beds of aquatic vegetation were lacking. Some mid-river cover is provided by numerous old rock and timber cribs remaining from past log driving activities (Yoder, *et al.*, 2005).

CRA and a study team, comprised of biologists from state and federal fisheries agencies, the PIN, Bangor Hydro and experienced anglers from three local salmon clubs, located existing salmon lies in the reach of the Penobscot River in the vicinity of the Great Works Project (Kleinschmidt, 2008c). From the Milford Project to the Great Works Project, there are about 26 salmon lies and from the Great Works Project to the Veazie Project, there are 44 lies.

Fish Assemblages

Fish assemblages in the project impoundment and tailwaters were surveyed during the summer of 2004 by boat electrofishing (Yoder, *et al.*, 2005). A total of 6,562 feet (1.24 miles) of impoundment habitat shoreline was fished in the project impoundment and 3,281 feet (0.62 miles) of riverine habitat shoreline was also surveyed in the tailwater. This survey was part of the same effort described for the Veazie Project, using standardized methods so that results can be quantitatively compared (Yoder, *et al.*, 2005).

The impoundment was comprised of warmwater habitat generalists, and migratory species. A total of ten species comprise the fish assemblage, with smallmouth bass the most abundant both in biomass and also numeric abundance (Table 14). Smallmouth bass, American eel (a catadromous species) and Atlantic salmon (an anadromous species) collectively comprised 96 percent of the fish assemblage by weight; however, salmon and eel were not numerically abundant. Fallfish and common shiner were the next most abundant species after smallmouth bass, followed by American eel and redbreast sunfish. Biomass was indexed at 18.22 kilograms per kilometer of shoreline, and numeric abundance was indexed at 185 fish per kilometer.

The tailwater area species assemblage was comprised of nine species of warmwater habitat generalists, riverine, and migratory fish (Table 15). Smallmouth bass, white sucker and American eel collectively comprised approximately 98 percent of the fish assemblage by weight. Smallmouth bass were numerically dominant and accounted for 73 percent of the catch. Redbreast sunfish, American eel, white sucker and fallfish were the next most abundant species. A single Atlantic salmon and a sea lamprey were anadromous species that were sampled. Biomass was indexed at 61.34 kilograms per kilometer of shoreline and numeric abundance was indexed at 198 fish per kilometer.

Table 14. Composition of Fish Assemblage from the Great Works Project Impoundment, Summer 2004

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (Number/km)	Percent Abundance (%)
Smallmouth bass	14.02	77.0	79	42.7
American Eel	1.965	10.8	18	9.7
Atlantic Salmon	1.45	8.0	1	0.3
Redbreast Sunfish	0.515	2.8	9	4.9
Brown Bullhead	0.16	0.9	1	0.5
Fallfish	0.055	0.3	37	20.0
Common Shiner	0.035	0.2	32	17.0
White Sucker	0.015	0.1	8	4.1
Eastern Banded Killifish	0	0.0	1	0.5
Pumpkinseed	0	0.0	1	0.3
Grand Total	18.22		185	

Note: Data are normalized in units per kilometer of shoreline.
(Source: Yoder, *et al.*, 2005)

Table 15. Composition of Fish Assemblage from the Great Works Project Tailwater, Summer 2004

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (Number/km)	Percent Abundance (%)
Smallmouth Bass	52.3	85.26	145	73.23
White Sucker	6.4	10.43	6	3.03
American Eel	1.77	2.89	12	6.06
Redbreast Sunfish	0.75	1.22	20	10.10
Atlantic Salmon	0.06	0.10	1	0.51
White Sucker	0.02	0.03	2	1.01
Fallfish	0.02	0.03	6	3.03
Sea Lamprey	0.01	0.02	1	0.51
Common Shiner	0.01	0.02	5	2.53
Grand total	61.34		198	

Note: Data are normalized in units per kilometer of shoreline
(Source: Yoder, *et al.*, 2005)

The 2004 survey indices show that the contiguous riverine reach below the Great Works Project has a similar number of fish species to that of the impoundment but greater biomass per kilometer. The total numbers of individuals and biomass per kilometer is greater in the tailwater. The species composition above and below Great Works also has numbers of migratory fish that serve to import marine nutrients into the riverine ecosystem. Smallmouth bass, an important freshwater resident game species, has much greater biomass in the downstream riverine habitat than in the impoundment and twice the numeric abundance. This is consistent with many other similar riverine hydroelectric impoundments in Maine (Yoder, *et al.*, 2005).

Mussels

A total of seven areas within the Great Works impoundment, ranging in depths from 0 to11 feet, including one cross channel area, were surveyed by a professional team of SCUBA divers trained in freshwater mussel and aquatic vegetation identification (Normandeau Associates, 2007). There was not sufficient time to survey the tailrace, however, the Trust assumes that there were mussels present in the tailrace based on their widespread distribution elsewhere.

Eastern elliptio was the overwhelmingly dominant species observed across all transects, accounting for more than 97 percent of all mussel observations in the seven areas surveyed. Other species observed were substantially less abundant than the eastern elliptio and included, in decreasing order of abundance: eastern lampmussel; eastern floater triangle floater; the Maine Threatened yellow lampmussel; and the Maine Species of Special Concern creeper (Normandeau Associates, 2007).

Of the more common species (eastern elliptio, eastern lampmussel, eastern floater, and triangle floater) of mussels observed in the Great Works impoundment, eastern elliptio was the only species observed at all of the surveying sites, while eastern lampmussel and eastern floater were identified by the divers at all sites except one, which was located furthest upstream from the dam at water depths less than one foot. The triangle floater was observed at four of the seven sites sampled. In general, substrate types were mixed in the surveyed areas, and the mussels were most numerous in areas that included cobble, gravel, and sand. Very little vegetation was observed during the survey. While there did not appear to be a distinct trend in the number of mussels observed and the distance from shore at which the observations were made, the greatest abundance and diversity of the more common species occurred between 130 to 160 feet from shore in water depths ranging from 7 to 9 feet (Normandeau Associates, 2007).

The 2007 survey results indicated that only two Maine rare, threatened or endangered species were observed in the Great Works impoundment: yellow lampmussel and creeper. These two species were present in relatively low abundances as compared

to the more common species, accounting for less than one percent of the observations in the Great Works impoundment study areas. Substrate types where these species were observed included cobble, gravel, sand and silt, and water depths ranged from 0 to 11 feet. Of the three yellow lampmussels observed during the cross channel transects, two were located 20 feet from shore and the third was located approximately 50 feet from shore (Normandeau Associates, 2007).

ENVIRONMENTAL EFFECTS

Physical Habitat Changes

It is expected that the dewatered impoundment will gradually assume habitat characteristics and thus fish community composition similar to those found in the existing contiguous riverine tailwater areas. Dam removal will restore free-flowing conditions in 1.7 miles of river above the Great Works spillway. The removal of the Great Works dam will result in changes in water depth and velocity and will create new pools, riffles and runs similar to what is found in the unimpounded tailwater areas. These hydrologic changes will positively affect habitat quantity and quality for migratory and resident fish species.

Dam removal is also expected to increase spawning opportunities for endangered shortnose sturgeon and Atlantic sturgeon. While existing spawning locations for sturgeon in the Penobscot are still unknown (Fernandes, 2008), both species would likely experience an increase in access to potential spawning habitat in the 1.7-mile segment of the river currently impounded by Great Works dam.

Atlantic salmon ascending the river rely on cover, such as pools and other deep depressions greater than three feet deep, as resting and shelter sites often referred to as "lies" (Moreau and Moring, 1993). To assess the expected changes to the hydrology of the Great Works impoundment area after dam removal, the Trust's consultant conducted hydraulic modeling using the USACE's Hydrologic Engineering Center-River Analysis System (HEC-RAS). In the immediate vicinity of the existing dam and powerhouse, dam removal will remove the concentration of discharge from the existing powerhouse and distributing it more evenly across the entire river (Milone and MacBroom, 2008d). It will also change the number or location of salmon lies in the area.

Habitat for Atlantic salmon is expected to increase with the proposed removal of the Great Works dam. After dam removal, under high flow conditions (May mean flow) approximately seven boat accessible salmon lies and extensive shoreline lies around French Island will be created (Kleinschmidt, 2008c). Under median August flow conditions, boat-accessible lies increase on the Milford side of French Island. Similarly, the footprint of the largest boat-accessible lie between French Island and the existing dam enlarges and joins the smaller May lie just upstream (Kleinschmidt, 2008c). There are

modest shifts in the size and lengths of shoreline lies, and a small opportunity for a wadable lie is predicted to be created along the Old Town shoreline approximately midway between French Island and the existing dam (Kleinschmidt, 2008c). Additionally, migrating Atlantic salmon depend on access to cool-water tributary streams during warmer conditions (Holbrook, 2007). Dam removal will improve access to these upstream temperature refuges in a timely manner and will increase successful migration and survival.

After dam removal, fish communities are expected to gradually increase in biomass, gain riverine species, and potentially recruit additional migratory species as barriers to habitat connectivity between the currently segregated river segments are removed to permit free passage.

Water Quality Improvements

Removal of the Great Works dam would alter the flow characteristics from slow deep water in the Great Works impoundment to a more natural sequence of shallower pools, riffles and runs. This would potentially increase the aeration and DO of the river. Additionally, the diurnal temperature variation would increase. Both migratory and resident fish species would benefit from these changes in DO and temperature patterns.

During in-water construction activities, there may be short-term effects on water quality, including sedimentation and increased turbidity which could be harmful to aquatic life. Due to the limited amount of fine, mobile sediment in the construction area, these effects are expected to be minor and temporary. The Trust proposes to employ BMPs, including erosion and sediment control measures, to limit the extent and duration of any increase in turbidity or sedimentation.

Fish Passage

Upstream migrating species such as Atlantic salmon, Atlantic and shortnose sturgeon, striped bass, rainbow smelt, Atlantic tomcod, American shad, alewife, blueback herring, sea lamprey and American eel will benefit greatly from the proposed removal of the Veazie and Great Works dams and wing dam remnants in the impoundment. In addition, the new upstream fish passage facilities at the Milford Project and the proposed Howland bypass will allow these species to access their entire historic habitat in the Penobscot watershed. Studies on fish passage effectiveness on lower dams in the river indicate that the removal of a dam such as Great Works or Veazie could enhance upstream movements by 10 to 20 percent (FERC, 1997b). As concluded in the National Academy of Sciences Report on Atlantic salmon in Maine (NRC, 2004), removal of lower river dams will provide the greatest improvement in access to upstream spawning and rearing habitats for these species and will greatly improve overall chances for successful restoration of migratory species in the watershed.

Removal of the Great Works dam will also eliminate current downstream passage mortality at the site. Dam removal will greatly increase the numbers of out-migrating fish reaching the ocean and will enhance overall chances for successful restoration of migratory species in the Penobscot River (Holbrook, 2007). Although the remaining crib works and other submerged structures upstream are not proposed for removal under the Proposed Action, hydraulic modeling conducted by the Trust's consultant suggests that the man-made submerged structures of the Great Works Dam will not present a problem for fish passage.

The Trust's consultant used limited bathymetric studies and the HEC-RAS hydraulic model to determine if sufficient minimum water depth for fish passage would exist during low flow conditions after the dam is removed (Milone and MacBroom, 2008d). According to the model, immediately upstream from the existing dam the river would be approximately 380 feet wide with two channels of that cross-section (one approximately 150 feet of contiguous width and another approximately 50 feet) would exceed 1 foot deep. The thalweg of the first channel would generally be approximately 2 feet deep and the second channel would range between two to 3.7 feet deep. The average channel velocity would be approximately 6 fps. These depths and widths provide adequate zone of passage for adult-sized migratory fish (Bovee, 1982) and this velocity would not exceed a threshold that would impair upstream swimming of adult migratory fish (Haro, *et al*., 2004).

At French Island, the river would be approximately 1,500 feet wide separated by 1,300 foot-wide French Island (Milone and MacBroom, 2008d). The two channels would contiguously be at least one to two feet deep. The thalweg of the east channel would generally range between one to two feet deep and the west channel would range between two to 6.7 feet deep with an average channel velocity of approximately 7.5 fps (Milone and MacBroom, 2008d). This depth and width should be an adequate zone of passage for adult-sized migratory fish (Bovee, 1982). Although this average velocity begins to approach a threshold that would impair upstream swimming of adult migratory fish (Haro, *et al*., 2004), passage would still be feasible.

Kleinschmidt (2008a) points out that the HEC-RAS model only outputs channel-wide mean velocity; which is not reflective of point-specific velocities in complex channels such as that which would be found after the in the Great Works impoundment was dewatered. Submerged ledge outcrops provide localized velocity shelters that facilitate upstream movement of migratory fish. For example, the ledge-controlled shoreline in this reach (CR Environmental, 2008) offsets higher center channel velocities with numerous eddy zones and velocity shelters that exist along its length. These will enable ascending fish to swim and rest in lower-velocity, localized flow fields (Kleinschmidt, 2008c).

The USDOI comments that two areas near French Island, upstream of the Great Works dam, would not meet its minimum water velocity criteria for fish passage during May. Thus, it recommends that an evaluation of the French Island area should be conducted after the dam is removed. Commission staff agrees with the USDOI, and believes that the Trust should survey the reservoirs (including French Island) after draining for any areas of blockage to fish migration and make any modifications needed to clear the block if such obstructions are present.

The proposed decommissioning and removal of the Great Works dam will not disrupt current trapping and trucking of Atlantic salmon broodstock conducted by the Maine DMR at the project. As described in the Settlement Agreement and required by the Milford Project license, PPL will construct a fish lift and trapping facility at Milford to replace the trap at Veazie. The current fish lift and trapping facility at Veazie is not accessible during high flows but the new Milford fish trap will be shore-based and accessible during spill conditions. As outlined in the April 2005 Commission Order, the Milford fish lift and trapping facility will be operational about 2 years after the Trust takes ownership of the Veazie, Great Works and Howland Projects.

Once the Milford fish lift is operational, the Trust proposes to remove the Veazie and Great Works dams in sections and provide zones of passage through the breached sections. The Trust proposes to remove the Great Works dam first to allow for fish to be trapped at the Veazie dam and transported upstream of the Great Works dam. After the east bank of Great Works dam breach has been sufficiently widened to provide the depth and velocity conditions necessary for upstream migration, trapping activities at Veazie could be halted. The window of no-passage at Great Works during the removal is expected to be approximately three weeks long, from the start of the drawdown until the breach is fully developed, assuming that access roads and coffer dams are previously initiated. This time could be longer if any necessary mussel relocation efforts take longer to complete. The ability to trap fish at the Veazie dam and transport them around the Great Works dam site will minimize any impacts on migrating fish. The Trust proposes to coordinate with the resource agencies to ensure minimal impacts to migrating fish during dam removal.

Impacts to Resident Fisheries

Removal of the Great Works dam would have both adverse and beneficial impacts on resident fisheries resources, depending on individual species. Species that prefer lentic conditions, such as yellow perch and chain pickerel, will experience a decline in habitat following dam removal. However, the FEIS found that any reduction in pickerel populations will help to reduce in-river predation of Atlantic salmon smolts (FERC, 1997b). Species that prefer riverine conditions will experience improved habitat after dam removal. Popular sport fish such as smallmouth bass can thrive under both riverine and lake-like conditions (Scott and Crossman, 1973) and should continue to be a

dominant presence in the aquatic community after the dam is gone (Kleinschmidt, 2008b).

It is expected that the diversity of the fish community in the area of the former Great Works impoundment would be similar to that found in the tailrace area. The contiguous riverine reach below the Veazie Project has greater fish species diversity, numbers and biomass of fish per linear distance of shoreline than does the Veazie impoundment (Yoder, *et al*., 2005). Yoder, *et al.* (2006) found that quantitative fish abundance and biomass data collected in the Kennebec, Androscoggin and Penobscot showed that the biomass of un-impounded riverine reaches is higher than that of rivers with multiple contiguous impoundments. After the removal of the Edwards Dam on the Kennebec (formerly positioned at the head of tide), seasonal biomass increased partially from the influx of marine protein from migratory species. This increase in protein would move through the food web increasing the productivity of all trophic levels. A similar increase in the macroinvertebrate community abundance, biomass and species richness was recorded in this reach subsequent to removal of the dam (David Courtemanch, Maine DEP, personal correspondence, April 2005; as cited in Trust, 2008).

After dam removal, the lowering of the water level in the former impoundment may reveal sediment bars that have built up at the confluences of tributary streams. These sediment bars could create barriers to resident fish traveling into and out of these tributaries. There may be short term effects to resident fish passage into and out of tributaries to the former impoundment. The Trust proposes to monitor tributary deltas following dam removal and to take remedial measures to remove barriers that are affecting fish passage. Additionally, the Trust proposes to drawdown the impoundment slowly to help reduce adverse impacts on resident fish and catadromous American eel.

Mussels

Many mussels in the project area will potentially be dewatered under the Proposed Action, including two State of Maine listed rare, threatened or endangered species (yellow lampmussel and creepers). The Proposed Action will have direct, short-term impacts on individual mussels located in the drawdown area. The Trust proposes to attempt to reduce this impact by drawing down the impoundment gradually, in stages, allowing mussels to move to deeper water and facilitating relocation efforts. The Trust proposes to consult with the resource agencies to develop a mussel relocation plan.

Other Ecological Effects

Other ecological benefits will result from removing Veazie dam such as increasing the abundance of river herring to: 1) provide prey for predatory fish; 2) serve as prey buffers for fish such as Atlantic salmon smolts; 3) provide an uncontaminated food for fish-eating birds and mammals and; 4) renew the historical nutrient exchange between the

river and marine environment. Potential benefits to near-shore stocks of cod and other groundfish in the Gulf of Maine as a result of restored migratory fish runs could also be realized as an indirect effect of dam removal.

3.3.2.4 Botanical Resources

AFFECTED ENVIRONMENT

Shoreline surveys were completed by Stantec in summer 2007 to identify existing wetlands and other botanical communities within 500 feet of the normal high water line of the Great Works impoundment. The shoreline survey investigated wetland boundaries and habitats in the project impoundment area using NWI maps and the Cowardin Classification System, in accordance with the guidance of the 1987 Corps of Engineers Wetland Delineation Manual. The following information in this affected environment description for the botanical resources section is based on Stantec's shoreline surveys, unless otherwise noted.

The Great Works impoundment extends approximately 1.7 miles upstream into the tailrace of the Milford Dam. The results of the shoreline surveys show that, wetlands within the project area are primarily found on the less developed, eastern shoreline of the impoundment. Wetland types frequently found in this area include the palustrine forested wetlands and palustrine scrub-shrub wetlands. Palustrine emergent wetlands are not currently mapped within the Great Works impoundment. The vegetative cover types within the project area range from the lower gradient wetland areas, classifed as graminoid swales and hardwood floodplain forest communities, to upland, terrestial areas classifed as northern hardwood forest and early successional forest communities. Table 16 below identifies acreage of each wetland type at the Great Works Project that are within 200 feet and 500 feet of the Penobscot River.

Table 16. Acres of each wetland type at the Great Works Project within 200 and 500 feet of the Penobscot River

Wetland Type	Acres within 200 feet	Acres within 500 feet
Palustrine Emergent Marsh Wetland	0	0
Palustrine Emergent Marsh/ Forested Wetland	0	0
Palustrine Emergent Marsh/ Scrub-Shrub Wetland	0	0
Forested Wetland	6.1	6.5
Scrub-Shrub Wetland	1.8	3
Scrub-Shrub/ Forested Wetland	0	0
Uncon. Bottom/Emergent Marsh Wetland	0	0
Uncon. Bottom/ Forested Wetland	0	0
Uncon. Bottom Wetland	0	0.8

(Source: Stantec, 2008)

Palustrine forested wetlands are the dominant wetland type found on the eastern shoreline of the impoundment and are seasonally flooded communities. The vegetation characteristics of these areas primarily consist of a silver maple floodplain forest community and, to a lesser extent, acidic shoreline shrub thicket and acidic shoreline outcrop communities. According to botanical surveys conducted in June 1999 by PPL and August 2007 by Stantec, the forested wetland areas are dominated by silver maple and sometimes contain red maple, green ash, or hop-hornbeam (*Ostrya virginiana*). The shrub layer is not well developed, but also includes species such as meadowsweet, green ash, and red maple. The herbaceous layer within the forested wetland ranges from sparse to well developed and is primarily dominated by ostrich fern, jewelweed, bluejoint, sensitive fern, and infrequent sedges (*Carex spp*). Two additional areas of this community occur in the northern extent of the impoundment along each shoreline. Invasive species, such as honeysuckles, glossy buckthorn, and purple loosestrife, are also present at low densities in these forested wetland areas.

Mixed graminoid-shrub marsh communities are a mix of grass and grasslike species and shrubs that belong to the palustrine emergent wetland class and generally are found intermittently along the immediate shoreline at this project. The emergent communities are dominated by vegetation, such as grasses, sedges, or rush, while the swale communities are typically dominated by bluejoint grass, blunt spikerush (*Eleocharis obtuse*), fringed sedge (*Carex crinita*), and lake bank sedge (*Carex lacustris*).

Scrub-shrub wetland areas occur primarily along the eastern shore of the Great Works impoundment and are primarily dominated by speckled alder. Additional species found within these communities include: white birch, steeple bush, meadowsweet, and small patches of honeysuckle. Herbaceous species within these wetland communities include sensitive fern, blue joint, timothy (*Phleum pretense*), tall meadow rue, and royal fern.

Aspen-birch forest communities and northern hardwood forest communities are also located within the project area. The majority of the aspen-birch forest community is located east of the palustrine forested wetland areas on the east river shore and is dominated by quaking aspen (*Populus tremuloides*), balsam poplar (*P. balsamea*), gray birch (*Betula populifolia*), red maple, hawthorne (*Cratageus spp*.) and white pine (*Pinus strobus*). Shrub species found in this community include speckled alder, meadowsweet, and raspberry (*Rubus idaeus*) and common herbs include gray goldenrod (*Solidago nemoralis*), field horsetail (*Equisetum arvense*), evening primrose (*Oenothera biennis*), and daisy fleabane (*Erigeron annuus*). The northern hardwood forest community is located only in a few limited places along the east shore near the upstream edge of the Project area. Vegetation within this community includes: northern red oak (*Quercus rubra*), sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), white pines and eastern hemlock (*Tsuga canadensis*). The herbaceous layer has a variety plants, such as

Canada mayflower (*Maianthemum canadense*), partridge-berry (*Mitchella repens*), starflower (*Trientalis borealis*), panic grasses (*Panicum spp*.), spinulose wood fern (*Dryopteris intermedia*), and shining clubmoss (*Lycopodium lucidula*).

Exotic and invasive plant species are currently present in limited numbers along the impoundment at the Great Works Project, as noted above. Additionally, in general, non-native, invasive plant species that are commonly found within the Penobscot River watershed include: include: Norway maple, black locust, tree-of-heaven, autumn olive, Japanese barberry, morrow honeysuckle, tartarian honeysuckle, multiflora rose, common buckthorn, glossy buckthorn, common reed, purple loosestrife, Japanese knotweed, garlic mustard, Japanese stilt grass, asiatic bittersweet, black swallowwort, Japanese honeysuckle, and porcelainberry (Milone & MacBroom, Inc., 2009).

ENVIRONMENTAL EFFECTS

As noted previously under the water resources section, the proposed dam removal at the Great Works Project is expected to reduce water surface elevation and river width by varying degrees at locations along the impoundment. Reductions in water levels are likely to affect existing wetland areas that are hydrologically connected to the Great Works impoundment. However, HEC-RAS hydraulic modeling indicates that wetlands with a direct hydrologic connection to the Penobscot River are limited primarily to a narrow part along the eastern shoreline of the impoundment. Further, the reduction in water levels following dam removal may result in the development of approximately 3.7 acres of new wetlands in areas where the impoundment currently resides. After dam removal, newly exposed areas of fine-textured sediment are expected to rapidly develop into a variety of functioning wetland and riparian habitats, such as palustrine emergent wetlands, scrub shrub wetlands, forested wetlands, forested floodplain upland communities, and early successional upland forest communities.

Changes in vegetation compositions and wetland type designations are likely to occur to some existing wetlands in the project area. Such changes that are likely to occur include conversion from palustrine scrub shrub wetlands to palustrine forested wetlands or conversion from palustrine forested wetlands to non-wetland floodplain forest communities. According to Stantec (2008), most of the existing wetland resources in the Great Works impoundment are likely to remain unchanged from the Proposed Action of dam removal, but it is expected that the higher forested wetland areas are likely to change in vegetation composition and designation due to changes in flood flows. Overall, removal of Great Works dam may result in the conversion of 1.8 acres from palustrine scrub shrub wetlands to palustrine forested wetlands and the conversion of 0.4 acres of palustrine forested wetlands into upland communities.

Following dam removal, invasive species currently present along the impoundment and along the Penobscot River are likely to compete with native species

and may rapidly spread during colonization of the newly created terrestrial and wetland areas, resulting in lower biodiversity. As part of the Proposed Action, the Trust intends to initially plant native herbaceous and shrub species in select newly exposed riverbank areas immediately following construction activities, as well as conduct soil testing, repeated seed broadcasting, and fertilizer application. The Trust also proposes to conduct monitoring and control activities of invasive species, such as hand removal, herbicide treatment, and when necessary biological control activities, for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the project area.

3.3.2.5 Wildlife

AFFECTED ENVIRONMENT

The wildlife species identified at the Veazie Project are also known, or likely to occur at the Great Works Project (See Tables 5 and 6). Though Great Works has less abundant waterfowl habitat, Mallards (*Anas platyrhynchos*), Black Ducks (*Anas rubripes*), and Green-winged Teals (*Anas crecca*) typically occupy the area in late summer and early fall. A Bald Eagle's nest was also identified on the west bank, approximately one mile downstream of the Great Works dam.

The presence of emergent and scrub-shrub wetlands should also attract SGCN species like the Black Tern (*Chlidonias niger)*, Sedge Wren (*Cistothorus platensis*), American Coot (*Fulica Americana*), Purple Martin (*Progne subis)*, blue-spotted salamander (*Ambystoma laterale*), spotted turtle (*Clemmys guttata*), Blanding's turtle (*Emydoidea blandingii*), and ringed boghaunter (*Williamsonia lintneri*).

ENVIRONMENTAL EFFECTS

Removal of the Great Works Dam would permanently lower the August median water surface elevations by 19.0 feet at the dam, with a reduction of about three feet at the top of French Island. The impact of the Proposed Action on wildlife species at Great Works would be very similar to those described for the Veazie Project (section 3.3.1.5) due to similar habitat conditions and water surface elevation changes. Any adverse effects should be minor and short-term in duration, caused by the change in water surface elevations and disturbance associated with construction activities.

3.3.2.6 Rare, Threatened and Endangered Species

AFFECTED ENVIRONMENT

The affected environment for rare, threatened, and endangered species at the Great Works project is the same as that described for the Veazie project because of similar

species composition and close geographic proximity. Thus, please refer to section 3.3.1.6, "Affected Environment" for the Veazie Project.

ENVIRONMENTAL EFFECTS

State listed species

It is not expected that any state listed species will be adversely impacted by the Proposed Action. However, some species or their habitat may benefit from the Proposed Action. Some species may experience temporary minor impacts during dam removal activities.

The lowering of water levels at the Great Works impoundment may increase flow rates and prevent freezing in some reaches of the river benefitting both the Bald Eagle and the Barrow's Goldeneye. Bald Eagles may also benefit from increased availability of prey due to fish passage improvements. The wood turtle may benefit from the creation of new habitats following re-vegetation of newly exposed sediments which may provide food resources and nesting habitat. The extra-striped snaketail prefers fast-flowing and clean medium-sized rivers in forested watersheds that have gravel bottoms. The availability of this habitat could increase after dam removal.

New areas of IWWBH (Inland Waterfowl and Wading Bird Habitat) may develop following dam removal such as open water that does not freeze in winter and emergent wetland. Following dam removal, exposed shorelines at the Great Works impoundment may in fact provide new suitable habitat for Orono sedge, Nantucket shadbush, purple clematis, hyssop-leaved fleabane, longleaved bluet, and New England violet (Stantec, 2008).

Areas consisting of Silver Maple Floodplain Forest were identified as the dominant forested wetland along portions of the eastern shoreline of the impoundment. The Silver Maple Floodplain Forest in the vicinity of the Great Works Project is listed S3 by the Maine NAP which defines the community as rare within Maine (on the order of 20 to 100 occurrences) (Stantec, 2008). These areas may be affected by the Proposed Action as new high water events may not reach areas of floodplain forest.

Many mussels in the project area will potentially be dewatered under the Proposed Action, including two State of Maine listed species (yellow lampmussel, and creepers). The Proposed Action will have direct, short-term impacts on individual mussels located in the drawdown area. The Trust proposes to attempt to reduce this impact by drawing down the impoundment gradually, allowing mussels to move to deeper water and facilitating relocation efforts. The Trust further proposes to consult with the resource agencies to develop a mussel relocation plan.

ESA listed species

Because the same ESA listed species do occur or have the potential to occur in the Great Works project area as occur in the Veazie project area, please refer to the Environmental Effects section for the Veazie Project (section 3.3.1.6).

By letter dated August 12, 2009, the Commission requested formal consultation with the NMFS pursuant to section 7 of the ESA regarding the effects of removing the Great Works dam on these three ESA-listed species and their habitat. Attached to that letter was a BA discussing those potential effects and providing further life history information for the three ESA-listed species. During dam removal activities, a three week period would occur when fish would not be able to pass at the project which, depending on timing, may adversely impact shortnose and Atlantic sturgeon (although they are not currently found at Great Works) as well as Atlantic salmon. On December 23, 2009, the NMFS issued its BO, which found that the proposed action may adversely affect but is not likely to jeopardize the continued existence of shortnose sturgeon or Atlantic salmon. Furthermore, the BO states that the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In its BO, the NMFS issued an incidental take statement, four reasonable and prudent measures, and five terms and conditions to minimize and monitor incidental take.

3.3.2.7 Cultural Resources

AFFECTED ENVIRONMENT

The Great Works Project is located at a formerly important logging and milling site. The existing dam was constructed in the late 19th century, and has been modified over time. The history of the project was researched by PPL to assess its eligibility for listing in the National Register, and a report on the findings was prepared and submitted to the SHPO. The SHPO responded on June 22, 2007, stating that it determined that the Great Works Project and associated structures are not eligible for listing in the National Register (Kleinschmidt, 2008).

Though 107 known archaeological sites exist within in the City of Old Town, none of these sites are located adjacent to or within the Great Works Project boundary. The SHPO concurred with this determination on March 20, 2008 (Kleinschmidt, 2008).

ENVIRONMENTAL EFFECTS

Removal of the Great Works dam would not affect any known historic or cultural resources. As discussed above, no resources are known to exist within the project boundary, and the SHPO has determined that the Great Works dam and its associated facilities are not eligible for listing in the National Register. There is the potential for

previously unidentified historic or cultural resources to be uncovered during dam removal. However, the MOA among the Commission and SHPO, with the Trust, PIN, and NMFS as concurring parties, executed on January 14, 2010, includes provisions for addressing inadvertent discoveries of previously unknown historic or cultural resources. Specifically, the MOA requires in the event that an unanticipated discovery of human remains occurs, work would cease within 10 meters of the area of discovery during notification of local law enforcement and consultation with the PIN and SHPO. Further, if any previously undiscovered resources are identified, the MOA requires that the Trust provide curation fees for the artifacts and include a description of the recovered artifacts and any data recovery in the final technical report to be provided to the SHPO and THPO.

3.3.2.8 Recreation

AFFECTED ENVIRONMENT

Recreational use of the Great Works impoundment is extremely low relative to other recreation areas in the region. The PPL estimated annual recreational use of the project at 24 recreation days (PPL, 2003). Recreational use of the Great Works impoundment and bypass reach is limited due to several factors, including: 1) lack of public access opportunities; 2) private landownership and development of surrounding shorelines; 3) topography limiting access; 4) the availability of more desirable areas for fishing and boating in the region; and 5) the short length of the project impoundment between the Milford dam and Great Works dam. Recreation is generally important to the public in this area, but many recreational opportunities are available elsewhere in the region.

Recreational activities occurring at the Great Works impoundment are limited to flatwater boating (canoeing and kayaking) and fishing. Fishing opportunities exist for smallmouth bass, chain pickerel, white perch, brown bullhead, and sunfishes. The only formal public access to the impoundment is a canoe portage owned by the licensee, described below.

<u>Great Works Canoe Portage</u> - This informal site within the project boundary provides carry-in access to the Great Works impoundment just upstream of the dam on the eastern shore, and then continues around the dam to an informal carry-in access just downstream of the dam. Roadside parking adjacent to the upstream access site can accommodate approximately two vehicles. Usage of this site is estimated to be 5 percent of capacity (PPL, 2003).

Additionally, a baseball field, owned by the PPL, is located within the project boundary. In general, this field experiences very low use (PPL, 2003).

Many opportunities for recreation, especially for fishing and boating, exist outside of the project boundary but in the vicinity of the project. Opportunities for camping, snowmobiling, and hunting also exist in the project vicinity. There are several local parks such as Binette Park and Old Town Riverfront Park; Fort Halifax, Baxter, and Swan Lake State Parks; and Acadia National Park; within driving distance of the project. The Old Town Riverfront Park provides shoreline access above the impoundment for non-motorized boating. The park also features a playground, splash pad, walking path, gazebo and restrooms, and features various festivals throughout the year.

Whitewater boating opportunities are generally located outside of the project area, such as at Basin Mill Rips located downstream of the project. The mainstem of the Penobscot River downstream of Old Town to the Veazie dam is classified as a Class I – III river (American Whitewater, 2009). At certain water levels, however, rapids exist at the southern end of French Island in the upper reaches of the Great Works impoundment. Further downstream of the Great Works dam are two sites that also provide hand-carry access for non-motorized boats.

ENVIRONMENTAL EFFECTS

By removing the Great Works dam, the affected area would be changed from a slow-moving impoundment to an unimpounded river environment. Because recreational use of the Great Works impoundment is so low, this dam removal would likely have mostly positive effects on recreation opportunities at the project. These effects mainly concern fishing and boating.

Fishing opportunities would change from reservoir-based to river-based, changing the type of angler to access the river. Opportunities for shoreline fishing as well as fishing from canoes and kayaks would likely increase. Increased fishing opportunities for migratory species such as Atlantic salmon, striped bass, and American shad would be expected to be available post-removal (See the fisheries and aquatic resources section for more information about changes to recreation fisheries).

Currently, access to the impoundment exists only by a hand-carry launch and canoe portage - there is no access for motorized boaters. If the dam were removed, boating opportunities would change from mostly flatwater paddling at the former impoundment to mostly swift- or white-water paddling. Opportunities for whitewater paddling and rafting would increase because exposed boulders, ledges, and other features would provide whitewater opportunities in the free-flowing river under low- and high-flow conditions.

The Great Works Canoe Portage would experience dewatering of approximately 100 feet, measured horizontally from shore, if the dam were removed. Even though the dam (the original reason for a portage facility) would be removed, a portage facility

would likely still be necessary because the dam was built on a ledge that could obstruct through-access and could pose a safety hazard to some paddlers. The portage may need to be moved or extended because of the dewatering that would occur, but the Trust has no plans to transfer ownership, improve, or change access to the facility post-surrender. If the portage is not functional post-removal, then minor, long-term, negative effects on non-motorized boaters using the river both upstream and downstream of the project could occur. Because of this, the Trust should be required to examine the efficacy of the Great Works Canoe Portage post-removal, and file a report with the Commission on the results of its review, and if necessary, provide recommendations for a functional portage route around the obstruction.

The function of the baseball field that lies within the project boundary is not expected to be affected by changes in water level. The Trust has no plans to change access to the field, but the Town of Bradley has expressed interest in acquiring the facility.

A free-flowing river would provide beneficial recreation opportunities to an otherwise underutilized area. This is especially true around the Great Works dam, where recreation is very low. Because many people currently use or would like to use the river for passive recreation (i.e., relaxing, picnicking, and walking; Fusselman and Tynon, 1995), it is reasonable that these and other recreational activities may increase if the river were restored to its free-flowing state.

Overall recreational use at the Great Works Project is currently very low. Thus, Commission staff expects major, long-term, beneficial impacts on recreational activities at the project if the dam were removed. Additionally, Commission staff expects minor, long-term, negative impacts on public access to the Penobscot River could result under the Proposed Action unless proper mitigation measures are undertaken at the Great Works Canoe Portage, as described above. If a functional canoe portage is ensured, then minimal impacts to public access would be expected.

3.3.2.9 Land Use and Aesthetics

AFFECTED ENVIRONMENT

The shoreline lands adjacent to the Great Works impoundment are much more developed than those in the vicinity of the Veazie Project, with less agricultural/open areas. The Old Town residential areas, however, are more densely populated than the residential property in Milford. Land use along the eastern shore is predominately residential with some industrial and commercial development areas. The area south of Sandy Pond Road to Route 178 is undeveloped with thin forest fragments until the baseball field at Great Works. The topography of the Great Works Project is relatively flat, which allows development to occur fairly close to the shoreline.

The dominant industrial use of in the vicinity of the project is currently the operation of the Red Shield Mill, located immediately adjacent to the dam. The mill covers an area of approximately 55 acres. Various commercial businesses are also located along the western shore of the impoundment in Old Town's downtown area.

The dam and other project features are visible from the residential neighborhoods in Old Town, Bradley, and from French Island to the north. The project impoundment is visible from Route 178, as well as at select locations near French Island. Similar to conditions at Veazie, heavy vegetation and lack of access can prevent some views of the river.

ENVIRONMENTAL EFFECTS

The dam removal at the Great Works Project would involve removing all five spillway sections of the 1,020 foot-long dam and both fishways. Meanwhile, the eastern sheet pile abutment, upstream ice break piers and submerged mill remnants would remain in the river. The piers and dam remnants would be allowed to deteriorate naturally.

The Great Works impoundment, dam, and project works can be seen from the canoe launch upstream of the dam, as well as, at a fenced-in area on the east side of the river. The tailrace can be seen from the downstream portage trail. Removal of the above structures would lower the water surface elevation by approximately 19 feet at the dam, between eight and nine feet at the midpoint of the impoundment, and by three feet at the downstream end of Ayers Island.

The Trust would acquire the land rights to the five parcels of project land totaling approximately 32 acres in Old Town, Bradley and Milford, Maine. These rights would be held during the decommissioning of the project, after which the Trust would relinquish management and ownership of these lands to others. The effects of the Proposed Action would be similar to those described for Veazie (Section 3.3.1.5). No major changes to land use or aesthetic resources are anticipated. Any adverse impacts would be minor and short-term.

3.3.2.10 Socioeconomics

AFFECTED ENVIRONMENT

Demographics and Population

The Great Works Project is located in Penobscot County, Maine, and affects approximately nine miles of shoreline at the towns of Bradley, Milford and Old Town. Based on the 2006 U.S. Census estimate, the population of Penobscot County is 147,180,

with a population density of 42.7 persons per square mile. The estimated growth for the county since 2000 was 1.6 percent, while the estimated growth for the state of Maine for the same period was 3.7 percent (US Census, 2008a).

According to 2000 census data, the population of Bradley was 1,242 persons, the area was 49.56 square miles and there were 25.06 persons per square mile. Milford had a population of 2,950 people, an area of 45.6 square miles, and a density of 64.69 people per square mile. Old Town had the highest population with 8,130 persons, an area of 38.29 square miles, and density of 38.29 persons for each square mile (US Census, 2008b).

Employment

The median annual income in Penobscot County in 2000 was $34,274, while that for the United States was $41,994 (US Census, 2008a). The median annual income for the town of Bradley was $37,163, the poverty rate was 9.3 percent, and the unemployment rate was 3.2 percent. Milford had a median annual income of $39,500, a poverty rate of 10.8 percent, and an unemployment rate of 3.6 percent. Old Town had a median income of $29,886 annually, a poverty rate of 18.6 percent, and an unemployment rate similar to Milford's of 3.6 percent (US Census, 2008b).

Tax Base

The Great Works Project provides taxes to the three towns within the project area. In 2007, Bradley collected 2.9 percent of its tax base from the project which amounts to $30,615, Milford received $591, a negligible addition to their tax base, and Old Town collected 1.8 percent of their total tax revenue from the project which equates to $129,196.

Property Value

Property along the shoreline of the Great Works impoundment is predominately residential on the eastern shore within the towns of Bradley and Milford and industrial, commercial, and residential along the western shore. French Island at the upper end of the reservoir is a densely populated residential area.

The median values for owner occupied homes as recorded in 2000 in the area of the Great works Project were $78,100 in Bradley; $84,100 in Milford; and $77,100 in Old Town. For comparison, the median home value in the state of Maine was $98,700 while that of the United States was $119,600 (US Census, 2000).

ENVIRONMENTAL EFFECTS

Power Generation

Under the Proposed Action, about 23,875 MWh of energy generated at the project each year, would no longer be available once the license is surrendered. Additionally, this project, like hydropower projects in general, provides a source of renewable energy that would no longer be available after surrender of the license. However, the Settlement Agreement includes Proposed Actions to mitigate this loss of power.

In expectation of the decommissioning of this project, the signatories to the Settlement Agreement provided for the increase of headpond elevation by one foot at the nearby Stillwater, West Enfield, and Medway Projects. This has already resulted in 9,068 MWh of additional annual energy generation. Additionally, the inoperative Orono Project on the Stillwater Branch of the Penobscot River was relicensed in conjunction with the Settlement Agreement, providing an additional 16,682 MWh of annual energy generation.

Following the surrender and decommissioning of this project, the Trust proposes to sell units from this project to PPL to be installed in other nearby projects such as the Milford, Orono, Stillwater, Medway, and Ellsworth Projects to increase their installed capacity. This would increase the installed capacity of hydroelectric plants in the area by about 10.7 MW. In aggregate, these enhancements are predicted to restore about 90 percent of the generation capacity lost in the Proposed Action.

Although the generation capabilities at this project would cease, the Trust would be required to pay annual charges based upon the installed capacity of the Great Works Project until the surrender becomes effective. Since a great deal of time would be required to perform the activities under the Proposed Action, the Trust would be paying annual charges to the Commission for many years even following cessation of generation at the project.

Employment

The Proposed Action would not directly affect the number of workers employed in the energy industry within the affected environment. The activities associated with the decommissioning of the dam would result in the temporary employment of construction workers within the area. The decommissioning would create an estimated 64 jobs equivalent to one year of full time employment with benefits. Using information from the Maine Department of Labor, these jobs would have a direct economic value of $2,816,000. The Proposed Action would have a moderate, beneficial, short term impact on employment within the project area.

Tax Base

The Great Works Project currently provides about $160,402 of annual tax revenue to the towns of Bradley, Milford, and Old Town. The surrender and decommissioning of the project would terminate this source of tax revenue for the three towns. Decommissioning of the project may also result in a temporary increase of tax revenue for the affected area. Most notably this increase would be through personal income taxes from construction workers employed for the demolition as well as sales and lodging taxes.

Property Values

Property values along the Great Works Project impoundment are not expected to decline as a result of the Proposed Action. Several studies, including d'Arge and Shogren (1989; study of Okoboji Lakes, Iowa); David (1968; study of property values in Wisconsin); Feather et al. (1992; study of lakefront property values in Orange County, Florida); and Young and Teti (1984; study of St. Albons Bay in Vermont), suggest that the Proposed Action may have a positive effect on property values in the project area. In these studies, the rise in value was attributed to improved water quality and enhanced wildlife habitat. Additionally, it is unlikely the removal of the impoundment would lead to mass wasting events and damage to riverside properties which has been a concern in other dam removals in the area. As stated in section 3.3.2.9, the area around the Great Works project is relatively flat, significantly reducing the likelihood of slope instability issues and associated drop in property value. The effect of the Proposed Action on property values is expected to be minor, beneficial, and long term.

Fishery and Recreational Industries

The Proposed Action would help restore sea run fisheries within the area of the project. This would likely result in an increase in the value of both inland and coastal commercial fisheries. Coastal commercial fisheries would benefit from the increase of migratory forage-fish species such as shad and alewives. An increase in the number of these fish may improve the commercially valuable groundfish populations which contributed over $10 million to Maine's economy in 2007. The result of the Proposed Action may also benefit community based commercial fisheries. Alewife, a common target of these fisheries, is frequently used as bait in the lobster industry, a fishery that contributed about $300 million to Maine's economy in 2006.

The removal of the dam will return the Great Works impoundment to a more natural, free flowing river. In this condition, the river would be less navigable by power boats but would likely be more highly utilized by recreational canoers, kayakers, and rafters. Additionally, based on historic maps, removal of the Great Works project should reveal several rapids, features that would increase the availability of whitewater

recreation on the river. Since the Great Works impoundment is lightly utilized for recreation, the Proposed Action could significantly increase its use. The improved habitat may also attract more birdwatchers and wildlife viewers to the area. These "eco-tourists" along with recreational boaters and fishermen would increase direct expenditures for transportation, food and lodging, as well as income through jobs in tourism related fields. The Proposed Action would likely have a moderate beneficial impact on this affected environment over the long term.

3.3.2.11 Infrastructure

AFFECTED ENVIRONMENT

The infrastructure that may be negatively influenced by the Great Works Project was surveyed by the Trust in 2007 and is listed in Table 17 below. The Red Shield Mill, adjacent to the Great Works Project also has an associated water intake structure that draws from the impoundment immediately adjacent to the project's powerhouse.

Table 17. Great Works Project Infrastructure

Structure	Location in Feet Upstream of Dam
Culvert	West Bank, 1,835
Municipal sewage outfall	West Bank, 3,585
6'x4' Culvert	West Bank, 3,669
60' Railroad ballast	West Bank, 4,505
Retaining wall	East Bank, West Branch, 5,396
Wall and culvert	East Bank, West Branch, 5,561
Masonry wall	West Bank, West Branch, 5,673
Retaining wall	West Bank, East Branch, 5,934
Retaining wall	West Bank, East Branch, 6,296
Retaining wall	West Bank, East Branch, 6,510
Masonry wall	West Bank, West Branch, 6,583
Culvert outfall	West Bank, East Branch, 6,971
30" Culvert	West Bank, West Branch, 7,342
Tributary gully	East Bank, East Branch, 7,425
Sewage outfall	East Bank, East Branch, 7,611
Bulkhead	West Bank, East Branch, 8,393

(Source: Trust, 2008)

ENVIRONMENTAL EFFECTS

The Proposed Action would reduce the elevation and increase the flow speed of the previously impounded waters which may affect related infrastructure. The magnitude of the changes would decrease progressing upstream with an accordingly smaller impact

on infrastructure. After decommissioning the dam, some structures may be higher than the water level of the river while those that are still submerged in the river would be subjected to increased flow speeds.

To prevent damage to infrastructure in the project area, the Trust has proposed specific actions to modify particular structures affected by the Proposed Action. In order to prevent damage to the several retaining and masonry walls, the gully and the bulkhead affected by the Great Works Project, the Trust proposes to monitor the erosion potential after drawdown and stabilize the particular structure as necessary. The culverts that drain into the impoundment would have riprap drainage swales installed that extend to the proposed edge of the water. Additionally, the Trust proposed to construct a riprap ramp and preformed scour hole at the six-foot-by-four-foot culvert located about 3,670 feet upstream of the dam in order to prevent adverse effects from full discharge. Further, the Trust proposes to have riprap placed at the toe of the bank of railroad ballast located on the west bank of the impoundment in order to reinforce it. The Trust proposes to extend the sewage outfall pipe 30 feet past the proposed edge of the water and coordinate with the treatment plant in order to discuss other submergence requirements. Finally, the Trust proposes to coordinate with the Red Shield Mill in order to construct a new water intake.

The Proposed Action would have an adverse impact on the structures indicated in Table 17 that are in the project area. These impacts may be exacerbated by proximity to the dam and age of the structure; however, the modifications proposed by the Trust and listed in the previous paragraph would help mitigate these impacts.

3.3.3 Howland Project

The Howland Project is located on the Piscataquis River, approximately 500 feet upstream of its confluence with the Penobscot River (Figure 10). The contributing drainage area above the Howland Project is approximately 1,500 square miles, including the Piscataquis River tributaries such as Seboeis Stream and Meadow Brook. The Howland impoundment is contained within the Town of Howland and the shoreline is sparsely developed with residential housing and light commercial development (BHEC, 1998). Howland is the third least populated town among those towns within the three project areas (US Census, 2008b). The dam, itself, is in the center of town, which is the most developed area. The project is operated as a run-of-river project with a hydraulic capacity of 1,710 cfs and an impoundment that is 4.7 miles in length and 270 surface acres (Figure 11). The Howland impoundment provides opportunities for motorized and non-motorized boating and angling on the Piscataquis River (BHEC, 1998).

Figure 10. View of confluence of Piscataquis and Penobscot Rivers (downstream) from the Howland powerhouse on the southern bank of the Piscataquis River.
(Source: Staff)

Figure 11. View of impoundment and catwalk from Howland powerhouse on southern bank of the Piscataquis River.
(Source: Staff)

3.3.3.1 Geologic and Soil Resources

AFFECTED ENVIRONMENT

The Howland Project is situated within the Laurentian Plains and Hills Ecoregion which is predominantly forested with numerous glacial lakes (USEPA, 2007). The majority of this region is characterized by low relief, but rolling hills commonly occur.

Surficial geologic materials adjacent to the Howland impoundment primarily consist of stream alluvium and elevated stream terrace deposits, glacial till, and some areas of artificial fill. Large stones and boulders are also common along the shoreline (CR Environmental, 2008). An esker[44], the Hoytville Horseback, is located approximately 2 miles west of the Howland Project.

Predominant soil series that occur adjacent to the project impoundment include Colton, Limerick, Podunk, Suffield, Ondawa, Machias, Made Land, and Mixed Alluvial Land. Colton and Suffield series are comprised of deep, well-drained to excessively-drained soils; Podunk soils are deep and moderately well-drained and Limerick soils are deep and poorly-drained. Ondawa soils are very deep and well-drained, and Machias soils are moderately well-drained. Mixed alluvial land consists of poorly-drained alluvial deposits on floodplains. With the exception of Suffield soils, which formed in marine or lake-like sediments, all the typical soils are derived from materials deposited by glaciers or river flooding (NRCS, 2008). The location proposed for construction of the bypass channel consists of Made land, which is fill placed by human activities to create additional useable land areas.

A subsurface investigation of the area to be excavated to create the nature-like fish bypass channel was conducted to characterize soils on-site, determine if special soil-handling or management needs are needed, assess if sub-surface materials pose challenges to engineering aspects of the bypass channel and determine the types of material that would remain after construction (Milone and MacBroom, 2008b). Thirty borings were taken on-site and the chemical and physical properties were analyzed. Approximately 66,000 cubic yards of material would be excavated to construct the proposed nature-like fish bypass channel, of which 14,000 cubic yards would be rock and 52,000 cubic yards sand and gravel with some woody debris and glacial till (Milone and MacBroom, 2008b).

The subsurface investigation identified an area of fill containing metal slag and cinders within the area to be excavated. Chemical analysis of soil samples indicate that arsenic is present at levels in almost all the borings that exceeds the threshold for on site

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[44] An esker is a long winding ridge of stratified sand and gravel.

reuse under the Maine Beneficial Reuse criteria, but is suitable for disposal at a state-owned landfill. In addition to arsenic, lead also exceeded the reuse criteria in 4 different borings, and two boring locations contained concentrations of polyaromatic hydrocarbons (benzo(a)anthracene and dibenzo(a,h)anthracene) greater than the reuse criteria (Trust, 2009).

ENVIRONMENTAL EFFECTS

Permanent removal of the flashboards on the Howland dam would stabilize water levels within the impoundment, particularly during the summer and fall when the flashboards are typically in place but would not affect annual high water levels significantly because the flashboards typically fail during high flows (Kleinschmidt, 2008a). This would result in some areas of shoreline becoming exposed which could potentially increase erosion. However, it is expected that vegetation would quickly establish on the exposed shoreline soils and would help stabilize these areas. Stabilization of the impoundment water level would help to reduce the shoreline erosion that is prevalent along the impoundment because it would reduce the frequency of fluctuations that could cause the saturation and subsequent slumping or slope movement of shoreline soils and sediments.

Excavation of the nature-like fish bypass channel could adversely affect soil resources in the project area. Construction of the bypass would require the stripping and stockpiling of topsoil, which could potentially erode, and the removal and disposal of approximately 52,000 cubic yards of soil contaminated with metal slag, and arsenic and lead at levels exceeding Maine's beneficial reuse criteria. Further, once the upper coffer dam is breached and water is allowed to flow through the bypass channel, bare soils along the bypass channel and within the substrates used to contour the channel would be susceptible to erosion.

In order to minimize the effects of its proposal, the Trust proposes to seed stockpiled soils to help stabilize them and reduce erosion, and extensive armoring and vegetation would be installed and planted along the bypass channel. Given this information, approval of the Trust's proposal would have some minor, temporary, adverse impacts on geology and soil resources in the project area. These effects would be minimized by implementation of the measures proposed by the Trust, as discussed above, and the implementation of BMPs to control erosion and sedimentation during construction activities.

3.3.3.2 Water Resources

AFFECTED ENVIRONMENT

Water Quantity

The Howland Project includes an upstream impoundment with a surface area of 270 acres. The impoundment is approximately 4.7 miles long and extends from the dam to the upstream area of Lowell Island and has a normal impoundment elevation of 148.2 feet. This elevation is maintained whenever river flows are at or below the hydraulic capacity of the units and gates. When the gates are closed and the river flow is at 2,500 cfs (average annual flow), the impoundment elevation is at 148.6 feet. Table 18 presents the average, maximum, and minimum monthly flows, from the period 1924 through 1996, on the Penobscot River at the Howland Project.

In the Howland impoundment, as mapped by Maine GIS and included with the Trust's application, aquifers were identified on either side of the Piscataquis River. The aquifers follow the Meadow Brook tributary on the south bank and another tributary on the north bank approximately 3.5 miles upstream of the dam. The aquifers also begin at high elevations relative to the river of about 170 feet NGVD on the south side of the river and 225 feet NGVD on the north side of the river (Maine GIS, 2008; as cited by the Trust, 2008).

Table 18. Average, Maximum, and Minimum Monthly Flows (cfs) at the Howland Project (1924-1996)

Month	Mean Monthly Flow (cfs)	Maximum Monthly Flow (cfs)	Minimum Monthly Flow (cfs)
January	1,744	5,922	415
February	1,714	6,932	628
March	2,764	17,787	3,523
April	8,803	14,970	1,728
May	5,911	13,377	763
June	2,319	5,731	305
July	1,333	6,323	197
August	974	4,515	183
September	1,140	6,647	338
October	1,955	7,704	496
November	3,306	9,398	445
December	2,765	14,198	415
Annual	2,893	17,787	183

(Source: USGS, 2009c, Trust, 2008)

Water Quality

In 1989 the Maine DEP reclassified and upgraded waters below the Howland dam on the Penobscot River from Class C to Class B (BHEC, 1998; as cited by the Trust, 2008). In 2001, Maine DEP conducted sampling for DO, BOD, *E. coli*, nutrient concentrations, and Chlorophyll-a content in the Piscataquis River (Miller, 2002). The results of this sampling, included in the Trust's application, showed that the average daily, daily minimum, and daily maximum DO measurements indicated that the majority of the Piscataquis River met state water quality standards. Measurements of BOD increased when continuing downstream of the project, but loading from wastewater was below established levels. Established *E. coli* levels were not attained at the confluences of Black Stream, Carleton Stream and at the Route 23 Bridge crossing. Increases in phosphorus concentration were observed in those areas below wastewater discharges and levels decreased heading away from such discharge sites. Instream Chlorophyll-a measurements were low, indicating limited eutrophication events (Miller, 2002; as cited by the Trust, 2008).

In 1995 and 1996, the PIN conducted monitoring of DO, water temperature, and *E. coli* levels at three sampling stations within the Howland Project area. Results from this monitoring showed that state water quality standards for DO and *E. coli* levels were being met (BHEC, 1998; as cited by the Trust, 2008).

In 1997, the Maine DEP monitored water clarity at one sampling station slightly upstream of the Howland dam and results indicated good water clarity. In 1997, Bangor Hydro conducted a macroinvertebrate study in the Howland impoundment to assess if water quality was meeting established standards for aquatic life. The results of this study indicated that the Howland impoundment was above Class C water quality standards for aquatic life (BHEC, 1998; as cited by the Trust, 2008).

ENVIRONMENTAL EFFECTS

Water Quantity

Based on HEC-RAS hydraulic modeling conducted by the Trust's consultant, permanent removal of the flashboards on the Howland dam will likely reduce the surface water elevation of the impoundment by a maximum of 3.8 feet (at median August flow) at the face of the dam (Milone and MacBroom, 2008d, as cited by the Trust, 2008). Assuming spring run-off and isolated precipitation events, spillage will occur sooner and in larger volumes than under current conditions. Water surface elevation at the head of the existing impoundment is expected to change approximately 0.8 feet (Milone and MacBroom, 2008d, as cited by the Trust, 2008). The potential for downstream flooding is not expected to increase over current conditions due to the anticipated small change in impoundment levels and flows into the impoundment remaining the same. Additionally,

according to USACE's ice jam study included in the Trust's application, the permanent removal of the flashboards at Howland dam are expected to create lower freezeup pool levels and ice passage breakups at a lower surface elevation. These changes are expected to decrease the potential for ice jam floods at the Howland Project area (USACE, 2008).

As mapped by Maine GIS and included in the Trust's application, since the aquifers in the Howland Project area begin at high elevations relative to the Piscataquis River, are associated with tributaries, and are located in areas where the water surface elevation is expected to change by about 1.8 to 2.3 feet at normal river levels, it is not likely that the aquifers would be impacted by the removal of the flashboards at Howland Dam. Also, there are no known public supply wells near the Howland impoundment to be affected by the removal of the flashboards at this project.

Water Quality

Because there is no major in-water construction activities proposed at the Howland Project, adverse effects associated with sedimentation, turbidity, dredging, and resuspension of settled materials would be limited. Due to increased spillage at the dam associated with the proposed removal of generating facilities, any existing fine-grained sediments in the area below the dam could be entrained and moved downstream, potentially affecting water clarity downstream. However, the substrate is mostly bedrock below the spillway, minimizing this concern.

Permanent removal of the flashboards would allow water to spill over the dam continuously when flows exceed the hydraulic capacity of the bypass channel. This would likely improve water quality below the dam and throughout the reach below the project, primarily as a result of increased aeration during spill, which would cause tailrace water to be infused with DO. However, during normal inflows, bypass channel operations would require eliminating or reducing the occurrence of spill to reduce the potential for attracting migrating fish to the spillway. In this case, the water quality at the base of the spillway will be similar to the current condition. Further, due to the predicted reduction in water depth in the impoundment (up to 3.8 ft at the August median flow), higher DO concentrations would likely be obtained in the impoundment as the overall volume of impounded, warm water is reduced.

During construction of the nature-like fish bypass, temporary, adverse effects associated with erosion leading to increased turbidity are likely to occur. The Trust proposes to employ BMPs to control erosion around the construction area which will likely minimize any adverse effects on water quality at the Howland Project.

3.3.3.3 Fisheries and Aquatic Resources

AFFECTED ENVIRONMENT

Habitat

The Howland Project impoundment extends approximately 4.7 miles upstream from the Howland dam to Lowell Island which is just downstream of the Howland-Maxfield town line. The lower portion of the impoundment is characterized by slower velocities and deeper water. The substrates appear to consist primarily of coarse material with cobble and gravel mixed with some larger boulders (BHEC, 1998). The upper reaches of the impoundment tend to be more riverine with shallow, faster moving water over more coarse substrates. Considering the substrates alone, much of the impoundment could provide habitat for a number of coldwater species including brook trout. However, a combination of deeper water, elevated temperatures during the summer months and a large smallmouth bass population (which draws anglers from around the region) likely suppress any significant coldwater fish populations in the impoundment. Based on the habitat types available throughout the Howland Project area, the fish resources are expected to be similar to those known to exist in other reaches of the Penobscot River and major tributaries, particularly upstream in the Piscataquis drainage.

It is known that a significant smallmouth bass fishery exists in the Piscataquis River, including the area of the Howland Project impoundment, predominantly fished from boats (Richard Dill, MDIFW, personal correspondence, February 29, 2008; as cited by Trust, 2008). Smallmouth bass are habitat generalists that inhabit both riverine and impounded habitats with adequate water quality and abundant cover and/or velocity shelters such as boulders, logs, structures and low velocity pools, and runs (Kleinschmidt, 2008b). Optimal depths for smallmouth bass generally range from one to eight feet for spawning, two to four feet for fry and juvenile lifestages and at least four feet for adults. Unstable water levels during spawning and incubation can trigger nest abandonment (Edwards, *et al.*, 1983) and thus impair reproduction.

Fish Assemblages

The fish assemblage in the project tailwater was surveyed during the summer of 2004 by boat electrofishing. The tailwater is located at the confluence of the Piscataquis and Penobscot rivers and thus sampling occurred in the Penobscot River immediately at the confluence between the towns of Howland and Enfield. A total of 6,562 feet (1.24 mi about two km) of riverine habitat shoreline were surveyed below the Project as part of a quantitative fish assemblage survey conducted throughout the Penobscot River basin using standardized methods (Yoder, *et al.*, 2005). No comparable data are available for the project impoundment.

The tailwater fish assemblage was comprised of warmwater habitat generalists, river-dependent and river-specialist species (Bain and Meixler, 2000) and migratory species. A total of eighteen species comprise the fish assemblage, with white sucker being the most abundant in biomass (Table 19). White sucker, smallmouth bass, American eel (a catadromous species) and Atlantic salmon (anadromous species) collectively comprised approximately 87 percent of the fish assemblage by weight; however, American eel and Atlantic salmon were not numerically dominant. Common shiner, white sucker, fallfish and smallmouth bass were the most numerically abundant species and collectively comprise approximately 90 percent of the community. Biomass was indexed at 22.3 kilograms per kilometer of shoreline, and numeric abundance was indexed at 636 fish per kilometer (Table 19).

A recent electrofishing survey of the Howland impoundment and contiguous upstream Piscataquis River riverine habitat was conducted by TNC in June, 2008. The impoundment was generally comprised of warmwater habitat generalists and catadromous American eel. A total of eight species comprise the fish assemblage. In June, young-of-year fallfish were the most numerically abundant species, followed by common shiner and white sucker (Table 20). Smallmouth bass and white sucker collectively comprised 90 percent of the fish assemblage biomass. Biomass was indexed at 6.18 kilograms per kilometer of shoreline and numeric abundance was indexed at 128 fish per kilometer (Table 20).

The Piscataquis River channel is significantly smaller than the Penobscot River. The surveyed segment was generally comprised of pools/run habitat, with boulder, gravel and bedrock substrates, steep banks with overhanging vegetation, with low sinuosity and moderate habitat complexity (TNC, unpublished data). A total of five species comprise the fish assemblage, dominated by warmwater habitat generalists and catadromous American eel. In June, young of year fallfish were the most numerically abundant species, followed by smallmouth bass and white sucker (Table 21). Smallmouth bass, and white sucker collectively comprised 92 percent of the fish assemblage biomass. Biomass was indexed at 9.52 kilograms per kilometer of shoreline, and numeric abundance was indexed at 53 fish per kilometer (Table 21).

Table 19. Composition of Fish Assemblage from the Howland Project Tailwater, Summer 2004

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (Number/km)	Percent Abundance (%)
white sucker	11.64	52.1	132	20.8
smallmouth bass	4.19	18.7	52	8.1
American eel	2.45	11.0	11	1.7
Atlantic salmon	1.25	5.6	1	0.1
common shiner	1.01	4.5	301	47.2
fallfish	0.69	3.1	88	13.8
redbreast sunfish	0.67	3.0	30	4.7
black crappie	0.27	1.2	5	0.7
burbot	0.09	0.4	1	0.1
chain pickerel	0.02	0.1	1	0.2
pumpkinseed	0.02	0.1	2	0.3
blacknose shiner	0.01	0.0	9	1.3
golden shiner	0.01	0.0	2	0.2
white perch	0.01	0.0	1	0.1
yellow perch	0.01	0.0	1	0.1
creek chub	0.01	0.0	2	0.2
eastern banded killifish	0.01	0.0	3	0.4
northern redbelly dace	0	0.0	1	0.1
Grand Total	22.33		636	

Note: Data are normalized in units per kilometer of shoreline
(Source: Yoder, *et al.*, 2005)

Table 20. Composition of Fish Assemblage from the Howland Project Impoundment, June 2008

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (number/km)	Percent Abundance (%)
Fallfish	1.6	3	81	63
common shiner	0.4	1	16	13
white sucker	3.2	52	13	10
smallmouth bass	2.39	39	8	6
redbreast sunfish	0.15	2	4	3
American eel	0.12	2	3	2
yellow perch	0.11	2	2	2
Pumpkinseed	0.1	0	1	1
TOTAL	6.18		128	

Note: Data are normalized in units per kilometer of shoreline
(Source: TNC unpublished)

Table 21. Composition of Fish Assemblage from the Piscataquis River Upstream from the Howland Project Impoundment, June 2008

Species	Biomass (kg/km)	Percent Biomass (%)	Abundance (number/km)	Percent Abundance (%)
Fallfish	0.114	1	23	43
Smallmouth bass	4.7	49	20	38
White sucker	4.05	43	7	13
American eel	0.66	7	2	4
Pumpkinseed	0.002	0	1	2
TOTAL	9.524		53	

Note: Data are normalized in units per kilometer of shoreline.
(Source: TNC unpublished)

Mussels

No studies of the mussel populations in the Howland Project impoundment and tailrace or assessments of the impacts of construction of the bypass channel on mussels at the Howland Project have been conducted. Virtually all of the direct construction impacts at the Howland Project are in upland areas where mussels are not found. Although permanent water levels will be lowered when the flashboards are removed, these areas are already seasonally dewatered when the flashboards fail. Therefore, no impacts on the mussel populations are expected.

ENVIRONMENTAL EFFECTS

The Proposed Action involves decommissioning of the powerhouse, the three generating units, the existing fish ladder and the construction of a nature-like fish bypass channel on the inland side of the existing powerhouse. The powerhouse and the dam, with its four sluice flood gates, will remain in place. The Trust proposes to first remove the flashboards and open the flood gates to lower the water level and then construct the bypass channel.

Removal of Flashboards

The proposed removal of the flashboards at the Howland Project will lower the surface area of Howland impoundment by approximately 57 acres and lower the water level behind the dam by 3.8 feet and at the upstream limit of the existing impoundment by 0.8 feet. Historically, the flashboards have been installed on the spillway in the spring after flows recede to 3,000 cfs and are designed to fail at flows greater than 6,200 cfs. As a result, flashboards are typically absent annually between mid-April and late-May. The proposed removal of the flashboards will result in an impoundment which resembles that which presently exists between December and May, with a relatively consistent water

elevation fluctuating only according to volume of inflow.

Physical habitat area for resident species, including smallmouth bass, will experience a slight reduction due to the lowered water level, but (in the case of smallmouth bass) will continue to thrive in the expanded section of flowing water at the upper end of the impoundment. The presence of pools is important for smallmouth bass for adult forage and cover habitat and also over-wintering shelter for all life stages.

HEC-RAS hydraulic modeling conducted by the Trust's consultant indicates that when flashboards are absent, the lower two-thirds of the impoundment is dominated by areas with depths exceeding four feet and the area downstream from the Interstate 95 crossing has abundant pool refugia with most pools ranging from 7 to 15 feet deep (Milone and MacBroom, 2008d). The continued existence of pool refugia should ensure adequate over winter recruitment to the smallmouth bass population. The upper approximately one mile of the impoundment will maintain at least one pool of 8-foot depth, but typically will be dominated by depths of 2 to 3 feet (Milone and MacBroom, 2008d). Fluctuating water levels due to flashboard presence/absence make habitat in this area of the impoundment more vulnerable. With permanent removal of the flashboards, water levels will remain more stable and will reduce impacts to smallmouth bass nesting, incubation, and fry/juvenile rearing habitat.

It is not expected that mussels or fish will be stranded by the lowering of the reservoir, but the Trust proposes to employ a controlled drawdown through the flood gates to allow fish or mussels to migrate to watered areas. The Trust further proposes to consult with the resource agencies to develop a fish and mussel relocation plan.

Addition of Nature-Like Fish Bypass

The preliminary design for the Howland dam bypass has been developed in cooperation with state and federal fisheries agencies and each agency has provided a letter expressing its support of the proposed design.[45] The fish bypass, although experimental, is expected to provide safe, timely, and effective upstream and downstream passage of migratory species at a level of efficiency approaching that which would be expected to occur if the Howland dam were not present. The design of the 924-foot long bypass channel has been optimized for passage of key target species such as Atlantic salmon, alewife, blueback herring, American shad, American eel and sea lamprey.

[45] The Trust received letters of support that the Howland nature-like bypass design will provide safe, timely, and effective fish passage from the following agencies: 1) USFWS by letter dated June 18, 2008; 2) PIN by letter dated June 18, 2008; 3) NMFS by letter dated June 17, 2008; and 4) State of Maine Agencies (Maine DMR, ASC and Maine DIFW) by letter dated June 18, 2008.

The proposed bypass channel has also been designed with dual hydrology criteria; fish passage during normal flows as well as stability during flood conditions (Milone and MacBroom, 2008c). Design criteria for fish passage under normal flow conditions include: 1) must operate efficiently at Piscataquis River flows from 300 to 9,000 cfs; 2) average velocity should be 6 fps or less; 3) minimum flow depth should not be less than 1.5 feet; and 4) the low-flow channel should not be less that 10 feet wide and 1.5 feet deep with a maximum average velocity of 3 fps (Milone and MacBroom, 2008). Additionally, the low-flow channel design includes a series of pools to provide resting areas and habitat diversity as well as boulders and J-hook boulder clusters to create roughness and shelter. High flow design was based on a 100-year flood event which is just under 8,000 cfs, corresponding to 87,900 cfs in the Piscataquis River (Milone and MacBroom, 2008c).

The entrance to the downstream end of the bypass channel will be located immediately adjacent to the existing powerhouse, on the right side of its tailrace, at a 45 degree angle. After the installation of the bypass, velocities upstream of the dam are not expected to be very different from normal annual flow conditions occurring without the flashboards in place. Expected differences are 0.1 fps under normal flow and 0.3 fps during low flow (Milone and MacBroom, 2008c). The 8-foot wide sluice gate, that regulates flow to the existing fish ladder and log sluice, will be replaced with a crest overflow gate to allow downstream fish passage. It will be necessary to periodically adjust the gates at the dam, particularly at higher flows, to provide for optimal attraction flow to the bypass by minimizing spill over the dam (Milone and MacBroom, 2008c). The Trust proposes to work with the resource agencies to further refine plans for gate operation prior to construction.

There may be short-term impacts to migrating fish during construction due to the closure of the existing fish ladder before the bypass channel is complete. The Trust proposes to work closely with the resource agencies to coordinate installation of the fish bypass such that fish passage at the site is not unavoidably interrupted or delayed. The bypass channel, dam and associated gates will require maintenance after construction is complete. The Trust also proposes to work closely with the resource agencies and PIN to develop and implement plans for operation and maintenance of the bypass channel and associated facilities at the project after construction is complete. Commission staff recommends that the Commission retain jurisdiction of the Howland fish bypass until construction of the bypass is complete to ensure that it is built to specifications. Further, after construction, the Trust proposes to work with the agencies to monitor the effectiveness of the bypass over a 15-year period to determine whether required levels of passage efficiency are realized. According the Settlement Agreement, if the resource agencies determine that the nature-like fish bypass does not perform as expected, the Settlement Agreement requires the Trust to remove the dam.

Potential Introduction of Non-Native Species

The proposed bypass channel would provide upstream passage for migratory species but may also provide upstream access to migrating resident fish, including non-native species such as northern pike and black crappie (*Pomoxis nigromaculatus*) which are present in the Penobscot watershed downstream of the Veazie dam. The Maine DIFW considers northern pike to be an undesirable, non-native, invasive species in the Piscataquis River drainage. Northern pike are voracious predators that have the potential of negatively impacting native fish populations such as Eastern brook trout (*Salvelinus fontinalis*) and Atlantic salmon (Maine DIFW, 2007). Several commenters have expressed concerns that introduced northern pike would out-compete native brook trout in the Piscataquis River and its headwaters. Brook trout provide an important sport fishery and source of revenue for many towns near the Piscataquis River and its headwaters.

In early design discussions, the feasibility and cost of the installation of a trap-and-sort facility at the Howland bypass was considered.[46] Maintenance and operation of such a facility such as trapping, sorting, or trucking of fish would be the responsibility of the resource agencies, under the terms of the Settlement Agreement. Stantec developed designs for the trap-and-sort facility and evaluated the effectiveness of such facilities.[47] Stantec and the resource agencies determined that it is unlikely that the facility could be 100 percent effective in preventing undesirable species, including northern pike, from passing the Howland dam because of uncertainty about the swimming capacity of northern pike and concerns that required manual sorting would be subject to error due the large number of fish that would need to be handled. Based on information and analyses performed for this feasibility study, a trap-and-sort facility would negate any benefits associated with the use of a nature-like fishway by hindering the free movement of migrating fishes at Howland dam. The proposed trap-and-sort facility would have negative impacts on target species, including migratory delays, required handling of all fish passed, potential injuries to fish that attempted to leap the barrier, crowding, and the need for a separate eel passage facility and thus have substantial impacts on safe, timely and effective fish passage at the Howland dam. Thus, the benefits of unrestricted fish passage for migratory fishes through the project area outweigh the potential risks associated with invasive fish passage.

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[46] A trap-and-sort facility is a general term for a type of fish passage facility at an obstacle, such as a dam, whereby fish can be lured into a confined area, manually or automatically sorted according to species, and released above the dam to continue movement upstream. Such facilities are used to locate target fish species for specific purposes or exclude certain non-target fish species from passing upstream.

[47] See Stantec's May 20, 2008 report filed by the Trust on February 20, 2009.

While apparently successful efforts have been made to modify the existing fish passage facilities at Howland dam and at the West Enfield dam to exclude upstream passage of northern pike, it is understood that these modifications prevent upstream passage of target passage species such as alewife and American shad. In addition, the efficacy of a trap-and-sort facility for exclusion would be difficult to evaluate due to the potential for illegal, human introduction of target exclusion species upstream from Howland Dam. The presence of multiple dams in the Androscoggin, Kennebec, and Sebasticook watersheds has not prevented introduction of pike into headwaters in those watersheds, suggesting that humans have likely introduced northern pike above these dams. As a result of Stantec's work and consultation with the agencies, the Trust determined that a trap-and-sort facility at the Howland bypass could be designed and constructed at an additional construction cost of $250,000 to $500,000 and with annual maintenance and operations costs of $75,000 to $300,000. The maintenance and operations costs would be largely driven by the number of returning alewives, which are the most abundant species anticipated. Thus, the Trust and resource agencies determined that a trap-and-sort facility at the Howland bypass would not be feasible because (1) the large amount of alewives would require an excessive amount of funds for operation and maintenance of the facility; (2) the facility would not likely be 100% effective; (3) the facility would introduce other constraints (i.e., space) on an effective passage facility; and (4) such a facility would lead to delayed, ineffective, and potentially dangerous fish passage.

The Maine resource agencies do have concerns about the impact of invasive fish species such as northern pike that are found in the lower reaches of the Penobscot.[48] The Maine DMR and the Maine DIFW published an Operational Plan for the Restoration of Diadromous Fishes to the Penobscot River (Maine DMR and Maine DIFW, 2009). Section 4 of the State's plan identifies the objective to restrict upstream passage of non-native species where risks are the greatest. The plan further discusses tasks to, among other things: 1) to survey potential connection between waterways in the Penobscot River headwaters; 2) maintain current blockages in some locations in the headwaters; 3) create velocity or jump barriers at Guilford; and 4) determine if juvenile northern pike are present in the headwaters (Maine DMR and Maine DIFW, 2009).

Several commenters have expressed concern that the Commission has not considered Executive Order 13112 regarding invasive species. This order requires, among other things, that any federal agency whose actions may affect the status of invasive species to (1) identify such actions; (2) prevent the introduction of invasive species; and (3) not carry out actions that are likely to cause the spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm. However, as outlined

[48] See State of Maine letter dated April 10, 2009, filed by the Trust on February 20, 2009.

above, Commission staff has determined that although the possibility exists for invasive species (e.g., northern pike) to spread as a result of its action, the benefits outweigh the potential harm. This view is shared by Interior, which by letter filed September 2, 2009, states: "The Department does not believe that the Proposed Action is likely to cause or promote the spread of any invasive species, and, even if there were a risk of spread, the benefits of the Proposed Action clearly outweigh the potential harm." Additionally, Interior noted that Executive Order 13112 also calls for the restoration of native species and habitat conditions to reduce the effects of invasive species and to prevent further invasions, of which the Proposed Action would be a significant contribution.

3.3.3.4 Botanical Resources

AFFECTED ENVIRONMENT

Shoreline surveys were completed by Stantec in summer 2007 to identify existing wetlands and other botanical communities within 500 feet of the normal high-water line of the Howland impoundment. Stantec (2008) investigated the wetland boundaries and habitats in along the shoreline of the 4.7 mile-long impoundment area using NWI maps and the Cowardin Classification System, in accordance with the guidance of the 1987 Corps of Engineers Wetland Delineation Manual. The following information in this affected environment description of the botanical resources section is based on Stantec's shoreline surveys, unless otherwise noted.

The results of the shoreline surveys showed that large areas of wetlands are most commonly located along the smaller tributary streams flowing into the Piscataquis River. Those wetlands located adjacent to the impoundment primarily consist of palustrine forested wetlands, as well as palustrine emergent wetlands and scrub-shrub wetlands. Table 22 below identifies acreage of each wetland type at the Howland Project that are within 200 feet and 500 feet of the Penobscot and Piscataquis River.

Table 22. Acres of each wetland type at the Howland Project within 200 and 500 feet of the Penobscot and Piscataquis Rivers (Source: Stantec 2008)

Wetland Type	Acres within 200 feet	Acres within 500 feet
Palustrine Emergent Marsh Wetland	9.3	10.3
Palustrine Emergent Marsh/Forested Wetland	0.3	0.6
Palustrine Emergent Marsh/Scrub-Shrub Wetland	0.1	2.2
Forested Wetland	42.9	73
Scrub-Shrub Wetland	1.5	3.8
Scrub-Shrub/Forested Wetland	0	1.7
Uncon. Bottom/Emergent Marsh Wetland	0	0
Uncon. Bottom/ Forested Wetland	6.3	8.7
Uncon. Bottom Wetland	1.4	2.6

Palustrine forested wetlands are the dominant wetland type found within the Howland impoundment and the vegetation characteristics of these areas primarily consist of a silver maple floodplain forest community. These forested areas are dominated by silver maple and sometimes contain red maple. Shrub layers within these forests are not well developed, but may include speckled alder, wild raisin, and arrowwood. The herbaceous layer within the forested wetlands is well developed and has a variety of plants, such as ostrich fern, wood nettle, spotted Joe-pye weed, sensitive fern, jewelweed, and cinnamon fern (*Osmunda cinnamomea*).

Scrub-shrub wetland communities within the Howland project are located primarily in the immediate vicinity of the I-95 corridor. The scrub-shrub wetland communities that are well developed are typically dominated by speckled alder, steeplebush, and winterberry. Emergent wetland areas can be found within several embayments and along islands within the Howland impoundment. These emergent wetland communities are dominated by pickerel weed, softstem bulrush, wool grass, and yellow water lily. Invasive plants, such as reed canary grass and purple loosestrife, are also present at low densities along the shoreline.

Hardwood upland forest communities also exist along this section of the Piscataquis River within the project area. Those communities that are dominated by a red oak forest are located along several upland slopes and plateaus in close proximity to the shoreline. There are also mixed species hardwood forests in the Project area that include sugar maple, paper birch, gray birch, aspen, and red maple. The understory and herbaceous layers of these forest communities are often sparse due to a thick canopy layer, but the understory layer does include species such as dogwoods (*Cornus spp.),* viburnums (*Viburnum spp*.), june berries (*Amelanchier spp*.), raspberries, beaked hazelnut, Canada mayflower, and wintergreen (*Gaultheria procumbens*).

Exotic and invasive plant species are currently present in limited numbers along the impoundment at the Howland Project, as noted above. Additionally, in general, non-native, invasive plant species that are commonly found within the Penobscot River watershed include: Norway maple, black locust, tree-of-heaven, autumn olive, Japanese barberry, morrow honeysuckle, tartarian honeysuckle, multiflora rose, common buckthorn, glossy buckthorn, common reed, purple loosestrife, Japanese knotweed, garlic mustard, Japanese stilt grass, asiatic bittersweet, black swallowwort, Japanese honeysuckle, and porcelainberry (Milone and MacBroom, Inc., 2009).

ENVIRONMENTAL EFFECTS

As noted previously under the water resources section, HEC-RAS hydraulic modeling by the Trust's consultant indicates that permanent removal of the flashboards on the Howland dam will likely reduce the surface water elevation of the impoundment by a maximum of 3.8 feet (at median August flow) at the face of the dam. The change in

water levels will impact some areas of emergent wetland that currently exist within the impoundment, particularly along islands and embayments. The majority of effects to wetland resources are likely to occur in areas closest to the existing project structures and the greatest effect is expected at the narrow band of wetlands affected by the flashboards. Approximately 29.1 acres of existing wetlands in the project area are likely to experience a change from one wetland designation to another. See Table 23 for a summary of the conversions in wetland designations that are likely to occur from the Proposed Action.

Additionally, the proposed bypass channel construction at the Howland site is likely to impact 0.4 acres of an existing 0.47 acre of palustrine scrub-shrub and palustrine emergent wetland resource at the Project site. The Trust should develop a mitigation plan, in consultation with the USACE and Maine DEP, to compensate for this impact.

Areas of wetland resources associated with smaller tributary streams are not likely to be affected due to hydrologic inputs from these streams. Also, it is not expected that the higher floodplain forested wetlands will be affected from the Proposed Action since flood flows are not expected to change significantly from current conditions. Also, few changes are likely to occur to wetland resources at the upper ends of the impoundment.

Table 23. Summary of the conversions in wetland designations that are likely to occur from the Proposed Action at Howland Project

Conversions in Wetland Designations	Square Feet	Acres
Deep Water Habitat to Palustrine Emergent Marsh Wetland	420,227	9.6
Deep Water Habitat to Palustrine Scrub-Shrub Wetland	55,152	1.3
Deep Water Habitat to Palustrine Scrub-Shrub Wetland/ Palustrine Emergent Marsh Wetland	377,686	8.7
Palustrine Emergent Marsh Wetland to Palustrine Scrub-Shrub Wetland	378,707	8.7
Palustrine Emergent Marsh Wetland to Palustrine Forested Wetland	26,341	0.6
Palustrine Scrub-Shrub Wetland to Palustrine Forested Wetland	11,369	0.3
Total	1,269,483	29.1

(Source: Stantec, 2008)

Exotic and invasive plant species, such as purple loosestrife and reed canary grass are currently present in limited numbers along the impoundment at the Howland Project. These invasive species, as well as native plant communities, may experience a limited change as a result of the Proposed Action. In cases where invasive plants are present they may, however, compete with native species and rapidly colonize any newly created terrestrial and wetland areas. As part of the Proposed Action, the Trust proposes to initially plant native herbaceous and shrub species in select newly exposed riverbank areas immediately following construction activities, as well as conduct soil testing, repeated seed broadcasting, fertilizer application. The Trust also proposes to conduct

monitoring and control activities of invasive species, such as hand removal, herbicide treatment, and, when necessary, biological control activities for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the project area.

3.3.3.5 Wildlife

AFFECTED ENVIRONMENT

Northern hardwood forest is the most common natural habitat at the Howland Project, comprising 32 percent of the project area. Northern hardwood forest communities, including red-oak and mixed species forests, support a number of passerine bird species, including the Black-throated Green Warbler (*Dendroica virens)*, Blackburnian Warbler (*Dendroica fusca*), Rose-breasted Grosbeak (*Pheucticus ludovicianus)*, Scarlet Tanager (*Piranga olivacea)*, Ovenbird (*Seiurus aurocapilla)*, Sharp-shinned Hawk (*Accipiter striatus)*, Cape May Warbler (*Dendroica tigrina)*, Spruce Grouse (*Falcipennis canadensis)*, Swainson's Thrush (*Catharus ustulatus)*, Northern Parula (*Parula americana)*, and a large proportion of the global population of Black-throated Blue Warblers (*Dendroica caerulescens*) (Maine DIFW, 2005). Mature stands of red oak forest offer excellent potential sites for cavity nesters, and the red-winged sallow moth (rare in the state of Maine) uses red oak as one of its host plants.

The vegetative habitat at Howland also supports species associated with silver maple flood plain forest, as well as scrub-shrub and emergent wetlands. Several species common to Veazie can also be found at the Howland Project, including green frog, common snapping turtle, wood duck, hooded merganser, white-tailed deer and occasionally moose. No state designated “significant habitat” is present on the Piscataquis River near the Howland impoundment; however, waterfowl and wading bird habitat has been identified near Lowell Island in the upper limit of the impoundment. Aquatic and semi-aquatic mammals, woodland rodents and black bears (*Ursus americanus*) have been observed, along with Bald Eagles, though no nests have been identified.

ENVIRONMENTAL EFFECTS

The removal of the flashboards at the Howland Project would lower the impoundment by approximately four feet closest to the dam, and by one foot near the head of the impoundment. The small reduction in water surface elevation should not change the wildlife use of the project. Aquatic mammals, waterfowl and wading birds may feel the effects of the change in water levels more directly; however, these species should adjust to the changes fairly quickly. As with Veazie and Great Works, vegetation should begin to grow in newly exposed areas soon after exposure and provide a long-term benefit to species that utilize riparian habitat. Minor, short-term adverse impacts may

occur due to the disturbance associated with the development of the fish bypass channel, similar to those described section 3.3.1.5, as a result of construction activities.

3.3.3.6 Rare, Threatened and Endangered Species

AFFECTED ENVIRONMENT

The affected environment for rare, threatened, and endangered species at the Howland project is the same as that described for the Veazie project (because of similar species composition and close geographical proximity), with one noteworthy exception. The historical distribution of ESA-listed Atlantic (species of special concern) and shortnose sturgeon (endangered) is not believed to have extended to the Howland Project area. Although this fact is disputed by one commenter, the Maine DIFW, for management purposes, considers the upper range of Atlantic and shortnose sturgeon to be the falls at the Milford dam (see section 3.3.1.3, Fisheries and Aquatic Resources, Affected Environment section for Veazie). Shortnose and Atlantic sturgeon would be unlikely to pass the Milford dam, so these species are not included in the Howland Project analysis.

Other characteristics of the affected environment for the Howland Project, including habitat for federally endangered Atlantic salmon, are similar to those described for the Veazie Project. Thus, please refer to section 3.3.1 “Affected Environment” for the Veazie Project.

ENVIRONMENTAL EFFECTS

State listed species

Lands adjacent to the Howland impoundment and in the area where the nature-like fish bypass is proposed to be constructed, do not contain any state listed species, thus no impacts are expected.

Areas consisting of Silver Maple Floodplain Forest (state designated significant habitat) were identified as the dominant forested wetland type within portions of the impoundment and are located in areas where seasonal high-water accounts for a portion of their hydrologic input. Because seasonal high-water events are expected to continue after the removal of the flashboards, there will be little effect on this habitat.

Wood turtle is designated as a species of special concern for the state of Maine with the potential to occur within the Howland impoundment. Streams that flow into the Howland impoundment offer suitable habitat for wood turtle but there is no suitable habitat in the existing or proposed impoundment, therefore the proposed flashboard removal is not expected to affect wood turtle habitat.

ESA listed species

The goal of the fish bypass is to provide unobstructed passage of migratory fish around the Howland Dam. Atlantic salmon, classified as endangered under the ESA, is one of the target species expected to use the bypass. The Piscataquis River has been designated as critical habitat for the Atlantic salmon DPS, and listed Atlantic salmon are known to occur in the Piscataquis River. The resource agencies have reached consensus that the nature-like fish bypass would most likely benefit Atlantic salmon migration. The Trust proposes a 15-year monitoring and evaluation period to measure the effectiveness of the bypass; if it is found to be not effective, then the dam would be required to be removed. If the dam were to be removed, consultation with the NMFS under section 7 of the ESA would be expected for Atlantic salmon and its critical habitat. Because the Proposed Action would not likely affect shortnose or Atlantic sturgeon, no consultation for these species is expected.

By letter dated August 12, 2009, the Commission requested formal consultation with the NMFS pursuant to section 7 of the ESA regarding the effects of constructing the Howland fish bypass on the Atlantic salmon DPS and its habitat. Attached to that letter was a BA discussing those potential effects and providing further life history information for the Atlantic salmon DPS. On December 23, 2009, NMFS issued its BO, which found that the proposed action may adversely affect but is not likely to jeopardize the continued existence of Atlantic salmon nor is it expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In its BO, the NMFS issued an incidental take statement, four reasonable and prudent measures, and five terms and conditions to minimize and monitor incidental take.

3.3.3.7 Cultural Resources

AFFECTED ENVIRONMENT

The Howland Project was constructed in 1916 and few structural modifications were made over time. A Denil fishway was constructed in 1965, mechanical modifications were made to the rake support structure and sluice gates, and some concrete surfaces have been repaired over the years (BHEC, 1998). Adjacent to the dam and powerhouse are several industrial buildings that have been used for various purposes over the years, including those for paper product manufacturing and tannery facilities.

A review of the historical and architectural significance of the Howland powerhouse and other structures in the project area was conducted in 1997. As a result, it was determined that no structures in the project area are eligible for listing in the National Register. In support of this determination, the Trust's application includes a June 22, 2007, letter from the SHPO indicating that it has previously determined that Howland Project and associated structures are not eligible for inclusion in the National Register.

A phase I archaeological survey was conducted in 1995 and 1996 to determine if National Register eligible archaeological sites were present at the project. That survey resulted in the identification of 38 prehistoric sites, 12 of which were recommended for phase II review. Phase II surveys were conducted during 1996 and 1997 to establish cultural affiliation and site dimensions, and to assess the integrity of the sites with regard for their eligibility for listing in the National Register. Nine sites, located in the upper end of the Howland impoundment, were determined to be National Register eligible. PPL Maine had the sites re-evaluated in 2008; however, landowner access was only granted for three sites. An erosion monitoring plan between PPL and the SHPO has been developed and implemented to determine whether project-related erosion is affecting those sites and to provide for the review and comparison of shoreline erosion on an annual basis. The SHPO determined on July 10, 2007, that no archaeological properties would be affected by construction of the proposed bypass channel.

ENVIRONMENTAL EFFECTS

Construction of the fish-bypass channel would not affect known historic or cultural resources. Adverse effects could result from removal of the flashboards through the exposure and potential erosion of historic resources resulting from decreased impoundment levels and higher water velocity within the impoundment. However, decreased water levels would also allow eroded shoreline to revegetate, which would stabilize and protect eroded archaeological sites. The Trust proposes to identify sites prone to exposure under the Proposed Action and monitor those sites to determine the need for remedial stabilization measures until permanent stabilization or data recovery can be accomplished.

In order to address affects that would occur from the proposed undertaking, a MOA among the Commission, and SHPO, with the ACHP, Trust, PIN, and NMFS as concurring parties was executed on January 14, 2010. The MOA sets forth measures to be carried out regarding the treatment of historic structures, treatment of archaeological sites, resolving disputes, and amending or terminating the agreement.

Regarding the treatment of archaeological sites, the MOA indicates that measures would be implemented for the protection of archaeological sites, subject to the financial limitation indicated. For the Howland Project, these measures include: (1) conduct archaeological monitoring and, if necessary, data recovery during the first three years after the removal of the flashboards from the Howland dam, including at least three walkovers of known sites to assess bank slumping, erosion and the potential to yield culturally significant materials, (2) provide artifact curation fees for any artifacts recovered from sites related to the Veazie, Great Works, or Howland hydroelectric projects; and (3) in the event that an unanticipated discovery of human remains occurs, work would cease within 10 meters of the area of discovery during notification of local

law enforcement and consultation with the PIN and SHPO.

The Trust would not be required to expend more than $150,000 in connection with completing the archaeological work for the license surrenders as identified, exclusive of the cost of the documentation of the Veazie Lumber Company Mills and associated structures. Archaeological monitoring, any artifacts recovered from eroded contexts and any data recovery excavation would be reported in a technical report to the SHPO and THPO within 3 years of the completion of any archaeological monitoring associated with the Howland impoundment as described in above. All of the resulting documentation and any artifacts would be forwarded to the SHPO and THPO, and/or any other repository designated by the SHPO and THPO.

3.3.3.8 Recreation

AFFECTED ENVIRONMENT

Recreational use at the Howland impoundment is low relative to other recreational opportunities in the region, but is high relative to Great Works and Veazie Projects. PPL estimated annual recreational use of the project at 803 recreation days (PPL, 2003).[49] Such low recreational use at the Howland impoundment is likely due to several factors, including: 1) limited access to the project impoundment and tailwater; 2) the project location is far from major population centers; and 3) the availability of other options for recreation within proximity of the project, including opportunities on the mainstem of the Penobscot River. Recreation is important to the public in this area, but many recreational opportunities are available elsewhere in the region.

Fishing is reported to be the most popular recreational activity at the Howland impoundment, but motor boating and flatwater paddling (canoeing and kayaking) opportunities also exist. Like the Penobscot River, the Howland impoundment on the Piscataquis River has a popular smallmouth bass fishery (BHEC, 1998), but other popular sport fishes found in the impoundment include brook trout and splake (a hybrid between lake trout and brook trout). The only formal public access to the project is for fishing in the tailrace area below the Howland dam on property owned by the licensee, described below.

<u>Howland Tailrace Fishing Access</u> – This small trail within the project boundary provides access to the dam tailrace for fishing purposes. It is relatively informal, accessible from a gravel turn-off near the Howland boat launch. The trail has very steep topography, and is not easily accessible. Usage of this site is estimated to be 30 percent of capacity (PPL, 2003).

[49] A recreation day is defined as each visit by a person to a project for recreation during a 24-hour period.

An additional important public access point to the Howland impoundment, not owned by the licensee, is the Howland Boat Launch. This year-round facility is located just upstream of the dam outside of the project boundary, and is owned and operated by the Town of Howland and the Maine Department of Inland Fisheries and Wildlife. The site provides a gravel parking area for four vehicles without trailers and five vehicles with trailers. The single-lane boat launch and boat preparation area are both paved.

There are also several informal hand-carry boat access sites on the upper reaches of the impoundment and tributaries to the Piscataquis River in the vicinity of the project. Several hand-carry access sites are located on privately-owned lands on the upper reaches of the impoundment (BHEC, 1998).

Popular recreation activities in the vicinity of the Howland Project include ice fishing, snowmobiling, hunting, open water fishing, boating, hiking and camping. Several recreation areas are within driving distance of the Howland Project within the Piscataquis River watershed such as Peaks-Kenney State Park, Gulf Hagas, Katahdin Iron Works, and the Appalachian Trail (BHEC, 1998).

ENVIRONMENTAL EFFECTS

Removing the flashboards at the Howland dam would only reduce the water level by approximately 4 feet near the dam. The flashboards are typically removed during spring for 46 days per year, thus the lowered water levels are typically experienced every year at the project. Because the removal of the flashboards would only lower the water level slightly, the effects on recreational facilities and opportunities would be minimal.

Access to the reservoir by fishermen (both shoreline and boating) and boaters (motorized and non-motorized) will still be available under post-flashboard removal conditions. Smallmouth bass, which provide a popular fishery at the Howland impoundment, would be minimally affected by the flashboard removal. The addition of the nature-like fish bypass channel may provide other enhanced fishing opportunities upstream of the dam, especially for Atlantic salmon and American shad (See fisheries and aquatic resources section for more details on changes to the fishery). Currently, no whitewater features exist at the project and none are expected to exist if the flashboards were removed.

Regarding public access, the Howland Tailrace Fishing Access would be unaffected by lower water levels resulting from flashboard removal. Lower water levels may, however, affect the Howland Boat Launch. This facility may need to be extended to continue providing access for motorized boats. Although not owned by the Trust, the Trust proposes to design and construct an extension to the boat launch if necessary, in consultation with the Town of Howland.

Overall, there would be no long-term impacts on recreational activities or public access to the Penobscot or Piscataquis Rivers if the flashboards were removed.

3.3.3.9 Land Use and Aesthetics

AFFECTED ENVIRONMENT

The project occupies a portion of the Piscataquis River where it flows through a broad flat valley. The lands adjacent to the Howland impoundment are generally undeveloped and forested. Development is fairly heavy just upstream of the dam with both commercial facilities and single-family homes. North of River Road, however, there are several miles of mixed wetlands, pasture/filed and undeveloped forest (MEGIS, 2008). Most of the shoreline lands are forested with steep banks, and rip-rap is installed along the western bank (Stanec, 2008).

In the upper impoundment, the scenic view of the river is best along River Road along the south side of the shoreline. The Route 116 Bridge also provides views of the impoundment, dam, appurtenant features, and the tailrace as it crosses the Piscataquis River. The natural setting and wildlife in the area enhance the scenic aesthetic value of the project. During the Maine Rivers Study (1982), the Piscataquis River (from Howland dam to West Branch) was shown to have valuable diverse scenic resources due to a unique combination of land use, vegetation, and aquatic elements.

ENVIRONMENTAL EFFECTS

The Trust would acquire the rights to the land and facilities at the Howland Project, which total 17.7 acres on two parcels of land in Howland, Maine. The Trust would retain these rights for 15 years to evaluate the success of the fish bypass channel. Thereafter, it intends to convey these rights in fee to other parties, which could include conservation organizations, municipal/state agencies, or existing upland land owners.

Lowering the impoundment should have little to no effect on land use, though it will expose previously submerged shoreline during the growing season. As is the case for Veazie and Great Works, these areas should revegetate quickly allowing the development of new riparian habitat as community succession occurs. Some areas will still be flooded seasonally by annual high water.

The development of the fish bypass at Howland would require the removal of several abandoned mill buildings. The removal of these dilapidated structures would widen the view of the Piscataquis and Penobscot Rivers from the Tannery property, and provide a long-term aesthetic benefit. Overall, minor adverse impacts could result from an increase in ambient noise and dust/debris from removal of the abandoned mill

buildings; however completion of the channel would positively change the view of project waters and the channel itself could become a point of interest to members of the public.

3.3.3.10 Socioeconomics

AFFECTED ENVIRONMENT

Demographics and Population

The Howland Project is located in Penobscot County, Maine and affects approximately 9.5 miles of shoreline near the town of Howland. Based on the 2006 U.S. Census estimate, the population of Penobscot County is 147,180, with a population density of 42.7 persons per square mile. The estimated growth for the county since 2000 was 1.6 percent, while the estimated growth for the state of Maine for the same period was 3.7 percent (US Census, 2008a). In 2000 the town of Howland had a population of 1,362 persons and occupied 34.65 square miles of land. This equates to a population density of 39.31 persons per square mile (US Census, 2008b).

Employment

The median annual income in Howland in 2000 was $29,213. The median annual income in Penobscot County in 2000 was $34,274, while that for the United States was $41,994 (US Census, 2008a). The poverty rate in Howland was 11.5 percent and the unemployment rate was 4.1 percent (US Census, 2008b).

Tax Base

According to information provided by the town of Howland, the Howland Project provided $41,676 in tax revenue in 2007. This accounted for 4.9 percent of the town's total tax revenue in that year.

Property Value

Residential and commercial properties along the Howland impoundment are generally concentrated immediately upstream of the dam. The majority of the shoreline is undeveloped forestland. The median values for owner occupied homes as recorded in 2000 in the area of the Howland Project was considerably lower than that of the state of Maine or the country. The housing value in the town of Howland was $63,900, while the median home value in the state of Maine was $98,700 and that of the United States was $119,600 (US Census, 2000).

ENVIRONMENTAL EFFECTS

Power Generation

Under the Proposed Action, about 7,585 MWh of energy generated at the project each year, would no longer be available once the license is surrendered. Additionally, this project, like hydropower projects in general, provides a source of renewable energy that would no longer be available after surrender of the license. However, the Settlement Agreement includes Proposed Actions to mitigate this loss of power.

In expectation of the decommissioning of this project, the signatories to the Settlement Agreement provided for the increase of headpond elevation by one foot at the nearby Stillwater, West Enfield, and Medway Projects. This has already resulted in 9,068 MWh of additional annual energy generation. Additionally, the inoperative Orono Project on the Stillwater Branch of the Penobscot River was relicensed in conjunction with the Settlement Agreement, providing an additional 16,682 MWh of annual energy generation.

Following the surrender and decommissioning of this project, the Trust proposes to sell units from this project to PPL to be installed in other nearby projects such as the Milford, Orono, Stillwater, Medway, and Ellsworth Projects to increase their installed capacity. This would increase the installed capacity of hydroelectric plants in the area by about 10.7 MW. In aggregate, these enhancements are predicted to restore about 90 percent of the generation capacity lost in the Proposed Action.

Although the generation capabilities at this project would cease, the Trust would be required to pay annual charges based upon the installed capacity of the Howland Project until the surrender becomes effective. Since a great deal of time would be required to perform the activities under the Proposed Action, the Trust would be paying annual charges to the Commission for several even following cessation of generation at the project.

Employment

The Proposed Action would not directly affect the number of workers employed in the energy industry within the affected environment. The activities associated with the construction of the bypass channel would result in the temporary employment of construction workers within the area. The surrender and bypass construction would create an estimated 56 jobs equivalent to one year of full time employment with benefits. Using information from the Maine Department of Labor, these jobs would have a direct economic value of $2,464,000. The Proposed Action would have a moderate, beneficial, short term impact on employment within the project area.

Tax Base

The Howland Project currently provides about $41,676 of annual tax revenue to the town of Howland. The surrender of the project would terminate this source of tax revenue for the town. However, redevelopment of the land associated with the project may help mitigate the loss to the tax base. Construction of the fish bypass may result in a temporary increase of tax revenue for the affected area, most notably through personal income taxes from construction workers employed for the demolition as well as sales and lodging taxes.

Property Values

The Proposed Action includes the removal of the flashboards which regularly occurs on an annual basis. It is expected that this action would have no impact on property values.

Fishery and Recreational Industries

The Proposed Action would help restore sea run fisheries within the area of the project. This would likely result in an increase in the value of both inland and coastal commercial fisheries. Coastal commercial fisheries would benefit from the increase of migratory forage species such as shad and alewives. An increase in the number of these fish may improve the commercially valuable groundfish populations which contributed over $10 million to Maine's economy in 2007. The result of the Proposed Action may also benefit community based commercial fisheries. Alewife, a common target of these fisheries, is frequently used as bait in the lobster industry, a fishery that contributed about $300 million to Maine's economy in 2006. The impact on fisheries in the area from this action would likely be a moderate long term benefit.

The removal of flashboards at the project is not expected to have any significant impact on recreational boating or fishing in the impoundment, nor on the socioeconomics of the surrounding communities. However, the construction of the fish bypass may provide opportunities for wildlife based recreation. The proposed bypass channel would be constructed in an area that is now occupied by several unused buildings that would be demolished. The demolition of the buildings along with the construction of the bypass channel would improve the aesthetics of this location. This may increase the number of visitors to the area with an associated impact on spending at local businesses.

3.3.3.11 Infrastructure

AFFECTED ENVIRONMENT

The Trust conducted a survey of the infrastructure affected by the Howland

Project in 2007. Table 24 below lists these structures.

Table 24. Howland Project Infrastructure

Structures
Corrugated pipe culverts (10)
Interstate 95 bridge pier, abutments, and riprap
Overhead electric line crossings (4)
Pipeline crossing structure
Private earthen boat ramp
Rock riprap along shoreline adjacent to State Route 116 bridge
Shoreline rock and seasonal docks
Snow machine access trail
State Route 116 bridge and right abutment
Submerged water main crossing

(Source: Trust, 2008)

ENVIRONMENTAL EFFECTS

During normal operating conditions of the Howland Project, the flashboards fail at least once a year. There would be an approximately four foot drop of elevation directly above the dam and a minimal increase in water velocity during low flow periods when the flashboards were typically in use. The Proposed Action of permanently removing the flashboards will not expose existing submerged structures to any new or abnormal conditions; therefore, the effects on infrastructure are expected to be minimal. The increase in velocity will have minimal impact on bridges within the impoundment. The Trust proposes to remove a substation and overhead power lines just downstream of the route 116 bridge that are associated with the project. Additionally, two electrical utility poles would need to be relocated in order to provide a path for the proposed nature-like fish bypass and access road. This would create only minimal, temporary impacts on electrical infrastructure during relocation of these structures.

3.4 ACTION ALTERNATIVE 1 – REMOVAL OF ALL THREE DAMS

Under this action alternative, we examine the impacts if the Veazie, Great Works and Howland dams were removed. We assume that environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. The discussion below focuses on impacts to the various resource areas at the Howland Project.

3.4.1 Geologic and Soil Resources

Under this Action Alternative (removal of all three dams), dewatering the impoundment could result in the erosion of sediments that have accumulated along the

shorelines and elsewhere behind the dam, particularly if the rate of the drawdown is too fast. After removal of the dam, water velocity in the river would increase and there would be potential for erosion of newly exposed substrates and sediments, particularly at high flows, until vegetation is fully established.

The majority of the soils adjacent to the impoundment are well-drained, and much of the shoreline is covered with established vegetation and is free of excessive human disturbances. Thus drawdown of the impoundment is not likely to cause slope movement or erosion along the present river banks (Stantec, 2008). A gradual drawdown at the Howland Project, as proposed for the removal of the Veazie and Great Works dams, would ensure that shoreline soils are able to drain at rates comparable to the reduction in impoundment level which would minimize soil slumping and slope movement.

Increased erosion could occur in the areas where existing gullies, tributary streams and culverts enter the river channel. Substantial fluvial deposits are likely to exist at the outfalls of many of these structures, and incision through these deposits would occur as the gullies, streams, and culverts re-establish gradients as they flow into the river channel. Construction of the coffer dams and access roads, and the removal of the Howland dam would temporarily increase sediment loads in the river. However, these impacts would gradually end once construction activities are completed.

The Trust has proposed various measures that would be implemented before, during and after construction and dam removal activities for the Veazie and Great Works Projects and would need to be implemented at the Howland Project under the Action Alternative. The entire shoreline should be monitored during dam removal activities and bank stabilization measures, such as placement of geotextile fabric, selective plantings, and stone-toe revetments, would be used at locations prone to or actively eroding (Milone and MacBroom, 2008b). These and other shoreline features susceptible to erosion would need to be monitored following dam removal to determine the need for remedial measures for each feature. In instances where fluvial deposits are significantly eroding or obstructing the flow of water into the river, the deposits should be removed and the shoreline graded. In addition, outfall pipes and culverts would need to be extended as necessary in order to minimize the potential for such erosion. Newly exposed shoreline would need to be seeded with native plants and monitored following dam removal in order to ensure that newly exposed sediments are adequately stabilized. It is expected that natural revegetation would begin to occur as soon as the impoundment is drawn down and is expected to be rapid in areas with finer sediments.

Given this information, implementation of this Action Alternative would have some minor, temporary, adverse impacts on geology and soil resources in the project area. These effects would be minimized by implementation of the measures proposed by the licensee, as discussed above, and the implementation of BMPs to control erosion and sedimentation during construction activities.

3.4.2 Water Resources

Water Quantity

Under the Action Alternative, the removal of Howland Dam would likely result in environmental impacts similar to those previously discussed for the Veazie and Great Works Projects. Dam removal at Howland would result in a greater reduction of the water surface elevation at the face of the dam compared to the Proposed Action of constructing the bypass channel at the Project. Flood elevations upstream of the dam would also likely reduce, with the greatest reductions occurring closest to where the dam is located. Dam removal is also likely to result in substantial decreases in river width at the face of the dam and upstream of the impoundment.

Water Quality

Although water quality in the Piscataquis River at the Howland Project is generally adequate for all current and designated uses, the return to a natural flowing riverine environment would most likely benefit water quality of the project area. The removal of the Howland dam would allow for increased turbulence and aeration in the water flow, which would provide enhancement to DO levels and eliminate large water temperature variations associated with impounded waters. Removal of the impoundment and the dam will also allow for non-point sources of pollution and nutrient concentrations to more likely flush through the water system, which will reduce the potential for eutrophication and anoxic conditions to occur in the water system within the project area.

The Trust did not conduct studies of sediment accumulation or contaminants at the Howland dam, therefore, it is unknown whether the removal of the Howland dam would result in impacts to water quality due to re-suspension of such sediments. Sediment studies would be necessary before dam removal. As noted for the Veazie and Great Works dam removal and other proposed dam removals evaluated by the Commission, the removal of Howland dam is most likely to temporarily affect water clarity from increased turbidity due to potential sedimentation and erosion events during construction activities (FERC, 2003). As part of this Action Alternative (removal of all three dams) if selected, the Trust should employ BMPs to reduce the input of fine sediment and erosion of soils into the water stream. The implementation of such erosion control measures would help minimize the temporary, negative effects on water clarity and quality in the project area from this Action Alternative.

3.4.3 Fisheries and Aquatic Resources

Under Action Alternative 1, the Howland dam would be removed. These modifications would directly affect the flow of water through, and immediately below,

the reach of the river now impounded by the dam. Physical habitat for migratory and resident fish is also likely to change, along with water quality conditions. These changes would be similar to those described for the removal of the Veazie and Great Works dams (e.g., restoration of a free-flowing river, improved water quality [temperature, dissolved oxygen], creation of new cover and spawning habitat for fish, etc.). Access for upstream and downstream migrating fish also would be improved with the dam removed. There may be temporary construction-related impacts, which should be addressed through standard erosion control measures and BMPs, but no long term effects to aquatic resources are expected. There may be temporary disruption of fish passage during dam removal activities. If this Action Alternative were to be implemented, the Trust should coordinate with the resource agencies to ensure minimal impacts to migrating fish during dam removal.

Dam removal would create a free, unobstructed path for fish to migrate up and down the area of river formerly impounded by the dam. Although these effects would be mostly positive for migratory fish, the effects could potentially be harmful with respect to invasive species. As previously discussed regarding the Proposed Action of building a fish bypass around Howland Dam (See section 3.3.3.3, Fisheries and Aquatic Resources), the potential exists for northern pike to pass upstream into the Piscataquis River headwaters if the Howland Dam were removed. Northern pike could potentially compete with and prey upon native fish, such as brook trout, upsetting the river ecosystem that is important economically and recreationally to local residents. Similar to the proposed action, the potential exists for northern pike to spread as a result of removing the Howland dam, but this possibility is small and the benefits to fisheries would outweigh the potential harm.

The cost estimate for constructing the Howland fish bypass is $4.8 million. Removing the Howland dam would likely cost between $4.6 million and $5.6 million (this is the range of estimates given for the Great Works and Veazie dams). Thus, this alternative of removing the Howland dam is financially feasible.

3.4.4 Botanical Resources

This Action Alternative (removal of all three dams) would likely result in a greater reduction of the water surface elevation and the river width at the face of Howland dam and upstream of the impoundment compared to the Proposed Action. Based on hydraulic models conducted for proposed removal of Veazie and Great Works dams, the reduction in water levels, following dam removal at Howland Project, is likely to result in similar effects, such as the development of new wetlands in areas where the impoundment currently resides. Moreover, newly exposed areas of fine-textured sediment are expected to rapidly develop into a variety of functioning wetland and riparian habitats, such as palustrine emergent wetlands, scrub shrub wetlands, forested wetlands, forested floodplain upland communities, and early successional upland forest communites.

Changes in vegetation compositions and wetland type designations are also likely to occur to some existing wetlands in the project area following dam removal. Such changes that are likely to occur include conversion from palustrine unconsolidated bottom wetlands to palustrine emergent marsh wetlands and palustrine scrub shrub wetlands, or conversion from palustrine emergent marsh wetlands to palustrine scrub shrub wetlands and palustrine forested wetlands, or even conversion from palustrine forested wetlands to non-wetland floodplain forest communities. Exotic and invasive plant species, such as purple loosestrife and reed canary grass are currently present in limited numbers along the impoundment at the Howland Project. Following dam removal, these invasive species are likely to compete with native species and would likely rapidly spread during colonization of the newly created terrestrial and wetland areas. Therefore, to minimize this adverse effect, the Trust should plant native herbaceous and shrub species in select newly exposed riverbank areas immediately following dam removal activities, as well as conduct soil testing, repeated seed broadcasting, and fertilizer application, if this Action Alternative were to be implemented. The Trust should also conduct monitoring and control activities of invasive species following removal of the three dams.

3.4.5 Wildlife

It is not expected that wildlife use or distribution at the Howland Project will change significantly as a result of this Action Alternative. Some species, such as aquatic mammals and waterfowl, may experience minor adverse impacts associated with the change in water level in the short term. However, these species should easily adjust to the lowering of the impoundment as they have the ability to relocate to new foraging areas. These impacts would be similar to those described for the Veazie and Great Works Projects in sections 3.3.1.5 and 3.3.2.5. Over time, areas of exposed substrate will re-vegetate resulting in wider vegetated riparian buffer zones. This will provide a long-term benefit a wide range of species including aquatic furbearers (e.g., expanded foraging habitat for beaver), some waterfowl, wading birds, and shore birds (e.g., expanded foraging areas as existing mud flats begin to support plant growth and expanded buffers from human development form along the shoreline), songbirds that utilize riparian areas, and herptofauna.

3.4.6 Rare, Threatened and Endangered Species

Lands adjacent to the Howland impoundment do not contain habitat for any state listed species, therefore, the removal of the dam and the associated change in water level within the impoundment will not negatively affect any terrestrial state listed species within the project. Bald Eagles would benefit from the enhanced forage base associated with fish passage improvements and potentially also from more reaches that will remain ice free in the winter. There may be potential negative effects on Silver Maple

Floodplain Forest habitat following dam removal due to their dependence on seasonal high-water events for hydraulic input (Stantec, 2008).

It is not known if any mussels in the project area will be dewatered if the Howland dam is removed. This Action Alternative may have direct, short-term impacts on individual, state-listed mussels located in the drawdown area. As with the dam removals at Veazie and Great Works, the Trust should attempt to reduce this impact by drawing down the impoundment gradually, allowing mussels to move to deeper water and facilitating relocation efforts, if this Action Alternative was implemented. The Trust should also consult with the resource agencies to develop a mussel relocation plan, if necessary.

The Piscataquis and Penobscot Rivers around the Howland dam are classified as critical habitat for the federally listed Atlantic salmon DPS, and listed Atlantic salmon are known to occur in both rivers. Although removal of the Howland dam would likely benefit Atlantic salmon in the project area by providing unobstructed fish passage and greater access to spawning and nursery habitat, consultation with the NMFS would be required to ensure that dam deconstruction was accomplished in a manner that would not jeopardize this endangered species. Atlantic (candidate species) and shortnose (endangered) sturgeon are not expected to move upstream of the falls at the Milford dam, thus, they would not likely inhabit the waters surrounding the Howland Project.

3.4.7 Cultural Resources

Dam removal would lower water elevations in the impoundment area, which would expose known archaeological sites. Further, removal of the dam would increase water velocities within the project area, which could lead to increased erosion that could affect archaeological sites by dispersing the cultural artifacts and exposing the site. However, it is expected that revegetation would occur quickly on exposed sediments following dam removal, which would help to stabilize and protect historic resources.

The MOA among the Commission, and SHPO, with the Trust, PIN, and NMFS as concurring parties, executed on January 14, 2010, sets forth measures to be carried out regarding the treatment of historic structures, treatment of archaeological sites, resolving disputes, and amending or terminating the agreement. If Action Alternative 1 were selected, the MOA would need to be amended to reflect the changes in the undertaken not evaluated by the executed MOA.[50]

[50] Stipulation IV of the executed MOA sets forth the conditions governing amendments and termination of the MOA.

3.4.8 Recreation

If the Howland dam were removed, positive effects on recreation would generally be expected, similar to those described for the removal of the Veazie and Great Works dams. The most notable effect would be a shift from motorized to non-motorized boating activities. Removing the dam would dewater the impoundment and restore the project area to a free-flowing river environment, which would support paddling, shoreline fishing, and other desirable recreation activities. Fishing opportunities for migratory fish species would also be expected to increase.

However, recreation at the Howland Project reservoir is very important to local residents. Relative to the Veazie and Great Works Projects, the Howland Project experiences the highest amount of recreational use. During negotiations for the relicensing process around 1998, strong local opposition arose to removing the Howland dam. Residents expressed a desire that the impoundment remain in place, asserting that dam removal would have adverse impacts on the social and recreational benefits it provides, including flat water boating, fishing, and snowmobiling. The recreational benefits of the reservoir are currently available throughout the year, during all seasons. Reservoir-based recreational activities such as motor-boating and ice fishing would be reduced if the Howland dam were removed.

The change from reservoir-based to river-based recreation would be a positive, long-term impact for some recreationists, while the loss of reservoir-based recreation would be a negative, long-term impact for others. The Howland Boat Launch, as well as other boat launches located on the project reservoir, would experience significant dewatering. These facilities would likely need to be redesigned and extended to provide necessary access to the river channel.

3.4.9 Land Use and Aesthetics

Under the Action Alternative (removal of all three dams) the Trust would still acquire the rights to the land and facilities at the Veazie, Great Works and Howland Projects. Further, existing development and or land use changes in the proximity of the Howland Project would likely continue at current rates.

Action Alternative 1 would not result in any changes the aesthetic landscape along the Penobscot and Piscataquis Rivers, though more previously submerged shoreline lands would be exposed along the Howland impoundment. Based on the information provided however, it is unclear whether or not the dilapidated structures associated with the abandoned mill would be removed, or remain under this Action Alternative.

3.4.10 Socioeconomics

Power Generation

Since the dam is being removed in this scenario, the impacts on generation of Action Alternative 1 would be identical to the effects of the Proposed Action as described in section 3.3.3.10. These include a total loss of power at the project and the continuation of annual charges until the surrender becomes effective.

Employment

Employment increases due to this Action Alternative would be comparable to the Proposed Action as described in section 3.3.3.10. Rather than employing construction workers to demolish buildings and excavate the bypass channel, these workers would be employed in decommissioning the dam itself. The expected number of workers and duration of employment between these two scenarios are expected to be similar.

Tax Base

Decommissioning of the Howland dam would likely have similar effects as the Proposed Action described in a section 3.3.3.10. These include the loss of tax revenue for the town of Howland through surrender of the project. Additionally, the tax benefit from expenditures by temporary construction workers would be similar as well.

Property Values

Property values along the Howland Project impoundment would not be expected to decline as a result of the action alternative. Several studies, including d'Arge and Shogren (1989; study of Okoboji Lakes, Iowa); David (1968; study of property values in Wisconsin); Feather et al. (1992; study of lakefront property values in Orange County, Florida); and Young and Teti (1984; study of St. Albons Bay in Vermont), suggest that this alternative may have a positive effect on property values in the project area. In these studies, the rise in value was attributed to improved water quality and enhanced wildlife habitat. The effect of the Proposed Action on property values is expected to be minor, beneficial, and long term.

Fishery and Recreational Industries

The impact on fisheries of the action alternative would be similar to the impact of the Proposed Action described in a previous section. However, effects on recreation would be significantly different then under the Proposed Action. The Howland impoundment would return to a more natural, free flowing river. In this condition, the

river would be less navigable by power boats but would likely be more highly utilized by recreational canoers, kayakers, and rafters. The improved habitat may also attract more birdwatchers and wildlife viewers to the area. These "eco-tourists" along with recreational boaters and fishermen would increase direct expenditures for transportation, food and lodging, as well as income through jobs in tourism related fields.

3.4.11 Infrastructure

Infrastructure within the Howland Project area would be significantly affected if the dam was entirely removed. The greater drop in impoundment elevation and increase in flow velocity would strand, expose, and possibly damage some structures. The magnitude of these influences would decrease progressively upstream. Structures of notable concern would be bridge piers and abutments which would be subject to greater flow velocities and associated erosion. Additionally, the drop in water elevation and rise in velocity could cause the river to undercut some riprap banks adjacent to the project's impoundment. Without mitigation, this could result in a moderate, adverse, long term impact on the affected infrastructure.

3.5 ACTION ALTERNATIVE 2 – REMOVAL OF VEAZIE AND GREAT WORKS DAMS AND SURRENDER IN PLACE OF HOWLAND PROJECT

Under this action alternative, we examine the impacts if the Veazie and Great Works dams were removed and the Howland Project was surrendered in place, without the removal of the flashboards or the construction of the nature-like fish bypass. It can be reasonably assumed that after surrendering the three Projects, the Trust would continue, without Commission oversight, to implement the conditions of the Settlement Agreement including construction of the nature like-fish bypass at the Howland Project. In this analysis, we assume that the environmental effects at the Veazie and Great Works Projects would be the same as those under the Proposed Action. The discussion below focuses on impacts to the various resource areas at the Howland Project under this Action Alternative.

3.5.1 Geologic and Soil Resources

Short-term effects to geologic and soil resources from Action Alternative 2 (surrender of Howland without fish bypass) would not be different from those under the no-action alternative. Existing project effects would continue until the Trust implements the Settlement Agreement and constructs the nature-like fish bypass after the Commission finalizes the surrender. Reasonably foreseeable, long-term effects that would occur under this alternative would be the same as those analyzed in the Proposed Action (Section 3.3.3.1), including the potential erosion of stockpiled soils and exposed soils along the new fish bypass, and the need to dispose of soils contaminated with metal slag, arsenic, and lead.

In order to minimize the effects of its proposal, the Trust proposes to seed stockpiled soils to help stabilize them and reduce erosion, and extensive armoring and vegetation would be installed and planted along the bypass channel. Given this information, Action Alternative 2 would have some minor, temporary, adverse impacts on geology and soil resources in the project area. These effects would be minimized by implementation of the measures proposed by the Trust, as discussed above, and the implementation of BMPs to control erosion and sedimentation during construction activities.

3.5.2 Water Resources

Water Quantity

At the Howland Project, in the short and long term, the water surface elevation at the head of the existing impoundment and the river width at the front of the dam are not expected to change significantly under this action alternative (surrender of Howland without fish bypass). Also, the potential for downstream flooding is not expected to increase over current conditions due to the anticipated no change in impoundment levels and flows into the impoundment remaining the same. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of Howland and the nature-like fish bypass is constructed, the effects to water quantity at the Project would be similar to those described for the Proposed Action. Specifically, surface water elevation of the impoundment is likely to reduce by a maximum of 3.8 feet from removal of the flashboards at Howland dam.

Water Quality

In the short and long term, because there is no major in-water construction activities proposed at the Howland Project under this action alternative, adverse effects associated with sedimentation, turbidity, dredging, and resuspension of settled materials most likely will be limited. Other water quality factors, such as water temperature, DO, BOD, *E. coli*, and nutrient concentrations are also not likely to change from current conditions due to the anticipated no change in water surface elevation and river width in the existing impoundment. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of Howland and the nature-like fish bypass is constructed, the effects to water quality at the Project would be similar to those described for the Proposed Action. Specifically, during construction of the nature-like fish bypass, temporary, adverse effects associated with erosion leading to increased turbidity are likely to occur. However, as part of implementing conditions under the Settlement Agreement, it can be expected that the Trust would employ BMPs to control for erosion and sedimentation around the construction area of the bypass, which will likely minimize any adverse effects on water quality at the Howland Project.

3.5.3 Fisheries and Aquatic Resources

Under Action Alternative 2 (surrender of Howland without fish bypass), impacts to fisheries and aquatic resources at the Veazie and Great Works Project would be the same as those under the Proposed Action, provided that the Trust implements the measures of the Settlement Agreement. At the Howland project, in the short term, this alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas in the Piscataquis River. The Trust would likely need to continue operation of the fish ladder without operation of the turbines, therefore, it may be necessary to provide attraction flow to the denil ladder through gates or sluiceways. If Action Alternative 2 was required, the Trust should work with the resource agencies to refine plans for gate operation after decommission of the Howland Project. However migrating fish would no longer be exposed to the operating turbines, which contribute to downstream mortality. Habitat for resident fish would likely be unaffected by this alternative.

Should the Trust choose to fulfill the conditions of the Settlement Agreement and construct the nature-like fish bypass after surrendering the project, the resource agencies and signatories of the Settlement Agreement would have oversight of the construction and evaluation of the effectiveness of the nature-like fish bypass. In this case, the impacts to fisheries and aquatic resources in the Howland Project area would be similar to those discussed in the analysis of the Proposed Action (section 3.3.3.3).

3.5.4 Botanical Resources

In the short and long term, because water levels and river width are not expected to change significantly under this action alternative (surrender of Howland without fish bypass), it is not expected that wetland resources will be affected or change significantly from current conditions at the Howland Project. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust the effects to botanical resources at the Project would be similar to those described for the Proposed Action. Specifically, it is expected that approximately 29.1 acres of existing wetlands in the Howland Project are likely to change from one wetland designation to another. Also, 0.4 acres of an existing 0.47 acres of palustrine scrub-shrub and palustrine emergent wetland are likely to be impacted from the bypass channel construction. Invasive plants present in the Project area may compete with native species and rapidly colonize any newly created wetland areas. However, as part of implementing conditions under the Settlement Agreement it, can be expected that the Trust would conduct plantings of native herbaceous and shrub species in select newly exposed riverbank areas immediately following construction activities, as well as conduct soil testing, repeated seed broadcasting, fertilizer application. It can also be expected that the Trust would conduct monitoring and control activities of invasive species, such as hand removal, herbicide

treatment, and when necessary biological control activities, for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the Project area.

3.5.5 Wildlife

Under this action alternative (surrender of Howland without fish bypass), the distribution and use of suitable lake-like habitat by wildlife species in the vicinity of the Howland Project would continue at current levels. Most wildlife species would be completely unaffected under this alternative; however, without the operation of a fish passage facility the dam would act as a barrier to migratory fish species. Birds of prey (e.g., Bald Eagles) and other wildlife that depend on these species as a food source upstream of the dam may slightly alter foraging practices (hunting either further up or downstream depending on where fish populations are plentiful). These potential impacts would be minor, as predator species will adjust to the changes in prey population. Long-term, however, it can reasonably be expected that the Trust would enact the provisions of its Settlement Agreement, allowing for either development of a fish bypass or removal of Howland dam which would impact wildlife at the project as specified above (Sections 3.3.3.5 and 3.4.5).

3.5.6 Rare, Threatened and Endangered Species

Under this Action Alternative, no known state listed species would be impacted. However, since listed Atlantic salmon and critical habitat occur in the Piscataquis and Penobscot Rivers, surrendering the Howland Project in place would require consultation with the NMFS under section 7 of the ESA. The effects would likely be beneficial, considering that the measures of the Settlement Agreement would likely be carried out, including the construction of a fish bypass around Howland dam. Atlantic (species of concern) and shortnose (endangered) sturgeon are not expected to move upstream of the falls at the Milford dam, thus, they would not likely be affected by actions undertaken at the Howland Project.

3.5.7 Cultural Resources

Effects to cultural resources under Action Alternative 2 (surrender of Howland without fish bypass) would not be different from those under the no-action alternative. Reasonably foreseeable, long-term effects that would occur under this alternative would be the same as those analyzed in the Proposed Action, including exposure of cultural sites and the potential for increased erosion due to removal activities and increased water velocities.

The MOA among the Commission, and SHPO, with the Trust, PIN, and NMFS as concurring parties, executed on January 14, 2010, sets forth measures to be carried out

regarding the treatment of historic structures, treatment of archaeological sites, resolving disputes, and amending or terminating the agreement. If Action Alternative 2 were selected, the MOA would need to be amended to reflect the changes in the undertaking not evaluated by the executed MOA.[51]

3.5.8 Recreation

Under this Action Alternative, impacts to recreation at the Howland Project would be similar to those described for the Proposed Action for the short- and long-term, assuming that the conditions of the Settlement Agreement are implemented. Although Commission oversight for the provision of recreation facilities would cease, sufficient interest by state and local agencies exists to ensure public recreation opportunities in the future.

3.5.9 Land Use and Aesthetics

Under this action alternative (surrender of Howland without fish bypass), the Trust would attain all existing land rights at Howland yet there would be no change to the land use or aesthetic value of the project. All existing project structures and facilities, as well as the dilapidated buildings associated with the abandoned mill, would remain in place though hydropower generation would be discontinued. If this alternative is adopted, it is likely that the Trust would still construct a fish bypass at Howland once the surrender was complete, and monitor the fish bypass to determine if removal of the dam is necessary. Therefore, long-term this alternative would have the same impacts as the Proposed Action (for construction of the fish bypass), and/or Action Alternative 1 (if the dam is ultimately removed).

3.5.10 Socioeconomics

Power Generation

Similarly to Action Alternative 1, because the project is being surrendered under this scenario, the effects on generation of Action Alternative 2 would be identical to the effects of the Proposed Action described in section 3.3.3.10.

Employment

The effect on employment caused by this action alternative would be minimal. Employment of operators and crew at the project would be terminated but this would

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[51] Stipulation IV of the executed MOA sets forth the conditions governing amendments and termination of the MOA.

likely have little impact since these positions are utilized at other hydropower projects in the area. Since the dam would remain, there would be no increase in employment of construction or demolition crew and only minimal further employment may be required for periodic maintenance of the dam.

Tax Base

Surrender of the Howland Project would likely have similar effects as the Proposed Action. These include the loss of tax revenue for the town of Howland through surrender of the project. However, since no significant construction would take place under this scenario, there would be no tax revenue drawn from expenditures by temporary construction workers.

Property Values

Changes to property values along the Howland Project impoundment would likely remain essentially the same and be similar to those under the Proposed Action described in 3.3.3.10.

Fishery and Recreational Industries

In this action alternative, operation of the fish ladder would help maintain upstream fish migration, causing similar effects on the fisheries industries as would be found under current operation of the project. Additionally, the socioeconomic effects from recreation would be similar to current conditions.

3.5.11 Infrastructure

The conditions infrastructure would be exposed to under this action alternative would be nearly identical to those under current conditions. Since the project would no longer be in operation, it would be likely that the project related structures would not be maintained as well as current conditions.

3.6 ACTION ALTERNATIVE 3 – SURRENDER IN PLACE OF ALL THREE PROJECTS

Under this final action alternative, we examine the impacts if the Veazie and Great Works dams were surrendered in place and the Howland Project was surrendered in place without the removal of the flashboards or construction of the nature-like fish bypass. Commission staff reasons that after surrendering the three Projects, the Trust would continue, without Commission oversight, to implement the conditions of the Settlement Agreement including removal of the Veazie and Great Works dams and construction of the nature like-fish bypass at the Howland Project. In this analysis, we also assume that

the environmental effects at the Howland Project would be the same as those under Action Alternative 2. The discussion below focuses on impacts to the various resource areas at the Veazie and Great Works Projects under this Action Alternative.

3.6.1 Geologic and Soil Resources

3.6.1.1 Veazie

Under this Action Alternative 3, surrender of the Veazie project license would not affect geologic or soil resources. The Trust would be required to disconnect the project from the transmission grid and would have to disable the generating equipment and close the powerhouse intake. These actions would not require any significant ground-disturbing activities and would not alter the dynamics or increase the velocity of water through the area, and would therefore not cause erosion at the project. In the long term, after the surrender is approved and finalized, the Trust could then implement the terms and conditions of the Settlement Agreement and proceed with removal of the Veazie dam. Implementation of the Settlement Agreement after satisfying the terms of the Commission's surrender order would result in the same effects analyzed under the Proposed Action.

3.6.1.2 Great Works

Under Action Alternative 3, surrender of the Great Works Project license would not affect geologic or soil resources. The Trust would be required to disconnect the project from the transmission grid and would have to disable the generating equipment and close the powerhouse intake. These actions would not require any significant ground-disturbing activities and would not alter the dynamics or increase the velocity of water through the area, and would therefore not cause erosion at the project. In the long term, after the surrender is approved and finalized, the Trust could then implement the terms and conditions of the Settlement Agreement and proceed with removal of the Great Works dam. Implementation of the Settlement Agreement after satisfying the terms of the Commission's surrender order would result in the same effects analyzed under the Proposed Action.

3.6.2 Water Resources

3.6.2.1 Veazie

Water Quantity

In the short and long term under this Action Alternative (surrender in place of all three projects), the water surface elevation at the head of the existing impoundment and the river width at the face of the dam are not expected to change significantly. Also, the potential for downstream flooding is not expected to increase over the current conditions due to insignificant changes in impoundment level and flows into the impoundment. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Veazie dam, the effects to water quantity at the Project would be the same as those described for the Proposed Action. Specifically, removal of Veazie is expected to reduce water surface elevation by a maximum of 20.7 feet (at median August flows) at the front of the dam and less than a foot at the upstream end of the existing impoundment. Moreover, river width may decrease by approximately 343 feet at the front of the dam and by less than 200 feet at other locations along the impoundment.

Water Quality

In the short term and long term under Action Alternative 3, because there are no major in-water construction activities, adverse effects associated with sedimentation, turbidity, dredging, and re-suspension of settled materials most likely will be limited. Also, other water quality factors, such as water temperature, DO, BOD, E. coli, and nutrient concentrations are also not likely to change from current conditions due to the anticipated no change in water surface elevation and river width in the existing impoundment. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Veazie dam, the effects to water quality at the Project would be similar to those described for the Proposed Action. Specifically, the removal of Veazie dam would improve water quality by enhancing DO levels and eliminating large water temperature variations associated with impounded waters and by allowing pollution and nutrient concentrations to flush through the water system. Dam removal would also temporarily affect water clarity from increased turbidity due to potential sedimentation and erosion events during dam removal activities. However, as part of implementing conditions under the Settlement Agreement, it can be reasonably expected that the Trust would employ BMPs to control for erosion and sedimentation events during dam removal, which will likely minimize any adverse effects on water quality at the Project.

3.6.2.2 Great Works

Water Quantity

In the short and long term under Action Alternative 3 (surrender in place of all three projects), the water surface elevation at the head of the existing impoundment and the river width at the face of the dam are not expected to change significantly. Also, the potential for downstream flooding is not expected to increase over the current conditions due to the anticipated no change in impoundment level and flows into the impoundment. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Great Works dam, the effects to water quantity at the Project would be similar to those described for the Proposed Action. Specifically, removal of Great Works is expected to reduce water surface elevation by a maximum of 19.0 feet (at median August flows) at the front of the dam and approximately 3.4 feet at the upstream end of the existing impoundment. Moreover, river width may decrease by approximately 52 feet near the head of the existing impoundment.

Water Quality

In the short term and long term under Action Alternative 3, because there are no major in-water construction activities, adverse effects associated with sedimentation, turbidity, dredging, and re-suspension of settled materials most likely will be limited. Also, other water quality factors, such as water temperature, DO, BOD, E. coli, and nutrient concentrations are also not likely to change from current conditions due to the anticipated no change in water surface elevation and river width in the existing impoundment. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Great Works dam, the effects to water quality at the Project would be similar to those described for the Proposed Action. Specifically, the removal of Great Works dam would improve water quality by enhancing DO levels and eliminating large water temperature variations associated with impounded waters and by allowing pollution and nutrient concentrations to flush through the water system. Dam removal would also temporarily affect water clarity from increased turbidity due to potential sedimentation and erosion events during dam removal activities. However, as part of implementing conditions under the Settlement Agreement, it can be expected that the Trust would employ BMPs to control for erosion and sedimentation events during dam removal, which will likely minimize any adverse effects on water quality at the Project.

3.6.3 Fisheries and Aquatic Resources

3.6.3.1 Veazie

Under Action Alternative 3 (surrender in place of all three projects), the Trust would discontinue the operation of the Veazie Project but not remove the Veazie dam. In the short term, this alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas between the Veazie and Milford dams. The Trust would likely need to continue operation of the fish ladder and lift without operation of the turbines, therefore, it may be necessary to provide attraction flow to the denil ladder through gates or sluiceways. If this alternative were chosen, the Trust should work with the resource agencies to refine plans for gate operation after decommission of the Veazie Project. However, downstream migrating fish would no longer be exposed to the operating turbine blades, which contribute to downstream mortality. Habitat for resident fish would likely be unaffected by this alternative.

In the long term, should the Trust choose to fulfill the conditions of the Settlement Agreement and remove the Veazie dam after surrender of the project, the impacts to fisheries and aquatic resources in the Veazie Project area would be the same as those discussed in the analysis of the Proposed Action (section 3.3.1.3).

3.6.3.2 Great Works

Under Action Alternative 3 (surrender in place of all three projects), the Trust would discontinue the operation of the Great Works Project but not remove the Great Works dam. In the short term, this alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas between the Veazie and Milford dams. The Trust would likely need to continue operation of the fish ladder without operation of the turbines, therefore, it may be necessary to provide attraction flow to the fish ladder through gates or sluiceways. If this alternative was implemented, the Trust should work with the resource agencies to refine plans for gate operation after decommission of the Great Works Project. However, migrating fish would no longer be exposed to the operating turbine blades, which contribute to downstream mortality. Habitat for resident fish would likely be unaffected by this alternative.

In the long term, should the Trust fulfill the conditions of the Settlement Agreement and remove the Great Works dam after surrender of the project, the impacts to fisheries and aquatic resources in the Great Works Project area would be the same as those discussed in the analysis of the Proposed Action (section 3.3.2.3).

3.6.4 Botanical Resources

3.6.4.1 Veazie

In the short and long term under Action Alternative 3, because water level and river width is not expected to change significantly at the Veazie Project, it is not expected that wetland resources will be affected or change significantly from current conditions. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Veazie dam, the effects to botanical resources at the Project would be similar to those described for the Proposed Action. Specifically, dam removal at Veazie may result in the development of approximately 31 acres of new wetlands in areas where the impoundment currently resides and changes in vegetation compositions and wetland type designations are likely to occur to some existing wetlands. Also, invasive species currently present along the impoundment and along the river are likely to compete with native species and may rapidly spread during colonization of the newly created terrestrial and wetland areas. However, as part of implementing conditions under the Settlement Agreement, it can be expected that the Trust would conduct plantings of native herbaceous and shrub species in select newly exposed riverbank areas immediately following dam removal, as well as conduct soil testing, repeated seed broadcasting, and fertilizer application. It can also be expected that the Trust would conduct monitoring and control activities of invasive species, such as hand removal, herbicide treatment, and when necessary biological control activities, for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the Veazie Project.

3.6.4.2 Great Works

In the short and long term under Action Alternative 3, because water level and river width is not expected to change significantly at the Great Works Project, it is not expected that wetland resources will be affected or change significantly from current conditions. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the Great Works dam, the effects to botanical resources at the Project would be similar to those described for the Proposed Action. Specifically, dam removal at Great Works may result in the development of approximately 3.7 acres of new wetlands in areas where the impoundment currently resides and changes in vegetation compositions and wetland type designations are likely to occur to some existing wetlands. Also, invasive species currently present along the impoundment and along the river are likely to compete with native species and may rapidly spread during colonization of the newly created terrestrial and wetland areas. However, as part of implementing conditions under the Settlement Agreement, it can be expected that the Trust would conduct plantings of native herbaceous and shrub species in select newly exposed riverbank areas immediately following dam removal, as well as

conduct soil testing, repeated seed broadcasting, and fertilizer application. It can also be expected that the Trust would conduct monitoring and control activities of invasive species, such as hand removal, herbicide treatment, and when necessary biological control activities, for several years following dam removal. The implementation of these monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the Great Works Project.

3.6.5 Wildlife

3.6.5.1 Veazie

Under Action Alternative 3 (surrender in place of all three projects), there would be no change to the distribution and habitat use in the vicinity of the project. The dam would remain in place, though hydropower generation and fish passage would cease. As noted in Action Alternative 2 (Section 3.5.5), wildlife species that prey upon migratory fish species may be impacted by the barriers that the dam poses, though they would be minor and short-term. Most wildlife species would be completely unaffected under this alternative. Long-term, staff anticipates that the Trust would implement the covenants of its Settlement Agreement and ultimately remove Veazie dam. The impacts to wildlife species long-term would therefore be identical to those described in the Proposed Action (Section 3.3.1.5).

3.6.5.2 Great Works

The impact of Action Alternative 3 on wildlife species at Great Works would be the same as those described for the Veazie Project under Action Alternative 3 (section 3.6.5.1).

3.6.6 Rare, Threatened and Endangered Species

3.6.6.1 Veazie

Under Action Alternative 3, the Trust would discontinue the operation of the Veazie Project but not remove the Veazie dam. In the short term, the existing habitat conditions along and within the impoundments would persist into the future and the known and potential RTE species that use these habitats would not be affected, except for the Atlantic salmon DPS, which are known to occur in the Penobscot River. The river impounded by the Veazie dam is classified as critical habitat for this endangered species, thus surrendering the dam in place would likely require consultation with the NMFS under section 7 of the ESA.

If the Veazie dam is surrendered in place, the Atlantic (candidate species) and shortnose (endangered) sturgeon will continue to have restricted access to historic

spawning, rearing, and feeding habitat between the Milford dam and the head of tide. In the long term, should the Trust fulfill the conditions of the Settlement Agreement and remove the Veazie dam after surrender of the project, the impacts to RTE species in the Veazie Project area would be the same as those discussed in the analysis of the Proposed Action (section 3.3.1.6). Consultation with the NMFS under section 7 of the ESA would likely be necessary to assess impacts to Atlantic salmon and shortnose sturgeon under this Action Alternative.

3.6.6.2 Great Works

Under Action Alternative 3, the Trust would discontinue the operation of the Great Works Project but not remove the Great Works dam. Since Great Works and Veazie share the same RTE species compositions and are in close geographic proximity, the same effects described in the above section (section 3.6.6.1. Rare, Threatened and Endangered Species, Veazie) apply for Great Works.

3.6.7 Cultural Resources

3.6.7.1 Veazie

Cultural resources at the Veazie project would be adversely affected under Action Alternative 3 (surrender in place of all three projects), since surrender of the project license would remove known cultural resources from federal jurisdiction. Further, the implementation of the Settlement Agreement after project surrender is finalized would have the potential to further disrupt and adversely affect cultural resources. Such impacts are discussed under the Proposed Action (e.g. erosion potential and site exposure). However, the implementation of an MOA that considers the potential adverse effects of removing said resources from federal jurisdiction could properly mitigate for such impacts.

3.6.7.2 Great Works

Surrender of the Great Works project license would not affect any known historic or cultural resources. As discussed under the Proposed Action, no resources are known to exist within the project boundary, and the SHPO has determined that the Great Works dam and its associated facilities are not eligible for listing in the National Register. The potential exists for previously unidentified historic or cultural resources to be uncovered if the Trust implements the Settlement Agreement and removes the Great Works dam after the Commission finalizes the surrender. Any inadvertent discoveries under this alternative would be outside of the Commission’s jurisdiction since the surrender would be final prior to dam removal, and would be the responsibility of the Trust to address.

3.6.8 Recreation

3.6.8.1 Veazie

Under Action Alternative 3, impacts to recreation at the Veazie Project would be minimal for the short-term. The reservoir would continue to provide recreation opportunities, similar to current conditions. Public access and a variety of recreation activities would continue on the reservoir, which is currently not at full capacity. Commission oversight of recreation facilities would cease, however, the Trust, state and local governments, or other management entities would have the opportunity to continue operation and maintenance of recreation facilities. Over the long-term, impacts to recreation at the Veazie Project would be similar to those described for the Proposed Action, assuming that the conditions of the Settlement Agreement are implemented.

3.6.8.2 Great Works

Under Action Alternative 3, impacts to recreation at Great Works Project would be minimal for the short-term. The reservoir would continue to provide recreation opportunities, similar to current conditions. Public access and a variety of recreation activities would continue on the reservoir, which is currently not at full capacity. Commission oversight of recreation facilities would cease, however, the Trust, state and local governments, or other management entities would have the opportunity to continue operation and maintenance of recreation facilities. Over the long-term, impacts to recreation at the Great Works Project would be similar to those described for the Proposed Action, assuming that the conditions of the Settlement Agreement are implemented.

3.6.9 Land Use and Aesthetics

3.6.9.1 Veazie

Under this Action Alternative (surrender in place of all three projects), the Trust would attain all existing land rights at Veazie yet there would be no change to the land use or aesthetic value of the project. It is likely that the Trust would ultimately decide to remove Veazie dam after surrender of the project; therefore the long-term impacts at Veazie would be indistinguishable from those listed in the Proposed Action (Section 3.3.1.9).

3.6.9.2 Great Works

There would be no change to land use or aesthetics at Great Works under Action Alternative 3, though long-term, we anticipate removal of the Great Works as the Trust implements its Settlement Agreement (see Section 3.3.2.9 for long-term impacts).

3.6.10 Socioeconomics

3.6.10.1 Veazie Project

Power Generation

In the case of a surrender of license, regardless of demolition of the Veazie Project, the long term effects would be similar to those of the Proposed Action. However, in the short term, the Commission would likely require the licensee to provide a plan and schedule detailing the procedures it will take to ensure the safety of the surrendered properties. In compliance with the safe and timely surrender which may be required by the Commission, the licensee would likely be required to shut down the project in a relatively short amount of time. Since the Trust proposes to operate the project for some time before decommissioning it (while other events under the Settlement Agreement take place first), this action alternative would prevent the production of several years of electrical generation. Additionally, since the surrender would become effective in a short period of time, the Trust would pay few annual charges to the Commission.

Employment

The effect on employment caused by this Action Alternative would be minimal. Employment of operators and crew at the project would be terminated, but this would likely have little impact since these positions are utilized at other hydropower projects in the area. Since the dam would remain, there would be no increase in employment of construction or demolition crew and only minimal further employment may be required for periodic maintenance of the dam. However, if following surrender of the project, the parties of the Settlement Agreement follow through on their required actions, the long term effects will be similar to those under the Proposed Action.

Tax Base

Surrender of the Veazie Project would likely have similar long term effects as the Proposed Action (3.3.3.10). These include the loss of tax revenue for the towns of Eddington, Orono, and Veazie through surrender of the project. However, since no significant demolition would take place under this scenario, there would be no tax revenue drawn from the expenditures by temporary construction workers. Alternatively, assuming the Settlement Agreement will be enacted, this action would have beneficial short term impacts as described in the Proposed Action.

Property Value

The surrender of the project, leaving all facilities in place, would likely have no impact on the property values in the immediate area. Although, once the project would be demolished, assuming the Settlement Agreement is acted upon, the long term effects would be similar to those under the Proposed Action. In that case, the property values would likely rise as a result of visual and environmental enhancements.

Fishery and Recreational Industries

In this alternative, the dam and associated impoundment would remain in place. Therefore, there would not likely be any change from current conditions in fisheries and recreational activities. In the long term however, it would be likely that the dam would be removed under the terms of the Settlement Agreement. In that case fishery and recreational industries would likely benefit as described in the Proposed Action.

3.6.10.2 Great Works

Power Generation

In the case of a surrender of license, regardless of demolition of the Great Works Project, the effects would be similar to the long term effects of the Proposed Action. However, in the short term, the Commission would likely require the licensee to provide a plan and schedule detailing the procedures it will take to ensure the safety of the surrendered properties. In compliance with the safe and timely surrender which may be required by the Commission, the licensee would likely be required to shut down the project in a relatively short amount of time. Since the Trust proposes to operate the project for some time before decommissioning it (while other events under the Settlement Agreement take place), this action would prevent the production of several years of electrical generation. Additionally, since the surrender would become effective in a short period of time, the Trust would pay few annual charges to the Commission.

Employment

The effect on employment caused by this Action Alternative would be minimal. Employment of operators and crew at the project would be terminated, but this would likely have little impact since these positions are utilized at other hydropower projects in the area. Since the dam would remain, there would be no increase in employment of construction or demolition crew and only minimal further employment may be required for periodic maintenance of the dam. However, if following surrender of the project, the parties of the Settlement Agreement follow through on their required actions, the long term effects would be the same as those described under the Proposed Action in section 3.3.3.10.

Tax Base

Surrender of the Great Works Project would likely have similar long term effects as the Proposed Action. These include the loss of tax revenue for the towns of Bradley, Milford, and Old Town through surrender of the project. However, since no significant demolition would take place under this scenario, there would be no tax revenue drawn from the expenditures by temporary construction workers. Alternatively, assuming the Settlement Agreement will be enacted, this action would have beneficial short term impacts including increased revenue from sales and room occupancy taxes as described in the Proposed Action.

Property Value

The surrender of the project, leaving all facilities in place, would likely have no impact on the property values in the immediate area. Although, once the project would be demolished, assuming the Settlement Agreement is acted upon, the long term effects would be similar to those under the Proposed Action as described in 3.3.3.10.

Fishery and Recreational Industries

In this alternative, the dam and associated impoundment would remain in place. Therefore, there would not likely be any change from current conditions in fisheries and recreational activities. In the long term however, it would be likely that the dam would be removed under the terms of the Settlement Agreement. In that case, the effects would be identical to those of the Proposed Action.

3.6.11 Infrastructure

3.6.11.1 Veazie

The effect on infrastructure under this alternative would be nearly identical to that under current conditions. Since the project would no longer be in operation, it would be likely that the project related structures would not be maintained as well as current conditions. However, assuming the Settlement Agreement is enacted, and the Veazie dam is removed, structures in the impoundment would likely be adversely affected and require mitigation as described under the Proposed Action.

3.6.11.2 Great Works

The effect on infrastructure under this Action Alternative would be nearly identical to that under current conditions. Since the project would no longer be in operation, it would be likely that the project related structures would not be maintained as

well as current conditions. However, assuming the Settlement Agreement is enacted, and the Great Works dam is removed, structures in the impoundment would likely be adversely affected and require mitigation as described under the Proposed Action.

3.7 NO-ACTION ALTERNATIVE

The following analysis of the No-Action Alternative assumes that the Proposed Action is not approved by the Commission and that the Veazie, Great Works and Howland Projects will remain licensed to PPL. According to the Settlement Agreement, if any element of the Proposed Action is substantially altered or removed by the Commission's action on the three surrender applications, any party may ultimately terminate the Settlement Agreement. This may result in the resumption of litigation that occurred for many years regarding numerous environmental and other issues in connection with the licensing and operation of the PPL Maine, LCC-owned hydroelectric projects on the Lower Penobscot River in Maine. Nevertheless, NEPA requires that a no-action alternative be examined.

3.7.1 Veazie Project

The existing geology and soils, water resources, botanical resources, wildlife, cultural resource, recreation, land use and aesthetics, socioeconomics and infrastructure within and adjacent to the impoundment will persist into the future under the No-Action Alternative. The existing conditions are a combination of natural processes and cycles that are influenced by hydroelectric power production at the Veazie dam. Some minor erosion along the impoundment perimeter will continue (Stantec, 2008).

3.7.1.1 Fisheries and Aquatic Resources

Under the No-Action Alternative, the Trust would not exercise its option to purchase and remove the Veazie dam. The current hydroelectric project would continue to generate power, and PPL would proceed with its obligations to provide fish passage facilities at the dam as prescribed by the USDOI in 1997[52], as well as carrying out other responsibilities contained in its current license (PPL Maine, LLC 2004 and NDT, 1990).

The No-Action Alternative would raise significant uncertainties for successful restoration of migratory fish in the Penobscot watershed. Atlantic and shortnose sturgeon, striped bass, rainbow smelt, and Atlantic tomcod would not gain restored access to historic spawning, nursery and/or feeding areas between Veazie and Milford. In its earlier environmental report regarding hydroelectric projects in the lower Penobscot River, Commission staff concluded that the current number of dams and associated passage inefficiencies for those projects with conventional fish passage (which includes

[52] See Section VII of the Settlement Agreement

Veazie) make it unlikely that restoration goals for Atlantic salmon, American shad, and alewife would be achieved in the foreseeable future (FERC, 1997b).

Under the No-Action Alternative, the Penobscot basin would not experience the enhanced prey base for predatory fish and wildlife together with an increase in marine derived nutrients associated with the Proposed Action. Habitat for resident fish would likely be unaffected by the No-Action Alternative.

3.7.1.2 Rare, Threatened and Endangered Species

Under the No-Action Alternative, the existing habitat conditions along and within the impoundments would persist into the future and most of the known and potential RTE species that use these habitats would continue to be affected by project operation. Because listed Atlantic salmon and critical habitat are present in the Penobscot River, consultation with the NMFS under section 7 of the ESA would be necessary to ensure protection of the species and its critical habitat. If the Veazie dam and Great Works dams are not removed, federally endangered shortnose sturgeon will not gain access to historic spawning, rearing, and feeding habitat between Milford and the Veazie.

3.7.2 Great Works Project

The existing geology and soils, water resources, botanical resources, wildlife, cultural resource, recreation, land use and aesthetics, socioeconomics and infrastructure within and adjacent to the impoundment will persist into the future under the No-Action Alternative. The existing conditions are a combination of natural processes and cycles that are influenced by human development, including hydroelectric power production at the Great Works dam. Some minor erosion along the impoundment perimeter will continue (Stantec, 2008).

3.7.2.1 Fisheries and Aquatic Resources

Under the No-Action Alternative, the Trust would not exercise its option to purchase and remove the Great Works dam. The current hydroelectric project would continue to generate power. Pursuit of the No-Action Alternative would raise significant uncertainties for successful restoration of migratory fish in the Penobscot watershed. Atlantic and shortnose sturgeon, striped bass, rainbow smelt, and Atlantic tomcod would not gain restored access to historic spawning, nursery and/or feeding areas between Veazie and Milford. Although the Great Works dam currently has a fish ladder, the need for improved facilities was identified during the relicensing process for both projects (FERC, 1997; PPL Great Works, 2000). If the Trust or PPL chose to get a new license for the Great Works Project, such measures would likely be required under USFWS Section 18 fishway prescriptions under the No-Action Alternative.

Resident fish would likely be unaffected by the No-Action Alternative. Fish populations would continue to be dominated by smallmouth bass, and sport fishing opportunities and access would remain unchanged. Other ecological benefits associated with the proposed action, such as enhanced prey base for predatory fish and wildlife and an increase in marine derived nutrients, also would not be realized under the No-Action Alternative.

3.7.2.2 Rare, Threatened and Endangered Species

Under the No-Action Alternative, the existing habitat conditions along and within the impoundments will persist into the future and most of the known and potential RTE species that use these habitats would continue to be affected by project operation. Because listed Atlantic salmon and critical habitat are present in the Penobscot River, consultation with the NMFS under section 7 of the ESA would be necessary to ensure protection of the species and its critical habitat. If the Veazie dam and Great Works dams are not removed, federally endangered shortnose sturgeon will not gain access to historic spawning, rearing, and feeding habitat between Milford and the Veazie.

3.7.3 Howland Project

The existing geology and soils, water resources, botanical resources, wildlife, RTE, cultural resource, recreation, land use and aesthetics, socioeconomics and infrastructure within and adjacent to the impoundment would persist into the future under the No-Action Alternative. The existing conditions are a combination of natural processes and cycles that are influenced by human factors such as development and hydroelectric power production at the Howland dam.

3.7.3.1 Fisheries and Aquatic Resources

Under the No-Action Alternative, the Trust would not exercise its option to purchase and modify the Howland dam, including construction of the proposed nature-like fish bypass. The current hydroelectric project would continue to generate power. The No-Action Alternative would raise significant uncertainties for successful restoration of migratory fish in the Penobscot watershed, including the Piscataquis River. Although the Howland dam currently has a fish ladder, the need for improved facilities was identified during the relicensing process for both projects (FERC, 1997; PPL Great Works, 2000). If the Trust or PPL chose to get a new license for the Howland Project, such measures would likely be required under USFWS Section 18 fishway prescriptions under the No-Action Alternative.

Other ecological benefits associated with the restoration project would not be realized under the No-Action Alternative. These include enhanced prey base for predatory fish and wildlife together with an increase in marine derived nutrients. Habitat

for resident fish would likely be unaffected by the No-Action Alternative. Fish populations would continue to be dominated by smallmouth bass, sport fishing opportunities and access for resident fish species would remain unchanged, and northern pike would not have access to waters upstream of Howland.

3.7.3.2 Rare, Threatened and Endangered Species

Because the Piscataquis River has recently been designated as critical habitat for the Atlantic salmon DPS, consultation with the NMFS under section 7 of the ESA would be necessary to ensure protection of the species and its critical habitat.

3.8 CUMULATIVE EFFECTS ANALYSIS

Based on the Trust's pre-filing consultation and request for public comments, Commission staff have identified three cumulatively affected resources for analysis: 1) water quality (including DO, water temperature, and sediment transport); 2) water quantity (potential for changes in ice jamming); and 3) aquatic resources (migratory fish species).

3.8.1 Past Actions

3.8.1.1 Water Quality

Water quality in the Penobscot River was significantly changed following construction of the first dams on the lower mainstem in the 1830's. Replacement of riverine habitats with impoundments reduced residence time of the water, which in turn contributed to lowered DO levels and increased water temperatures within the impoundments and downstream of the dams.

3.8.1.2 Fisheries

Migratory fish runs in the Penobscot significantly declined following construction of the first dams on the lower mainstem in the 1830's. Replacement of riverine habitats with impoundments, together with blocked access to upstream spawning areas, severely reduced the numbers of Atlantic salmon and other migratory species in the river. Loss of migratory fish runs had an immediate effect on the public's ability to use the resource for commercial and recreational purposes. The PIN's historical reliance on the river's large runs of fish for sustenance and cultural purposes also was curtailed. Loss of native fish stocks also had ecological impacts, by reducing forage for predatory fish and wildlife and by interrupting the exchange of marine derived nutrients between freshwater and marine ecosystems. This lack of energy flow may also have played a role in reducing near-shore stocks of cod and other marine fish in the Gulf of Maine.

Various strategies were tried over the years to restore fish populations in the

Penobscot, typically involving construction of fish ladders at dams and stocking (of Atlantic salmon). While such measures helped maintain some presence of migratory fish, the stocks were less diverse (fewer species) and far smaller in number. The reliance on fish ladder construction at dams and stocking continued as the main tools for restoring fish to the river into the late 1990's. While fish ladders are present at the Veazie, Great Works and Howland Projects, they are used primarily by Atlantic salmon, albeit at levels far below what existed historically in the river, and only at a fraction of what is needed for self-sustaining populations. Other migratory species, including American shad, alewives, and blueback herring are absent or exist in extremely low numbers upstream of the lowermost dams on the river. Furthermore, studies on the Penobscot reflect what has been observed elsewhere in the northeast U.S., specifically that the presence of multiple dams can result in significant cumulative losses, as a result of delays, injuries or mortalities for migratory fish (Holbrook, 2007).

Elimination of barriers through fishway construction remains an integral part of an overall restoration strategy on the Penobscot and will be critical at the Milford Project, for example, as a complement to the proposed removal of Veazie and Great Works dams. As was the case on the Kennebec River in Maine, a more holistic approach is needed to address the needs of those species, as well as the endangered shortnose sturgeon, that do not use passage facilities (Maine SPO, 1993).

In 1999, the State of Maine removed Edwards dam, which had existed as the initial barrier on the Kennebec for 160 years. Sturgeon, striped bass, and other migratory fish, including American shad, immediately moved upstream of the former site of Edwards dam, where they had been blocked for decades.

3.8.2 Proposed Action

3.8.2.1 Water Quality

The Proposed Action would remove the Veazie and Great Works dams and convert their current impoundments to riverine stretches. This would in turn be expected to lower water temperatures and increase DO both within the former impounded areas as well as downstream of the dams. At Howland, similar effects would be expected under the Proposed Action. Reduced residence time under the Proposed Action would be expected to increase DO and lower water temperatures.

Based on the results of the substrate survey of the impoundments conducted by the Trust in 2007, it appears that the impoundments of Great Works and Veazie retain relatively little in the way of fine grained sediment deposits. Based on this, the Proposed Action would not be expected to contribute to cumulative effects with regards to sediment transport.

The USACE's 2008 analysis of ice jamming did not indicate that the Proposed

Action would be expected to significantly change flooding caused by ice jamming as opposed to current conditions. Based on this, the Proposed Action would not be expected to contribute to cumulative effects with regards to ice jamming.

3.8.2.2 Fisheries

The Trust's proposed removal of the Veazie and Great Works dams, along with construction of a nature-like fish bypass at Howland, would contribute to the restoration work laid out in the State of Maine's recent Strategic Plan for the Restoration of Diadromous Fishes to the Penobscot River (Maine DMR and Maine DGIF, 2008). The Strategic Plan calls for restoring runs of all species historically occurring in the Penobscot. The Trust's Proposed Action at Veazie, Great Works, and Howland, together with continued use of fish passage measures at Milford and other remaining dams on the river, will lay the foundation for work by the state and other partners to rebuild historic fish stocks in the river, resulting in a host of ecological and public use benefits.

Removal of the two lowermost dams will immediately benefit an assemblage of "lower river" migratory species by restoring habitat used historically for spawning and/or foraging. These species include striped bass, Atlantic sturgeon, shortnose sturgeon, rainbow smelt, and Atlantic tomcod. Historic habitat for these species likely extended up to, but not beyond, the natural falls at the current site of the Milford dam (Old Town falls). These lower river species are not known to use conventional fish passage facilities. Restoration of historic spawning and rearing habitats in the lower Penobscot River for these species can be accomplished only by removing mainstem dams up to Milford. Another group of migratory species, including Atlantic salmon, American shad, alewife, blueback herring, sea lamprey, and American eel historically had access to almost 1,000 miles of habitat, widely distributed in the Penobscot drainage. The bulk of the habitat for this entire group of species is currently located above three mainstem dams (Veazie, Great Works, and Milford).

Removal of the Veazie and Great Works dams, along with the fish bypass at Howland, and new fish passage measures at Milford, will significantly reduce cumulative effects due to multiple dam passages (upstream and downstream) that have been observed on the Penobscot and elsewhere in the northeast U.S. Without these collective efforts, the number and location of barriers on the Penobscot will remain largely unchanged, and the ability to restore historic fish runs and meet overall fishery management goals will remain highly problematic. In addition to the immediate benefits for migratory species, nutrients from sea-run fish will reach farther upstream and the natural flushing of nutrients will extend into Penobscot Bay, thus improving the natural cycle of the river. Ecosystem processes will be further improved with the restoration of sea-run fish by enhancing the supply of food for a wide variety of fish and wildlife inhabiting the Penobscot River and Gulf of Maine.

3.8.3 Action Alternative 1

Removal of all three dams will have same cumulative effects as the Proposed Action.

3.8.4 Action Alternative 2

In the long-term, the removal of the Veazie and Great Works dams would increase DO and lower water temperatures. The surrender in-place of the Howland Project is not likely to change water quality at this project in the long term.

Under this alternative, the long-term impacts to fisheries would be similar to those under the Proposed Action. The surrender in-place of the Howland Project will reduce fish passage mortality caused by the operation of the turbines. In the long-term, this will improve fish passage and spawning success for migratory species. The Trust would likely need to continue operation of the fish ladder without operation of the turbines, therefore, it may be necessary to provide attraction flow to the fish ladder through gates or sluiceways. If the efficient operation of the fish ladder can not be maintained without operation of the turbines, then the Howland dam would continue to restrict the access of migratory fish to historic spawning, nursery and/or feeding areas in the Piscataquis River.

Should the Trust choose to implement the Settlement Agreement after the surrender of Veazie, Great Works and Howland Projects, the cumulative effects on water quality and fisheries will be the same as the Proposed Action.

3.8.5 Action Alternative 3

In the long-term, the surrender in-place of the Veazie, Great Works, and Howland Projects is not likely to change water quality. The surrender in-place of these projects will reduce fish passage mortality caused by the operation of the turbines. In the long-term, this will improve fish passage and spawning success for migratory species. The Trust would likely need to continue operation of the fish ladders without operation of the turbines, therefore, it may be necessary to provide attraction flow to the fish ladder through gates or sluiceways. If the efficient operation of the fish ladders can not be maintained without operation of the turbines, then the Veazie, Great Works and Howland dam would continue to restrict the access of migratory fish to historic spawning, nursery and/or feeding areas in the Piscataquis River.

Should the Trust choose to implement the Settlement Agreement after the surrender of Veazie, Great Works and Howland Projects, the cumulative effects on water quality and fisheries will be the same as the Proposed Action.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 COMPARISON OF ALTERNATIVES

4.1.1 Geologic and Soil Resources

Under the Proposed Action or Action Alternative 1 (removal of all three dams) there would be minor, short-term, adverse impacts to geologic and soil resources. Dam removal activities would disturb soils and sediments and result in increased turbidity within the projects' areas. However, these impacts would persist only during dam-removal activities, and the licensee's implementation of best-management-practices such as silt screens and coffer dams would help to minimize these effects. While some erosion may occur as a result of lower impoundment levels and increased water velocities, it is expected to be minimal as a result of natural channel substrates armoring the shoreline. With regard to the Howland project, the Proposed Action or alternative one would help to stabilize water levels within the Howland impoundment, and would lead to decreases in erosion, which would be beneficial over the long-term. Under Action Alternative 2 (surrender in place of Howland), the same effects discussed above would hold true for the Veazie and Great Works project, but the Howland project would continue to experience shoreline erosion from fluctuating impoundment levels. This would lead to short-term, minor, adverse impacts for geologic and soils resources at the Howland project until the Trust implements the Settlement Agreement after the Commission finalizes the surrender. Under Action Alternative 3 (surrender in place of all three projects), short-term effects to geologic and soil resources at the Veazie and Great Works projects would be the same as the effects analyzed under the no-action alternative, and long-term effects would be identical to those discussed under the Proposed Action. Action alternative 3 would affect geologic and soil resources at the Howland project as discussed under Action Alternative 2.

4.1.2 Water Resources

Moderate, long-term, beneficial impacts to water resources would occur if the Proposed Action or Action Alternative 1 (removal of all three dams) were chosen. The removal of Veazie and Great Works dams under the Proposed Action is expected to return these Project areas to a natural, flowing, riverine environment and improve water quality. Specifically, removal of the dams is likely to enhance DO levels and eliminate large water temperature variations associated with impounded waters. Non-point sources of pollution and nutrient concentrations are more likely to flush through the water system, which will reduce potential for eutrophication and anoxic conditions to occur in the water system at the two project areas. The removal of the flashboards at Howland dam is also likely to result in some of the same benefits to water quality. During Veazie and Great Works dam removal activities, water clarity would temporarily be affected from increased turbidity due to potential sedimentation and erosion events. However,

implementation of BMPs, as proposed by the licensee, will help minimize these temporary, negative effects. Action Alternative 1 would be similar to the Proposed Action, but removal of Howland dam would also likely return the Project area to a natural, flowing, riverine environment and improve water quality in terms of DO levels, water temperature, non-point source pollution, and nutrient concentrations. Removal of Howland dam would also have short-term negative effects to water clarity from increased turbidity due to potential sedimentation and erosion events at that project site.

Under the No-Action Alternative, water quantity and water quality is not likely to change from current conditions. Under Action Alternative 2 (surrender in place of Howland), water quantity and water quality impacts at the Veazie and Great Works Projects would be similar to the Proposed Action or Action Alternative 1; but, water quantity and water quality is not likely to change from current conditions at the Howland Project in the short term. Under Action Alternative 3 (surrender in place of all three projects), in the short term, water quantity and quality are not likely to change from current conditions at the three Projects. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the three dams, the effects to water quantity and quality at the three Projects would be similar to those described for the Proposed Action.

4.1.3 Fisheries and Aquatic Resources

Under the Proposed Action and Action Alternative 1 (remove all three dams), fisheries and aquatic resources would benefit over the long-term. During dam removal activities, there may be temporary impacts to migrating fish due to periods when fish passage facilities will not be able to operate. Additionally, there may be short-term impacts to resident fish and mussels due possible stranding during impoundment drawdowns. However, the Trust's proposed environmental measures should help to reduce these impacts.

Under Action Alternative 2 (remove the Veazie and Great Works dams and surrender in place the Howland project), the impacts to fisheries and aquatic resources at the Veazie and Great Works Projects would be the same as those described for the Proposed Action. At the Howland Project, this alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas in the Piscataquis River. The Trust would likely need to continue operation of the fish ladder without operation of the turbines, therefore, it may be necessary to provide attraction flow to the denil ladder through gates or sluiceways. However migrating fish would no longer be exposed to the operating turbine blades, which contribute to upstream and downstream mortality. If the Trust chose to construct the nature-like fish bypass after the surrender, case, the impacts would be similar to the Proposed Action.

Under Action Alternative 3(surrender in place all three dams), the impacts at the

Howland Project would be the same as those under Action Alternative 2. At the Veazie and Great Works Projects, this alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas between the Veazie and Milford dams. The Trust would likely need to continue operation of the fish ladders without operation of the turbines; therefore, it may be necessary to provide attraction flows through gates or sluiceways. However, migrating fish would no longer be exposed to the operating turbine blades, which contribute to downstream mortality. If the Trust implements the measures of the Settlement Agreement and removes the Veazie and Great Works dams after the surrender, the impacts to fish and aquatic resources would be similar to the Proposed Action.

Under the No-Action Alternative, the Settlement Agreement may be terminated which may result in the resumption of litigation regarding fish passage issued in connection with the licensing and operation of the PPL Maine, LCC-owned hydroelectric projects on the Lower Penobscot River. Although the Great Works and Howland dams currently have fish ladders, the need for improved facilities was identified during the relicensing process for both projects (FERC, 1997; PPL Great Works, 2000). If the Trust or PPL chose to get new licenses for the Great Works and Howland Projects, such measures would likely be required under USFWS Section 18 fishway prescriptions under the No-Action Alternative. This alternative would continue to restrict access of migratory fish to historic spawning, nursery and/or feeding areas in the Penobscot River

4.1.4 Botanical Resources

Impacts to botanical resources would occur if the Proposed Action or Action Alternative 1 (removal of all three dams) were chosen. Under the Proposed Action, the reduction in water levels after dam removal at Veazie and Great Works may result in the development of approximately 31 acres of new wetlands and 3.7 acres of new wetlands, respectively, in areas where the two impoundments currently reside. In addition, removal of Veazie dam may result in the conversion of 3.1 acres from one wetland designation to another and the conversion of 1.1 acres of palustrine wetland areas into upland communities. The removal of Great Works dam may result in the conversion of 1.8 acres from palustrine scrub shrub wetlands to palustrine forested wetlands and the conversion of 0.4 acres of palustrine forested wetlands into upland communities. Removal of the flashboards on Howland dam may result in 29.1 acres of existing wetlands in the project area changing from one wetland designation to another and the proposed bypass channel construction is likely to impact 0.4 acres of an existing 0.47 acre of palustrine scrub-shrub and palustrine emergent wetland resource at the Howland site. Also, invasive species currently present along the three projects' impoundments and the rivers are likely to compete with native species and may rapidly spread during colonization of the newly created terrestrial and wetland areas, resulting in lower biodiversity. However, implementation of the licensee's proposed monitoring and control practices will help minimize the potential adverse effects of invasive plant species within the project areas.

Action Alternative 1 would be similar to the Proposed Action, but removal of Howland dam would also likely result in the development of additional new wetlands in areas where the impoundment currently resides, and additional conversions in vegetation compositions and wetland type designations at Howland.

Under the No-Action Alternative, water levels and river width are not expected to change significantly. Therefore, it is not expected that wetland resources will be affected or change significantly from current conditions at the three Project areas. Under Action Alternative 2 (surrender of Howland without fish bypass), impacts to wetland resources at the Veazie and Great Works Projects would be similar to the Proposed Action or Action Alternative 1; but, it is not expected that wetland resources will be affected or change significantly from current conditions at the Howland Project in the short term. Under Action Alternative 3 (surrender in place of all three projects), in the short term, impacts are not likely to change from current conditions at the three Projects. However, in the long term, if conditions under the Settlement Agreement are implemented by the Trust after the surrender of the three dams, the effects to botanical resources at the three Projects would be similar to those described for the Proposed Action.

4.1.5 Wildlife

Based on the Proposed Action, minor, short-term, adverse impacts as well as minor long-term, beneficial impacts would occur. Under the Proposed Action, adverse impacts would be associated with lowering the water surface elevation and disturbance activities due to the removal of the dams and related facilities at the Veazie and Great Works Projects. Wildlife at the Howland Project would be the least affected, as the dam would remain in place. Though, construction of the fish bypass would have some minor, short-term, adverse impacts to noise-sensitive species. Ultimately, the original riverine system of the Penobscot River would be restored, providing new upland, riparian and riverine habitat.

The wildlife impacts described above would be similar for Veazie and Great Works under Action Alternatives 1 (remove all three dams) and 2 (surrender in place of Howland). Under Action Alternative 1 there would be slightly greater adverse impacts at the Howland Project associated with a more substantial change in the impoundment level under. However, more riparian and riverine wildlife habitat would be restored under this alternative, when compared to the others. Under Action Alternative 2, wildlife use and distribution at Howland would be consistent with existing conditions short-term; though long-term the impacts to wildlife at Howland would be similar to those in the Proposed Action (assuming that the trust follows the actions described in its Settlement Agreement).

Under Action Alternative 3 (surrender in place all three dams), wildlife would be least impacted when compared to the other alternatives. Short-term, wildlife use and

distribution at all three projects would be consistent with current conditions; though species that depend on migratory fish species as a primary food source may experience minor short-term impacts due to the barriers posed by the dams and lack of fish passage. Yet, long-term the impacts would be identical to those described in the Proposed Action.

4.1.6 Rare, Threatened and Endangered Species

It is reasonable to expect that the Trust will fulfill the conditions of the Settlement Agreement (including removal of Veazie and Great Works dams and construction of fish bypass at Howland) eventually, regardless of which alternative/action is chosen. Thus, under the Proposed Action or any Action Alternatives, it is not expected that any federally listed species will experience any long-term adverse impacts. However, the Atlantic salmon DPS and shortnose and Atlantic sturgeon could potentially be affected under any action. During dam removal activities, there will be a short period when fish passage will not be able to occur at the projects. Formal consultation with the NMFS under section 7 of the ESA has been completed for the Proposed Action. If any Action Alternative or the No-Action Alternative were chosen, formal consultation with the NMFS would need to be reinitiated. Relative to the No Action Alternative, each of the alternatives and the Proposed Action would likely benefit ESA listed fish species by providing greater, unrestricted access to valuable spawning, feeding, and nursery, and overwintering habitats.

4.1.7 Cultural Resources

Cultural and historic resources could be adversely affected through approval of the Proposed Action or any of the action alternatives. Cultural resources would either be impacted by construction and dam removal activities, or by the removal of federal jurisdiction. However, the MOA among the Commission and Maine SHPO, with the PIN, and NMFS as concurring parties, executed on January 14, 2010, to address the effects under proposed action, would need to be amended accordingly with whatever option is selected. The MOA sets forth the measures to be taken to mitigate for the adverse impact of removing the resources from federal jurisdiction and any other effects that may result from increases in erosion or exposure as water levels are lowered. The cultural agreement document being developed by the Trust would continue to mitigate for long-term impacts after federal jurisdiction ends, regardless of which action is chosen. Under Action Alternative 2, cultural resources at the Howland project would continue to experience erosion resulting from fluctuating water levels associated with the installation and failure of the flashboards until the Trust implements the Settlement Agreement. This would be a continued, long-term, adverse effect to those resources, although it could be addressed by amending the MOA that executed for the Proposed Action. Effects under Action Alternative 3 for the Veazie and Great Works projects would be the same as under the Proposed Action; for the Howland project, the effects would be identical to those analyzed under Action Alternative 2.

4.1.8 Recreation

Moderate, long-term, beneficial impacts to recreation would occur if the Proposed Action, or Action Alternatives 2 (surrender in place of Howland) or 3 (surrender in place of all three projects) were chosen, assuming that the conditions of the Settlement Agreement were eventually implemented and the Veazie and Great Works dams were removed. The Proposed Action and Action Alternatives 2 and 3 would change recreational boating opportunities from mostly reservoir-based to mostly river-based at the Veazie and Great Works Projects, whereas recreation at Howland would be mostly unaffected. Action alternative 1 would be similar to the Proposed Action for the Veazie and Great Works Projects, but would also restore river-based recreational boating opportunities along the Piscataquis River in the vicinity of the Howland dam. However, residents of the Town of Howland are opposed to removing the dam because of the perceived negative effects on local recreation opportunities. The Proposed Action and Action Alternatives 1, 2, and 3 would each help to restore native sea-run fisheries, increasing the potential for improved recreational fishing at each of the three Projects.

4.1.9 Land Use and Aesthetics

The Proposed Action, as well as the three action alternatives, would have little to no effect on land use at the projects. Though several land areas would be temporarily disturbed for dam removal and/or construction of the fish bypass, these areas would likely be used for purposes consistent with existing land use categories in the area.

In regard to aesthetics, under the Proposed Action, short-term, minor, adverse impacts could result from an increase in ambient noise, exposure of inundated shoreline areas, and dust/debris from removal of the abandoned mill buildings; however completion of the bypass channel would permanently improve the view of project waters at Howland and the channel itself could become a point of interest to the public. Action Alternatives 1 and 2 would have impacts identical to the Proposed Action, for Veazie and Great Works. However, at Howland, more previously submerged shoreline lands would be exposed under Action Alternative. Under Action Alternative 2 (surrender in place of Howland), no changes to the aesthetic landscape at Howland would occur. Similarly, under Action Alternative 3 (surrender in place of all three dams), there would be no changes to aesthetics at any of the three projects in the short-term. Long-term, the impacts at each project would be identical to those described in the Proposed Action if the Trust implements its Settlement Agreement.

4.1.10 Socioeconomics

The implementation of both the Proposed Action and Action Alternative 1 (removal of all three dams) would help improve the socioeconomic environment in the

area through increased property values and new, financially valuable methods of recreation. The only possible adverse impact, loss of electrical generation, would be mitigated by the energy enhancements at other hydropower projects within the area of this proceeding. Alternative 2 (surrender in place of Howland) would have similar though less drastic effects, as only two of the three projects would be substantially changed. Alternatively, except for the drastic reduction in the number of annual charges payments, the socioeconomic environment under alternative 3 (surrender in place of all three dams) would remain unchanged, leading to essentially no impact barring the implementation of the Settlement Agreement. If the agreement were to be implemented, this action would eventually result in conditions very similar to those found in the Proposed Action.

4.1.11 Infrastructure

The Proposed Action, as well as Action Alternative 1 (removal of all three dams), would have an adverse impact on the infrastructure within the impoundments of these projects. The affected structures could be damaged by the changes in water level and velocity. With proper mitigation as proposed by the Trust and Commission staff, however, the infrastructure would be adequately protected and no impact would occur upon this environment from these actions. Similarly, Action Alternative 2 (surrender in place of Howland) would also have an adverse impact on infrastructure, but only in the Veazie and Great Works impoundments. Therefore, mitigation of these impacts would require slightly less effort then the previous actions. Alternative three would result in little to no impact on affected infrastructure. However, this action would not require mitigation to achieve this result as the other two actions would. If the signatories follow through on the actions proposed in the Settlement Agreement, then action three would result in the same impacts as the Proposed Action and require similar mitigation efforts.

4.2 UNAVOIDABLE ADVERSE IMPACTS

There will be no unavoidable adverse effects to geologic and soil resources, water resources, wildlife, RTE or recreation as a result of the Proposed Action.

4.2.1 Fisheries and Aquatic Resources

During in-water dam removal activities, there may be unavoidable short-term effects on water quality, including sedimentation and increased turbidity. Due to the limited amount of fine, mobile sediment in the construction area, these effects are expected to be minor and transitory. BMPs, including erosion and sediment control measures, will be employed to limit the extent and duration of any effects. There may be short term effects to resident fish passage into and out of tributaries to the former impoundment. Tributary deltas should be monitored following dam removal and remedial measures taken to remove barriers that are affecting fish passage. Slow drawdown will

help reduce adverse impacts on resident fish and catadromous American eel. The Proposed Action will have direct, short-term impact on individual mussels located in the drawdown area. The Trust proposes to attempt to reduce this impact by drawing down the impoundment gradually and in stages, allowing mussels to move to deeper water and facilitating relocation efforts. There are no long-term effects expected to resident fish, migratory fish, or mussels as a result of the Proposed Action.

4.2.2 Botanical Resources

Minor, post-removal redistribution of wetland species and functions is expected as the hydrologic regimes of various wetlands are altered, in terms of inundation frequency and duration. In some locations along the shoreline of the impoundments, a decrease in normal water level will dewater areas for periods of time that allow for plant colonization that was previously precluded by the continuously or nearly continuously inundated condition. This newly dewatered area, although allowing for the development of new wetlands, will also be vulnerable to invasion by exotic weed species that tend to be opportunistic and rapid colonizers. To avoid encroachment by invasive species, post-removal monitoring and management through plantings of native species should compensate for potential adverse effects.

4.2.3 Cultural Resources

There is a potential for short term erosion or bank failure and subsequent degradation of National Register eligible sites occurring immediately upon enacting the Proposed Action. Archaeological sites most susceptible to exposure or bank failure would be identified in the field and documented before any action. Afterward, the sites would be intensively monitored to determine the need for remedial stabilization measures until permanent stabilization or data recovery can be accomplished. A MOA among the Commission and SHPO, with the Trust, PIN, and NMFS as concurring parties, was executed on January 14, 2010. The MOA addresses potential adverse impacts to historic and cultural resources, and sets forth measures to be carried out regarding the treatment of historic structures, treatment of archaeological sites, resolving disputes, and amending or terminating the agreement.

4.2.4 Land Use and Aesthetics

Temporary post-removal exposure of unvegetated shoreline areas will result from dam removal and some observers may consider them unsightly, particularly soon after removal.

4.2.5 Socioeconomics

Tax revenue from the Veazie Project currently amounts to $162,502, that of the

Great Works Project currently amounts to $159,811 annually, and that of the Howland Project is currently $41,676 annually. The surrender and decommission of the Veazie, Great Works and Howland Projects will result in a loss of tax revenue. However, there are a number of factors that will eventually determine the actual impact of this change in municipal property tax base including the future value that municipalities place on these properties, adjustments to general purpose aid and state revenue sharing, and future town budgeting decisions.

4.2.6 Infrastructure

A number of the identified structures will potentially be affected by drawdown after removal of the Veazie and Great Works dams. Structure types include existing stormwater outfalls, retaining walls, and a sewage outfall.

4.3 STAFF RECOMMENDATIONS

4.3.1 Proposed Action

- In order to ensure that effects resulting from dam removal activities under the Proposed Action at the Veazie and Great Works Projects and construction of the fish-bypass channel at the Howland Project are minimized, the Trust should develop erosion and sedimentation control plans prior to commencing ground-disturbing activities. Such plans should include a description and design drawings of the best management practices that would be implemented by the Trust, including, but not limited to, silt fences, screens, and floating curtains, coffer dams, geotextile mats for stabilizing sediment deposits, and lay-down areas for material excavated during dam removal or fish-bypass construction. The erosion and sedimentation control plan should be submitted for approval by the Commission's Regional Engineer.

- The Trust should continue consultation with resource agencies regarding fish passage during dam removal activities to coordinate the timing of dam removal activities to ensure minimal impacts to migrating fish and to develop a relocation plan for any mussels or fish stranded during impoundment drawdowns.

- In order to allow the Commission to ensure that the Howland fish bypass is built as proposed, the Trust should file functional design drawings, for Commission approval, prior to initiating construction of the fish bypass channel.

- The Trust should survey the reservoirs after draining for any area of blockage to fish migration and make any modifications needed to clear the block if such obstructions are present.

- In order to minimize the adverse effects to botanical resources from dam removal activities in the Project areas, the Trust should submit an Invasive Species Monitoring and Control Plan to the Commission for approval prior to dam removal activities. This plan should at a minimum include the following information: 1) native herbaceous and shrub species that will be planted in the newly exposed riverbank areas immediately following dam removal activities; 2) locations where plantings of native species, soil testing, repeated seed broadcasting, and fertilizer application will likely occur; 3) a description of the monitoring method that will be used to identify invasive species in the Project areas; and 4) the control measures that will be used on invasive species if found to be competing with native plants in the Project areas.

- The Great Works Canoe Portage may need to be moved or extended because of the dewatering that would occur if the dam were removed. The dam was built on a ledge that could obstruct through-access and could pose a safety hazard to some paddlers. If the portage is not functional post-removal, then minor, long-term, negative effects on non-motorized boaters using the river both upstream and downstream of the project could occur. Because of this, the Trust should be required to examine the efficacy of the Great Works Canoe Portage post-removal, and file a report with the Commission on the results of its review, and if necessary, provide recommendations for a functional portage route around the obstruction.

- The Trust should consult with the USFWS and the Maine DIFW to develop a plan for surveying the three projects for bald eagle nests, prior to decommissioning activities or construction of the fish bypass. The Trust should also submit the results of the above surveys to the USFWS and Maine DIFW at least 30 days prior to the start of decommissioning and other ground-disturbing activities. If additional nests are found near construction areas this plan should also include a protocol for minimizing impacts and notifying the USFWS and the Maine DIFW.

- The Trust should continue consultation with resource agencies regarding state and federally listed species and develop mitigation plans to reduce impacts to these species.

- The MOA among the Commission and SHPO, with the PIN, Trust, and NMFS as concurring parties, executed on January 14, 2010, should be incorporated into the licenses for the Veazie, Great Works, and Howland projects.

- The Commission should retain jurisdiction of the Howland fish bypass until construction of the bypass is complete.

4.3.2 Action Alternative 1—removal of all three dams

- In order to ensure that effects resulting from dam removal activities under Action Alternative 1 at the Veazie, Great Works, and Howland Projects are minimized, the Trust should develop erosion and sedimentation control plans prior to commencing ground-disturbing activities. Such plans should include a description and design drawings of the best management practices that would be implemented by the Trust, including, but not limited to, silt fences, screens, and floating curtains, coffer dams, geotextile mats for stabilizing sediment deposits, and lay-down areas for excavated material during dam removal. The erosion and sedimentation control plan should be submitted, for approval by the Commission's Regional Engineer.

- In addition, under Action Alternative 1, the licensee should characterize the sediments and assess the potential for erosion of gullies and culverts in the Howland impoundment prior to commencing dam removal activities. The Trust should implement the various measures it proposes for the Veazie and Great Works dam removals at the Howland project under this alternative, including, but not limited to, monitoring the entire shoreline during drawdown and dam removal activities and utilize bank stabilization measures such as rip-rap, stone-toe revetments, and placement of geotextile fabric as necessary. Newly exposed soils should be stabilized with plantings of native vegetation, and outfall pipes and culverts should be extended as necessary.

- In order to ensure that effects to water quality from dam removal activities at the Howland Project is minimized, the Trust should conduct studies of sediment accumulation and heavy metal and organic compound contaminants at the Howland dam prior to removal. The results of these studies should be filed with the Commission.

- In order to reduce impacts to migrating fish, the Trust should consult with the resource agencies to determine the appropriate timing and coordination of dam removal activities.

- In order to reduce impacts to mussels or fish that may be stranded by the lowering of the reservoirs, the Trust should employ a controlled drawdown through the flood gates to allow fish or mussels to migrate to watered areas. The Trust should also consult with the resource agencies to develop a fish and mussel relocation plan.

- The Trust should survey the reservoirs after draining for any area of blockage to fish migration and make any modifications needed to clear the block if such obstructions are present.

- In order to minimize the adverse effects to botanical resources from dam removal activities in the Project areas, the Trust should submit an Invasive Species Monitoring and Control Plan to the Commission for approval prior to dam removal activities. This plan should at a minimum include the following information: 1) native herbaceous and shrub species that will be planted in the newly exposed riverbank areas immediately following dam removal activities; 2) locations where plantings of native species, soil testing, repeated seed broadcasting, and fertilizer application will likely occur; 3) a description of the monitoring method that will be used to identify invasive species in the Project areas; and 4) the control measures that will be used on invasive species if found to be competing with native plants in the Project areas.

- The Trust should consult with the USFWS and the Maine DIFW to develop a plan for surveying the three projects for bald eagle nests, prior to decommissioning activities. The Trust should also submit the results of the above surveys to the USFWS and the Maine DIFW at least 30 days prior to the start of decommissioning activities. If additional nests are found near construction areas this plan should also include a protocol for minimizing impacts and notifying the USFWS and the Maine DIFW.

- The Trust should continue consultation with resource agencies regarding state and federally listed species and develop mitigation plans to reduce impacts to these species.

- If this Action Alternative is selected, the Trust should monitor and repair structures affected by this action located in all impoundments. More specifically the Trust should place or extend rip rap where applicable, protect or remove project related electrical infrastructure during decommissioning, and finally, suitably modify water withdrawal or discharge structures located in the rivers. Short term monitoring should be performed after these stabilization efforts in order to ensure the actions are having the desired effects.

- The MOA among the Commission and SHPO, with the PIN, Trust, and NMFS as concurring parties, executed on January 14, 2010, should be incorporated into the licenses for the Veazie, Great Works, and Howland projects.

4.3.3 Action Alternative 2—surrender in place of Howland without fish bypass

- In order to ensure that effects resulting from dam removal activities under Action Alternative 2 at the Veazie and Great Works Projects, the Trust should develop erosion and sedimentation control plans prior to commencing ground-disturbing activities. Such plans should include a description and design drawings of the

BMPs that would be implemented by the Trust, including, but not limited to, silt fences, screens, and floating curtains, coffer dams, geotextile mats for stabilizing sediment deposits, and lay-down areas for material excavated during dam removal or fish-bypass construction. The erosion and sedimentation control plan should be submitted, for approval by the Commission's Regional Engineer.

- In order to reduce impacts to migrating fish, the Trust should consult with the resource agencies to determine the appropriate timing and coordination of dam removal activities.

- In order to provide continued fish passage after decommission of the Howland Project when the turbines are no longer operating, it may be necessary to provide attraction flow to the fish ladder through gates or sluiceways. The Trust should consult with the resource agencies to develop plans for gate operation after decommission of the Howland Project.

- In order to reduce impacts to mussels or fish that may be stranded by the lowering of the reservoirs, the Trust should employ a controlled drawdown through the flood gates to allow fish or mussels to migrate to watered areas. The Trust should also consult with the resource agencies to develop a fish and mussel relocation plan.

- The Trust should survey the reservoirs after draining for any area of blockage to fish migration and make any modifications needed to clear the block if such obstructions are present.

- The Trust should consult with the USFWS and the Maine DIFW to develop a plan for surveying the Veazie and Great Works Projects for bald eagle nests, prior to decommissioning activities. The Trust should also submit the results of the above surveys to the USFWS and the Maine DIFW at least 30 days prior to the start of decommissioning activities. If additional nests are found near construction areas this plan should also include a protocol for minimizing impacts and notifying the USFWS and the Maine DIFW.

- The Trust should continue consultation with resource agencies regarding state and federally listed species and develop mitigation plans to reduce impacts to these species.

- The MOA among the Commission and SHPO, with the PIN, Trust, and NMFS as concurring parties, executed on January 14, 2010, should be incorporated into the licenses for the Veazie, Great Works, and Howland projects.

- The Trust should monitor and repair structures affected by this action located in

the Veazie and Great Works impoundments if this action is selected. More specifically the Trust should place or extend rip rap where applicable, protect or remove project related electrical infrastructure during decommissioning, and finally, suitably modify water withdrawal or discharge structures located in the rivers. Short term monitoring should be performed after these stabilization efforts in order to ensure the actions are having the desired effects. Additionally, a thorough inspection of the Howland dam should be performed in order to ascertain any potential problems that may arise following surrender of the project.

4.3.4 Action Alternative 3—surrender in place of all three projects

- In order to ensure that effects resulting from dam removal activities are minimized, if implemented under the terms of the Settlement Agreement, the Trust should develop an MOA among the relevant agencies to outline erosion and sedimentation control plans prior to commencing ground-disturbing activities. The MOA should include a description of the BMPs that would be implemented by the Trust, including, but not limited to, silt fences, screens, and floating curtains, coffer dams, geotextile mats for stabilizing sediment deposits, and lay-down areas for material excavated during dam removal or fish-bypass.

- Upon the selection of this Action Alternative, the Trust should perform a thorough inspection of all three dams associated with this action to determine the integrity of the structures and reveal any potential future problems. The dams should also be inspected intermittingly under a state dam safety program.

- If the Veazie and Great Works dams are removed following surrender as specified in the Settlement Agreement, then the Trust should monitor and repair structures affected by this action located in the Veazie and Great Works impoundments. More specifically the Trust should place or extend rip rap where applicable, protect or remove project related electrical infrastructure during decommissioning, and finally, suitably modify water withdrawal or discharge structures located in the rivers. Short term monitoring should be performed after these stabilization efforts in order to ensure the actions are having the desired effects. Additionally, a thorough inspection of the Howland dam should be performed in order to ascertain any potential problems that may arise following surrender of the project.

- In order to provide continued fish passage after decommission of the projects when the turbines are no longer operating, it may be necessary to provide attraction flow to the fish ladders through gates or sluiceways. The Trust should consult with the resource agencies to develop plans for gate operation after decommission of the projects.

- The Trust should continue consultation with resource agencies regarding state and

federally listed species and develop mitigation plans to reduce impacts to these species.

- The MOA among the Commission and SHPO, with the PIN, Trust, and NMFS as concurring parties, executed on January 14, 2010, should be incorporated into the licenses for the Veazie, Great Works, and Howland projects.

4.4 STAFF RECOMMENDED ALTERNATIVE

Based on our independent review and evaluation of the environmental and economic effects of the Proposed Action, Action Alternative 1, Action Alternative 2, Action Alternative 3, and the No Action Alternative, we recommend the Proposed Action, as modified by staff and with staff identified measures, as the preferred alternative. Under the Proposed Action as modified by staff, the Commission would authorize the removal of the Great Works and Veazie dams, and authorize the construction of the Howland fish bypass. The surrenders would become effective once the Veazie and Great Works Dams are removed, all mitigation measures are completed at all three projects, and the Howland fish bypass is constructed as designed.

We recommend this alternative because the Settlement Agreement, of which the Commission is not a signatory, provides for adequate oversight of the evaluation of the bypass including the input of local experts. The environmental effects of the Proposed Action as modified by staff would be the same as those under the Proposed Action for all three projects; however, the Commission's jurisdiction would end prior to completion of the effectiveness monitoring studies of the Howland fish bypass. The signatories to the agreement would then have jurisdiction over any remaining activities and ultimate authority would be given to signatories of the Settlement Agreement to oversee these activities. This would provide similar environmental benefits as the Proposed Action, because the measures stipulated in the Settlement Agreement would be implemented at all three projects. Further, the Proposed Action as modified by staff would allow the Trust to continue generating electricity at the Great Works and Veazie Projects until dam removal activities begin, and until construction of the fish bypass begins at the Howland Project. This would provide revenue to help fund implementation of the Settlement Agreement. The public benefits of the Proposed Action as modified by staff would exceed those of the No Action Alternative.

We recommend the following environmental measures to be included in any order the Commission issues for the surrender of the Veazie, Great Works, and Howland Projects.

- In order to ensure that effects resulting from dam removal activities under the Proposed Action at the Veazie and Great Works Projects and construction of the fish-bypass channel at the Howland Project are minimized, the Trust should

develop erosion and sedimentation control plans prior to commencing ground-disturbing activities. Such plans should include a description and design drawings of the best management practices that would be implemented by the Trust, including, but not limited to, silt fences, screens, and floating curtains, coffer dams, geotextile mats for stabilizing sediment deposits, and lay-down areas for material excavated during dam removal or fish-bypass construction. The erosion and sedimentation control plan should be submitted, for approval by the Commission's Regional Engineer.

- The Trust should continue consultation with resource agencies regarding fish passage during dam removal activities to coordinate the timing of dam removal activities to ensure minimal impacts to migrating fish and to develop a relocation plan for any mussels or fish stranded during impoundment drawdowns.

- The Trust should survey the reservoirs after draining for any area of blockage to fish migration and make any modifications needed to clear the block if such obstructions are present.

- In order to minimize the adverse effects to botanical resources from dam removal activities in the Project areas, the Trust should submit an Invasive Species Monitoring and Control Plan to the Commission for approval prior to dam removal activities. This plan should at a minimum include the following information: 1) native herbaceous and shrub species that will be planted in the newly exposed riverbank areas immediately following dam removal activities; 2) locations where plantings of native species, soil testing, repeated seed broadcasting, and fertilizer application will likely occur; 3) a description of the monitoring method that will be used to identify invasive species in the Project areas; and 4) the control measures that will be used on invasive species if found to be competing with native plants in the Project areas.

- The Great Works Canoe Portage may need to be moved or extended because of the dewatering that would occur if the dam were removed. The dam was built on a ledge that could obstruct through-access and could pose a safety hazard to some paddlers. If the portage is not functional post-removal, then minor, long-term, negative effects on non-motorized boaters using the river both upstream and downstream of the project could occur. Because of this, the Trust should be required to examine the efficacy of the Great Works Canoe Portage post-removal, and file a report with the Commission on the results of its review, and if necessary, provide recommendations for a functional portage route around the obstruction.

- The Trust should consult with the USFWS and the Maine DIFW to develop a plan for surveying the three projects for bald eagle nests, prior to decommissioning activities or construction of the fish bypass. The Trust should also submit the

results of the above surveys to the USFWS and the Maine DIFW at least 30 days prior to the start of decommissioning and other ground-disturbing activities. If additional nests are found near construction areas this plan should also include a protocol for minimizing impacts and notifying the USFWS and the Maine DIFW.

- The Trust should continue consultation with resource agencies regarding state and federally listed species and develop mitigation plans to reduce impacts to these species.

- The MOA among the Commission and SHPO, with the PIN, Trust, and NMFS as concurring parties, executed on January 14, 2010, should be incorporated into the licenses for the Veazie, Great Works, and Howland projects.

- In order to allow the Commission to ensure that the Howland fish bypass is built as proposed, the Trust should file functional design drawings, for Commission approval, prior to initiating construction of the fish bypass channel.

Based on our evaluation of the environmental effects and public benefits of the Trust's proposal, we conclude that approving the surrender of the Veazie, Great Works, and Howland Projects under the Proposed Action as modified by staff and with staff-recommended environmental protection measures, would be in the public interest. Surrender of the projects would further the implementation of the Settlement Agreement and assist in the restoration of the lower Penobscot River.

4.5 CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA, 16 U.S.C. § 803 (a)(2)(A), requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. We reviewed 21 qualifying comprehensive plans that are applicable to the Veazie, Great Works and Howland Projects, located in Maine. The Proposed Action and all Action Alternatives are consistent with these comprehensive plans.

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5.0 FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent analysis, we find that the proposed surrender of the licenses for the Veazie, Great Works and Howland Projects, as modified by staff, would not constitute a major federal action significantly affecting the quality of the human environment. In addition, we find that none of the three action alternatives, with our recommended environmental measures, would constitute a major federal action significantly affecting the quality of the human environment.

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APPENDIX A

STAFF RESPONSE TO COMMENTS ON THE DRAFT EA FOR THE SURRENDER OF THE VEAZIE, GREAT WORKS, AND HOWLAND PROJECTS

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On August 4, 2009, the Federal Energy Regulatory Commission (Commission) issued a notice of availability of the DEA, which set a deadline of September 3, 2009, for filing comments. The Following entities filed comments pertaining to the DEA:

Commenting Entity	Date Filed	Type of Filing
U.S. Army Corps of Engineers	September 1, 2009	Comments
National Marine Fisheries Service	September 2, 2009	Comments
U.S. Department of the Interior	September 2, 2009	Comments
Fin & Feather Club of Maine	August 31, 2009	Comments Against
Fin & Feather Club of Maine	September 2, 2009	Comments Against
Diane Walter	September 3, 2009	Comments Against
Kenneth Fletcher	September 8, 2009	Comments Against
Town of Millinocket	September 15, 2009	Comments Against
Craig Gordon	October 7, 2009	Comments Against
State of Maine	September 1, 2009	Comprehensive Plans
Red Shield Acquistion, LLC	December 8, 2009	Comments
James Shelton	August 13, 2009	Support
Dan Moellentin	August 24, 2009	Support
Adam Johnson	August 31, 2009	Support
Alan Wojtalik	August 31, 2009	Support
Andrew Street	August 31, 2009	Support
Anthony Montapert	August 31, 2009	Support
Arleen Raymond	August 31, 2009	Support
Arran Thompson	August 31, 2009	Support
Barry Grimes	August 31, 2009	Support
C.T.	August 31, 2009	Support
Chelsea Lane-Miller	August 31, 2009	Support
Cheryl Vallone	August 31, 2009	Support
Chris Ahrens	August 31, 2009	Support
Chris Rich	August 31, 2009	Support
Christina Harmon	August 31, 2009	Support
Christine Witschi	August 31, 2009	Support
Christopher Heuman	August 31, 2009	Support
Chuck Maclin	August 31, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Curtis Welling	August 31, 2009	Support
Dan Silver	August 31, 2009	Support
David Bryson	August 31, 2009	Support
David Long	August 31, 2009	Support
David Vinski	August 31, 2009	Support
Deb Freele	August 31, 2009	Support
Delia Barrett	August 31, 2009	Support
Dennis Ledden	August 31, 2009	Support
Diana Parker	August 31, 2009	Support
Dogan Ozkan	August 31, 2009	Support
Don Preister	August 31, 2009	Support
Donna Gawlas	August 31, 2009	Support
Donna Marks	August 31, 2009	Support
Dorinda Scott	August 31, 2009	Support
Douglas Estes	August 31, 2009	Support
Douglas Underwood	August 31, 2009	Support
Eb	August 31, 2009	Support
Edward Dombroski	August 31, 2009	Support
Edward Whitney	August 31, 2009	Support
Edwin Quigley	August 31, 2009	Support
Elise Legare	August 31, 2009	Support
Elizabeth Weigle	August 31, 2009	Support
Gerald Orcholski	August 31, 2009	Support
Gerry Crow	August 31, 2009	Support
Grace Burson	August 31, 2009	Support
Grace Holden	August 31, 2009	Support
Greg Schofer	August 31, 2009	Support
Gregory Estevez	August 31, 2009	Support
Guy Winig	August 31, 2009	Support
H. Shukla	August 31, 2009	Support
Harold Stewart	August 31, 2009	Support
Heather Halvorson	August 31, 2009	Support
Helen Anderson	August 31, 2009	Support
Helen Drwinga	August 31, 2009	Support
Herbert Stein	August 31, 2009	Support
Ionna Richmond	August 31, 2009	Support
J. Copozzelli	August 31, 2009	Support

Commenting Entity	Date Filed	Type of Filing
James Harst	August 31, 2009	Support
James McRoberts	August 31, 2009	Support
James Provenzano	August 31, 2009	Support
James Salkas	August 31, 2009	Support
Jamie Lindsay	August 31, 2009	Support
Jason Kapchinske	August 31, 2009	Support
Jeff Grimes	August 31, 2009	Support
Jeff Spakowski	August 31, 2009	Support
Jenna Garvey	August 31, 2009	Support
Jessica Cresseveur	August 31, 2009	Support
Jim Geyer	August 31, 2009	Support
Joel Perkins	August 31, 2009	Support
John Brinkman	August 31, 2009	Support
John Brock Freyer	August 31, 2009	Support
Jorge Romero	August 31, 2009	Support
Joseph Labuda	August 31, 2009	Support
Joyce Blumenshine	August 31, 2009	Support
Judith Hinds	August 31, 2009	Support
Kari Knabe	August 31, 2009	Support
Kathleen Eaton	August 31, 2009	Support
Kathy Day	August 31, 2009	Support
Kathy Plate	August 31, 2009	Support
Keith Gagomiros	August 31, 2009	Support
Keith Kolischak	August 31, 2009	Support
Kristen Osman	August 31, 2009	Support
Kyle Corbeil	August 31, 2009	Support
L.G. McCandless	August 31, 2009	Support
Laura Herndon	August 31, 2009	Support
Laurie Manis	August 31, 2009	Support
Linda Bishop	August 31, 2009	Support
Linda Ore-Vopicka	August 31, 2009	Support
Lois Orchard	August 31, 2009	Support
Loreli Fister	August 31, 2009	Support
Lori Profitt	August 31, 2009	Support
Louis Kovach	August 31, 2009	Support
Louise Bavier	August 31, 2009	Support
Maggie Shermock	August 31, 2009	Support
Marcella Hammond	August 31, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Marguerite Panzica	August 31, 2009	Support
Mark Boyden	August 31, 2009	Support
Mark Giese	August 31, 2009	Support
Mark Hanson	August 31, 2009	Support
Mark Hoyer	August 31, 2009	Support
Marlana Harrison	August 31, 2009	Support
Marvin Cornell	August 31, 2009	Support
Mary Clark	August 31, 2009	Support
Mary Tucker	August 31, 2009	Support
Michael Toobert	August 31, 2009	Support
Michaela Oldfield	August 31, 2009	Support
Mikki Chalker	August 31, 2009	Support
Neil Hulbert	August 31, 2009	Support
Nick Maniatis	August 31, 2009	Support
Pat Velasquez	August 31, 2009	Support
Paul Burke	August 31, 2009	Support
Paul Orr	August 31, 2009	Support
Paula Saaf	August 31, 2009	Support
Paulette Zimmerman	August 31, 2009	Support
Rainey	August 31, 2009	Support
Randolph Gyulay	August 31, 2009	Support
Rebecca Scibek	August 31, 2009	Support
Richard Kula	August 31, 2009	Support
Richard McAnulty	August 31, 2009	Support
Rick Meyers	August 31, 2009	Support
Robert Hayden	August 31, 2009	Support
Robert Keiser	August 31, 2009	Support
Robert Rutkowski	August 31, 2009	Support
Roberta Richardson	August 31, 2009	Support
Roger Hamilton	August 31, 2009	Support
Russell Blalack	August 31, 2009	Support
Sarah Hafer	August 31, 2009	Support
Sergio Monteiro	August 31, 2009	Support
Sharon Koogler	August 31, 2009	Support
Sherry Cordova	August 31, 2009	Support
Sherry Weiland	August 31, 2009	Support
Stan Samuels	August 31, 2009	Support
Susan Pierce	August 31, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Susanne Madden	August 31, 2009	Support
T.S. McMillin	August 31, 2009	Support
Ted Newton	August 31, 2009	Support
Vic Burton	August 31, 2009	Support
Virginia Newlin	August 31, 2009	Support
Wayne Wolfram	August 31, 2009	Support
Wendy Walters	August 31, 2009	Support
William Harned	August 31, 2009	Support
Ze daLuz	August 31, 2009	Support
Alanna Louin	September 1, 2009	Support
Alexander Rouhana	September 1, 2009	Support
Alice Neuhauser	September 1, 2009	Support
Amy R.	September 1, 2009	Support
Andrew Cadot	September 1, 2009	Support
Anthony Dambrosi	September 1, 2009	Support
Art Howe	September 1, 2009	Support
Atlantic Salmon Federation	September 1, 2009	Support
Barbara Menkes	September 1, 2009	Support
Barry Tuscand	September 1, 2009	Support
Blakely LaCroix	September 1, 2009	Support
California	September 1, 2009	Support
Carolyn Gopalan	September 1, 2009	Support
Charlotte Stahl	September 1, 2009	Support
Craig Denis	September 1, 2009	Support
D. Bryan	September 1, 2009	Support
David Grant	September 1, 2009	Support
David Hedrick	September 1, 2009	Support
Diane Heath	September 1, 2009	Support
Elizabeth Beatty	September 1, 2009	Support
Florence Sullivan	September 1, 2009	Support
Frank Buckley	September 1, 2009	Support
Gerald Leitzell	September 1, 2009	Support
James Gilland	September 1, 2009	Support
Jeffery Garcia	September 1, 2009	Support
Jennifer Griffith	September 1, 2009	Support
Jerry Smith	September 1, 2009	Support
John Papandrea	September 1, 2009	Support
Joseph Ransdell-Green	September 1, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Julianne Rule	September 1, 2009	Support
Kevin Merwin	September 1, 2009	Support
Kim Johnson	September 1, 2009	Support
Louis Pontillo	September 1, 2009	Support
Maine Department of Inland Fisheries and Wildlife	September 1, 2009	Support
Maine Department of Marine Resources	September 1, 2009	Support
Maine State Planning Office	September 1, 2009	Support
Margaret Barker	September 1, 2009	Support
Marty Gooch	September 1, 2009	Support
Mary Detrick	September 1, 2009	Support
Michael Cloud	September 1, 2009	Support
Michael Evans	September 1, 2009	Support
Mike Mattox	September 1, 2009	Support
Nancy Ann Gathing	September 1, 2009	Support
Nancy Beavers	September 1, 2009	Support
Newton Logan	September 1, 2009	Support
Paul Miller	September 1, 2009	Support
Peter Bernstein	September 1, 2009	Support
Phil Gormley	September 1, 2009	Support
Randall Fiebrandt	September 1, 2009	Support
Raymond Rosson	September 1, 2009	Support
Rebecca	September 1, 2009	Support
Richard Spotts	September 1, 2009	Support
Rick Battaglia	September 1, 2009	Support
Rick Wilson	September 1, 2009	Support
Robert Cattell	September 1, 2009	Support
Robert Davis	September 1, 2009	Support
Ron Avila	September 1, 2009	Support
Russ Anderson	September 1, 2009	Support
Sara Strassman	September 1, 2009	Support
Saundra Stehlin	September 1, 2009	Support
Scootch Pankonin	September 1, 2009	Support
Simone Traverse	September 1, 2009	Support
Stephen Zerefos	September 1, 2009	Support
Steve Robey	September 1, 2009	Support
Susan Chandler	September 1, 2009	Support
Thomas Nelson	September 1, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Timothy Rosser	September 1, 2009	Support
Tobi Zausner	September 1, 2009	Support
Vicki Murillo	September 1, 2009	Support
Virginia Melick	September 1, 2009	Support
Walter Tingle	September 1, 2009	Support
William Erlenbach	September 1, 2009	Support
Becca Wilson	September 2, 2009	Support
Ben Cody	September 2, 2009	Support
Dave Amato (George May)	September 2, 2009	Support
David Enevoldsen	September 2, 2009	Support
Deborah Stephenson	September 2, 2009	Support
James Jorgenson	September 2, 2009	Support
Kevin Scott	September 2, 2009	Support
Louis Nielsen	September 2, 2009	Support
Marc Beschler	September 2, 2009	Support
Margaret McGinnis	September 2, 2009	Support
Nicole Rahman	September 2, 2009	Support
Patricia Dishman	September 2, 2009	Support
PPL Maine and PPL Great Works	September 2, 2009	Support
Steven Templeman	September 2, 2009	Support
Ted Mackmiller	September 2, 2009	Support
Teresa Kurtzhall	September 2, 2009	Support
Victoria Beerman	September 2, 2009	Support
William Bryan	September 2, 2009	Support
Candy Hammond	September 3, 2009	Support
John Mattern III	September 3, 2009	Support
Michael Hammond	September 3, 2009	Support
Natural Resources Council of Maine	September 3, 2009	Support
Penboscot River Restoration Trust	September 3, 2009	Support
Stephanie Lidloff	September 3, 2009	Support
Trout Unlimited	September 3, 2009	Support
Corolyn Whiting	September 4, 2009	Support
Franklin Dwyer	September 4, 2009	Support
Luanne Serrato	September 4, 2009	Support
Rosmary Busterna	September 4, 2009	Support
Brian Gibbons	September 8, 2009	Support
Francisco Costa	September 8, 2009	Support
Franklin Platizky	September 8, 2009	Support

Commenting Entity	Date Filed	Type of Filing
Maine Audubon	September 8, 2009	Support
Mary Hickey	September 8, 2009	Support
The Nature Conservancy	September 8, 2009	Support

In this appendix, we summarize the comments received, provide response to those comments, and indicate where we have modified the text of the DEA. Many of the commentors only voiced their support for the proposal, and their comments are not addressed below. Comments on specific issues pertaining to the proposal or the Commission's DEA have been addressed below. We have grouped the comments by topic.

General

Comment: NMFS comments that it supports the Commission's identification of the proposed action with staff identified measures as the preferred alternative.

Response: NMFS support of the DEA's findings has been noted by Commission staff.

Comment: NMFS comments that the DEA would benefit from an expanded discussion of the public involvement to date to indicate how major comments received during public meetings were considered in developing the scope of the analysis and the alternatives considered in the DEA.

Response: Table 1, which summarizes by resource the issues identified during scoping meetings, has been added to FEA section 1.4.1.

Comment: NMFS recommends that the EA be revised to include a more robust analysis of the conditions and impacts to the human and natural environment during construction at the three projects.

Response: Comment noted. Commission staff analyzed the potential impacts to the human and natural environment that would result from approval of the Trust's proposal.

Comment: NMFS comments that the word "fish" should be replaced with "Atlantic salmon" in the first sentence of the second paragraph on page 42, and the first sentence of the third paragraph on page 46.

Response: We have corrected this in the FEA.

Comment: NMFS comments that Atlantic salmon habitat description be replaced with "Grows to maturity in ocean and returns to rivers to spawn and rear" in Table 9 on page 59.

Response: We have corrected this in the FEA.

Comment: NMFS comments that the following sentence be added to footnote 39 on page 59: "On June 19, 2009, NMFS and USFWS published a Final Rule in the Federal Register expanding the geographic range for the listing of Atlantic salmon to include the Penobscot River upstream of the former Bangor dam."

Response: This sentence has been added in the FEA.

Comment: NMFS comments that the last sentence on page 61 should indicate that Atlantic sturgeon are a candidate species.

Response: We have corrected this in the FEA.

Comment: NMFS comments that the second sentence in the first paragraph on page 62 should be replaced with: "The geographic extent of the Gulf of Maine DPS of Atlantic salmon currently includes the waters of the Veazie, Great Works, and Howland Projects."

Response: This sentence has been added in the FEA.

Comment: NMFS comments that the word "fish" be replaced with "Atlantic salmon" in the first sentence of the third paragraph on page 90.

Response: We have made this change in the FEA.

Comment: NMFS comments that the last paragraph on page 92 should note that removal of the Great Works dam should not disrupt current trapping and trucking of Atlantic salmon.

Response: We have made this change in the FEA.

Comment: NMFS comments that the following sentence should be added to the first paragraph on page 128: "Listed Atlantic salmon are known to occur in the Piscataquis River."

Response: We have added this sentence in the FEA.

Comment: NMFS comments that the following sentence should be added to the last

paragraph on page 140: "Listed Atlantic salmon are known to occur in both rivers."

Response: We have added this sentence in the FEA.

Comment: NMFS comments that the second sentence in the first paragraph on page 147 should be replaced with the following: "However, since listed Atlantic salmon and critical habitat occur in the Piscataquis and Penobscot Rivers, surrendering the Howland Project in place would require consultation with NMFS under section 7 of the ESA."

Response: We have made this change in the FEA.

Comment: NMFS comments that the following sentence should be added to the last paragraph on page 154: "Listed Atlantic salmon are known to occur in the Penobscot River."

Response: We have added this sentence in the FEA.

Comment: NMFS comments that the first paragraph on page 155 should indicate that Atlantic sturgeon are a candidate species.

Response: We have made this change in the FEA.

Comment: NMFS comments that in the first sentence of Section 3.7.1.2. "would not be affected" should be replaced with "would continue to be affected by project operation." NMFS further comments that the second sentence be replaced with the following: "Because listed Atlantic salmon and critical habitat are present in the Penobscot River, consultation with the NMFS under section 7 of the ESA will be necessary to ensure the protection of the species and its critical habitat."

Response: We have made these changes in the FEA.

Comment: NMFS comments that in the first sentence of Section 3.7.2.2. "would not be affected" should be replaced with "would continue to be affected by project operation." NMFS further comments that the second sentence be replaced with the following: "Because listed Atlantic salmon and critical habitat are present in the Penobscot River, consultation with the NMFS under section 7 of the ESA will be necessary to ensure the protection of the species and its critical habitat."

Response: We have made these changes in the FEA.

Comment: NMFS comments that section 3.7.3.2. should read as follows: "Because the Piscataquis River contains listed Atlantic salmon and critical habitat, consultation with the NMFS under section 7 of the ESA will be necessary to ensure the protection of the

species and its critical habitat."

Response: We have made this change in the FEA.

Comment: NMFS comments that the word "remedies" should be replaced with "strategies" in the first paragraph on page 164.

Response: We have made this change in the FEA.

Comment: The State of Maine requests that the Commission accept the *Strategic Plan for the Restoration of Diadromous Fishes to the Penboscot River* and *Operational Plan for the Restoration of Diadromous Fishes to the Penobscot River* as comprehensive plans under section 10(a)(2) of the Federal Power Act (FPA).

Response: We have added these plans to the list of comprehensive plans in section 4.5 of the FEA.

Comment: The Maine DMR, Maine DIFW, Maine SPO, and ASC comment that they concur with the conclusions of the DEA and the selection of the proposed action with staff identified measures as the preferred alternative.

Response: We note the Maine state agencies' concurrence with the conclusions of the DEA.

Comment: The Trust, PPL Maine, PPL Great Works, Trout Unlimited, Natural Resources Council of Maine, Maine Audubon, and the Nature Conservancy comment that they concur with the conclusions of the DEA.

Response: The concurrence of the Trust, PPL Maine, PPL Great Works, Trout Unlimited, Natural Resources Council of Maine, Maine Audubon, and the Nature Conservancy has been noted by Commission staff.

Comment: Interior comments that it supports the Commission's recommendation of the proposed alternative with staff identified measures because it is the alternative that is most consistent with the intent of the Settlement Agreement.

Response: Interior's support has been noted.

Comment: Interior comments that the evaluation of the environmental effects of alternatives 1, 2 and 3 in the DEA does not reflect the uncertainty of an outcome under the Settlement Agreement in the event one of them is selected. Commission staff treats the environmental effects of alternatives 1, 2, and 3 as certain, though this is not the case due to the structure of the Settlement Agreement. The Settlement Agreement provides

that closing of the sale of the projects to the Trust does not take place until after issuance of the orders requested, without alteration or change in a manner that prejudices any party to the Settlement Agreement, unless the change is deemed acceptable by the parties. The Interior comments that the DEA should be modified to reflect the uncertainty inherent in the Commission's approval of alternatives 1, 2, and 3.

Response: The Commission is aware that the structure of the Settlement Agreement does not guarantee closing unless the Commission issues an order congruent with the terms and conditions of the agreement. However, the Commission is not a signatory to the Settlement Agreement, and is not limited by that agreement. Commission staff identified and analyzed three alternatives to the proposal that would accomplish the same goal (i.e., surrender of the project licenses) as the Trust's proposal.

Comment: Interior comments that though the DEA describes the proposed action as including a 15-year monitoring period to determine the effectiveness of the Howland fish bypass, the Commission staff's recommended alternative states that the Commission's jurisdiction would end prior to the completion of the 15-year monitoring period. Interior recommends that the Commission clarify whether it intends to retain jurisdiction until the bypass is shown to be effective, or whether it would end its jurisdiction prior to this determination.

Response: This FEA will be used in the Commission's decision on the licensee's application. Such a decision will be made in an order, rather than in this FEA. Thus, Commission staff does not find it appropriate to speculate on its intentions in this FEA.

Comment: Interior comments that the DEA is unnecessarily declarative concerning the presence of federal lands within the projects' boundaries. Interior disagrees with the statement that "None of the project boundaries contain federal lands" in DEA section 1.3.1.2., and asserts that lands of the United States are affected since the PIN is an Indian reservation under federal law. Interior comments that since other parties to the Settlement Agreement disagree and assert that no federal lands are within the project boundaries, the parties have agreed that the question of the federal status of lands under section 4(e) of the FPA is not one that needs to be resolved. Interior recommends that DEA section 1.3.1.2. be revised to state: "No conditions under section 4(e) are presented to the Commission by any federal land management agency in this proceeding."

Response: We have made this change in the FEA.

Comment: The Fin and Feather Club of Maine comments that it does not think it was coincidental that after their initial comments were filed on August 31, 2009, the Commission's website was inundated with numerous comments supporting the project. The Fin and Feather Club comments that most of these filings said basically the same thing, many were not signed or addressed and many were from individuals that do not

live in the project areas. The Fin and Feather Club believes that this was an attempt to overshadow its' previous comments.

Response: The sudden influx of comments that began on August 31, 2009, after the Fin and Feather Club filed its initial comments on the DEA was entirely coincidental. It is a common occurrence that a large number of comments are filed just before the comment deadline date of public notices issued by the Commission. In this case, the notice of the DEA set a deadline of September 4, 2009, for filing comments; thus, entities wishing to file comments were doing so in the few last days of the notice period. Further, most of the comments received were filed electronically using the Commission's e-filing system or "quick comment" option for commenting on Commission proceedings. While the text of some of the comments did not indentify the commenter, the name of each commenter was recorded by the e-filing or quick comment systems and appears in the description field of each comment when viewed in the Commission's e-library system. The Commission does not prejudice or prohibit any entities from filing comments relating to Commission proceeding; therefore, an entities place of business or residence does not have any bearing on their ability to comment on any pending proceedings.

Comment: Kenneth Fletcher comments that the DEA repeats many of the same assumptions made for the Edwards and Fort Halifax dam removals by over-stating the benefits and under-estimating the costs and consequences. Specifically, Mr. Fletcher comments that the actual cost of the Edwards and Fort Halifax dam removals was higher than projected, anticipated increases in recreational opportunities and economic benefits have not occurred, erosion is more severe than anticipated, and the environmental consequences were not fully considered. He recommends that the Commission evaluate the assumed benefits of the Trust's proposal with the outcomes of the Edwards and Fort Halifax dam removals.

Response: Comment noted. The Commission has analyzed the Trust's proposal based on the best information available and has outlined the expected impacts to environmental resources at the projects.

Comment: USACE comments that DEA section 1.2 does not define the project purpose, only the purpose of the Commission's action. USACE recommends that the Commission clearly establish the project purpose to establish a baseline for comparing the practicability of various alternatives.

Response: The Trust's proposal to surrender the Veazie, Great Works, and Howland projects is one phase of the larger Penobscot River Restoration Project, which is a collaborative project that resulted from the Settlement Agreement. The Settlement Agreement and restoration project are described in DEA section 1.1. and outline the underlying reasons for the Trust's proposal. The Trust's current proposal represents the third phase of Settlement Agreement implementation. The Commission has previously

acted on applications relating to phases I and II of the Settlement Agreement, which authorized amendments to several other hydroelectric projects in the region, and has treated those amendments as distinct, separate actions. Though the overarching goal of the Settlement Agreement is to restore fish passage to the upper Penobscot River watershed, the purpose of the proposed action is to surrender the licenses for the Veazie, Great Works, and Howland projects, remove the Veazie and Great Works dams, and construct a fish bypass channel around the Howland dam. DEA section 1.2. provides a description of the purpose of the Trust's proposal.

Comment: USACE comments that, with regard to section 2 of the DEA, it is not possible to discuss alternatives without first defining the basic project purpose. Presumably, the purpose of the project is to restore fish passage to the upper Penobscot River.

Response: As discussed above, DEA section 1.2. describes the purpose of the project, which is to surrender the licenses for the Veazie, Great Works, and Howland projects, remove the Veazie and Great Works dam, and construct a fish bypass channel around the Howland dam. Further, section 3.8 describes how the Trust's proposal fits into long-term plans to restore native sea-run fish to the Penobscot River.

Comment: USACE comments that the discussion of the no-action alternative in section 2.1 of the DEA fails to demonstrate why the no-action alternative does or does not meet the as yet undefined basic project purpose.

Response: The no-action alternative would not meet the project purpose of surrendering the projects' licenses and restoring fish-passage to the upper Penobscot River because the projects' licenses would not be surrendered, the Veazie and Great Works dams would remain, and the Howland fish bypass would not be constructed.

Comment: USACE comments that the Trust's anticipated schedule indicates fall 2009 for receiving state and federal permits, which it feels is not a realistic goal. USACE suggests that winter 2010 is a more realistic goal, and comments that it requires a minimum 120 processing time once the public notice has been issued, which has not yet occurred.

Response: This comment has been noted. The schedule listed in DEA section 2.2.4. is the schedule proposed by the Trust, and is not the final construction schedule.

Comment: USACE comments that the Commission should add a section to the EA, perhaps section 2.6, to discuss other alternatives that have been considered.

Response: The alternatives analyzed in the DEA were considered because selection of any one of the alternatives would provide reasonable options that would meet the Trust's

purpose of surrendering the projects and would allow the Trust and the Settlement Agreement parties to proceed with the implementation of the Settlement Agreement as they deem fit. There is no need to discuss alternatives that were dismissed from analysis.

Comment: USACE comments that there is no mention of a scope of analysis for indirect impacts in section 3.2, which is a requirement of NEPA.

Response: Comment noted. In the DEA, the Commission staff analyzed the anticipated direct and indirect impacts of the Trust's proposal to surrender the projects, remove the Veazie and Great Works dams, remove the flashboards from Howland dam, and construct a fish bypass channel around the Howland dam. This analysis included the impacts expected to occur in the vicinity of each project.

Comment: USACE comments that the Commission should define indirect impacts, perhaps by adding a section 3.9, in accordance with NEPA, and should include indirect impacts to terrestrial and aquatic resources from habitat conversion from dewatering.

Response: Comment noted. The DEA analyzes indirect impacts associated with implementation of the Trust's proposal and discusses anticipated changes and impacts to terrestrial and aquatic resources in various sections including sections 3.3.1., 3.3.2., and 3.3.3.

Comment: USACE comments that cumulative impacts (DEA section 3.8) need to be better addressed and recommends that the Commission contact the USFWS, Natural Resources Conservation Service, National Oceanic and Atmospheric Administration, and U.S. Environmental Protection Agency to determine what actions have been taken, are presently underway, or are scheduled to occur that may have a bearing on the cumulative impact analysis, and the DEA be updated accordingly. USACE comments that it has taken a total of 124 permit action in the area since 1990, and recommends that the DEA reflect municipal and private actions as well.

Response: Comment noted. The Commission analyzed the cumulative effects that approval of the Trust's proposal would have on other resources at the projects and in their surrounding areas.

Comment: USACE comments that non-winter photos of the projects would be more descriptive.

Response: The winter photographs in the DEA were taken by Commission staff during their January 2009 visit to the projects. The USACE's comment is noted.

Comment: USACE comments that section 1.3.2. of the DEA mentions section 401 of the Clean Water Act but not section 404. The USACE recommends that the following be

added to section 1.3.2.: "Under Section 404 of the Clean Water Act, a permit is required from the USACE for the permanent or temporary discharge of dredged or fill material in to waterways and wetlands. On September 26, 2008, the Trust applied to the Corps."

Response: Comment noted.

Comment: The USACE comments that the Commission should add the following section to the EA to outline the USACE's jurisdiction under section 10 of the Rivers and Harbors Act: "Under section 10 of the Rivers and Harbors Act of 1899, a permit is required from the USACE for any work performed in navigable waters. The Penobscot River has been declared navigable from its mouth to the confluence of its east and west branches at Medway, Maine. On September 26, 2008, the Trust applied to the Corps."

Response: Comment Noted.

Comment: Red Shield Acquisition comments that any order regarding surrender and removal of the Great Works Project should include the following Condition: "The Trust should monitor and repair structures affected by this action located in all impoundments. More specifically, the Trust should place or extend rip rap where applicable, protect or remove project related electrical infrastructure during decommissioning, and finally, suitably modify water withdrawal or discharge structures located in the river. Short term monitoring should be performed after these stabilization efforts in order to ensure the action are having the desired effects."

Red Shield Acquistion comments that despite the conclusion of the DEA that the proposed action would adversely impact infrastructure, the conditions proposed by staff do not specifically required that the Trust implement the modifications necessary to mitigate the anticipated adverse impacts to infrastructure, including Red Shiled Mill's water intake.[53]

Response: The staff recommendations made in the DEA are in addition to the measures to mitigate various impacts included in the Trust's proposal. Since the Trust proposes to coordinate with Red Shield Mill for replacement of its water inatake, approval of the proposal would make this measure a requirement.

<u>Invasive Species</u>

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[53] In response to Red Shield's comment, the Trust states that the Commission should disregard Red Shield's comment, since the Commission has provided repeated opportunities for comment on the Trust's proposal and consideration of any further comments would be prejudicial to the Trust.

Comment: The Fin and Feather Club of Maine, Town of Millinocket, and Craig Gordon comment that they are opposed to the Trust's proposal and believe that removal of the Veazie and Great Works dams, and construction of a fish bypass channel at the Howland dam would facilitate the spread of invasive aquatic species, particularly northern pike (*Esox lucius*) and alewives (*Alosa pseudoharengus*), into the upper Penobscot River watershed and the Piscataquis River. The Fin and Feather Club, Town of Millinocket, and Craig Gordon assert that the inevitable migration of these species upriver would directly threaten native species.

Response: Approval of the Trust's proposal would provide unimpeded fish passage around the Howland dam into the Piscataquis River, which would allow all fish species to circumnavigate the dam. Commission staff has determined that although the possibility exists for invasive species, such as northern pike, to spread as a result of its action, this possibility is small and the benefits outweigh the potential harm. This view is shared Interior, which by letter filed September 2, 2009, states: "The Department does not believe that the Proposed Action is likely to cause or promote the spread of any invasive species, and, even if there were a risk of spread, the benefits of the Proposed Action clearly outweigh the potential harm."

The Maine DMR and the Maine DIFW published an Operational Plan for the Restoration of Diadromous Fishes to the Penobscot River (Maine DMR and Maine DIFW, 2009). Section 4 of the State's plan identifies the objective to restrict upstream passage of non-native species where risks are the greatest. The plan further discusses tasks to, among other things: 1) to survey potential connection between waterways in the Penobscot River headwaters; 2) maintain current blockages in some locations in the headwaters; 3) create velocity or jump barriers at Guilford; and 4) determine if juvenile northern pike are present in the headwaters (Maine DMR and Maine DIFW, 2009). Implementation of these provisions would help to minimize the risk that invasive aquatic species would be spread as a result of approving the Trust's proposal.

Comment: The Fin and Feather Club of Maine, Town of Millinocket, and Craig Gordon comment that the Commission's DEA has disregarded Executive Order No. 13112, which directs federal agencies "to prevent the introduction of invasive species". The Fin and Feather Club recommends that the Commission hold a public meeting to hear the public's concerns as required by the executive order. The Fin and Feather Club and Town of Millinocket further comment that the DEA does not consider Maine's invasive species plan or the Maine DIFW plan for northern pike containment.

Response: Executive Order 13112 requires, among other things, that any federal agency whose actions may affect the status of invasive species to (1) identify such actions; (2) prevent the introduction of invasive species; and (3) not carry out actions that are likely to cause the spread of invasive species unless the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm.

Commission staff has determined that although the possibility exists for invasive species (e.g., northern pike) to spread as a result of its action, this possibility is small and the benefits outweigh the potential harm. This view is shared Interior, which by letter filed September 2, 2009, states: "The Department does not believe that the Proposed Action is likely to cause or promote the spread of any invasive species, and, even if there were a risk of spread, the benefits of the Proposed Action clearly outweigh the potential harm." Additionally, Interior noted that Executive Order 13112 also calls for the restoration of native species and habitat conditions to reduce the effects of invasive species and to prevent further invasions, of which the Proposed Action would be a significant contribution.

Comment: Interior comments that it is aware of comments pertaining to Executive Order 13112 and the federal consistency with this order regarding access of northern pike to the Piscataquis River upon construction of the fish bypass at the Howland dam. Interior comments that it does not believe that the Trust's proposal is likely to cause or promote the spread of any invasive species, and, even if there were a risk of spread, the benefits of the Trust's proposal clearly outweigh the potential harm. The USFWS does not maintain a list of species that meets the regulatory definition of invasive other than the list of injurious species under the Lacey Act, which does not include northern pike.

Interior supports state programs to control introduced species, and notes that control measures have been implemented by the state and its partners for the northern pike population in Pushaw Lake and Mud Pond, and that the USFWS helped develop the *Operational Plan for the Restoration of Diadromous Fishes in the Penobscot River* that provides measures to selectively control and manage northern pike. Interior further comments that section 2(2)(iv) of the Executive Order calls for the restoration of native species and habitat to reduce the effects of invasive species and to prevent further invasions. The Trust's proposed action is meant to restore migratory fish to the watershed, and is consistent with the Executive Order. Interior feels that the Executive Order has been fulfilled and that the benefits of the proposed project outweigh any potential negative effects.

Response: Interior's comment is noted.

Comment: Craig Gordon recommends that the Commission require the Trust to build a 100% trap and sort facility to be staffed 24 hours-per-day at the Howland bypass to minimize the risk of northern pike migrating into the Upper Penobscot River watershed and Piscataquis River.

Response: In early design discussions, the feasibility and cost of the installation of a trap-and-sort facility at the Howland bypass was considered. Maintenance and operation of such a facility such as trapping, sorting, or trucking of fish would be the responsibility of the resource agencies, under the terms of the Settlement Agreement. Stantec

developed designs for the trap and sort facility and evaluated the effectiveness of such facilities.[54] Stantec and the resource agencies determined that it is unlikely that the facility could be 100 percent effective in preventing undesirable species, including northern pike, from passing the Howland dam because of uncertainty about the swimming capacity of northern pike and concerns that required manual sorting would be subject to error due the large number of fish that would need to be handled. Based on information and analyses performed for this feasibility study, a trap and sort facility would negate any benefits associated with the use of a nature-like fishway by hindering the free movement of migrating fishes at Howland dam. The proposed trap and sort facility would have negative impacts on target species, including migratory delays, required handling of all fish passed, potential injuries to fish that attempted to leap the barrier, crowding, and the need for a separate eel passage facility and thus have substantial impacts on safe, timely and effective fish passage at the Howland dam.

Comment: The Fin and Feather Club of Maine comments that it feels that the Maine DMR and DIFW's plans to stop or slow down northern pike migration are a ruse, and question the departments' neutrality since they are signatories of the settlement agreement.

Response: Comment noted.

Comment: The Fin and Feather Club comments that there was no concern about invasive species until the issue was brought up, and questions whether any control measures have been implemented as indicated by Interior. Fin and Feather comments that Interior completed the risk assessment under Executive Order 13112 without public input, and that the underlying principle behind the risk assessment was that northern pike would eventually pass through the Howland fish bypass.

Response: Comment noted.

Socioeconomics

Comment: Diane Walter comments that she is concerned with regard to potential damage to her home and property, which is located near the east abutment of the Great Works dam, and conveys her general opposition to the proposal. Ms. Walter comments that she wants a written agreement that the Trust would cover all losses to her home and any others that may be affected by removing the Great Works dam.

Response: Removal of the Great Works dam is unlikely to affect Ms. Walter's property. Ms. Walter's residence is located near the east abutment of the dam on a high terrace

[54] See Stantec's May 20, 2008 report filed by the Trust on February 20, 2009.

overlooking the river. The land in this area is relatively flat, and would not likely be susceptible to mass-wasting, bank slumping, or increased erosion as a result of removing the Great Works dam. Since Ms. Walter's property is located outside of the project boundary, development of any agreement between the Trust and Ms. Walter is outside of the Commission's jurisdiction and would need to be addressed between the Trust and Ms. Walter.

Comment: Craig Gordon comments that the Veazie, Great Works, and Howland projects should be refurbished, not decommissioned as proposed. Greater public good would come from generating power at the project than restoring fish habitat.

Response: The Trust's proposal to surrender the projects' licenses, remove the Veazie and Great Works dams, and construct a fish bypass around the Howland dam represent phase three of the Settlement Agreement. Settlement Agreement phase two facilitated amendments to the Medway and Stillwater Projects' licenses (FERC Nos. 2666 and 2712, respectively) to increase the maximum elevation of their project reservoirs for additional generation and the licensing of the Orono Project (FERC No. 2710), which was previously out of service due to penstock failure. Upon completion of the proposed project surrenders, Settlement Agreement phase four permits PPL to pursue energy enhancements at other hydropower project in the Penobscot River basin, which would allow PPL to retain 90 percent of the generating capacity that would be lost from surrender in the Veazie, Great Works, and Howland projects. As such, restoration of fish passage to the upper Penobscot River and Piscataquis River would only require a reduction of renewable energy capacity of 10 percent, which could easily be offset through increased power generation at existing facilities in the region. Restoration of fish passage in the Penobscot River watershed would benefit the public by helping to increase populations of Atlantic salmon, alewife, American eel, and several other fish species, which would benefit regional tourism, recreation, commercial fishing, and enhance the quality of the Penobscot River ecosystem.

Comment: Kenneth Fletcher comments that the value of hydropower was minimized in the analysis of the Edwards and Fort Halifax dam removals, allowing natural gas to be cited as more cost effective. He comments that increased generation of greenhouse gases from natural gas fueled generators is a major concern in the region, natural gas rates have risen dramatically, and Maine ratepayers will be subject to rate increases of at least $26 million per year for carbon dioxide credits as part of the Regional Greenhouse Gas Initiative.

Response: Comment noted.

Comment: The Fin and Feather Club of Maine comments that hydropower is crucial to Maine and New England, the dams should be kept for renewable energy, and new generators should be installed at other dams in the region to decrease our dependence on

fossil fuels.

Response: Comment noted.

Comment: The Fin and Feather Club of Maine comments that potential benefits to community based fisheries, such as alewife, seem to be the major reasoning for the Trust's proposal since alewife are used for bait in the lobster industry that contributes $300 million to Maine's economy.

Response: The restoration of migratory fish, including alewife, Atlantic salmon, and American eel, is a goal of the Settlement Agreement. Because their numbers are so low, much attention is given to the Atlantic salmon, though populations of other fish species have also declined for many of the same reasons, including blockage of fish passage by dams. Alwife is one of these species, and is used as bait by lobstermen and commercial groundfishing operations in the Gulf of Maine. Restoration of alewife, Atlantic salmon, and other migratory fishes in the Penobscot River would benefit recreation, tourism, commercial fishing, and subsistence of native people in Maine.

Fish Passage

Comment: The Fin and Feather Club of Maine comments that the DEA does not address the fact that most predatory problems with salmon are in the ocean and not the Penobscot River.

Response: Though natural predation of Atlantic salmon and other conditions in the ocean may affect populations of the species, habitat degredation and barriers to fish movement are widely accepted to be two major factors in the precipitous decline of populations of Atlantic salmon, pacific salmon species, and other migratory fishes. These reasons led to the development of the Settlement Agreement and the movement to restore spawning and rearing habitat and remove other dams on coastal rivers and streams throughout the United States.

Comment: Interior comments that two areas near French Island, upstream of the Great Works dam, would not meet its minimum water velocity criteria for fish passage during May. Thus, it recommends that an evaluation of the French Island area should be conducted after the dam is removed.

Response: Commission staff agrees with Interior, and has recommended that the Trust should survey the reservoirs (including French Island) after draining for any areas of blockage to fish migration and make any modifications needed to clear the blockage if such obstructions are present.

Comment: Interior recommends that the Commission include a condition for checking

and reporting on the final form of the Howland fish bypass to determine that the bypass was constructed as designed, even if the Commission intends to terminate its jurisdiction after construction. If the Commission intends to extend its jurisdiction beyond the point of construction of the bypass, it should require an effectiveness monitoring plan for upstream passage of Atlantic salmon, alewife, and American shad.

Response: Comment noted. The FEA recommends that the Trust be required to file, for approval, functional design drawings of the Howland fish bypass prior to commencing construction of the bypass.

Wetlands

Comment: USACE comments that section 4.4 of the DEA does not mention compensatory mitigation for direct or indirect impacts to wetlands, and recommends that the Commission require the Trust to continue consultation with the USACE and Maine DEP to develop a compensatory wetland mitigation plan.

Response: As indicated in the DEA analysis for the Veazie and Great Works impoundments, removal of the project dams and draining of the impoundments would create new wetlands and change the classification of some existing wetlands. Thus, the Commission staff do not feel that it is necessary for the Trust to develop a mitigation plan to address these effects. With regard to the Howland Project, the Commission staff agrees that the 0.4 acre of wetland lost to construction of the Howland fish bypass would indirectly impact the viability of the remaining 0.07 acre of wetland at that location; however, we do not feel that mitigation is necessary since the overall effects of project surrender and lowering thet impoundment would likely result in new or expanded areas of wetlands along the shoreline.

Comment: USACE comments that while the 0.4 acre of wetland loss resulting from construction of the Howland fish bypass is identified in DEA section 3.3.3.4., it believes the remainder of the wetland will be indirectly impacted by fragmentation and altered hydrology, and questions its long-term viability as a functioning wetland.

Response: Commission staff agrees that the 0.4 acre of wetland lost to construction of the Howland fish bypass would indirectly impact the viability of the remaining 0.07 acre of wetland at that location. However, we do not feel that mitigation is necessary since the overall effects of project surrender and lowering thet impoundment would likely result in new or expanded areas of wetlands along the shoreline.

Comment: USACE comments that DEA sections 3.3.1.4., 3.3.2.4., and 3.3.3.4. should reference that Stantec identified wetlands in accordance with the guidance of the 1987 Corps of Engineers Wetland Delineation Manual.

Response: We have made this change in the FEA.

Environmental Concerns

Comment: Craig Gordon comments that the ecosystems surrounding the projects have adapted to the presence of the dams and impoundments, and permanently lowered water levels resulting from approval of the Trust's proposal would result in massive die-off among wildlife and organisms living at the projects.

Response: There is no doubt, given the amount of times that the dams have been in place that the surrounding environment has adapted to the conditions created by these projects. However, the intent of the Trust's proposal is to surrender the projects and return the Veazie and Great Works projects to natural conditions. The shift from the current lentic conditions to natural lotic conditions would result in changes of the animal and plant communities present. In order to minimize mortality of aquatic organisms, the Trust proposes to gradually draw the impoundments down to allow organisms to respond to the changing water levels.

Comment: Kenneth Fletcher comments that draining of the project impoundments would result in the mass destruction of aquatic life. He states that soft sediments exposed during the Fort Halifax dam removal prevented the rescue and relocation of millions of mollusks. Further, Kenneth Fletcher comments that new wetlands have not formed as was anticipated because the resulting topography is not conducive to wetland formation.

Response: As discussed above, the shift from the current lentic to natural lotic conditions at the projects would result in changes of the animal and plant communities present. In order to minimize mortality of aquatic organisms, the Trust proposes to gradually draw the impoundments down to allow organisms to respond to the changing water levels, and would implement rescue and relocation efforts to prevent the stranding of fish or mussel species. Based on the sediment analyses of the Great Works and Veazie impoundments, there are no significant deposits of fine sediments that would prevent access to mussels or fish exposed during dewatering the impoundments.

Comment: Interior comments that the Commission should clarify the disposition of previously submerged project lands by providing a more detailed description of the future use of newly exposed areas, and the potential for managing the lands as fish and wildlife habitat. The DOI also suggests that a plan should be developed that identified which lands would be protected and by what means.

Response: Staff notes that the Trust's ability to manage these lands would vary based on the land rights acquired by the Trust (e.g., fee ownership, flowage easement, etc.) on newly exposed lands. As stated above, the Trust would consider a variety of options for the use of developed parcels and attempt to conserve undeveloped parcels for wildlife

habitat and recreational purposes. Even if the development of such partnerships was unsuccessful, the use of previously inundated areas would likely reflect that of back-lying areas and any level of environmental protection or development that exists therein. The Commission would not have jurisdiction of these lands and therefore, can not require the Trust to develop such a plan.

Comment: USACE comments the discussion about the coal tar deposits in Dennets Cove in section 3.3.1.1. should be revised to reflect that the areas with the highest concentrations of coal tar will be dredged and removed, and the remaining higher concentration will be capped and contained in place, by the end of December 2009.

Response: We have made this change in the FEA.