Federal Energy Regulatory Commission

Office of
Hydropower
Licensing

October 1997

FERC/FEIS-0082

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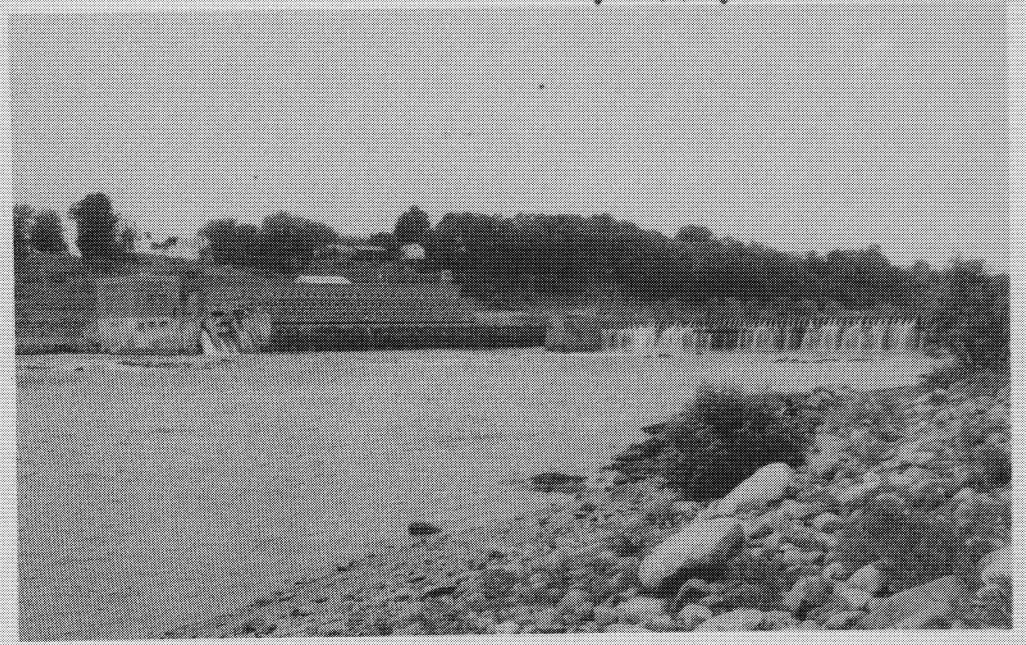
FINAL ENVIRONMENTAL IMPACT STATEMENT

Lower Penobscot River Basin

Maine

Part 1 of 3



Basin Mills Hydroelectric Project
(FERC No. 10981)

Stillwater Hydroelectric Project
(FERC No. 2712)

Milford Hydroelectric Project
(FERC No. 2534)

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING

FINAL ENVIRONMENTAL IMPACT STATEMENT

LICENSING THREE HYDROELECTRIC PROJECTS IN THE LOWER PENOBSCOT RIVER BASIN

FERC Project Nos.

10981 Basin Mills
2712 Stillwater
2534 Milford

Applicant:

Bangor Hydro-Electric Company

Additional copies of the FEIS are available from:

Federal Energy Regulatory Commission
Public Reference and Files Maintenance Branch
888 First Street, N.E. Room 2A
Washington, DC 20426

October 1997

FEDERAL ENERGY REGULATORY COMMISSION
Washington, DC 20426

TO THE PARTY ADDRESSED

Attached is the final environmental impact statement (FEIS) for licensing a new hydroelectric development as part of the Basin Mills Project (FERC No. 10981) and relicensing the existing Stillwater (FERC No. 2712) and Milford (FERC No. 2534) hydroelectric projects. All three projects are in Penobscot County, Maine. This FEIS was prepared pursuant to requirements of the National Environmental Policy Act (NEPA) and the Commission's regulations implementing NEPA (18 CFR Part 380).

The FEIS documents the views of government agencies, nongovernmental organizations, affected Indian tribes, the public, the license applicant, and the Commission's staff. It contains staff's recommendations about licensing the Basin Mills, Stillwater, and Milford projects in the lower Penobscot River Basin.

Any Commission order issued pursuant to this document will be subject to the Commission's rehearing process under 18 CFR Section 185.713. Requests for rehearing must be filed within 30 days of the date of issuance of the subject order.

Before the Commission makes a decision on licensing and relicensing these projects, it will take into account all concerns relevant to the public interest. This FEIS will be part of the record from which the Commission will make its decision.

Attachment

COVER SHEET

a. Title: Licenses for Three Hydroelectric Projects in the Lower Penobscot River Basin, FERC Project Nos. 10981, 2712, and 2534.

b. Final Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: Bangor Hydro-Electric Company (BHE) filed applications for licenses for three hydroelectric projects within the lower Penobscot River Basin. The proposed Basin Mills Project (FERC No. 10981) would involve constructing a new Basin Mills development, expanding the Veazie development, and decommissioning the Orono development. As proposed by BHE, the project would generate 271.8 million kilowatt-hours (kWh) of electrical energy per year. BHE proposes no increase in generating capacity at the Stillwater Project (FERC No. 2712) and would continue to operate the project as a run-of-river facility. BHE proposes to increase the generating capacity of the Milford Project (FERC No. 2534) by adding one generating unit at Milford dam. Installing the unit would increase the average annual energy production to approximately 59,400 MWh. BHE would continue to operate the Milford Project as a run-of-river facility.

The primary resource issues are potential effects on anadromous fish resources, salmon recreational angling and Penobscot Indian Nation (PIN) harvest, and socioeconomics. Other resource areas considered in assessing impacts include: (1) geology and soils, (2) streamflow, (3) water quality, (4) resident fisheries resources, (5) terrestrial resources, (6) wetlands, (7) threatened and endangered species, (8) recreation resources not related to salmon angling, (9) land use, (10) aesthetic resources, and (11) cultural resources.

The staff's preliminary recommendation with regard to the Basin Mills project is to not construct Basin Mills, expand Veazie and decommission Orono, with our recommended mitigation measures. For Milford and Stillwater, we recommend the proposed projects with additional mitigation.

e. Contact: Ronald McKitrick
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Office of Hydropower Licensing
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Washington, DC 20426
(202) 219-2783

f. Transmittal: This FEIS, prepared by the Commission's staff in connection with applications filed by BHE for FERC projects Nos. 10981, 2712, and 2534 is being made available to the public on or about October 1997, as required by NEPA of 1969 and the Commission's regulations implementing NEPA (18 CFR Part 380).

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)[1] and the U.S. Department of Energy Organization Act[2] is authorized to issue licenses for terms up to 50 years for the construction and operation of nonfederal hydroelectric developments subject to its jurisdiction, on the necessary conditions:

> (T)hat the project adopted...shall be such as in the judgment of the Commission will be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water power development, for the adequate protection, mitigation, and enhancement of fish and wildlife (including related spawning grounds and habitat), and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes referred to in section 4(e)...[3]

The Commission may require such other conditions not inconsistent with the provisions of the FPA as may be found necessary to provide for the various public interests to be served by the project.[4] Compliance with such conditions during the license period is required. Section 385.206 (1993) of the Commission's Rules of Practice and Procedure allows any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.[5]

Section 401(a)(1) of the Clean Water Act (CWA)[6] requires an applicant for a federal license or permit for any activity that may result in a discharge into navigable waters of the United States to provide to the licensing or permitting agency a certification from the state in which the discharge originates that such discharge will comply with certain sections of the CWA. As stated in Great Northern Paper, Inc., 77 FERC ¶ 61,068 (1996), under Section 401(d), states may lawfully impose only conditions related to water quality. In examining the conditions proposed in the Basin Mills, Stillwater and Milford WQCs, we follow the principles laid out and discussed in Great Northern Paper.

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[1] 16 U.S.C. Sec. 791(a)-825(r).

[2] 42 U.S.C. Sec. 7101-7352.

[3] 16 U.S.C. Sec. 803(a)(1).

[4] 16 U.S.C. Sec. 803(g).

[5] 18 CFR Sec. 385.206 (1996).

[6] 33 U.S.C. § 1341.

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ACRONYMS AND ABBREVIATIONS

401 WQC	Section 401 Water Quality Certification
7Q10	7-day, 10-year low flow
AADT	Annual Average Daily Traffic
AAHU	average annual habitat units
AAQS	ambient air quality standards
ACHP	Advisory Council for Historic Preservation
AIR	additional information request
AQCR	Air Quality Control Region
ASAL	Atlantic salmon population model developed by FWS
ASRSC	Atlantic Sea-Run Salmon Commission
BACT	Best Available Control Technology
BAT	best available technology
BEP	Maine Board of Environmental Protection
BHE	Bangor Hydro-Electric Company
BIA	Bureau of Indian Affairs, U.S. Department of the Interior
BOD5	five-day biological oxygen demand
BPR	Bureau of Parks and Recreation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
cm	centimeter(s)
cm/sec	centimeters per second
Commission or FERC	Federal Energy Regulatory Commission
Corps	United States Army, Corps of Engineers
CRMP	Cultural Resource Management Plans
CWA	Clean Water Act
DEIS	Draft Environmental Impact Statement
DEP	Maine Department of Environmental Protection
DIFW	Maine Department of Inland Fisheries and Wildlife
DMR	Maine Department of Marine Resources
DO	dissolved oxygen
DOI	Department of the Interior
EA	environmental assessment
EIS	environmental impact statement
EMDC	Eastern Maine Development Council
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FEMA	Federal Emergency Management Agency
FPA	Federal Power Act
fps	feet per second
FWS	U.S. Fish and Wildlife Service
GWh	giggawatt-hour(s)
HEP	Habitat Evaluation Procedure
HSI	habitat suitability indices
IFIM	Instream Flow Incremental Methodology
Interior	United States Department of the Interior
kW	kilowatt(s)
kWh	kilowatt hour(s)
lb	pound(s) per day

LMA	labor market area
MDEP	Maine Department of Environmental Protection
MDMR	Maine Division of Marine Resources
MDOC	Maine Department of Conservation
mg/l	milligrams per liter
MGD	million gallons per day
mm	millimeter(s)
MODFLOW	model of groundwater flow
MOU	memorandum of understanding
MHPC	Maine Historic Preservation Commission
MREIM	Maine Regional Economic Project
MSA	Bangor Metropolitan Statistical Area
MSPO	Maine State Planning Office
MW	megawatt(s)
MWh	megawatt hour(s)
NAI	Normandeau Associates, Inc.
NEPA	National Environmental Policy Act
NEPOOL	New England Power Pool
NERC	North American Electric Reliability Council
NGVD	National Geodetic Vertical Datum
NHP	Maine Natural Heritage Program
NMFS	National Marine Fisheries Service
NPCC	Northeast Power Coordination Council
NRHP	National Register of Historic Places
NSI	no substantial impact
NWI	National Wetland Inventory
OTR	Ozone Transport Region
PA	Programmatic Agreement
pg/g	picograms per gram
PIN	Penobscot Indian Nation
ppt	parts per trillion
SCORP	Maine Statewide Comprehensive Outdoor Recreation Planning Program
SCR	selective catalytic reduction
SD	scoping document
SHPO	State Historic Preservation Officer
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WDCAP	Maine Waterway Development and Conservation Act Permit
WET	Wetland Evaluation Technique
WQC	Water Quality Certificate
WUA	weighted usable area
WWTP	waste water treatment plant
YBP	years before present

EXECUTIVE SUMMARY

This final environmental impact statement evaluates the potential site-specific and cumulative environmental consequences, economic costs, and benefits associated with issuing licenses for three hydroelectric projects in the lower Penobscot River Basin.

The three projects we consider in this FEIS are:

(1) The proposed Basin Mills Project (FERC No. 10981), including construction of a new Basin Mills development (38 MW), expansion of the existing Veazie development (from 8.4 to 16.4 MW), both on the Penobscot River, and decommissioning the existing 2.3 MW Orono development on the Stillwater River (a branch of the Penobscot River). BHE would operate both Basin Mills and Veazie in a run-of-river mode, and the power generating equipment would be removed from Orono, with all flow passing over the dam.

(2) The Stillwater Project (FERC No. 2712) consisting of one reservoir and one hydroelectric development (1.95 MW) on the Stillwater River. BHE operates the project in run-of-river mode and proposes no changes in operation or headpond cycling of the Stillwater reservoir.

(3) The Milford Project (FERC No. 2534) consisting of one reservoir and one hydroelectric development on the Penobscot River (Milford) and Gilman Falls dam on the Stillwater River. BHE proposes to increase the generating capacity of Milford dam from 6.4 to 8 MW. BHE would continue to operate the Milford dam in run-of-river mode and proposes no headpond cycling of the Milford impoundment.

The major issues raised concerning the proposed projects include:

- The Penobscot River was targeted by state and federal fisheries agencies for restoration of a self-sustaining run of Atlantic salmon (also American shad and alewife); since 1968 the salmon run increased from zero to about 4,500 fish in 1986, subsequently declined to 1,049 fish in 1994, and rebounded to 2,045 fish in 1996. The federal fisheries agencies and intervenors contend that restoration of salmon, shad, and alewife runs will not be successful if there is further hydro development on the Penobscot River.

- The Penobscot River presently supports the largest and most intense Atlantic salmon recreational fishery in the U.S.; anglers and agencies believe the fishery will expand with their predicted increases in the salmon run size, if there is no further hydro development

- Penobscot Indian Nation (PIN) considers salmon to be of high spiritual value and desire to recover their cultural heritage through restoration of runs of salmon unassisted by human intervention, which is less likely to occur with further hydro development.

- Fisheries measures proposed by BHE to mitigate for construction of Basin Mills (trap-and-truck, stocking) are inconsistent with restoration of a self-sustaining run of salmon and other species, as defined by PIN and federal agencies. Some intervenors believe that removing one or more mainstem dams is the only adequate mitigation for constructing Basin Mills because they believe doing so would enhance restoration of wild salmon and other anadromous fish.

A new dam could adversely affect anadromous fish stocks because it would permanently eliminate some nursery habitat and increase cumulative losses of fish migrating upstream and downstream past the dam. Supporters of the Basin Mills Project contend that constructing the new dam would not preclude restoring anadromous fish and implementing the project, with BHE's mitigation proposals, would provide fisheries benefits. Opponents counter that although mitigation of the kind proposed by BHE (stocking and trap-and-truck) might produce numerical increases in fish stocks, the success of these measures is uncertain, and these measures would not help achieve the state and federal goal of restoring stocks that can persist without human intervention (i.e., self-sustaining or wild populations).

In this FEIS we evaluate five alternatives for the Basin Mills Project: No-action; the project as proposed by BHE; the project as proposed by BHE with staff's modifications; not constructing Basin Mills, but relicensing Veazie, with or without increased capacity, in combination with decommissioning or refurbishing Orono; and, not constructing Basin Mills, refurbishing/relicensing Orono, and decommissioning and removing Veazie. We also conducted a detailed analysis of dam removal as mitigation for construction of Basin Mills, evaluating all 116 dams located in the watershed as potential candidates.

For the Stillwater and Milford Projects, we evaluate three alternatives: no-action; the projects as proposed by BHE; and, the projects as proposed by BHE with staff's modifications.

We evaluated potential cumulative impacts of all projects, with particular focus on anadromous fish stocks (salmon, shad and alewife). For Atlantic salmon, we used a FWS model, called ASAL, to project salmon population growth and future status under all alternatives, taking into account all applicable enhancement and mitigation measures.

Among the Basin Mills Project alternatives, the key tradeoff is between the potential for anadromous fish restoration without human intervention and providing enhanced anadromous fish runs that are human-assisted. An important aspect of this tradeoff is the high degree of risk and scientific uncertainty in the projections of future wild salmon stock size. One finding of this environmental analysis is that persistence of a salmon run without human intervention is unlikely if current salmon smolt marine survival rates continue into the future. However, survival rates, while low, increased substantially since the DEIS was issued and the

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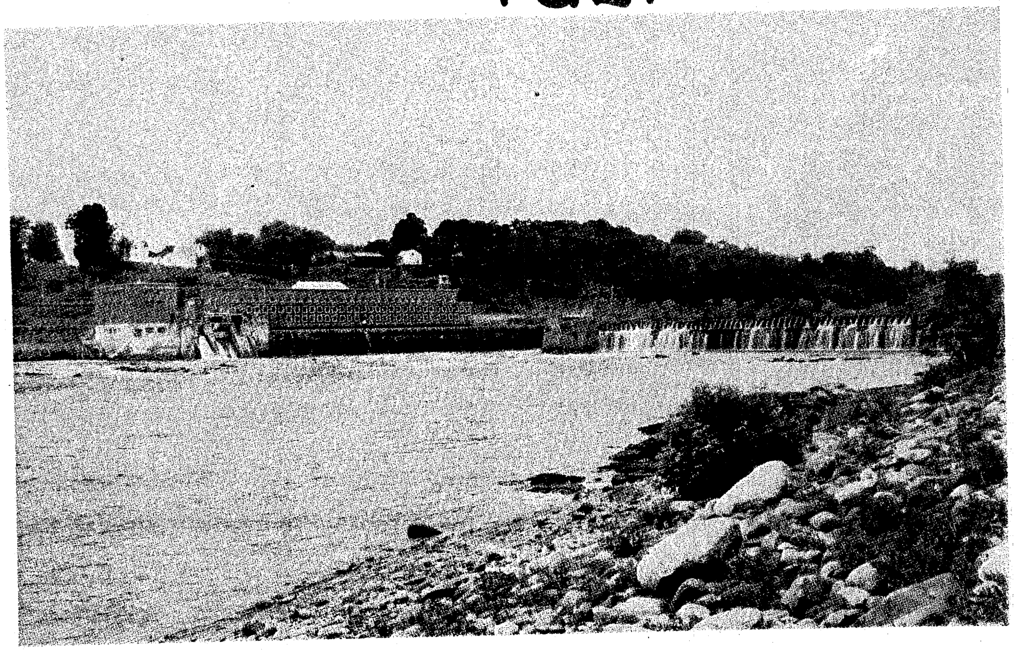
Maine

Part 2of3



Basin Mills Hydroelectric Project
(FERC No. 10981)

Stillwater Hydroelectric Project
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APPENDIX D

ANALYSIS OF DAM REMOVAL IN THE PENOBSCOT RIVER BASIN AS MITIGATION FOR THE ANADROMOUS FISHERIES IMPACTS OF THE BASIN MILLS DEVELOPMENT

METHODOLOGY AND RESULTS

INTRODUCTION

In the Lower Penobscot River Basin DEIS, we presented our evaluation of the overall economic and environmental feasibility of removing one or more dams in the Penobscot River Basin as mitigation for the impacts to anadromous fish attributable to construction of the new Basin Mills dam. In that earlier analysis, we considered two major factors:

- Many of the environmental concerns raised during scoping meetings and in written comments on Basin Mills and the other lower Penobscot River Basin projects focus on the potential effects of these projects on the restoration of Atlantic salmon and other anadromous fish in the Penobscot River.

- Constructing or removing hydroelectric facilities within a river system can alter the amount of spawning habitat and the survival of both downstream migrating juveniles and upstream migrating adults, all factors that influence the success of anadromous fish restoration. Removing a dam, therefore, might offset or partially mitigate the adverse effects of constructing a new hydroelectric facility within the same river basin.

A key element of this earlier assessment was determining the extent to which removing candidate dams would mitigate for the biological effects of constructing the Basin Mills development, with the primary focus being potential impact to restoration of Atlantic salmon. We also accounted for the relative potential economic viability of the Basin Mills development with dam-removal mitigation, however, by comparing estimated costs of removal and lost power generation of candidate dams (i.e., the value of those dams) with the economic value of the Basin Mills development as proposed.

Numerous respondents commenting on the DEIS questioned various aspects of the methodology we employed in our DEIS Appendix D analysis (see, for example, Conservation Intervenors comment 33). Also, as we explain in more detail in section 2 of the FEIS, during the time period between issuing the DEIS and the FEIS, the Commission changed its approach to evaluating the economics of all new and existing hydroelectric projects.[1] This change in economic analysis approach forced us to substantially alter the approach we applied in our evaluation of dam removal as mitigation for construction of the Basin Mills development. In 2.3.1 of the FEIS, we present the underlying basis for our consideration of dam removal as a fisheries mitigation measure.

In this appendix, we present the methodologies we employed to estimate the benefits that would accrue to salmon (as well as other anadromous species) from removal of a number

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[1] For a detailed explanation of the new economic approach see <u>Mead Corporation, Publishing Paper Division</u>, 72 FERC ¶ 61,027 (July 13, 1995).

of Penobscot River dams, provide estimates of the present worth of the net power benefits that would be foregone if a dam were removed, and estimate the cost for physical removal of each dam. We present the results of our analyses as a ranking of the selected dams according to the potential benefit to salmon resulting from their removal. These results contribute to our evaluation in section 2 of the suitability of dam removal as mitigation for Basin Mills dam construction.

Our dam removal analysis includes the following steps:

1) List all dams within the Penobscot River Basin.

2) Identify dams in parts of the basin that contain potential salmon spawning or nursery habitat (subsequently called "candidate dams") as defined in existing salmon restoration plans for the basin.

3) Obtain information about candidate dams, including current status, use, generating capacity (if any), ownership, and physical dimensions and characteristics.

4) Quantify the adverse effects on salmon associated with constructing the Basin Mills development (including loss of spawning/nursery habitat, increases in upstream and downstream mortality, and changes in expected run size 50 years after project licensing.

5) Estimate how much removing each of the candidate dams would benefit salmon (including increases in spawning/nursery habitat, reductions in upstream and downstream mortality, and changes in expected run size 50 years after project licensing with Basin Mills dam constructed.

6) Estimate the cost of removing candidate dams based on estimated cost of physical removal (annualized over 30 years) and annual value of lost generation (using current cost analysis; see footnote 1).

7) Rank the candidate dams according to the benefits to salmon realized from their removal.

In the following section we describe the methodology for and results of implementing each of these steps.

Step 1 - Dam Listing

We used three sources to compile a list of current dams within the Penobscot River Basin: a September 1991 Maine state listing of dams; a printout for the Penobscot River Basin from the FERC Hydropower Resources Assessment database; and a description of obstructions surveyed in the Penobscot River Basin between 1953 and 1958 (Cutting, 1963). We assumed that the Maine state listing was a complete list of existing licensed and unlicensed dams in the basin. Each dam was mapped on a USGS 1:100,000 planimetric map using the location reported in the state listing of dams and the descriptions of obstructions in Cutting (1963). Appendix A of this DEIS lists the dams in the basin, and Figure 3-1 shows the dam locations.

Step 2 - Dams Present in Salmon Spawning/Nursery Areas

We identified salmon spawning and nursery habitat by reviewing documents about the restoration of Atlantic salmon in the Penobscot River Basin (Cutting, 1963; Baum, 1983; Dube, 1987). We also confirmed our findings through telephone contacts with state and federal fishery agency staff involved in current Penobscot River salmon restoration efforts.

Figure 3-2 of this DEIS shows the distribution of Atlantic salmon spawning/nursery habitat in the Penobscot River. As that figure indicates, habitat in different geographical locations has one of three smolt production levels.[2] Comparing the distribution of salmon habitat with the location of dams in the Penobscot River Basin reveals that 17 dams are located within Atlantic salmon spawning and nursery habitat (Table D-1).

Table D-1. Dams located within salmon production habitat

Number in Figure 3-1	**Name**	**Number in Figure 3-1**	**Name**
25	Bangor (breached; not evaluated)	55	Lower
26	Veazie	56	Upper
32	Orono	65	Guilford
33	Stillwater	70	West Enfield
37	Gilman Falls (part of Milford Project)	71	Runaround (part of West Enfield Project)
35	Great Works	72	Roberts (breached; not evaluated)
36	Milford	92	Mattaceunk
47	Howland	90	Mill Pond (not evaluated)
51	Brownville (partially breached)		

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[2] The ASAL model documentation in Appendix E presents the source of habitat quantification.

We did not consider three of the 17 dams in detail (Mill Pond, Bangor and Roberts) in our analyses for several reasons. Mill Pond (No. 90, Figure 3-2) is on a small tributary of the Mattawamkeag River and affects less than 0.2 percent of the total basin population; this amount is too small to affect the conclusions drawn from the evaluation methodologies used in this study. We determined that two other projects, Bangor and Roberts, are breached to such an extent that removing them would cause only minor changes in habitat or mortality. Removing these dams would not enhance upstream or downstream survival or provide significant additional production habitat (personal communication, Mike Smith, Maine DEP, December 1993); therefore, we also excluded these projects from our analysis.

We treated the Stillwater (No. 33) and Orono (No. 32) dams differently from the other candidate dams in our analysis of potential benefits to salmon because of their location: both are situated along the Stillwater River, a branch of the Penobscot that splits from the mainstem at Milford and rejoins it below Orono (see Figure 1-1). The significance of their location relates to the fact that the Stillwater River is an alternative to the mainstem Penobscot River as a route for upstream and downstream migrating anadromous fish. We describe the manner in which we developed ASAL model parameters representative of conditions with each of these dams removed in detail in our discussion of Step 5, below.

Step 3 - Acquisition of Information on Candidate Dams

We obtained the information to analyze the economics of the candidate dams that passed the salmon habitat screen from several sources. We obtained the nameplate capacity, dependable capacity, and annual generation of the candidate dams from the license applications, if available. If these values were not available, we used values from the January 1, 1992, issue of "Hydroelectric Power Resources of the United States," which is published by FERC. Table D-2 presents generation figures for these dams.

In order to quantify the amount of material that would have to be removed and transported if a dam were to be eliminated, we obtained drawings of the dams from license applications and preliminary permits, if available. If drawings were not available, we contacted the Maine DEP and the fisheries agencies for information.

Step 4 - Quantification of Adverse Impacts of Basin Mills on Salmon

As discussed in the introduction, dams affect salmon in three ways: by eliminating riverine habitat, by killing juvenile fish that pass through generating turbines as they migrate downstream, and by partially blocking passage of fish migrating upstream to spawn.[3] Basin

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[3] In BHE and fisheries agency computer modeling of the Penobscot River salmon run, "upstream mortality" is the inability of a portion of upstream migrating adults to pass any given dam. Studies have not provided data to determine the fate of fish that do not pass upstream over a dam, but these fish probably do not die. Fish that do not pass upstream (continued...)

Mills development would do all three of these things. We estimated the magnitude of these effects using the ASAL model methodology developed by FWS (see Appendix E for details of model application; additional specific data from which impact estimates were derived are presented under Step 5, below). Our estimates of impacts attributable solely to a new Basin Mills development are as follows:

- 3.56 percent reduction in basinwide smolt[4] production due to inundation;
- 1.4 percent loss of the total population of downstream migrating smolts that would pass Basin Mills dam; and
- 4.2 percent[5] loss of the total population of upstream migrating adults.

Table D-2. Power generation of dams remaining after Step 2 screening

Dam Name	Nameplate Capacity (MW)	Dependable Capacity (MW)	Annual Generation (GWh)
Brownville[(a)]	0	NA	0
Great Works	7.6	6.0	49.7
Guilford	0	NA	0
Howland	1.8	1.6	12.1
Lower Dover/Foxcroft	0.6	0	2.5
Mattaceunk	19.2	17.6	105.0
Milford and Gilman Falls[(b)]	6.4	4.7	52.1
Orono	2.3	2.3	18.0
Stillwater	2.0	2.0	13.1
Upper Dover/Foxcroft	0.6	0	1
Veazie	8.4	7.9	64.0
West Enfield and	13.0	11.9	73.2

(a) Brownville is partially breached.
(b) Gilman Falls Dam is part of the Milford Project.

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[3](...continued)
over a dam probably do not spawn, however, because they do not reach their natal spawning area. We refer to the portion of the population that does not pass over a dam, therefore, as *lost to the spawning* stock.

[4] A smolt is a juvenile salmon; smolts remain in freshwater nursery areas for about 2 years before migrating to the ocean.

[5] This percentage is the difference between existing cumulative upstream mortality (see Table D-4) and the estimated cumulative upstream mortality with construction of Basin Mills.

The combination of habitat loss and the incremental increase in downstream mortality attributable solely to the presence of the Basin Mills development results in an estimated combined loss of 14,343 smolts, or 5.1 percent of the average annual number of smolts reaching the ocean in the absence of Basin Mills (281,275 smolts). The 4.2 percent loss of upstream migrating adults equates to 369 fish of a total "restored" population of 8,000 to 11,000 fish.[6,7]

As discussed in Appendix E and FEIS section 4.3.3.1, a number of ASAL model outputs can be used as metrics to represent the fate of the salmon stock under various project alternatives. For this dam removal evaluation, we have employed smolt and adult mitigation value and the expected run size 50 years after licensing as the metric for comparison of the various dam removal scenarios.[8]

Step 5 - Salmon Benefits of Removal of Candidate Dams

We determined the benefits of removing candidate dams by identifying how removing each dam would alter the three kinds of effects described under Step 4: change in smolt production habitat; change in downstream mortality of smolts; and change in loss of upstream migrating adults.

The available habitat survey data document both the number of 100-square-yard habitat units in each segment of the river basin and the production quality (i.e., 1, 2, or 3 smolts per unit) of that habitat. We used these data to estimate the potential smolt production for each interdam segment of the Penobscot River or its tributaries (Table D-3).[9] Table D-3 shows that the total potential annual average smolt production across all spawning/nursery

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[6] A total of 8,000 to 11,000 fish would be the population level reflective of a fully restored run, sufficient to saturate all basin-wide nursery habitat.

[7] Dr. Paul Rago, one of the co-authors of the ASAL model, developed a simplified version of the ASAL model (BASNMILL) that he applied in an evaluation of our ASAL modeling (see Attachment C of NMFS DEIS comment letter, in Appendix K of this FEIS). On page 2, he estimates the Basin Mills-related loss of adults at 13.5% and the loss of smolt output at 13.8%. In our evaluation of his analyses, we note that his analysis treats a combination of Basin Mills and Veazie developments as a single computational unit. Thus, his percentage losses are of the two dams combined, whereas our assessment examines the Basin Mills dam separately from the Veazie dam. Because we seek to identify the impact associated with construction of a new dam (Basin Mills) and not to compensate for the historical impact of an existing dam (Veazie), we have continued to use our estimates of percentage loss of smolts and adults in this dam removal alternative analysis.

[8] For consistency with our presentation of findings in sections 4 and 5 and Appendix F, the ASAL model results presented are those using the Merrimac maximum average marine survival rate of 2.5%; expected run sizes using the USFWS maximum average marine survival rate of 3.5% would be larger; however, the objective in this assessment is to compare the relative merits of each of the dam removal scenarios, the relative comparison would remain the same regardless of marine survival rate employed.

[9] The numbered population segments identified in Table D-3 represent elements of an Atlantic salmon population model (ASAL) discussed in detail in the following section.

habitat in the Penobscot River Basin is 292,696 fish under existing conditions; the figures presented in the sixth column of Table D-3 present the proportion of that total production that can be produced in each specific interdam river or tributary segment.

We estimated changes in smolt production habitat caused by removing candidate dams by defining the length of the existing impoundment behind the dam, determining the number of existing habitat units per mile of unimpounded river immediately adjacent to the dam (either upstream or downstream), and multiplying the impoundment length by the habitat units per mile. This rough estimate of increase in habitat units assumes that the characteristics and quality of riverine habitat created by eliminating the impoundment would be similar to those of habitat that already exists upstream or downstream (see Table E-3 in Appendix E).

We estimated mortality of downstream migrating smolts by reducing the percentage of smolts produced in each river segment by the percentage of mortality estimated for each of the downstream dams they must pass. FWS estimated these dam-specific mortality rates (FWS, 1989a), which vary from less than 1 percent to more than 5 percent according to hydraulic capacity, river flows during migration, hydraulic head, and turbine type. Column 5 of Table D-3 lists the number of dams downstream of each river segment. Column 4 of Table D-4 presents the mortality rates experienced by smolts passing each dam, and the bottom number in column 7 of Table D-4 presents the integrated cumulative survival rate, which integrates the losses experienced by all population segments passing all dams. We used this cumulative downstream survival value to estimate the total number of smolts that would survive under each scenario. Those estimates account for both the change in smolt production habitat and the change in downstream mortality rates under each scenario.

An underlying assumption in all evaluations of the effects of dams on Atlantic salmon is that adults returning to spawn will return only to the location of the river in which they hatch and reside as juveniles. This assumption is supported by most available scientific data. Based on this assumption, the proportion of smolt production in any given interdam river segment also represents the proportion of the upstream migrating adults destined for that segment. If a river segment had sufficient habitat to produce 10 percent of the total smolt production in a river basin, it is generally assumed that 10 percent of the adults returning to the river to spawn are destined for that specific river segment, which is known as their natal segment. Fish that are unable to return to their natal segment are presumed not to spawn and to be lost to the reproductive portion the population. Both BHE and FWS assumed a

Table D-3. Estimated smolt production in each Penobscot River segment

POPULATION SEGMENT #	POPULATION SEGMENT	POPULATION SUBSEGMENT	SMOLT PRODUCTION	# OF DAMS DOWNSTREAM	% OF SMOLT PRODUCTION IN PENOBSCOT RIVER BASIN$^{(a)}$
	Below Veazie	Mouth of River/Veazie dam	3299$^{(b)}$	0	1.13
2	Veazie/Great Works	Veazie/Great Works	11,833$^{(b)}$	1	4.04
3	Great Works/Milford	Great Works/Milford	2371$^{(b)}$	2	0.81
4	Milford/Mattaceunk	Total	36,710$^{(b)}$		12.54
		Milford/West Enfield	11,013$^{(c)}$	3	3.76
		West Enfield/Mattaceunk	25,697$^{(c)}$	4	8.78
5	Piscataquis	Total	73,514$^{(b)}$		25.11
		Howland/Lower D.F.	45,579$^{(d)}$	4	15.57
		Lower D.F./Upper D.F.	0$^{(e)}$	5	0.0
		Upper D.F./Guilford	7822$^{(f)}$	6	2.67
		Guilford/Headwaters	20,113$^{(f)}$	7	6.87
6	Mattawamkeag	Mouth of River/Headwaters	52,838$^{(b)}$	4	18.05
7	East Branch Penobscot	Mattaceunk/Headwaters	65,616$^{(b)}$	5	22.42
8	Pleasant River	Mouth of River/Headwaters	39,090$^{(b)}$	4	13.36
9	Tributaries	Total	7425$^{(b)}$		2.54
		Tributaries between West Enfield dam and Mattaceunk dam	3081.4$^{(g)}$	4	1.05
		Tributaries above Mattaceunk dam	631.1$^{(g)}$	5	0.22
		Others (below West Enfield)	3712.5$^{(h)}$	3	1.27
Grand Total Production			292,696		

(a) West Branch Penobscot River not included.

(b) From Basin Mills Application Vol. IV, Appendix C, Appendix 4.

(c) Milford/Mattaceunk smolt production*(.7)=Smolt production above West Enfield. Milford/Mattaceunk smolt production*(.3)=Smolt production below West Enfield. The Milford/Mattaceunk smolt production number is from the Basin Mills Application, Vol. IV, Appendix C, Appendix 4. The Milford/Mattaceunk smolt number was divided 70 percent above West Enfield and 30 percent below West Enfield based on the Basin Mills Application, Vol. IV, Appendix C, Appendices 5 & 6.

(d) Piscataquis smolt production*(.62)=Smolt production below Upper dam. The Piscataquis smolt production number is from the Basin Mills Application, Vol. IV, Appendix C, Appendix 4. The Piscataquis smolt number was divided 62 percent below Upper dam based on the Basin Mills Application, Vol. IV, Appendix C, Appendices 5 & 6. Note no smolt production habitat is assumed to exist between Lower dam and Upper dam since the area is an impoundment.

(e) Based on information indicating that the Lower dam impoundment extends to the base of Upper dam (Personal Comm. with Dana Murch).

(f) Used Basin Mills Application Vol. IV, Appendix C, Appendix 3 information to obtain estimate of percentage habitat units occurring above Guilford dam and the percentage occurring between Upper dam and Guilford dam. Based on Appendix 3 information, 6,103 habitat units occur above Upper Abbott and 3,872 habitat units occur below Upper Abbott. Map measurements indicated that 29 percent of the 3,872 habitat units (1,123) are above Guilford dam and 71 percent of the 3,872 habitat units (2,749) between Upper dam and Upper Abbott are located below Guilford dam. Therefore, 2,749 habitat units occur between Upper dam and Guilford, and 7,226 habitat units (1,123 + 6,103) occur above Guilford dam. There are 6,103 habitat units occurring above Upper Abbott (Appendix 3). The 2,749 habitat units occurring between Upper dam and Guilford dam are 28 percent of the total habitat units occurring above Upper dam (2,749/9,975 total habitat units above Upper dam, Appendix 3). The 7,226 habitat units occurring above Guilford dam are 72 percent of the total habitat units occurring above Upper dam (7,226/9,975 total habitat units above Upper dam, Appendix 3). Piscataquis smolt production x (.38) = Smolt production above Upper dam. The Piscataquis smolt production number is from the Basin Mills Application, Vol. IV, Appendix C, Appendix 4. The Piscataquis smolt number was divided 38 percent above Upper dam based on the Basin Mills Application, Vol. IV, Appendix C, Appendices 5 & 6. The 38 percent smolt production units occurring above Upper dam is 27,935 (73,514 x (.38), Appendix 4). The 27,935 smolt production units are allocated 72 percent above Guilford dam and 28 percent between Upper dam and Guilford dam based on previous calculations.

(g) Used Basin Mills Application Vol. IV, Appendix C, Appendix 2, p. 22 to estimate percentage habitat found between West Enfield dam and Mattaceunk Dam, and the percentage habitat above Mattaceunk dam. According to information, 1,234 habitat units out of 1,489 habitat units or 83 percent occur between West Enfield dam and Mattaceunk dam. 255 habitat units or 17 percent occur above Mattaceunk dam. The smolt production for the area between West Enfield dam and Mattaceunk dam is 3,712.5, the result of 50 percent of the smolt production found in tributaries occurring above West Enfield dam (7,425/2, Appendices 5&6). Therefore, 3,081.4 smolt production units (3,712.5 x .83)) occur between West Enfield dam and Mattaceunk dam, and 631.1 smolt production units (3,712.5 x (.17)) occur above Mattaceunk dam.

(h) Tributary smolt production x (.5) = Smolt production below West Enfield. West Enfield smolt production number is from the Basin Mills Application, Vol. IV, Appendix C, Appendix 4. The West Enfield smolt number was divided 50 percent below West Enfield Dam based on the Basin Mills Application, Vol. IV, Appendix C, Appendices 5 & 6.

Table D-4. Dam-specific mortality rates and integrated mortality rates by dam-removal scenario; see text for explanation of rates

Current Conditions

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	11.73
Veazie	5917		0.75%	99.25%	99.25%	5872	92.00%	92.00%	19.21
Basin Mills	5917		0.00%	100.00%	99.25%	5872	100.00%	92.00%	19.21
Great Works	2371		1.05%	98.95%	98.21%	2329	92.00%	84.64%	7.01
Milford	14726		0.63%	99.37%	97.59%	14370	92.00%	77.87%	39.78
West Enfield	81616		0.70%	99.30%	96.91%	79091	92.00%	71.64%	201.44
Mattaceunk	66247		1.50%	98.50%	95.45%	63234	92.00%	65.91%	148.17
Howland	84669		2.07%	97.93%	95.57%	80917	92.00%	71.64%	206.09
Brownville	0		0.00%	100.00%	95.57%	0	100.00%	71.64%	0.00
Lower D/F	0		1.08%	98.92%	94.54%	0	92.00%	65.91%	0.00
Upper D/F	7822		0.45%	99.55%	94.11%	7361	92.00%	60.64%	15.87
Guilford	20113		0.00%	100.00%	94.11%	18929	92.00%	55.78%	37.54
Total	292696	0				281275			706.05
						96.10%			70.60%

With Basin Mills

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.39
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.95
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.77
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.70
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	38.03
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	192.55
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	141.63
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	196.99
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	55.78%	15.17
Guilford	20113		0.00%	100.00%	92.58%	18620	92.00%	51.32%	35.88
Total	292696	-10688				266314			643.05
						94.43%			64.31%

Table D 4. Continued

Veazie Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Sites/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	11.68
Veazie	5917	7146	0.00%	100.00%	100.00%	13063	100.00%	100.00%	46.25
Basin Mills	5917	-5344	1.40%	98.60%	98.60%	564	92.00%	92.00%	1.84
Great Works	2371		0.68%	99.32%	97.93%	2322	92.00%	84.64%	6.96
Milford	14726		0.63%	99.37%	97.31%	14330	92.00%	77.87%	39.51
West Enfield	81616		0.70%	99.30%	96.63%	78867	92.00%	71.64%	200.07
Mattaceunk	66247		1.50%	98.50%	95.18%	63055	92.00%	65.91%	147.16
Howland	84669		2.07%	97.93%	95.30%	80688	92.00%	71.64%	204.69
Brownville	0		0.00%	100.00%	95.30%	0	100.00%	71.64%	0.00
Lower D/F	0		1.08%	98.92%	94.27%	0	92.00%	65.91%	0.00
Upper D/F	7822		0.45%	99.55%	93.84%	7341	92.00%	60.64%	15.76
Guilford	20113		0.00%	100.00%	93.84%	18875	92.00%	55.78%	37.28
Total	292696	1802				282404			711.21
						95.89%			71.12%

Gr. Works Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.02
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.89
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.72
Great Works	2371	6574	0.00%	100.00%	97.27%	8701	100.00%	84.64%	26.83
Milford	14726		0.63%	99.37%	96.66%	14233	92.00%	77.87%	40.38
West Enfield	81616		0.70%	99.30%	95.98%	78335	92.00%	71.64%	204.44
Mattaceunk	66247		1.50%	98.50%	94.54%	62630	92.00%	65.91%	150.38
Howland	84669		2.07%	97.93%	94.66%	80144	92.00%	71.64%	209.16
Brownville	0		0.00%	100.00%	94.66%	0	100.00%	71.64%	0.00
Lower D/F	0		1.08%	98.92%	93.63%	0	92.00%	65.91%	0.00
Upper D/F	7822		0.45%	99.55%	93.21%	7291	92.00%	60.64%	16.11
Guilford	20113		0.00%	100.00%	93.21%	18748	92.00%	55.78%	38.10
Total	292696	-4114				274502			701.01
						95.12%			70.10%

Table D-4. Continued

Milford Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival'	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.28
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.93
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.75
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.64
Milford	14726	703	0.00%	100.00%	96.61%	14905	100.00%	77.87%	43.20
West Enfield	81616		0.70%	99.30%	95.93%	78296	92.00%	71.64%	208.79
Mattaceunk	66247		1.50%	98.50%	94.49%	62598	92.00%	65.91%	153.58
Howland	84669		2.07%	97.93%	94.61%	80103	92.00%	71.64%	213.62
Brownville	0		0.00%	100.00%	94.61%	0	100.00%	71.64%	0.00
Lower D/F	0		1.08%	98.92%	93.59%	0	92.00%	65.91%	0.00
Upper D/F	7822		0.45%	99.55%	93.16%	7287	92.00%	60.64%	16.45
Guilford	20113		0.00%	100.00%	93.16%	18738	92.00%	55.78%	38.91
Total	292696	-9985				268639			697.16
						95.02%			69.72%

Orono removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.39
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.95
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.77
Great Works	2371		0.68%	99.32%	96.61%	2291	94.80%	80.24%	6.90
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	73.82%	39.18
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	67.91%	198.41
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	62.48%	145.94
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	67.91%	202.99
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	67.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	62.48%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	57.48%	15.63
Guilford	20113		0.00%	100.00%	92.58%	18620	92.00%	52.88%	36.98
Total	292696	-10688				266314			662.13
						94.43%			66 21%

Table D-4. Continued

Mattaceunk Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	11.98
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.89
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.71
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.48
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	36.77
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	186.18
Mattaceunk	66247	8566	0.00%	100.00%	95.33%	71317	100.00%	65.91%	170.66
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	190.48
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	55.78%	14.67
Guilford	20113		0.00%	100.00%	92.58%	18620	92.00%	51.32%	34.70
Total	292696	-2122				275427			655.49
						94.79%			65.55%

Howland Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.05
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.90
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.72
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.52
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	36.99
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	187.31
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	137.77
Howland	84669	5442	0.00%	100.00%	96.00%	86506	100.00%	71.64%	226.37
Brownville	0		0.00%	100.00%	96.00%	0	100.00%	71.64%	0.00
Lower D/F	0		1.08%	98.92%	94.96%	0	92.00%	65.91%	0.00
Upper D/F	7822		0.45%	99.55%	94.53%	7395	92.00%	60.64%	16.38
Guilford	20113		0.00%	100.00%	94.53%	19014	92.00%	55.78%	38.74
Total	292696	-5246				273768			665.74
						95.24%			66.57%

Table D-4. Continued

Stillwater removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.27
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.93
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.75
Great Works	2371	2000	0.68%	99.32%	96.61%	4223	92.00%	77.87%	12.23
Milford	14726		0.41%	99.59%	96.21%	14168	94.80%	73.82%	38.90
West Enfield	81616		0.70%	99.30%	95.54%	77975	92.00%	67.91%	196.99
Mattaceunk	66247		1.50%	98.50%	94.10%	62342	92.00%	62.48%	144.90
Howland	84669		2.07%	97.93%	94.22%	79775	92.00%	67.91%	201.54
Brownville	0		0.00%	100.00%	94.22%	0	100.00%	67.91%	0.00
Lower D/F	0		1.08%	98.92%	93.20%	0	92.00%	62.48%	0.00
Upper D/F	7822		0.45%	99.55%	92.78%	7257	92.00%	57.48%	15.52
Guilford	20113		0.00%	100.00%	92.78%	18661	92.00%	52.88%	36.71
Total	292696	-8688				268821			662.76
						94.65%			66.28%

W. Enfield Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.11
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.91
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.73
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.55
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.17
West Enfield	81616	5354	0.00%	100.00%	96.00%	83491	100.00%	71.64%	219.54
Mattaceunk	66247		1.50%	98.50%	94.56%	62643	92.00%	65.91%	151.54
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	192.56
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	55.78%	14.83
Guilford	20113		0.00%	100.00%	92.58%	18620	92.00%	51.32%	35.08
Total	292696	-5334				272441			673.02
						94 81%			67.30%

Table D-4. Continued

Lower D/F Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.34
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.94
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.76
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.67
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.90
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	191.88
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	141.14
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	196.31
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0	680	0.00%	100.00%	94.01%	639	100.00%	65.91%	1.58
Upper D/F	7822		0.45%	99.55%	93.59%	7321	92.00%	60.64%	16.61
Guilford	20113		0.00%	100.00%	93.59%	18823	92.00%	55.78%	39.29
Total	292696	-10008				267236			647.44
						94.53%			64.74%

Upper D/F Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.27
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.93
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.75
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.63
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.67
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	190.73
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	140.29
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	195.13
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822	2607	0.00%	100.00%	93.00%	9699	100.00%	60.64%	21.87
Guilford	20113		0.00%	100.00%	93.00%	18704	92.00%	55.78%	38.81
Total	292696	-8081				268856			647.09
						94.46%			64.71%

Table D-4. Continued

Guilford Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.17
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.92
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.74
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.58
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.35
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	189.12
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	139.11
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	193.49
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	55.78%	14.90
Guilford	20113	5215	0.00%	100.00%	92.58%	23448	100.00%	55.78%	48.24
Total	292696	-5473				271142			644.60
						94.40%			64.46%

Brownville Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.37
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.95
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.77
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.69
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.97
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	192.28
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	141.43
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	196.72
Brownville	0	391	0.00%	100.00%	94.01%	368	100.00%	65.91%	0.91
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822		0.45%	99.55%	92.58%	7241	92.00%	55.78%	15.15
Guilford	20113		0.00%	100.00%	92.58%	18620	92.00%	51.32%	35.83
Total	292696	-10297				266682			643.08
						94.43%			64.31%

Table D-4. Continued

Upper D/F & Guilford Removed

	Smolt Proc	New Prod	Downstr. Mortality	Downstr. Survival	Downstream Cum. Survival	Downstrean Num.Surviv	Upstream Survival	Upstream Cum. Survival	# Reaching Spawning Site/1000 at Veazie
Below Veazie	3299		0.00%	100.00%	100.00%	3299	100.00%	100.00%	12.05
Veazie	5917	-5344	1.35%	98.65%	98.65%	565	92.00%	92.00%	1.90
Basin Mills	5917	-5344	1.40%	98.60%	97.27%	557	92.00%	84.64%	1.72
Great Works	2371		0.68%	99.32%	96.61%	2291	92.00%	77.87%	6.52
Milford	14726		0.63%	99.37%	96.00%	14136	92.00%	71.64%	37.00
West Enfield	81616		0.70%	99.30%	95.33%	77802	92.00%	65.91%	187.35
Mattaceunk	66247		1.50%	98.50%	93.90%	62204	92.00%	60.64%	137.80
Howland	84669		2.07%	97.93%	94.01%	79599	92.00%	65.91%	191.67
Brownville	0		0.00%	100.00%	94.01%	0	100.00%	65.91%	0.00
Lower D/F	0		1.08%	98.92%	93.00%	0	92.00%	60.64%	0.00
Upper D/F	7822	2607	0.00%	100.00%	93.00%	9699	100.00%	60.64%	21.49
Guilford	20113	5215	0.00%	100.00%	93.00%	23554	100.00%	60.64%	52.18
Total	292696	-2866				273705			649.68
						94.44%			64.97%

passage efficiency of 92 percent for all dams in the basin (i.e., that 8 percent of migrating adults reaching each dam will not pass that dam and will not spawn). For this evaluation, the removal of any dam allows 8 percent more returning adults to reach the production segments located above that dam. Table D-4 presents the integrated cumulative percentage of successful upstream migrants under each dam-removal scenario.

We addressed removal of Stillwater and Orono dams somewhat differently than removal of other dams. Removal of each of the other dams results in the elimination of a certain amount of estimated upstream and downstream mortality to the entire portion of the fish population supported by the habitat located upstream of the dam site. However, Stillwater and Orono are located on the Stillwater River, a branch of the Penobscot River. Thus, fish whose origin is upstream of Stillwater can move upstream or downstream through either the mainstem Penobscot River or the Stillwater River. Removal of Stillwater or Orono would eliminate a certain amount of estimated upstream and downstream mortality only to that percentage of the run that would pass upstream through the Stillwater River.

We discuss in Appendix F studies that suggest that as many as 30 to 40 percent of downstream migrating smolts pass down the Stillwater River. Comparable studies of potential upstream migrants have never been done, since upstream passage facilities do not presently exist at Orono and Stillwater. For the purposes of this analysis, we have assumed that the percentage of upstream migrants that would choose to move up Stillwater River rather than the Penobscot mainstem would be the same as in the case of downstream migrating smolts, a mid-point value of 35 percent. We also assumed that the percentage loss of upstream migrants at each dam would be the same as for all other dams in the system (8 percent), and, in the absence of any other information, the mortality of downstream migrants would be the same as the respective mainstem dams (Great Works and Milford). In the absence of site specific study data, we believe that these assumptions are reasonable for the purpose of evaluating the merits of removal of Orono or Stillwater dams relative to the benefits of removal of the other candidate dams. For our ASAL modeling, removal of Orono was considered the equivalent of reducing Great Works upstream and downstream mortality by 35 percent; removal of Stillwater was considered the equivalent of reducing Milford upstream and downstream mortality by 35 percent.

Regarding the amount of new spawning and nursery habitat that would be created with the removal of either Stillwater or Orono, site-specific data are available for the Orono development. BHE evaluated potential consequences of breaching or removal of Orono dam (BHE, 1991) by analyzing reduced water levels in the impoundment to simulate partial or complete breach. They measured depth and velocity at 13 transects distributed along the length of the existing impoundment. Because of the physical structure of the Stillwater River channel in this area, areas with suitable depths for nursery salmon habitats (1 to 3 feet) exhibited velocities higher than are appropriate for juvenile salmon (> 4 fps); areas with suitable velocities were too deep for juvenile salmon (5 to 9 feet). The study indicated that very little riffle/run habitat, the type that would be lost due to inundation by Basin Mills, would be created by breaching or removing Orono dam. For our analyses, we assumed no new smolt production habitat would be created with Orono removal.

BHE did not conduct studies of the type done for the Orono development at Stillwater. For Stillwater, we used the same approach for estimating potential gains in smolt production habitat as we used for all of the other candidate dams, multiplying the impoundment length times the number of smolt production units per unit river length in the Basin Mills river reach, and dividing by half, since the Stillwater River is roughly half the volume of the mainstem Penobscot River at Basin Mills.

We applied the ASAL model to evaluate dam-removal scenarios by altering model parameters affected by changes in smolt production habitat, downstream mortality of smolts, and success of upstream adult migration. Table D-4 provides the detailed basis from which model parameters were modified.

Table D-5 presents several ASAL model metrics quantifying the consequences to Atlantic salmon of the various scenarios considered, including cumulative downstream survival of smolts, changes in the amount of smolt production habitat, the number of and changes in that number of smolts surviving to reach marine waters, cumulative survival of adults migrating upstream, and the expected run size 50 years after project licensing. In the DEIS version of this appendix, we used the metric used by FWS and BHE in previous evaluations of the Basin Mills development: the probability of achieving a self-sustaining run[10] in 2043. In revising the appendix, we adopted the ASAL model metric which we employed in our impact analysis in section 4 to present our findings here: the estimated salmon run size 50 years after project licensing[11]

Although this evaluation focused on the potential benefits of removing dams for Atlantic salmon, dam removal also would benefit two other anadromous species that spawn in the Penobscot River, American shad and alewife. Table D-6 presents estimates of habitat for each species located above each of the candidate dams. These data suggest that the species would benefit the most from removal of lower mainstem dams and would be relatively unaffected by removal of candidate dams located on the major tributaries. Our evaluation of the impact of Basin Mills dam on shad and alewife is presented in section 4 and Appendix F of the FEIS.

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[10] The agencies define "self-sustaining run" within this context as being a salmon run of fully restored run size (8 to 10 thousand fish per year) that can sustain itself indefinitely into the future without human intervention, such as stocking.

[11] In the DEIS, we refer to this metric as the expected run size in the year 2043; given the extended period over which BHE's license application has been considered, 50 years after licensing may be later than 2043.

Table D-5. Benefits of dam removal for salmon

	Downstream Cumulative Survival (%)	Change in Smolt Production Habitat (%)	Number of Smolts Reaching Marine Waters	Successful Upstream Adult Migration (%)	Expected Run Size 50 Years After Licensing(d)
Existing conditions	96.10	--	281,275	70.60	3312
With Basin Mills, without mitigation	94.43	-3.65	266,314 (Δ(a) - 14,961)	64.31	1910
With Basin Mills, with stocking and trap and truck	94.43	-3.65	295,132 (Δ + 13,857)(b)	72.7(c)	5934
With Basin Mills, without					
Veazie	95.89	+0.62	282,404 (Δ + 1,129)	71.12	3361
Great Works	95.12	-1.41	274,502 (Δ - 6,773)	70.10	2970
Milford	95.02	-3.41	268,639 (Δ - 12,636)	69.72	2827
Orono	94.43	-3.65	266,314 (Δ - 14,961)	66.21	2121
Stillwater	94.65	-2.96	268,821 (Δ - 12,454)	66.28	2162
West Enfield	94.81	-1.82	272,441 (Δ - 8,834)	67.30	2468
Mattaceunk	94.79	-0.72	275,427 (Δ - 5,848)	65.55	2256
Howland	95.24	-1.79	273,768 (Δ - 7,507)	66.57	2032
Lower D/F	94.53	-3.42	267,236 (Δ - 14,039)	64.74	1979
Upper D/F	94.46	-2.76	268,856 (Δ - 12,419)	64.71	1980
Guilford	94.40	-1.87	271,142 (Δ - 10,133)	64.46	1918
Brownville	94.43	-3.52	266,682 (Δ - 14,593)	64.31	1935
Guilford and Upper D/F	94.44	-0.98	273,705 (Δ - 7,570)	64.97	2043

(a) Δ is the difference between number of smolts swimming to reach the sea under existing conditions and under the conditions associated with each other scenario.

(b) Assumes 30,000 smolts or fry equivalents stocked in upstream river segments where they would experience 6% mortality (94% survival) before reaching marine waters.

(c) Accounts for 50% of the run not experiencing 8% losses at Basin Mills, Great Works and Milford.

(d) ASAL model runs using 2.5% maximum average marine survival rates.

Table D-6. Shad and alewife habitat accessible through or present in interdam river segment

Segment	Percent of Total Surface Area	Number of Dams Below Segment (without Basin Mills)
Shad		
Bangor/Veazie	1.5	0
Veazie/Great Works	4.7	1
Great Works/Milford	1.0	2
Milford to West Enfield	27.2	3
West Enfield to Mattaceunk	21.9	4
Howland/Lower Dover Foxcroft	10.4	4
Lower Dover Foxcroft/Upper Dover Foxcroft	0.7	5
Upper Dover Foxcroft/Guilford	1.5	6
Guilford/Headwaters	1.0	7
Alewife		
Bangor/Veazie	0.0	0
Veazie/Great Works	0.0	1
Orono/Stillwater	0.0	2
Great Works/Milford	0.0	2
Milford/West Enfield	0.0	3
West Enfield/Mattaceunk	0.0	4
Howland/Brownville	21.9	4
Brownville/Headwaters	2.3	5
Howland/Lower Dover Foxcroft	10.9	4
Lower Dover Foxcroft/Upper Dover Foxcroft	0.0	5
Upper Dover Foxcroft/Guilford	0.0	6
Guilford/Headwaters	0.7	7

Percentages based on tables presented in Flagg, 1984 (Penobscot River Shad and Alewife Restoration Potential).

Step 6 - Estimation of the Total Cost of Dam Removal

We estimated the total cost of dam removal as the sum of the estimated cost of removing the structure and the present worth of the net power benefits of the project. While we have used these two parameters to provide some measure of the potential relative economic consequences of removal of each of the candidate dams, our "total cost" estimate does not take into account the price required by a willing seller (or the profit contribution foregone if BHE is the project owner) or economic value associated with numerous other public benefits of a project foregone, such as water supply, recreational use or flood control.

We based our estimate of the net power benefits of the project on current electric power market conditions, the generation capacity of the project, and the estimated annual operation and maintenance costs for the project. We do not consider future inflation or escalation of prices of fuel or any other element (see footnote 1). Our estimated total cost of removal, based on these figures may not represent the price for a project demanded by a willing seller, or the potential profit lost to an existing owner.

Our value for lost power is based on the cost of power that would be obtainable from alternative sources. We based this estimate on an assumed capacity value of $109/kW-yr, which is based on costs for power from a combined-cycle combustion turbine plant - the least expensive, most reasonable capacity addition available, and the cost of alternative energy ($13.89/MWh) from natural gas-fueled electric plants in the New England region of the country. Our estimate of the amount of fuel that would be displaced is based on fuel consumption at a heat rate of 6,200 Btu/kWh. We estimated the 1997 cost of fuel based on the Energy Information Administration's 1997 Supplement to the Annual Energy Outlook, end - use energy prices: reference - case projects; source: electric utilities - natural gas.

Estimating the cost of removing the structure involved determining the amount of the dam to be removed, identifying the need for a cofferdam, computing the quantities of material to be removed, and developing unit costs for each of the kinds of materials involved. Such an estimate does not include the economic value of public benefits lost if a project is removed or of costs that might be incurred due to such a cleanup or removal of sediments or degradation of downstream water quality.

The purpose of removing a dam is to restore anadromous fish the Penobscot River and provide anadromous fish spawning habitat; therefore, the extent of removal would be limited to removing the dam structure within the main course of the river, not removing all project structures. Based on the extent of removal and the ability to dewater the impoundment before dam removal, we determined the need for a double cofferdam.

We examined the available drawings to compute the quantities of each major component to be removed. For dams for which available information was incomplete (Brownville, Guilford, and Runaround), we assumed a cross-section configuration that is consistent with the kind of construction. We considered components such as hand rail and flashboards ancillary and did not include them in the analysis.

We computed the structure-removal cost for each dam by applying unit costs to each major component of the dam. We developed unit costs by reviewing recently completed dam-removal studies (including the costs for removing the 80-foot section at the Veazie dam) and recent construction projects involving dam-removal work. Table D-7 lists the unit costs.

Table D-7. Unit costs of dam removal

Material Type	Unit Cost
Cofferdam installation and removal	$300/linear foot
Concrete demolition	$139/cubic yard
Masonry/timber demolition	$42/cubic yard
Earth/fill excavation	$3/cubic yard
Disposal cost of excavated materials	$10/cubic yard

* Disposal cost does not include special handling of hazardous waste materials.

The total cost of removing each dam is the sum of the present-worth power benefits of the dam, and the cost of removing structures. Table D-8 shows the total costs for removing each of the dams.

Step 7 - Ranking of the Projects Based on Salmon Benefits

Table D-9 provides a ranking of candidate dams according to the benefit to salmon from their removal. The table also includes our estimated total annual cost for removal of each (including both lost power value and cost for physical removal). The increases in smolts and adults are in comparison to the numbers of smolts and adults with Basin Mills dam constructed and no mitigation. We have also presented in the table, for comparison, the costs and benefits of BHE's proposed salmon mitigation measures. Our analysis and interpretation of the data presented in Table D-9 is presented in Section 2.3.1 of this FEIS.

Table D-8 Summary of removal costs for Penobscot River Basin candidate dams (all dollars in 1000's)

Dam Name	Dependable Capacity (MW) (1)	Generation (GWh) (2)	Current Annual Power Benefit ($) (3)	Dam Removal Construction Cost (1997 $) (4)	Annualized Construction Cost (30 yrs) (1997 $) (5)	Total Annual Cost[a] (1997 $) (3+5)
Great Works[b]	6.00	49.70	-$225.6	$809.5	$112.7	-$148.6
Brownville[c]	0.0	0.0	$0.0	$118.1	$16.4	$16.4
Upper Dover/Foxcroft	0.00	1.00	$5.7	$203.6	$28.4	$34.1
Guilford	0.00	0.00	$0.0	$253.4	$35.3	$35.3
Lower Dover/Foxcroft	0.00	2.50	$20.0	$409.4	$57.0	$77.0
Howland	1.60	12.10	$279.5	$666.1	$92.8	$372.3
Stillwater	2.0	13.10	$333.3	$801.4	$111.6	$444.9
Orono[d]	2.30	18.0	$409.5	$1,444.8	$201.2	$610.7
Veazie	7.90	64.00	$1,425.6	$829.6	$115.5	$1,541.1
Milford and Gillman Falls[e]	4.70	52.10	$971.3	$4,747.0	$661.2	$1632.5
West Enfield and Runaround[f]	11.90	73.20	$1,933.4	$2,010.2	$280.0	$2,213.4
Mattaceunk	17.60	105.00	$2,831.4	$354.7	$49.4	$2,880.8

[a] Includes current annual power benefits plus annualized dam removal construction costs.

[b] Includes cost of $8,670,000 (1995 $) to repair the dam.

[c] Brownville is partially breached.

[d] Orono to be decommissioned when Basin Mills is constructed.

[e] Gillman Falls is considered part of Milford.

[f] Runaround is considered part of West Enfield.

Table D-9. Cost benefit comparison; Basin Mills dam is assumed built in all cases

	Total Annual Cost[a] (1000 $)	Smolt Mitigation Value (No. of Smolts[b])	Adult Mitigation (No. of Adults)[c]	Expected Run Size 50 Years After Licensing
Basin Mills Alternative 3 Salmon Mitigation-Trap and Truck and Stocking	426.0	28,818	1,002	5,934
Dam Removed				
Veazie	1,541.1	16,090	741	3,361
Great Works	-148.6	8,188	673	2,970
Milford and Gillman Falls	1,632.5	2,325	686	2,827
West Enfield and Runaround	2,213.4	6,127	332	2,468
Mattaceunk	2,880.8	9,113	89	2,256
Stillwater	444.9	2,507	233	2,162
Orono	610.7	0[e]	247	2,121
Howland	372.3	7,454	127	2,032
Upper Dover/Foxcroft	34.1	2,542	31	1,980
Lower Dover/Foxcroft	77.0	922	49	1,979
Guilford	35.3	4,828	-19[d]	1,975
Brownville	16.4	368	-1[d]	1,918

[a] Dam removal costs taken from table D-8, costs of Alternative 3 trap and truck and stocking taken from section 2 of the FEIS.

[b] This represents the increase in number of smolts reaching the ocean, beyond what would occur with Basin Mills dam constructed, if the stocking was done or the indicated dam was removed.

[c] This represents the increase in number of adults that would reach spawning areas beyond what would occur with Basin Mills dam constructed, if trap and truck of 50% of the run was done or each dam was removed, assuming a fully restored run size; fully restored run size differs among the scenarios (see Appendix E, table E-3 for details).

[d] Negative adult mitigation numbers are a result of the fully restored run size being larger than the fully restored run size with Basin Mills present.

[e] There is no smolt benefit from Orono removal with Basin Mills constructed because Orono would be decommissioned if Basin Mills were built, and there is no increase in habitat with Orono removed.

APPENDIX E

DOCUMENTATION OF ASAL MODELING

DOCUMENTATION OF ASAL MODELING

We used the ASAL model developed by FWS[1] to evaluate the potential cumulative impacts of project alternatives on the Penobscot River Atlantic salmon stock. Figure E-1 is a schematic diagram of the ASAL model. The model accounts for all natural and human-controlled factors that contribute to establishing the numerical abundance of each salmon life stage. For example, total abundance of juveniles is accounted for by including natural production of smolts in the river and hatchery smolts released into the river. Dr. Rago, one of the authors of the ASAL model, states in his review of our model application (see Attachment C to NMFS comment letter) that "the applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent..."

The symbol DM in Figure E-1 illustrates where dam mortality effects are exerted within the life-cycle model. The model accounts for dam effects other than mortality, such as loss of nursery habitat, by modifying the potential production of fry or smolts. By altering inputs and parameters, we can use the model to evaluate the consequence of changes in any factor affecting any life-cycle element for long-term population trends. Dr. Rago, one of the authors of the ASAL model, states in his review of our model application (see Attachment C to NMFS comment letter) that "the applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent.

Model Acquisition and Implementation

Dr. Paul Rago, author of the ASAL family of programs and presently employed by the National Marine Fisheries Service (NMFS), provided us with the diskettes containing the source code and executable files, but we were unable to get the executable files to run. After recompiling the source code files, the models ran but the random number generator did not function properly. At Dr. Rago's recommendation, we substituted a compiler-supplied function call for the existing random number generator code, and this corrected the problem.

In response to an AIR, BHE provided input files for scenarios presented in application documents and subsequent testimony. Another source of input parameters was *Revised Computer Model Projections to Determine the Impacts of the Basin Mills Dam on the Penobscot River Atlantic Salmon Program* (FWS, 1989). Telephone conversations with Steve Shephard of BHE to clarify material received in response to the AIR revealed that BHE did not have actual copies of the input files used by the ASAL working group and FWS. Because BHE reconstructed the files using available information, BHE's runs did not replicate

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[1] Rago, Paul J., 1986. An introduction to simulation models and analysis programs for the assessment of Atlantic salmon populations. Fish and Wildlife Service, National Fishery Center, Kearneysville, WV; Draft Report, Version 2, December 11.

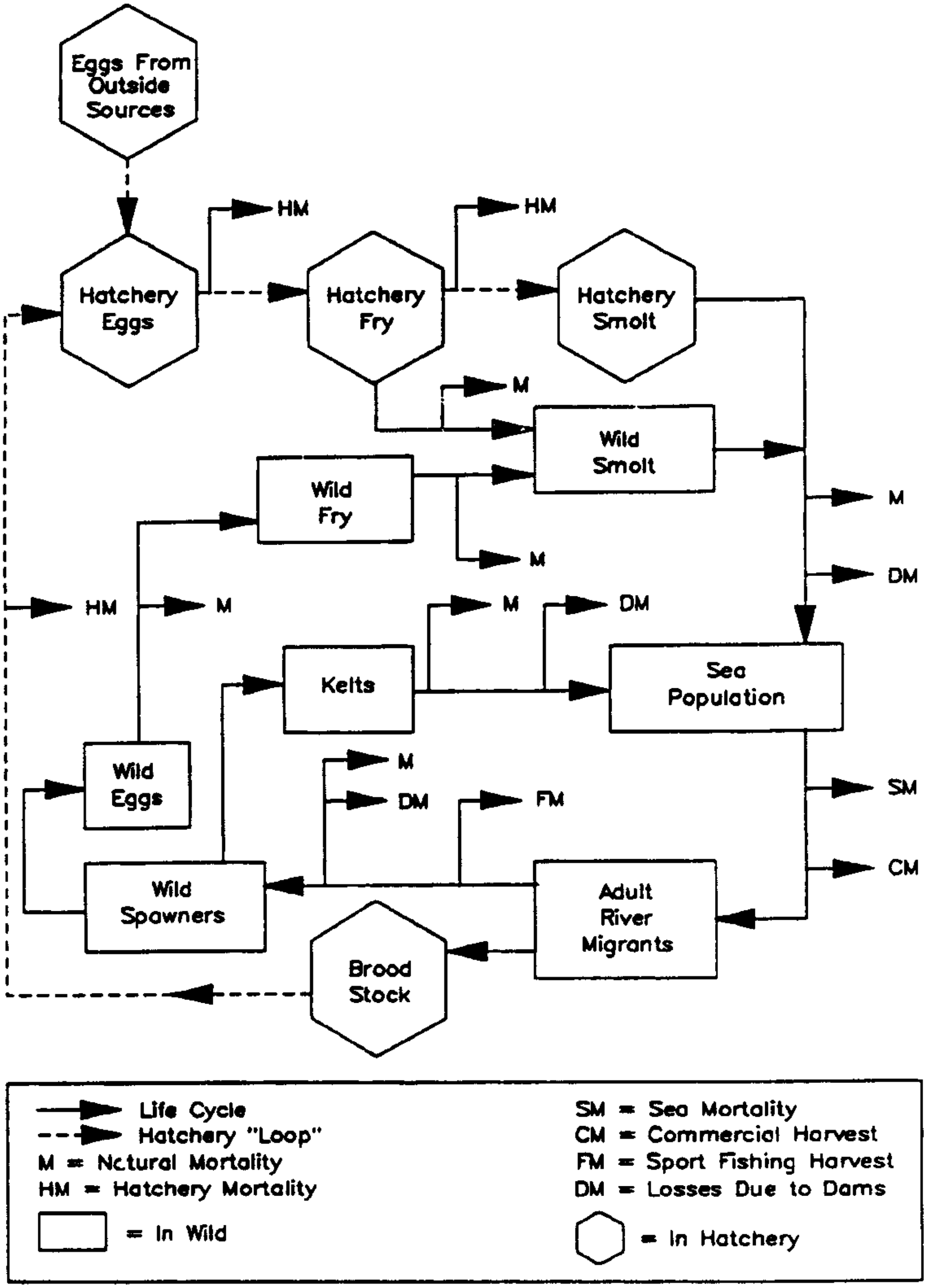

Figure E-1. Schematic of ASAL model (FWS 1989).

the working group's runs exactly. In addition, when responding to the AIR, BHE provided re-created rather than computer-generated copies of their own input files. These steps introduced typographical errors into the data that were provided.

Although we attempted to identify and rectify all discrepancies, we still were unable to duplicate BHE's or FWS' exact ASAL model outputs under identically defined conditions (e.g., current conditions, and current conditions plus the Basin Mills development with no mitigation). For example, FWS predicted that the probability of achieving a self-sustaining run in 2043 under current conditions was 72 percent (FWS, 1989); using their parameters, we predicted 68.2 percent. For Basin Mills with no mitigation, the probabilities were 39 percent in the FWS model run and 33.4 percent in our model run. We also were unable to duplicate BHE model outputs exactly with the input parameters they provided in their AIR response. BHE could not duplicate FWS' model output using the same input parameters (Shephard 1993b).

Model output discrepancies are not surprising because the model is complex, and input, structure, and operation for both BHE's and FWS's model runs were incompletely documented. Because the most important model result is an expected probability level without associated statistical confidence limits, however, the <u>magnitude of change</u> in probability associated with different project alternatives or mitigation options is most important for understanding impacts of alternatives. FWS and BHE agree, as expressed in testimony presented at MDEP WQC hearings.

The <u>general magnitude</u> of the modeled probability also is relevant to our assessment. A probability substantially less than 50 percent would indicate that successful restoration is unlikely, whereas a value substantially greater than 50 percent would suggest that restoration is very likely. To ensure equitable assessment of all alternatives, we used our own ASAL model runs to evaluate all major project alternatives and mitigation options in this DEIS; however, we relied on some BHE and FWS model runs in our discussion of the probability of Penobscot River salmon restoration under existing conditions. In addition, we extracted other quantitative measures of stock status from model output and considered them while comparing alternatives, including the expected run size in a particular year in the future, as discussed in the following section.

Underlying Model Concepts

The numeric salmon restoration goals that define "fully restored stock" as presented in state and federal management plans are based on several basic biological principles (see Section 4.3 for quantitative goals). The probability of attaining these goals was the primary ASAL model output disputed by BHE and fisheries agencies during their determination of potential effects of the Basin Mills Project.

The salmon population size in a river system is constrained by available spawning and nursery habitat. Although nursery habitat is generally the governing factor that determines the upper limit of population size, there must be adequate spawning habitat to produce the juveniles to occupy the nursery habitat.

There also must be a minimum number of spawning adults to produce juveniles. Numerical goals for salmon population size (see Section 4.3), therefore, generally reflect:

- estimates of numbers of smolts that can be produced in the Penobscot River, given the amount and quality of available nursery habitat;
- estimates of the number of spawning adults required to "saturate" all existing spawning and nursery areas;[2] and
- the number of "surplus" fish required to provide recreational harvest and removal of brood stock (the magnitude of the surplus establishes the level of harvest and other stock removal that can be tolerated without reducing the spawning stock to a level below that required to "saturate" the spawning/nursery habitat).

If the spawning stock is reduced below saturation levels, smolt production could decline to less than saturation, which could set up a spiraling decline in population size.[3] For a population to be self-sustaining, the long-term average numbers of adults on the spawning grounds and of smolts produced on nursery grounds must be near saturation. The ASAL model quantitatively characterizes relationships among all factors affecting salmon population size and provides a way to predict population trend change in response to factors that affect salmon life stages.

Partitioning the Penobscot River salmon nursery area into interdam segments is an important element of the model structure for assessing the consequences of the proposed project and various mitigation measures. The 1985 ASRSC habitat survey (Dube 1985) documented the location and amount of salmon nursery habitat in the Penobscot River. (See Figure 3-2 for location of that habitat.) The total amount of habitat can be divided into portions between dams in the basinwide nursery area. The potential number of smolts produced in each interdam segment is estimated by accounting for both the amount and quality of that habitat. Appendix D, Table D-6, presents potential production in each segment.

During downstream migration, some smolts produced in any interdam segment will be

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[2] This number is based on the percentage of females in the run, the average number of eggs produced by each female, and the estimated mortality of each early life stage (e.g., egg, fry).

[3] Natural biological populations vary considerably in size because of an array of biotic and abiotic factors (e.g., annual variability in temperature or abundance of predators or prey). Our discussion here is simplified, however, and reflects expected, long-term average population trends.

killed at each dam that they must pass before reaching the ocean. The total mortality within that particular portion of the smolt population, therefore, is a function of both the number of dams passed and the mortality rates at each of those dams.

Adult salmon are believed to return to the specific location at which they were reared. The proportion of returning adults appearing below Veazie that are destined for a specific interdam segment reflects the proportion of the total number of smolts produced in that same interdam segment that successfully migrated to the ocean. A certain percentage of the upstream-migrating adult salmon are lost at each dam that they pass,[4] as is reflected in upstream passage efficiency figures (see discussion of Alternative 2 in Appendix F). Highest upstream migration losses, therefore, are experienced by salmon destined for interdam segments located upstream of the greatest number of dams.

This interdam segmentation of the Penobscot River is critical for using the ASAL model to assess the impacts of hydroelectric projects. Appendix D, Tables D-6 and D-7 present estimates of interdam segment smolt production and dam-specific downstream and upstream mortality rates. Table D-7 also presents the cumulative upstream and downstream mortality rates (reflecting the effects of all dams on all population segments) for total smolt production and the total run of spawning adults. The cumulative loss figures for smolts also account for the smolts that would be lost due to inundation of habitat at the Basin Mills impoundment. As is indicated in Table D-7, the number of smolts produced in the Veazie/Great Works interdam segment would be reduced according to the number of habitat units inundated.

Input File Generation

We calculated cumulative upstream and downstream survival values using dam-specific values provided in the August 1989 FWS report and data about the distribution of spawning habitat among inter-dam river segments (Table D-6). Our calculated cumulative smolt survival values for the current conditions scenario (without Basin Mills) and the Basin Mills scenario match the values for each population segment given in the August 1989 FWS report. The August 1989 FWS report did not present cumulative upstream survival values for adults. Our calculated values differ slightly from the values provided by BHE. The largest discrepancies were in the Piscataquis River values; however, the differences were less than 5 percent.

Sport fishing mortality values and fishing vulnerability values provided in the FWS report and in the BHE input files were erroneous. The FWS report indicated a sport fishing

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[4] In computer modeling of the Penobscot River salmon run performed by BHE and the fisheries agencies, "upstream mortality" is the inability of a portion of upstream migrating adults to pass any given dam. Studies have not provided data to determine the fate of fish that do not pass upstream over a dam, but these fish probably do not die. Fish that do not pass upstream over a dam probably do not spawn, however, because they do not reach their natal spawning area. We refer to the portion of the population that does not pass over a dam, therefore, as lost to the <u>spawning</u> stock.

mortality of 0.1 and a fishing vulnerability of 0.1. The BHE input data file for the Basin Mills scenario indicated a sport fishing mortality of 0.01 and fishing vulnerability of 1.0. Sport fishing mortality and fishing vulnerability are multiplicative in the model; consequently, if BHE and FWS used the indicated parameter pairs, they would have produced the same results. These errors do not appear to have been incorporated into the model runs by the respective groups and, therefore, were only an issue in our attempt to replicate their work. These complementary errors in reported model parameters were identified through conversations with Steve Shepard of BHE. We assumed an annual sportfishing mortality of 10% in our model runs.

The FWS report indicates that the term of projection was from 1994 to 2043. The input files provided by BHE used a start year of 1987 and an end year of 2080. We used a start year of 1987 to achieve restoration in 2002 (which is consistent with FWS results); we also terminated the simulations in 2043 to correspond with the approximate end of the license period. An additional consideration is that model projections become increasingly uncertain as they extend farther into the future.

Our scenario involving 50 percent trap-and-truck of upstream migrants is a refinement of BHE's simplifying assumptions. To evaluate the trap-and-truck scenario, BHE assumed that the only loss of spawners in the Veazie/Basin Mills portion of the Veazie/Great Works population segment was due to passage losses at Veazie dam; BHE did not account for fish that were trucked above Milford. Because it is generally assumed that there is no fallback over Basin Mills, the trucked portion of spawners destined to spawn between Veazie and Basin Mills would be unable to reach the spawning grounds. In the model, fishway inefficiencies are treated as mortalities. For consistency, we also treat fish that cannot reach their spawning grounds because they were trucked above Milford as mortalities.

Because the trapping operation at Veazie dam cannot determine the appropriate destination of each migrant, 50 percent of the fish destined for the Veazie/Great Works spawning segment would be trucked above Milford on average. Only the untrucked portion (50 percent) of the Veazie/Basin Mills fish, less upstream passage losses at Veazie dam, would reach their spawning grounds. This would cause a 50 percent loss of spawners in the Veazie to Basin Mills section of the river that is directly attributable to the trap-and-truck program.

Although the biological reality of the assumption about spawners that do not reach their natal spawning grounds is debatable, a consistent set of assumptions when comparing the trap-and-truck scenarios with fishway-only alternatives must be maintained. Accordingly, we made the necessary changes to the trap-and-truck scenarios.

Model Execution

There are two major steps in applying the ASAL model to predict restoration success (Shepard, 1993b) to understand the meaning of the model outputs presented in Section 4.3:

- A deterministic form of the model is run to predict population growth from the present until the spawning stock is sufficient to saturate all nursery habitat (i.e., a fully restored and potentially self-sustaining run size). This modeled growth assumes that current management actions continue (e.g., smolt and fry stocking, capture of brood stock, 10 percent recreational harvest) and that there is no variability in any model parameter (e.g., upstream passage efficiency at each project is assumed to be constant at 92 percent); the assumption of no variability rests on the fact that the high stocking levels ensure that nursery habitat will be saturated continuously while the population is growing to fully restored status.

- A Monte Carlo, stochastic form of the model is initiated beginning with the year in which the deterministic model predicts a fully restored, potentially self-sustaining population. The Monte Carlo form incorporates variability into many of the model parameters (e.g., mean upstream passage efficiency is assumed to be 92 percent, but efficiency is assumed to vary randomly between 85 percent and 98 percent). Introducing variability simulates naturally variable environmental conditions and fish behavior.

  One thousand model runs are made, each with a random combination of input parameter values, and the percentage of runs that result in the desired outcome in any given year (e.g., 300 of 1,000 model runs result in nursery habitat being saturated by spawning adults in 2020) is expressed as the probability that a restored, potentially self-sustaining population will exist in that year (e.g., 30 percent probability of a self-sustaining stock in 2020). The Monte Carlo simulation assumes that stocking of fry and smolts (one million fry and 600,000 smolts, annually) continues for 5 years after the restored stock size is attained.

One complication in replicating model runs produced by the working group and BHE is that the model requires user input from the keyboard during the run. Second, parameters in one of the input files must be changed after running the deterministic model but before running the Monte Carlo model. Neither the working group nor BHE documented these run-time inputs and parameter changes. The following section provides documentation of steps required to replicate our model runs.

The first step in the ASAL modeling process is to create a single input file for each deterministic model scenario. This input file is named INFILE.DAT in Dr. Rago's model documentation. Tables E-1 and E-2 present the specific parameter values. Where median, high, and low values are presented for each population segment (Table F-7), we used the median values. The deterministic model program, MCINIT, uses the INFIL.DAT file to generate the initial conditions file, INICON.DAT, for the Monte Carlo model runs. We terminated the deterministic model run from the keyboard 5 years after restoration was achieved for a given scenario. We determined the year of restoration from the tabular summary of annual run characteristics (e.g., total run size, number of spawners, and percent restoration) contained in SAVFIL.DAT. The right (unlabelled) column in the output in SAVFIL.DAT gives the percent restoration based on the smolt carrying capacities in INFIL.DAT. Year of restoration is the first year in which the restoration exceeds 100 percent. For reasons explained below, subsequent determinations that restoration has been reached are based on the number of spawners rather than the number of smolts produced relative to the carrying capacity. Linear interpolation must be used to determine the number of spawners required to achieve 100 percent restoration; however, the appropriate spawner numbers are offset 1 year (lagged) from the percent restoration numbers.

Table E-1. Input data - Penobscot River ASAL projections

Parameter	**Data**
Component of Run	Males: 0.504 Females 0.496
Eggs/Pound of Female	880
Term of Projections	1987 to 2043
Parr/Smolt Schedule	Age 1: 0.0000 Age 2: 0.8792 Age 3: 1.0000
Age of Oldest Wild Parr	3
Maturity Schedule Virgin Males/Females	Males Females 1 SW 0.1659 0.0096 2 SW 0.9668 0.9663 3 SW 1.0000 1.0000
No Repeat Spawners	
Average Weight of Spawners (both male and female)	Age 1: 3.6 Pounds Age 2: 9.1 Pounds Age 3: 16.8 Pounds
Vulnerability to Fishing	1.0
Order of Removal of Adult Fish	1. Sport Fishing 2. Brood Stock 3. Upstream Mortality
Fishing Bycatch	None
Sport Fishing Mortality	0.10 (All Years)
Wild Egg to Smolt Survival	Deterministic: 0.01308 Stochastic: 0.006-0.0285

Table E-1. (Continued)

Parameter	Data		
Stocked Fry to Smolt Survival	Deterministic:	0.0489	
	Stochastic:	0.0200-0.1200	
"Optimistic" Marine Survival			
	Year	Range	Mean
Hatchery Smolts	1987-1998	0.0050-0.0175	0.0093
	1999-2004	0.0075-0.0200	0.0122
	2005-2043	0.0100-0.0230	0.0151
Wild Smolts	1987-1998	0.0150-0.0300	0.0212
	1999-2004	0.0200-0.0400	0.0282
	2005-2043	0.0250-0.0500	0.0353
"Less Optimistic (Merrimack)" Marine Survival			
	Year	Range	Mean
Wild and Stocked Smolts	1987-1993	0.0010-0.0048	0.0022
	1994-1998	0.0030-0.0146	0.0066
	1999-2004	0.0070-0.0306	0.0146
	2005-2043	0.0140-0.0454	0.0252
Actual Marine Survival Rate (mean from 1987 through 1992)	All Years	0.0079	

Probability of restoration as a function of time is derived from the MCASAL Monte Carlo projections. MCASAL requires three input files. The first MCASAL input file is in the INFIL.DAT format; however, the smolt carrying capacity values in this file have been changed to the high values indicated in Table E-1. All other values in the Monte Carlo version of the INFIL.DAT file are identical to those used for the MCINIT deterministic run. The second input file for running MCASAL is the INICON.DAT file containing initial conditions for the Monte Carlo model generated by MCINIT. The third MCASAL input file is designated RANSUF.DAT in Dr. Rago's model documentation. It contains the upper and lower limits for each of the stochastic parameters in the model and the model years for which model results will be saved.

Table E-1 lists parameter limits for stochastic variables. All Monte Carlo runs consisted of 1,000 stochastic model realizations. Note that in Table E-1 we specify three different sets of marine survival rates: "optimistic" values used by FWS in their ASAL modeling efforts; "less optimistic" values, based on Merrimack River data, that were used by BHE and which we adopted to investigate the consequences to restoration of marine survival being lower than is assumed by FWS; and, actual average marine survival of Penobscot River salmon smolts from 1987 to 1992. The consequence of use of these different survival rates is discussed in detail in section 4.3 of the DEIS. Table D-3 includes ASAL model outputs generated using both the "optimistic" FWS and the "less optimistic" Merrimack survival parameters.

Table E-2. Distribution of brood stock collection and hatchery production among population segments

Population Segment		Distribution of Brood Stock Collection and Hatchery Production (Proportion)		
Number	Name	Brood Stock	Fry	Smolts
1	Below Veazie	0.0000	0.0000	0.0131
2	Veazie/Great Works	0.0270	0.0000	0.0455
3	Great Works/Milford	0.0560	0.0000	0.0094
4	Milford/Mattaceunk	0.4410	0.0000	0.1111
5	Piscataquis	0.1770	0.0000	0.2831
6	Mattawamkeag	0.1260	0.0000	0.1695
7	East Branch Penobscot	0.0910	0.7423	0.2307
8	Pleasant	0.0550	0.0000	0.1376
9	Tributaries	0.0270	0.2577	0.0000

We used the program MCSTAT to analyze the model output and produce cumulative frequency distributions for the number of spawners during 4 years (2010, 2020, 2030, and 2043). We calculated probability of restoration as the proportion of model realizations in which the number of spawners equaled or exceeded the number required for 100 percent restoration. As with the MCINIT output, we had to interpolate the desired numbers from the model output.

The number of spawners required to achieve 100 percent restoration is the number calculated from the deterministic model run. The number of spawners from the deterministic run must be used instead of the percent restoration from the Monte Carlo run because the smolt carrying capacity values that the programs calculate percent restoration from have been changed to the high values; the desired benchmark of restoration is median smolt carrying capacity.

Model Outputs

Several outputs of the ASAL model can be used to measure the consequences of each project alternative. BHE and FWS used the probability of achieving a fully restored, potentially self-sustaining salmon run in 2043 (50 years after project licensing) as the principal metric. Several other metrics provide additional perspective, including:

- fully restored run size--this run size is established by the number of adults that must reach the spawning/nursery areas in the basin to produce the maximum supportable number of smolts. Although the number needed to saturate the nursery areas is constant across all alternatives, the number of spawning adults that must reach Veazie differs among alternatives according to how many adults are lost during upstream migration. For example, because Basin Mills dam would result in the loss of more adults during upstream migration, the restored run size under Alternative 2 is larger than the restored run size under Alternative 1, without Basin Mills;
- the potential number of smolts produced in the Penobscot River (i.e., not stocked) that are lost annually under a particular scenario, which is derived by adding the loss of smolts at each dam (from dam-specific downstream mortality rates multiplied by the number of smolts produced upstream from that dam that survive to reach that dam);
- the total number of smolts produced in the Penobscot River (i.e., not stocked) that survive to reach the ocean;
- the potential number of upstream migrating adults lost to the spawning stock, which is derived by multiplying the cumulative upstream mortality from all dams in the river basin (see Appendix D, Table D-6) by the number of adults appearing below Veazie dam that represents a fully restored run[5];
- the year in which a fully restored run size is reached or in which spawning/ nursery habitat is first saturated (i.e., when enough adults reach each interdam segment to produce the "saturation level" of juveniles); and
- expected run size--this number is derived from the output of the Monte Carlo ASAL model (explained further below); it is the average of the run sizes predicted for a given year from 1,000 model runs.

The predicted year in which a fully restored run would be reached is the least informative metric because existing management enhancement measures (e.g., stocking of fry and smolts) would continue under all alternatives, and these actions are primarily responsible for predicted population growth. As a result, fully restored run size is reached in 2002 for nearly

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[5] The number of adults that constitutes a "self-sustaining" run differs for each scenario because self-sustaining is defined by the number of fish that reach each interdam segment, not by the number of fish that appear below Veazie. Any scenario that results in a larger loss of upstream migrating adults requires a larger number of fish below Veazie to retain self-sustaining status.

all alternatives (except for Alternative 4: Veazie removal, discussed in detail in Section 4.3). Prior to our issuing the DEIS, intervenor and fisheries agency discussion focused on the probability that a fully restored population[6] of salmon will continue to exist in the years after a fully restored stock level is first achieved. In our assessments in section 4, we have focussed on expected run size 50 years after licensing. We present graphs of changes in probability and expected run size over time in our assessments of impacts and enhancements associated with each alternative and mitigation measures as described in Section 4.3. Table E-3 presents our ASAL model outputs for all model runs made in preparation of this DEIS (not all scenarios modeled are discussed in section 4.3 or Appendix F).

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[6] We discuss the meaning of the term "self-sustaining" as a restoration goal in detail under our discussion of the No-action alternative (see Section 4.3.3.1).

Table E-3. ASAL model output

USFWS Marine Survival Values

Scenario	Year Restored	Restored Run Size	Number of Lost Adults	Prob. of Restored Run in 2043 (%)	Expected Run Size in 2043	25%h %-tile	75th %-tile
Current Conditions	2002	9337	2745	68.2	10482	8393	12609
With Basin Mills	2002	9713	3468	33.4	8347	6014	10336
Veazie Removed	2002	9327	2693	69.4	10530	8438	12647
Gr. Works Removed							
Milford Removed							
W. Enfield Removed							
Mattaceunk Removed							
Howland Removed	2002	9586	3205	41.9	8888	6668	11012
Lower D/F Removed	2002	9677	3412	33.2			
Upper D/F Removed	2002	9738	3437	32.9			
Guilford Removed	2002	9849	3500	31.2			
Brownville Removed	2002	9721	3469	30.7			
Upper D/F & Guilford Removed	2002	9865	3456	34.3	8505	6174	10705
Current Cond. - Low Upstr. Passage	2007	12398	6042	2.1	5003	3172	6439
Current Cond. - With Stillwater Bypass	2002	9338	2745	68.2	10482	8393	12609
With Basin Mills - High Upstr. Passage	1999	8146	1944	89.7	11472	9677	13144
With Basin Mills - With Stillwater Bypass	2002	9718	3769	31.4	8122	5910	10225
With Basin Mills - 50% Trap & Truck	2002	8896	2426	74.8	10413	8495	12353
Current Cond. - High Downstr. Mortality	2002	9248	3222	38.6	8190	6152	10120
With Basin Mills - No Fishing	2002	8804	3143	64	9793	7763	11807
With Basin Mills - 50% Trap & Truck - Stock 30,000 Smolts/Yr - With Stillwater Bypass	2002	8892	2425	85.1	11493	9683	13328
No Basin Mills - Veazie Removed - With Stillwater Bypass	1999	8740	2145	96.6	13548	11646	15347
No Basin Mills - 50% Trap & Truck - With Stillwater Bypass	2002	9240	2353	76	10915	8992	12880

Table E-3. (Continued)

Merrimack Marine Survival Values

Scenario	Year Restored	Restored Run Size	Number of Lost Adults	Prob. of Restored Run in 2043 (%)	Expected Run Size in 2043	25%h %-tile	75th %-tile
Current Conditions	2002	9294	2732	2.6	3312	1824	4246
With Basin Mills	2003	9596	3429	0.8	1910	960	2438
Veazie Removed	2002	9864	2682	2.7	3440	1894	4250
Gr. Works Removed		9204	0		2970	1575	3240
Milford Removed		9046	0		2827	1484	3658
W. Enfield Removed		9459	0		2468	1277	3171
Mattaceunk Removed		9683	0		2256	1134	2878
Howland Removed	2002	9503	3178	0.6	2032	1222	3029
Lower D/F Removed		9574	0		1979	993	2522
Upper D/F Removed		9615	0		1980	993	2522
Guilford Removed		9691	0		1975	991	2521
Brownville Removed		9606	0		1918	964	2447
Upper D/F & Guilford Removed	2003	9703	3402	0.8	2043	1021	2609
Current Cond. - Low Upstr. Passage	2007	12979	6325	0	1367	726	1760
Current Cond. - With Stillwater Bypass	2002	9300	2734	2.6	3316	1828	4250
With Basin Mills - High Upstr. Passage	2002	8361	1996	9.3	4305	2437	5580
With Basin Mills - With Stillwater Bypass	2003	9620	3731	0.5	2217	1105	2804
With Basin Mills - 50% Trap & Truck	2002	8885	2423	1.8	3436	1862	4429
Current Cond. - High Downstr. Mortality	2003	9130	3181	0.9	2495	1342	3176
With Basin Mills - No Fishing	2002	8754	3125	2.1	3029	1626	3883
With Basin Mills - 50% Trap & Truck - Stock 30,000 Smolts/Yr - With Stillwater Bypass	2002	8889	2424	16.2	5934	4045	7347
No Basin Mills - Veazie Removed - With Stillwater Bypass	2002	8999	2208	29.8	7412	5361	8997
No Basin Mills - 50% Trap & Truck - With Stillwater Bypass	2002	9208	2345	3.8	3679	2000	4733

Table E-3. (Continued)

New Alternatives

Scenario	Year Restored	Restored Run Size	Number of Lost Adults	Prob. of Restored Run in 2043 (%)	Expected Run Size in 2043	25%h %-tile	75th %-tile
NA-1 No Basin Mills, remove Veazie A&B, install Veazie C, refurbish Orono	2002	9300			3279	1804	4202
NA-2 No Basin mills, retain Veazie A&B, vertical trubine in Veazie C, Orono unchanged	2002	9155			3606	2061	4544
NA-3a Basin Mills upstream of Stillwater River, remove Veazie, remove Orono	2002	9661			2074	1067	2632
NA-3b Basin Mills upstream of Stillwater River, refurbish Veazie, refurbish Orono	2002	9289			3203	1762	4087
NA-4 No Basin Mills, Veazie unchanged, new turbines at Orono	2002	9292			3440	1943	4365
NA-6 Build Basin Mills, remove Veazie, decommission Orono							

<u>Scenario</u>	New Prod.	Number Smolts Surviving	Number Smolts Lost
Current Conditions		281275	11421
With Basin Mills		266932	25764
Veazie Removed	12490	281415	23771
Gr. Works Removed	6574	276151	23119
Milford Removed	703	269263	24136
W. Enfield Removed	5354	273073	24977
Mattaceunk Removed	8566	276067	25195
Howland Removed	5442	274403	23735
Lower D/F Removed	680	267856	25520
Upper D/F Removed	2607	269480	25823
Guilford Removed	5215	271772	26139
Brownville Removed	391	267301	25786

Table E-3. (Continued)

Scenario	New Prod.	Number Smolts Surviving	Number Smolts Lost
Upper D/F & Guilford Removed	7822	267301	25786
Current Cond. - Low Upstr. Passage		274341	26177
Current Cond. - With Stillwater Bypass		281275	11421
With Basin Mills - High Upstr. Passage		282123	10573
With Basin Mills - With Stillwater Bypass		266932	25764
With Basin Mills - 50% Trap & Truck		267768	24928
Current Cond. - High Downstr. Mortality		266932	25764
With Basin Mills - No Fishing		258927	33769
With Basin Mills - 50% Trap & Truck - Stock		266932	25764
30,000 Smolts/Yr - With Stillwater Bypass- Merrimack Survival Rates		267755	24941
No Basin Mills - Veazie Removed - With Stillwater Bypass - Merrimack Survival Rates	12490	296706	8480
No Basin Mills - 50% Trap & Truck - With Stillwater Bypass - Merrimack Survival Rates		282109	10587
NA-1 No Basin Mills, remove Veazie A&B, install Veazie C, refurbish Orono	0	281695	11001
NA-2 No Basin mills, retain Veazie A&B, vertical trubine in Veazie C, Orono unchanged	7146	285297	11845
NA-3a Basin Mills upstream of Stillwater River, remove Veazie, remove Orono	0	269193	15459
NA-3b Basin Mills upstream of Stillwater River, refurbish Veazie, refurbish Orono	0	279996	12700
NA-4 No Basin Mills, Veazie unchanged, new turbines at Orono	7146	282678	11820
NA-6 Build Basin Mills, remove Veazie, decommission Orono			

APPENDIX F

DEVELOPMENT-SPECIFIC FISHERIES IMPACTS

TABLE OF CONTENTS

I. INTRODUCTION

In Section 4.3, we summarized development-specific impacts on and enhancements of fisheries and focused our in-depth discussion on the cumulative impacts of alternatives on fish stocks. In this appendix we present the detailed analysis from which we drew the Section 4.3 development-specific impact summary statements.

The kinds and magnitude of effects vary substantially as a function of species' life histories and current status, habitat distribution in the basin, location of the development, and existing and proposed enhancements. We analyze effects on Atlantic salmon, American shad, alewife, and resident fish separately, treating each as a separate resource area. Because there is little available information about them, we present all analysis for eel in Section 4.3.

The organization and level of detail on each fish species or group of species also differ because of differences in the number of issues and the amount of data and information available. Our analysis of Atlantic salmon, therefore, is the most complex and we partition our detailed assessment for this species according to the various ways in which effects may occur including:

- modification of river flows, either through diversion from bypassed reaches or alteration of natural flow patterns;
- modification of physical habitat through physical changes (e.g., construction activities), inundation, or dewatering;
- modification of water quality by altering temperature, dissolved oxygen (DO), or toxics to levels that adversely affect the species;
- complete or partial blockage of upstream migration, depending on the nature and effectiveness of upstream passage facilities; and
- mortality of downstream migrants due to turbine passage - the magnitude of the effect depends on the percentage[1] of fish that must pass through the turbines (in part related to the existence and efficiency of downstream passage facilities) and the type and operational mode of the turbines.

We do not subdivide our analysis of effects on other species by modes of effect because the issues are less complex.

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[1] The <u>percent</u> loss, rather than the number of fish lost, determines how growth of a fish population will be affected; losing relatively small numbers of fish when the population is small may significantly affect the future population size or rate of population growth.

We organize the discussion according to alternative and, within alternative, first by species then by development, starting with the most downstream. We present no development-specific analysis of **Alternative 1 (No-action)** because the only fisheries issues with this alternative were the potential fates of the shad, alewife, and salmon stocks, and the cumulative assessment is presented in detail in Section 4.3. We begin our detailed discussion, therefore, with **Alternative 2.**

II. ALTERNATIVE 2: Applicant's Proposal

Atlantic Salmon

Flow Modification

Veazie. BHE proposes to operate the expanded Veazie development as a run-of-river facility and to sequence the operation of all 18 units at plants A, B, and C to maximize fish passage at the site while maintaining or enhancing fish habitat and fishing opportunity below the dam. The proposed operation calls for using Plant C on the east shore of the river (see Figure 2-1), at flows up to 6,000 cfs; various units of plants A and B would be operated at flows between 6,000 and 13,525 cfs, which is the total combined hydraulic capacity of all Veazie units. When river flow exceeds 13,525 cfs, all units would operate and spillage would occur.

Conservation Intervenors and Interior expressed concern that discharges from Veazie Plant C would disrupt and significantly degrade flows below Veazie, endangering salmon habitat and nationally recognized salmon fishing pools at Veazie and Eddington (letter from R.G. Dreher, Conservation Intervenors, March 29, 1993; letter from W. Patterson, DOI, March 24, 1993). They also stated that BHE should have conducted hydraulic modeling to assess these effects.

The major flow alterations below Veazie with the applicant's proposal would be decreased spillage over the dam (because of the additional hydraulic capacity of the proposed Plant C) and a shift in flows, under some circumstances, from along the west shore and across the face of the dam to along the east shore. Under current conditions, which are the baseline for this impact assessment, all generating flows are released along the west shore of the river (where plants A and B are located), and all river flow greater than 7,525 cfs passes over flashboards across most of the width of the river. Figure F-1 shows average river flow just below Veazie dam for the years 1980 to 1991 and daily flows for the years 1990 and 1991. Horizontal lines marking the 7,500 cfs hydraulic capacity of existing plants and the 13,500 cfs hydraulic capacity of Veazie with Plant C illustrate that, under existing conditions, flow would pass over the dam during summer (mid-June through September) but would originate only along the west shore.

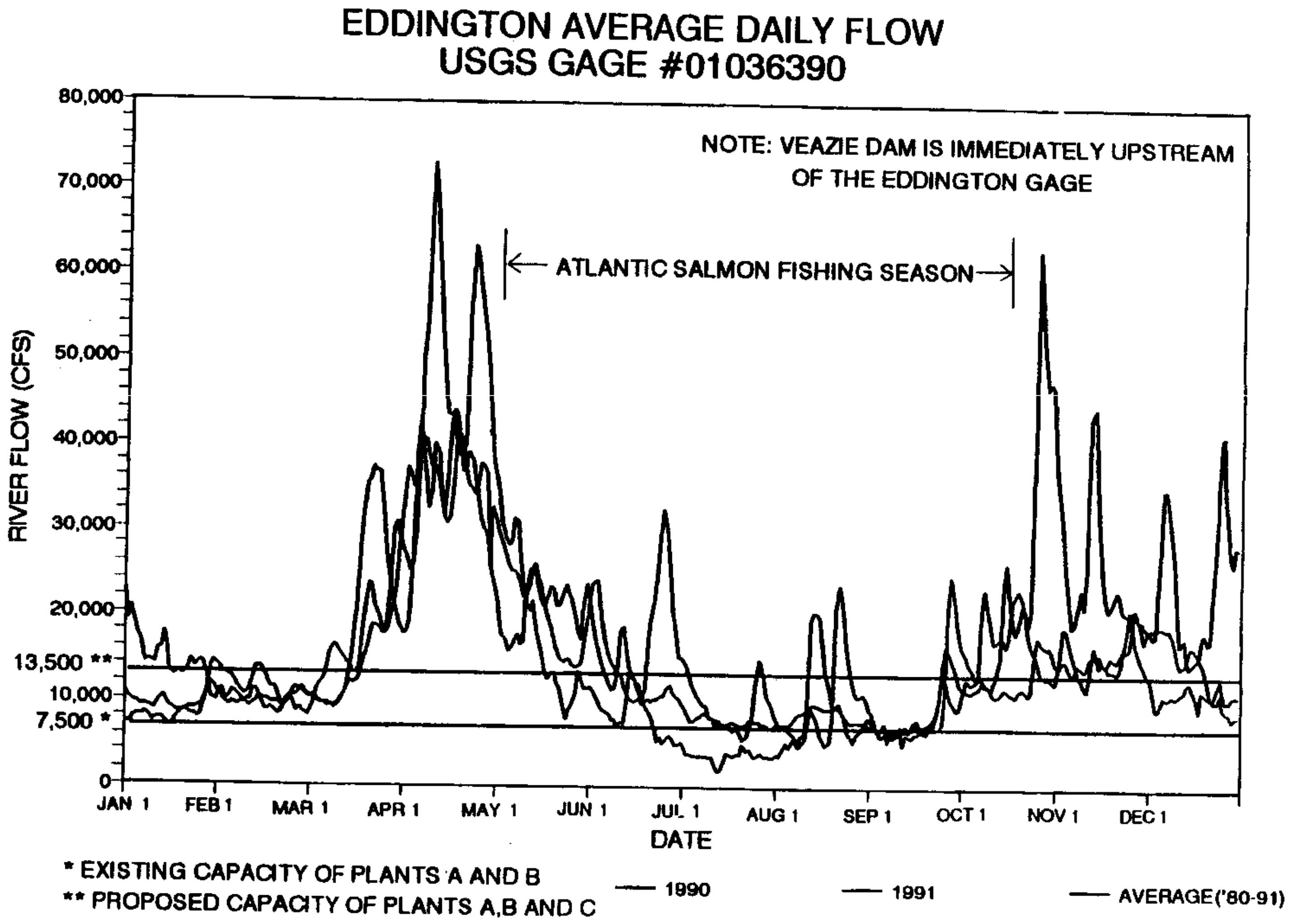

Figure F-1. Eddington average daily flow (Source: Lukas 1992).

With Plant C operating, flows would pass over the dam only about 30 percent of the year. During the rest of the year, downstream flow would originate along the east shore below Veazie when river flows were below 6,000 cfs and along both shores at flows up to 13,500 cfs. The major flow alteration would be redistribution of flow laterally across the river below Veazie dam during about 60 percent of the year, primarily during mid-winter and summer.[2]

We address the consequence of these effects on recreational fishing activity in Section 4.8; here we focus on the potential for altering habitat where salmon fishing occurs. Construction effects on flows would be very limited and temporary so we do not address them further.[3]

Figure F-2 shows salmon fishing lies[4] and rods[5] in the Penobscot River below Veazie dam. Decreasing spillage during summer and operating Plant C as the first-on, last-off unit would shift flows from the along the face of the dam and the west shore to the east shore at flows less than 13,500 cfs. At flows greater than 13,500 cfs, all plants would operate, spillage would occur, and flow regimes would not differ substantially from existing conditions (except for higher flows originating along the east shore).

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[2] Flashboard operation presently affects flow regimes below the dam minimally, and current operation practices would not be changed. Flashboards are 6 feet high and hinged; they generally begin to fail when water levels reach 18 inches above the crest of the boards, at flows of about 20,000 cfs (Figure F-3). Total failure is expected at flows greater than 50,000 cfs. Failure occurs in sections consisting of several adjacent boards, and the flashboards are restored (by transport and repair performed along cables suspended above the dam) without significant impoundment draw-down (generally 1 to 2 feet). The impoundment is refilled to crest by limited restrictions of plant operation (rather than complete unit shutdown) that produce no significant deviation from run-of-river operation. In the event of total flashboard failure, refilling of the pond may extend over 48 hours. Flashboards fail principally during spring, and all flashboards are generally restored prior to the Atlantic salmon fishing season (see seasonal flow patterns in Figure F-1).

[3] Exhibit C of Volume 1 of BHE's license application presents construction plans (BHE 1990a). The tailrace cofferdam would begin about 150 feet west of the east end of the dam and extend to the shoreline 240 feet downstream of the dam. Any spill that would have passed over the dam along the 150-foot crest would be passed over the remainder of the crest. Flows in all areas except the dewatered area behind the cofferdam would not be substantially altered.

[4] A lie is an area within a river in which upstream migrating salmon will rest or hold and will be inclined to strike at a fly. A resting or holding area in which fish are not likely to strike is not considered a lie; however, no scientific studies have characterized the habitat variables that establish a particular area as a lie.

[5] A rod is part of a lie that can accommodate either a single boat with two anglers or a single, shore-based fly fisherman without interfering with the fishing activity of other anglers. Each boat lie (70 ft long by 40 ft wide) is equal to two rods; a shore rod is 50 ft along shore by 35 ft wide (from BHE 1990h, Appendix D).

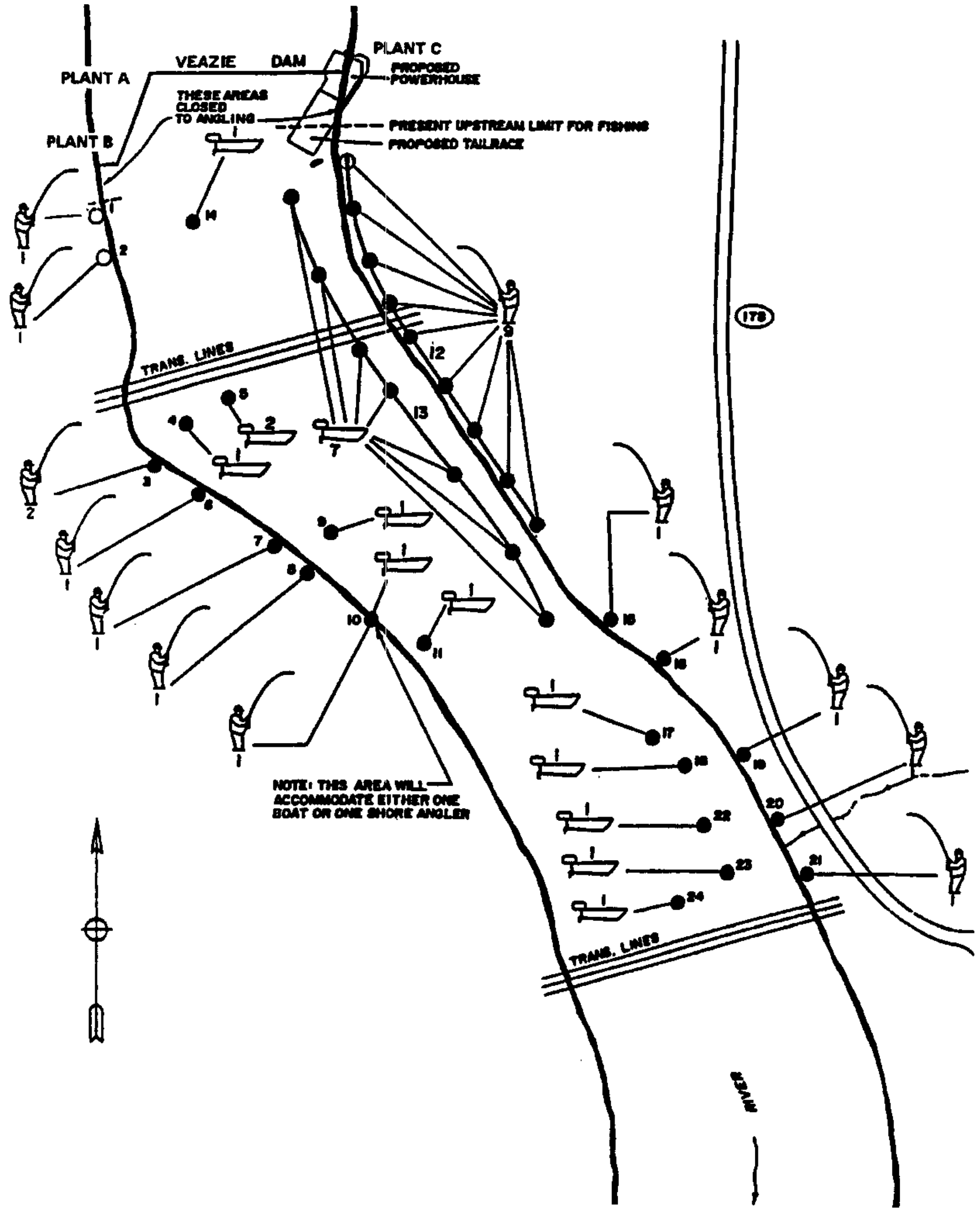

Figure F-2. Atlantic salmon lies and rods below Veazie Dam (Source: BHE 1990h, Appendix D).

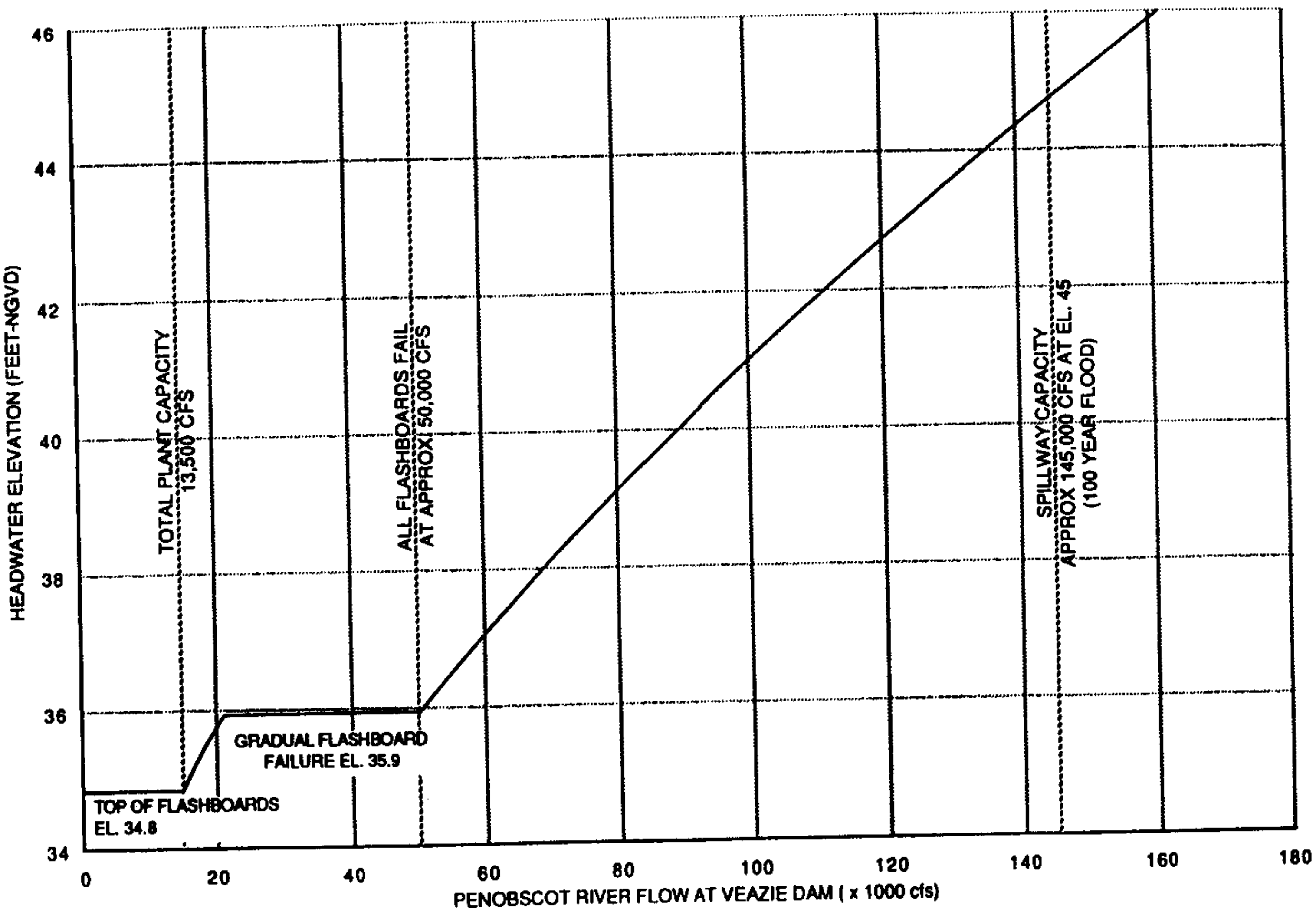

Figure F-3. Headwater curve for the Veazie Development (Source: BHE 1990a).

BHE investigated expected changes in flow regimes below Veazie with Plant C operating (BHE 1992f). BHE conducted studies at river flows ranging between 4,000 cfs and 7,000 cfs, which are typical for the mid-summer portion of the Atlantic salmon fishing season (Figure F-1). BHE created scenarios representing the potential consequences of flow discharge from Plant C by releasing flow from dropped flashboards at the east end of the dam. FWS and other commenters requested that BHE conduct hydraulic modeling to address this issue. We contend that, although hydraulic modeling is appropriate for detailed design of structures such as fish passage facility entrances, BHE's study was adequate to investigate the consequence of cross-river shifts of flow in relatively broad sections of the river. In addition, establishing an accurate, detailed reproduction of the very irregular bottom topography of the river reach immediately below Veazie, which is critical for accurate hydraulic modeling, probably would not be possible.

Figures F-4 and F-5 show flow patterns under a scenario (No. 1.a), in which all flow would originate from plants A and B, and another scenario (No. 2.a) in which most flow would originate from the east end of the dam, the proposed location of Plant C. For reference, boat lie No. 9 (Figure F-2) is approximately 1,600 feet downstream of Veazie dam, as is monitoring location No. 20 indicated on figures F-4 and F-5. Measured water velocities corroborate the flow patterns presented under scenarios 1.a and 2.a, indicating that cross-river velocity profiles are similar under the various operational scenarios at a distance of about 1,500 feet below the dam. We conclude that the major change in flow regime within 1,500 feet of the dam would be virtual elimination of flows along the west shore (the location of lies 1 and 2) when Plant C is operating and plants A and B are not. Flows at the most upstream rod in lie 12 would be somewhat affected under the two extreme flow scenarios depicted here.[6] We also conclude that flow characteristics would not be altered significantly at any of the other boat lies or shore lies below Veazie dam under the Applicant's Proposal.

There are several major factors unique to flow modification effects on salmon lies:

- Lies and rods have no biological meaning within the context of Atlantic salmon population dynamics (i.e., they do not represent a critical habitat); they are defined based on an angler's ability to harvest fish. Eliminating lies, therefore, could enhance salmon population levels by reducing harvest mortality.

- There are no criteria (e.g., depth, velocity, substrate) for scientifically identifying and locating salmon lies; therefore, there are no criteria to determine if a modification of the physical habitat at a known fishing lie is sufficient to eliminate the lie. Salmon, however, are known to rest in locations with certain general

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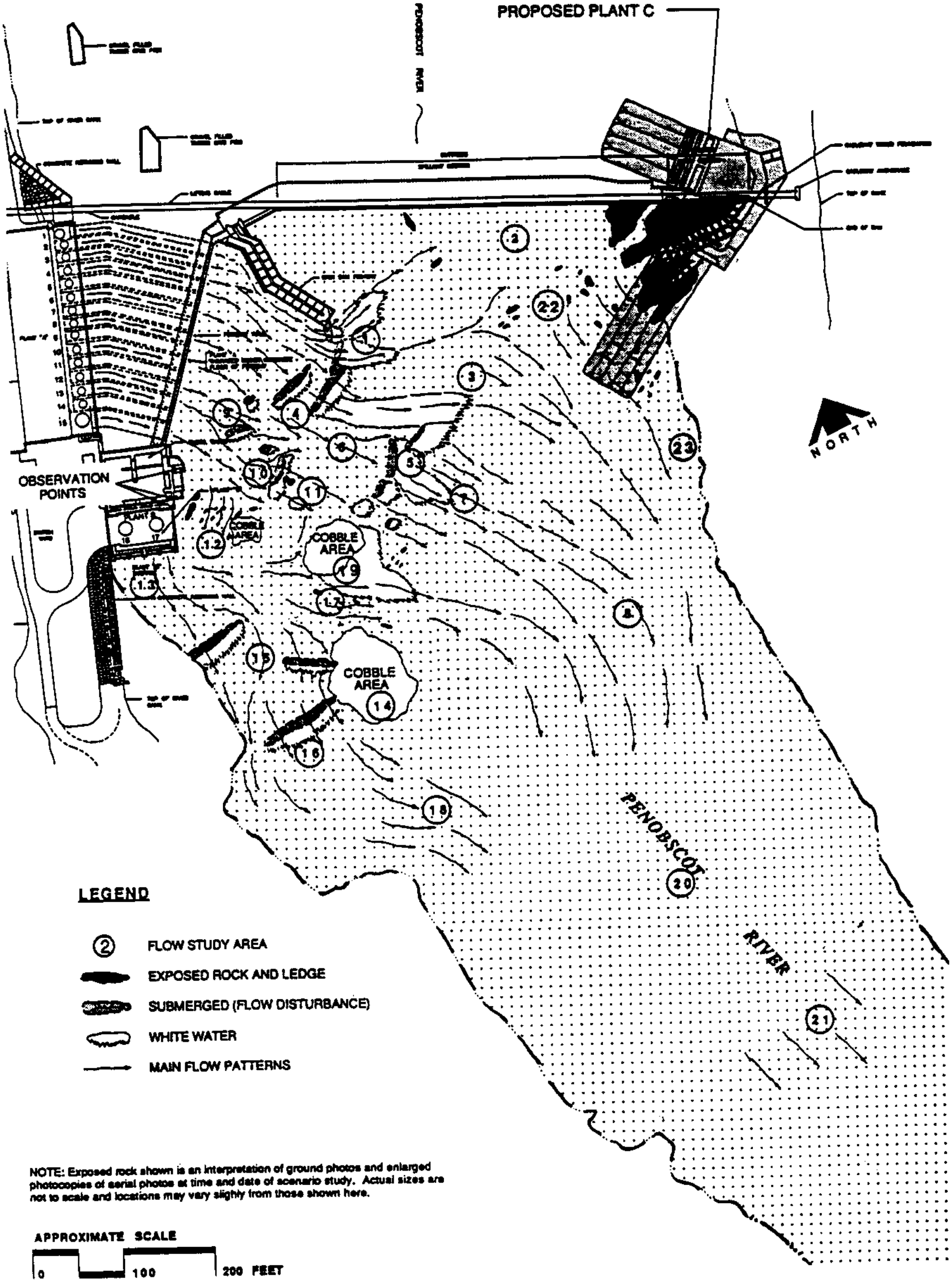
[6] BHE indicated that the use of the most upstream rod in lie 12 would be restricted after construction of Plant C and its associated fish passage facilities because state regulations prohibit fishing within 150 feet of a fish passage facility. In this assessment, we examined only the potential physical modifications of the environment that might affect fish and fishing opportunity.



NOTE: Exposed rock shown is an interpretation of ground photos and enlarged photocopies of aerial photos at time and date of scenario study. Actual sizes are not to scale and locations may vary slightly from those shown here.

Figure F-4. Operating scenario 1.a observations of flow patterns (August 6, 1991). Plants A and B at a flow of 4,870 to 5,100 cfs with no flow at east side of Veazie Dam (Source: BHE 1992f).

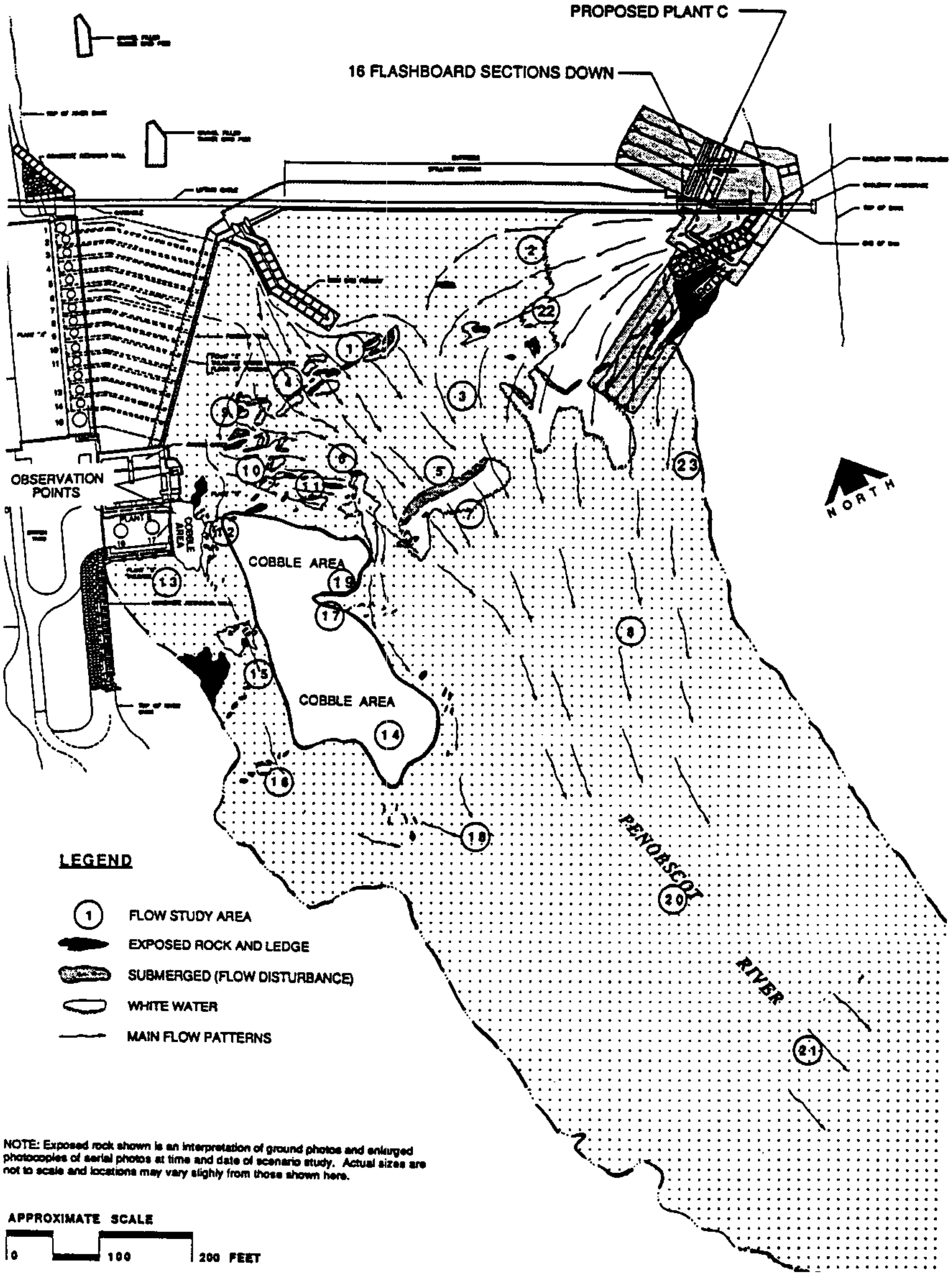


Figure F-5. Operating scenario 2.a observations of flow patterns (August 7, 1991). Plant A, units 1 and 6 at a flow of approximately 950 cfs with approximately 3,500 to 4,100 cfs at east side of Veazie Dam (Source: BHE 1992f).

characteristics (e.g., depths of about 2 feet, flow velocities of about 1 fps, and along sharp velocity gradients; BHE 1990h, Appendix D; Knight and Greenwood 1981), and a lie cannot exist without a resting or holding pool.

- Known lies are often near man-made structures (e.g., below Veazie dam and downstream at the Bangor City water supply line riprap; BEP 1993, p. 2499). The existence and productivity of lies also can be modified substantially by altering flow where possible, such as below generating facilities; these observations support the contention that lies can be created by physical modification of habitat.

Four factors control the existence and productivity of lies: the existence of a location in which salmon will rest, the existence of salmon to occupy such locations, the likelihood that salmon in such an area will strike a fly,[7] and the ability of the angler to reach these locations. Only the existence of resting pools relates to flow impacts of the proposed project.

BHE's flow study (BHE 1992f) documents that the two lies downstream of Plant B would be affected by the project as proposed, solely because of shifting operating flows from plants A and B to Plant C, and only when flows are below the hydraulic capacity of Plant C (6,000 cfs). This effect would occur primarily during the mid-summer (Figure F-1). Although eliminating those lies and possibly modifying flows at the upper rod in lie 12 would reduce fishing opportunity in those locations, it would have no biological effect on the salmon that would occupy those locations. Without an attraction flow along the west shore, the attraction flow along the east shore would cause salmon to redistribute themselves among existing resting pools below Veazie. Salmon densities in other known lies below Veazie probably would increase because fish would relocate, which could increase catch efficiency for anglers who fish those lies. There are no baseline data, however, to document the current relative productivity of the salmon lies documented in BHE's angling opportunity survey.

BHE proposed Plant C as the first-on, last-off unit of Veazie (the operational mode that affects lies 1 and 2) in response to agency suggestions that such an operating regime would enhance fish passage through the new upstream passage facility to be built at Plant C Alternative regimes, such as operating plants A and B before C, could be used to preserve fishing lies 1 and 2; however, given the state and federal goal of restoring salmon in the Penobscot River, enhanced passage should be a higher priority than preserving a small amount of angling opportunity.

BHE proposes to mitigate any potential loss of salmon lies below Veazie dam in three ways: by completely removing the Bangor dam (which is downstream of Veazie and is

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[7] Factors that may cause a fish to strike or avoid a fly are not documented in the scientific literature and cannot be addressed in this DEIS. Salmon abundance is addressed in this DEIS under cumulative impacts, and angler access is addressed in Section 4.8.

breached), by creating lies in the Plant C tailrace, and by creating lies in the reach of river affected by removing Bangor dam (BEP 1993, p. 2498). BHE's consultant, C. Ritzi, indicated that concrete tetrapods could be placed in various locations in the river to create lies. BHE also proposes to monitor the created lies and modify them, if necessary, to ensure their productivity; however, BHE did not identify criteria for measuring the success of created lies.

The breached Bangor dam has continued to deteriorate since BHE first submitted a license application for Basin Mills. Testimony during Maine DEP WQC hearings and visual observations by FERC staff members who visited the site during the scoping process suggest that removing the remnants of Bangor dam would do little to alter the habitat in that portion of the lower Penobscot River and, therefore, probably would not contribute to creating new salmon holding areas. Creating new resting pools and lies by placing artificial habitat structures, such as concrete tetrapods, has a long, successful history with many salmonids, such as trout, and has been accepted as habitat mitigation in other salmon rivers in Maine (BEP 1993). We conclude that creating artificial resting pools downstream of Veazie or in the Plant C tailrace could completely compensate for the minimal loss of resting pools and lies associated with the project as proposed and, in fact, could increase the number of pools and lies.

We acknowledge the strong traditions associated with Atlantic salmon fishing at specific locations in a given water body, as evidenced by the designation of various fishing locations as lies and rods and the naming of those specific locations (e.g., Eddington Pool); however, holding and resting pools within a river are readily created or eliminated by both natural phenomena (e.g., the breaching and degradation of Bangor dam) and man's activities (e.g., the construction of the water pipeline downstream of Veazie). We conclude, therefore, that "artificial" resting pools can offer the same quality of biological and recreational benefits as "natural" pools and that BHE's proposed mitigation is appropriate and adequate to compensate for limited effects of flow modification below the proposed Veazie Plant C.

One additional flow-related issue for Atlantic salmon below Veazie dam relates to the potential effects on juvenile nursery habitat. A 1985 Atlantic Sea Run Salmon Commission (ASRSC) habitat survey[8] documented 558 habitat units[9] for juvenile salmon between the

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[8] We used the ASRSC survey data as the basis for quantifying all Atlantic salmon spawning and nursery habitat in the Penobscot River. BHE consultant C. Ritzi questioned the validity of some of these figures for habitat in the project area, suggesting that potential smolt production from existing habitat may be lower than ASRSC estimated, which would result in lower estimates of impact. No rigorous scientific data are available to evaluate the validity of these comments; however, because all agencies and organizations involved in Penobscot River Atlantic salmon restoration have used the ASCRC data, we used it in this assessment to ensure consistency with all other estimates of population dynamics for this stock.

[9] A habitat unit is a particular combination of substrate, flow, and temperature characteristics; each unit consists of 100 square yards capable of producing 1, 2, or 3 smolts, depending on habitat quality. Production below Veazie was estimated at 1 smolt per unit.

dam and the first transmission lines downstream (see Figure F-2 for locations; BHE 1990h, Appendix F).[10] A shift from spillage to release through Plant C may alter flow in that portion of the river, as discussed previously. BHE conducted a habitat-based study below Veazie to quantify the potential effects of the anticipated flow changes (BHE, 1992f). Figure F-6 presents the weighted usable areas (WUA) for juvenile salmon in the affected area below Veazie under several operating scenarios. Op1 represents current operations in which only plants A and B are operating. Op2 data were collected with most flow produced from dropped flashboards at the east end of the dam and represents flows resulting from operating Plant C. The remaining scenarios represent various combinations of flows from all plants. All scenarios representing operation of Plant C increase WUA for juvenile salmon. The increases are attributable to moderation of high velocities in the affected area by shifting spill over the crest of the dam to localized discharge along the east shore. We conclude that the project as proposed would not adversely affect juvenile salmon habitat below Veazie dam and, in fact, could enhance it.

MDEP Water Quality Certificate Condition 16 requires that BHE conduct a hydraulic modeling study to provide data necessary to design and construct the Veazie Plant C tailrace to minimize the effect of Plant C discharges on existing angling opportunity and maximize salmon angling below the dam without unacceptably impairing fish passage.

We believe that elements of this condition are inherently inconsistent and provide no fisheries resource enhancement. Criteria by which "maximum" salmon angling would be measured or at what level of efficiency fish passage would be considered to be "impaired" are not defined. If the angling criteria metric is number of angler hours or days, the recreational enhancements required in other WQC conditions would appear to have greater potential for meeting the objective of this condition (we address WQC conditions relating to salmon angling further and in greater detail in Section 4.8). Upstream migrating anadromous fish are attracted by flow, and BHE's proposed Plant C first-on, last-off operational regime at Veazie appears to be the most effective means of enhancing fish passage at Veazie as proposed by BHE.

It is possible that hydraulic modeling could provide a basis for specialized modifications to the tailrace which would split flow in such a way as to fully retain the most upstream rod in lie 12 (see Figure 4-4 in Section 4.1.3.1). No hydraulic modeling result can change the fact, however, that operation of Plant C with plants A and B not operating would eliminate flow at the two salmon lies downstream of Plant B. We believe that enhancement of fish passage is the most effective means of enhancing run size (which is the ultimate means of maximizing salmon angling); therefore, passage efficiency should take precedence over provision for maximizing fishing opportunity. We conclude that hydraulic modeling is not needed for development of flow regimes to maximize salmon angling below Veazie, particularly since we have concluded that those impacts will be minor and that other WQC

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[10] The ASRSC survey documented no spawning habitat in the immediate vicinity of Veazie.

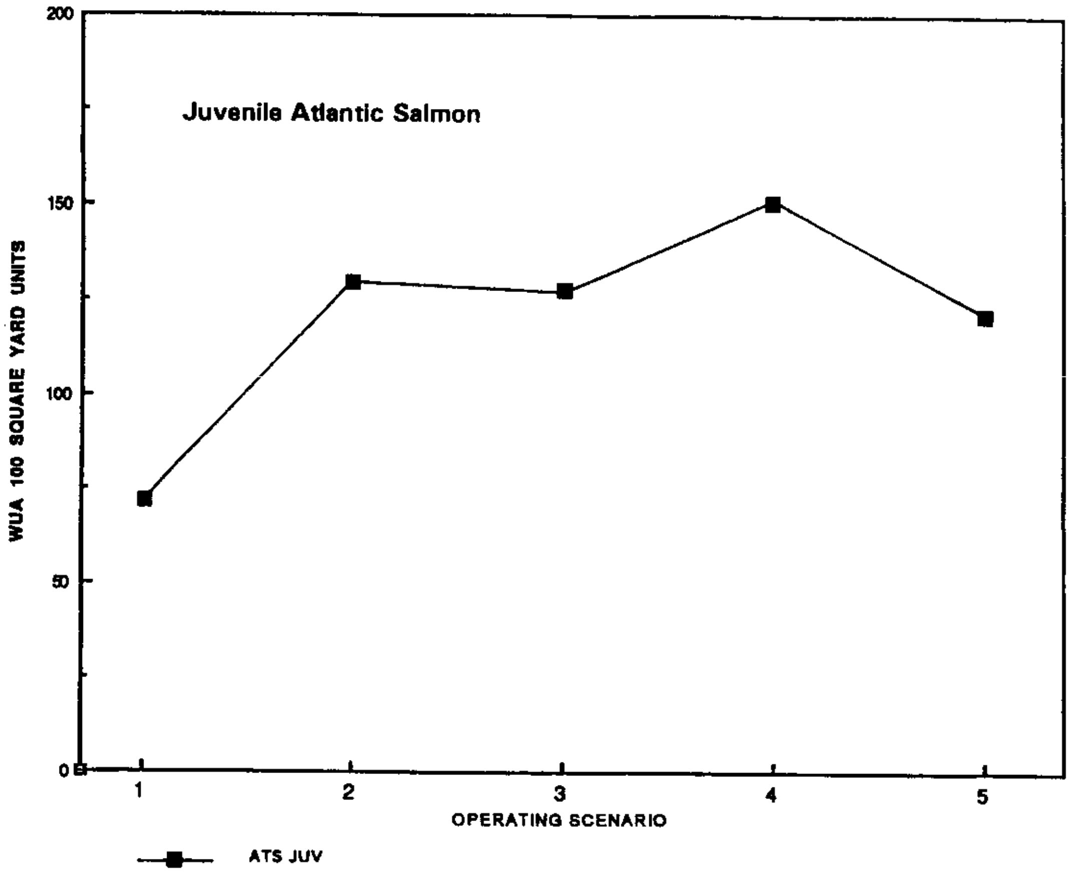

Figure F-6. Predicted weighted usable area for Atlantic salmon juveniles in the Veazie tailrace using various operating scenarios (Source: BHE 1992f).

conditions that call for the construction of artificial salmon lies would mitigate for project impacts on salmon angling. We do believe, however, that hydraulic modeling is required for proper detailed design of the Plant C fish lift and should be done for that purpose. Thus, we contend that adoption of this WQC condition is partially warranted.

Basin Mills. BHE proposes to operate the Basin Mills Development as a run-of-river facility (see Section 2.1.1.1). Operation of the project will cause a radical redistribution of flow laterally across the river between the dam and the head of the Veazie impoundment. With turbine capacity of 20,000 cfs, all flow would be released downstream of the dam along the east shore of the river at river flows below 20,000 cfs. Flows in excess of 20,000 cfs but less than 60,000 cfs would be released through the spillway gates at the west end of the dam (Figure 2-2). At flows greater than 60,000 cfs, water would spill over the flashboards along the length of the dam.

Gradual flashboard failure would be expected when flashboards are overtopped by about 1.5 feet of water, between flows of about 70,000 cfs and 145,000 cfs (Figure F-7). Given the seasonal pattern of flows in the lower river,[11] east shore flow release would be expected during about 70 percent of the year. Flow would originate along both the east and west shores for about 8 weeks during the spring (March to May) and 4 to 6 weeks during the late fall and winter (mid-October through December). Spill over the crest of flashboards would occur infrequently and only during major storms, which appear to occur most during the spring.

The approximate upstream limit of the Veazie impoundment would be about 300 yards downstream of the east shore powerhouse and 500 yards downstream of the west shore spillway (Figure 2-2). The Basin Mills forebay, powerhouse, and some of the tailrace would be constructed outside the existing river bed (Figure F-8), therefore, they would create new aquatic habitat (see discussion of impacts of physical habitat modification later in this appendix).

The existing riverine environment from the proposed location of the dam to the upper extent of the Veazie impoundment consists of a steep rapids at Basin Mills rip (6- to 8-foot vertical drop) and a riffle and run. Constructing a tailrace along the east shore and a discharge canal below the spillway at the west shore would create new, deep-water habitat, with high velocities at the point of discharge and decreasing velocities with distance from the discharge. At flows of less than 20,000 cfs (approximately 70 percent of the year), normal riverine flow through the existing riffle/run habitat would be replaced with deep, point-source discharge at the east shore powerhouse; flow would spread to the west but would be oriented primarily downstream. At flows between 20,000 cfs and 60,000 cfs, the east shore discharge

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[11] Seasonal flow patterns below Veazie represent flows at the site of the Basin Mills development because of the close proximity of the two and the lack of major tributaries in the area.

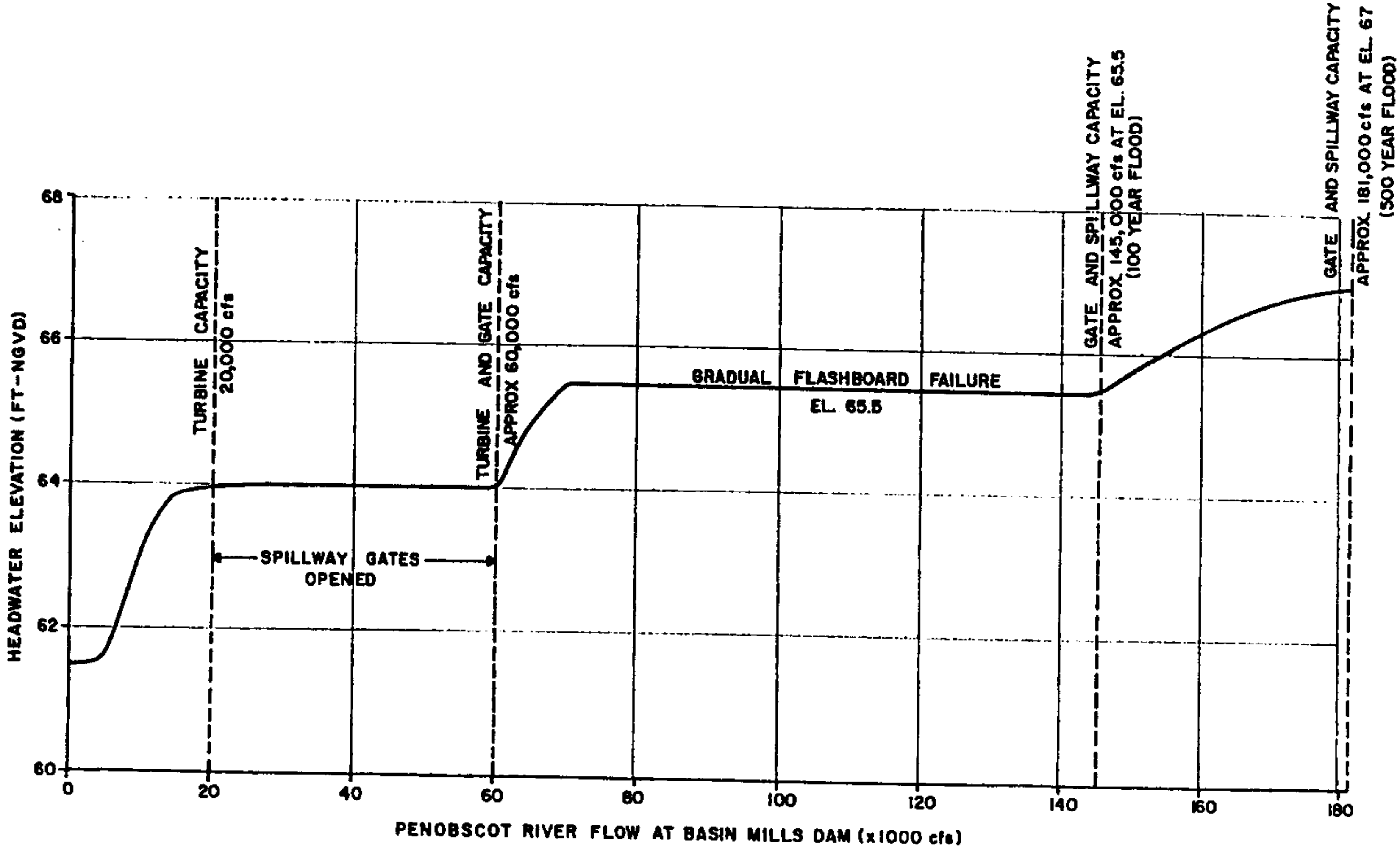

Figure F-7. Headwater curve for the Basin Mills Development (Source: BHE 1990a).

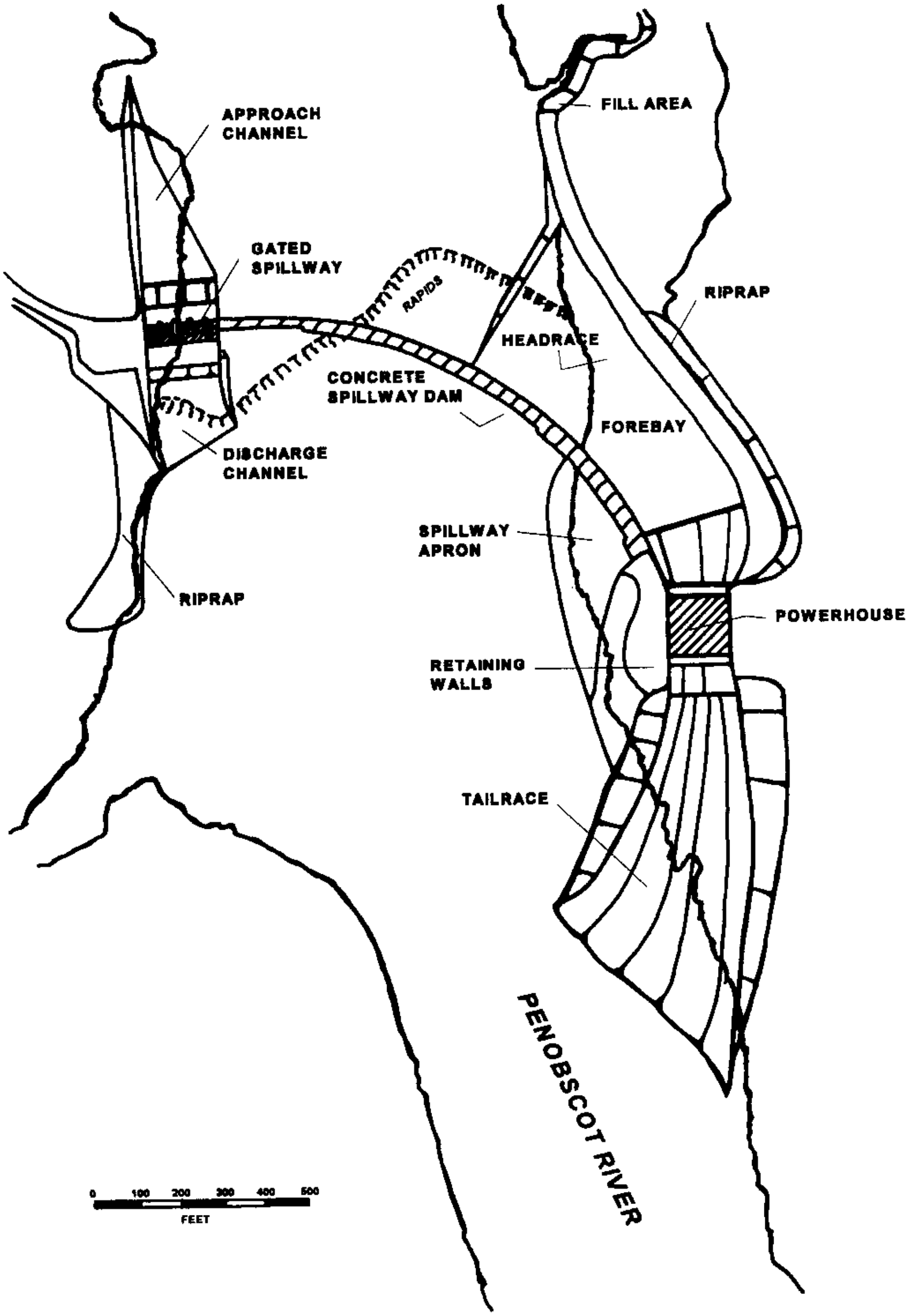

Figure F-8. General site plan for the proposed Basin Mills Dam and powerhouse (Source: BHE 1990a).

would be augmented by a surface discharge along the west bank. The habitat between those discharge points across the width of the river would be a backwater-type environment.

The 1985 ASRSC habitat survey documented approximately 2,200 salmon nursery habitat units (with potential production of 1 smolt per unit) between the proposed location of the Basin Mills dam and the upper end of the Veazie impoundment.[12] Most of these habitat units would be eliminated, both because of habitat modification and because of the complete change in flow regime in areas where the existing habitat would not be altered substantially. BHE presented no analysis or modeling to document retention of any habitat. Based on our analysis, we conclude that all of this nursery habitat would be lost.

The 1985 ASRSC habitat survey documented 230 Atlantic salmon spawning habitat units between the proposed location of the Basin Mills dam and the Veazie impoundment. The potential productivity of these spawning units was not assessed; there is no documented spawning in those areas to date, and the suitability of large mainstem river units for production purposes is considered uncertain (Dube 1987). Because these units are just above the head of the Veazie impoundment, it is not clear that they would be eliminated by flows expected under the proposed Basin Mills operating regime; however, even if the spawning habitat remains, the loss of all nursery habitat between the dam and the impoundment would preclude these spawning units from contributing to the salmon population. We conclude, therefore, that the effect of this loss of spawning habitat is not additive to the loss of nursery habitat but is subsumed within it.

Although we discussed the impact of operating Veazie dam on salmon fishing lies in the assessment of flow effects, the impact of Basin Mills on salmon lies results principally from inundation, and we discuss the effects under habitat modification. BHE identified no salmon lies between the proposed site of the Basin Mills dam and the head of the Veazie impoundment during its study of salmon angling opportunities (BHE 1990h, Appendix D). Creating a tailrace and allowing continuous high discharge into the tailrace from the operating units probably would create both holding and resting habitat for Atlantic salmon in the tailrace area. BHE proposes to place structures into the tailrace area to create fishing lies.

As discussed for Veazie, constructing salmon lies appears feasible, and creating lies in this area would be reasonable mitigation for some of the resting areas lost to inundation by the Basin Mills impoundment; however, BHE has not quantified the number of lies that might be created. The tailrace is about 600 feet long and about 350 feet wide. Lengths of boat lies and shore lies are typically 70 feet and 50 feet, respectively. Depth and velocity might preclude the formation of lies within several hundred feet of the turbine discharge. We

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[12] Although salmon nursery habitat is quantified in terms of 100-square-yard units, different quality habitat units produce different numbers of smolts varying between 1 and 3 smolts per unit. In most of our analysis and discussion, we consider nursery habitat in terms of its potential production of smolts, rather than simply in terms of the number of habitat units. In this case, however, since production is 1 fish per unit, potential production and number of habitat units are the same.

conclude, however, that it would be possible to create resting areas that would produce at least one boat lie and one shore lie in the tailrace area. Given the general high productivity of lies located below existing hydroelectric facilities (BEP 1993), the lies created below Basin Mills dam probably would be productive.

Orono. BHE proposes to decommission the Orono Development, eliminate flow into the existing tailrace, and divert all Stillwater River flow over the Orono dam into the existing bypass reach (see Section 2.1.1.1, Figure 2-2). Potential effects associated with this alternative would be caused by eliminating a significant volume of flow in one location and creating new flows in an area that is presently dewatered for substantial periods.

The existing tailrace area is small, and no study in the present record documents any salmon habitat there; however, tracking of radio-tagged adult salmon in the lower Penobscot River documented that salmon migrating past the Orono development are attracted to and remain in the tailrace for significant periods of time. Nine of 16 fish tracked during 1988 exhibited such behavior (Shephard 1989). These results suggest that the existing tailrace serves as a resting or holding area for upstream migrants. Diverting flow to the Orono dam would eliminate this resting/holding habitat.

Diverting all Orono flows into the Orono bypass reach would create additional salmon habitat where none presently exists. Under existing conditions, only leakage flow and spillage (when hydraulic capacity of turbines is exceeded) pass through the bypass reach. The new Basin Mills impoundment would back up into the bypass reach, creating water that is 2 feet deep at the base of the dam. BHE conducted habitat studies (BHE 1990h, Appendix F) in the Orono bypass under summer flow conditions (see Section 3.3.2.1) and estimated that, with the Basin Mills impoundment and all Stillwater River flow passing over the Orono dam, 140 salmon nursery habitat units would be created in the Orono bypass. We contend, however, that water in the bypass with the project as proposed (2 to 18 feet deep) would be deeper than typical for salmon nursery areas (less than 3 feet) and that juvenile salmon probably would not use the area. We conclude that the proposed flow in the Orono bypass reach would not significantly increase salmon nursery habitat.

The change in flow regime in the Orono bypass probably would create new resting and holding habitat for salmon. Typical adult salmon resting and holding habitat is at least 2 feet deep and generally more than 5 feet deep, velocities are less than 1.5 feet/second, and substrate is gravel with boulders or ledge (Knight and Greenwood 1981). Flows over the Orono dam would be run-of-river (Stillwater River flows are described in Section 3.3.2.1). Depths would range from 2 feet at the dam to about 18 feet at the confluence of the Stillwater and Penobscot rivers, and substrate consists of shelf rock, boulders, rubble, and gravel. We conclude, therefore, that enough resting/holding habitat would be created in the bypass reach to compensate for the loss of resting area in the Orono tailrace.

Stillwater. BHE originally proposed to operate the Stillwater development in run-of-river mode, allowing only leakage flows (2 to 4 cfs) in the bypass reach when river flows were less than the hydraulic capacity of the turbines. BHE also proposed to stock 1,000 salmon smolts in lieu of providing continuous minimum flows greater than leakage into the bypass reach. Interior and PIN (letter from W. Patterson, DOI, March 24, 1993) stated that long-term stocking of hatchery-reared salmon is inconsistent with agency plans for restoring self-sustaining runs of fish in the Penobscot River Basin; moveover, the agencies stated that stocking would not compensate for potential habitat that could be provided with flows higher than BHE's proposed continuation of leakage flow. They also noted that a variety of fish species other than salmon and a variety of aquatic invertebrates, which all would benefit from flows higher than leakage, use bypass habitat.

The bypass reach consists of several channels (Figure F-9) in which flows presently vary, depending on river flow and the amount of water diverted to the powerhouse. Flow duration curves for the Stillwater Branch from 1968 to 1990 indicate that spillage is likely to occur at least 90 percent of the time during April and May, but less than 30 percent of the time during late summer and fall.

As part of its relicensing studies, BHE conducted an instream flow study using a habitat-based, Delphi-process assessment method. This method combines measures of habitat quantity (total wetted area and usable wetted area) and quality (Habitat Suitability Index values) to compute WUA. BHE conducted the study in the bypass reach to determine the instream flow needs of Atlantic salmon and several other species.

The instream flow study showed that WUA for juvenile salmon increases from near zero at leakage to 49 habitat units in the east channel and 17.6 units in the west channel (a total of 60.6 units) when flows are increased to 20 cfs and 50 cfs in the east and west channels, respectively (a total minimum flow of 70 cfs; Figure F-10). Further flow enhancement up to a total of 230 cfs (more than 300 percent flow increase) increases total salmon WUA by only an additional 17.9 units (about 30 percent).

Flows of 20 cfs in the east channel and 50 cfs in the west channel were also projected to create two salmon lies, whereas flows of 40 cfs and 190 cfs in the east and west channels, respectively, were projected to create six lies. Lies do not represent biological habitat units for Atlantic salmon, however, and salmon fishing activity exists currently at the Stillwater development. The instream flow study also identified a run-around channel in the east bypass reach that is stagnant at flows less than 100 cfs because a wide gravel/cobble berm separates Habitat section 1 and Habitat section 3 (Figure F-9). Excavating a small portion of the gravel berm may provide more WUA for salmon at flows of less than 190 cfs. Bypass flows in the lower east channel could enhance salmon habitat if studies of berm excavation and subsequent flow show that WUA can be maintained or improved in Habitat section 3 without significant reductions in other sections.

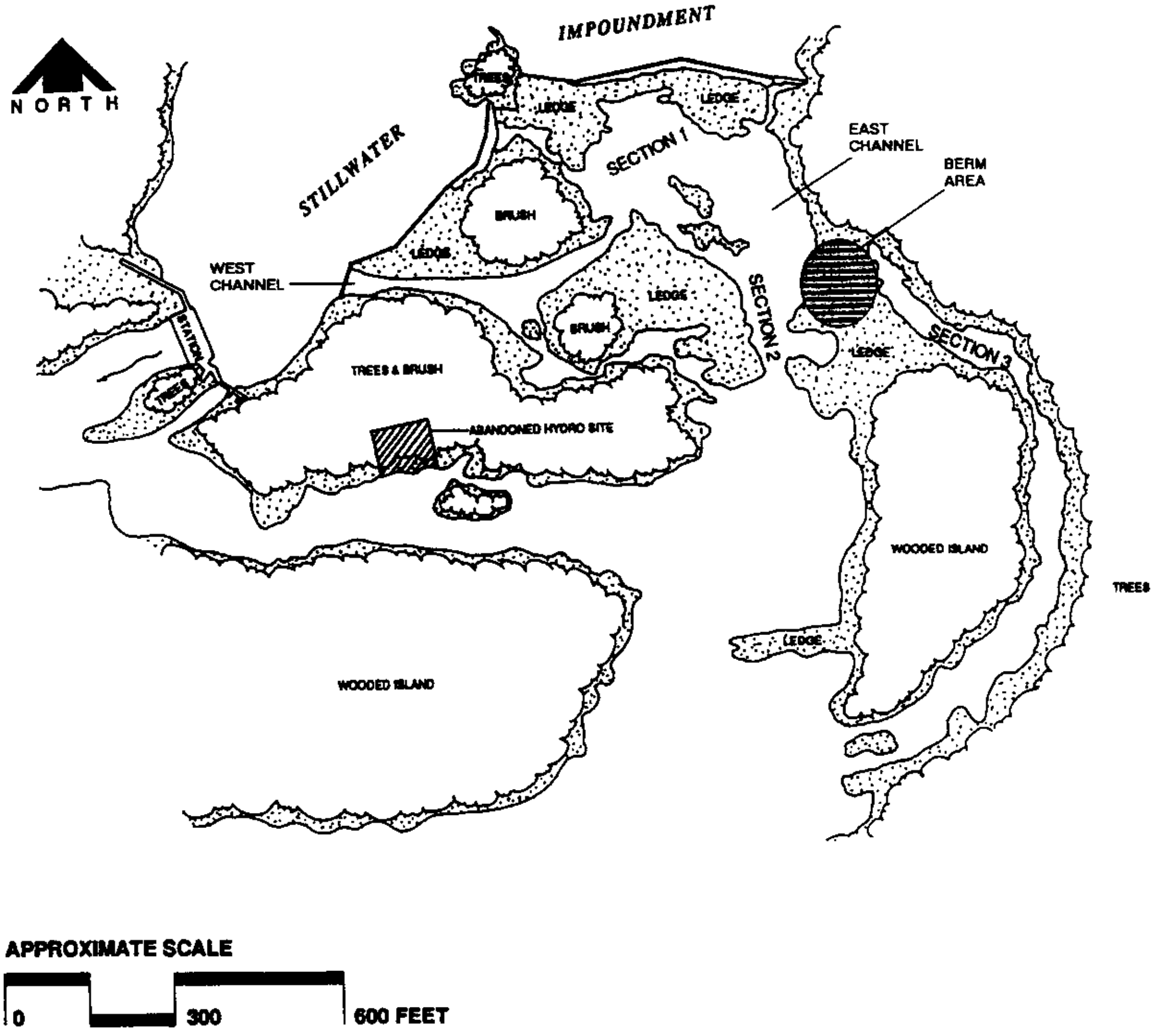

Figure F-9. Stillwater Project bypass reach showing the berm area proposed for removal (modified from Figure 9-1, BHE 1992e).

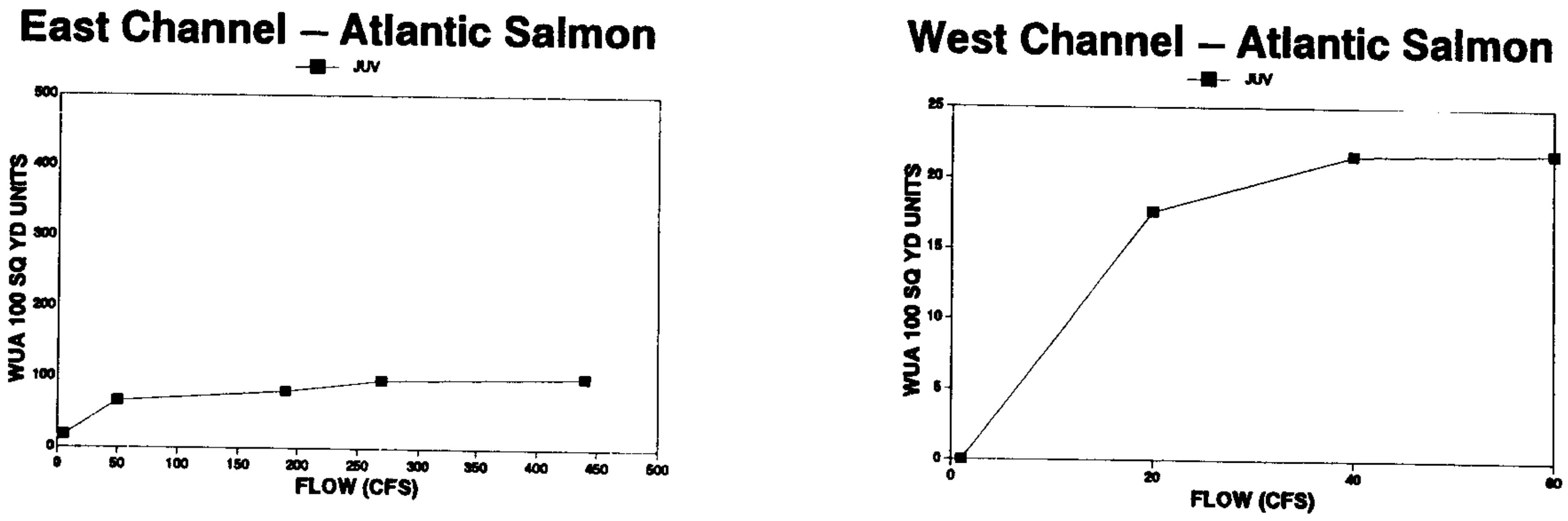

Figure F-10. Total weighted usable area (WUA) in the Stillwater bypass for Atlantic salmon juveniles (Source: BHE 1991b).

BHE believes that its original proposal regarding minimum flows (leakage) and annual stocking of 1,000 Atlantic salmon smolts would provide the most benefit to the anadromous fish restoration program while maximizing the production of hydroelectric power. BHE maintains that the differences in fish production between leakage and the flow recommended by Interior and PIN (230 cfs) would not be significant, and that the differences in fish production between the interim minimum flow ordered by the state of Maine (70 cfs) and 230 cfs are even smaller. Nevertheless, BHE concluded that the interim flow of 70 cfs recommended by MDEP, as discussed below, is a better balancing of fish resources and power generation than the 230 cfs recommended by Interior and PIN. BHE, therefore, accepted the state of Maine's recommended interim minimum flows as a reasonable compromise and withdrew its proposal to stock salmon smolts.

Based on our review of the study findings summarized in Figure F-10, BHE's proposed flows of 20 cfs in the west channel and 50 cfs in the east channel would significantly enhance existing juvenile salmon habitat in the bypass reach and would create new salmon lies. Further increases in flows would produce only limited additional increases in salmon habitat while substantially reducing power generation.

In addition, we conclude that modifying the gravel/cobble berm (Figure F-9) could increase WUA for juvenile salmon and the number of salmon lies without requiring a total minimum flow greater than 70 cfs; however, an instream flow study must be conducted to ensure that modifying the berm would not decrease available habitat and to quantify the amount of additional habitat (WUA) that might be created.

In its 10(j) recommendations, Interior (with the concurrence of PIN) maintained that a minimum flow of 230 cfs (190 cfs for the east channel and 40 cfs for the west channel) is necessary to maximize the production of Atlantic salmon and other anadromous fish and angling opportunity in the area below Stillwater dam. Maine DEP required the release of an interim minimum flow of 70 cfs as a condition of the 401 WQC for the project. The difference between MDEP's recommended interim flow and Interior's recommended flow was a rather limited increase in WUA (for salmon juveniles, an increase of 13 habitat units in the east channel), considering the additional amount of lost energy (approximately 619,287 kWh). During our 10(j) meeting, Interior agreed to quantify habitat goals and allow flows to range between 70 cfs, as specified in the WQC, and 230 cfs, as originally sought by Interior, with the required flow being that sufficient to achieve the habitat goals after the berm removal. On this basis, we adopted Interior's modified recommendation.

Milford. As suggested during agency consultation, BHE agreed to release a flow of at least 3,800 cfs (the aquatic base flow for this river reach) or inflow as a minimum flow at the project, provided that 532 cfs of the 3,800 cfs are released at Gilman Falls. The 532 cfs would be partitioned to 60 cfs from Gilman Falls dam and 472 cfs from the west channel adjacent to the Gilman Falls dam. BHE, the resource agencies, and PIN agreed to the minimum flow of 60 cfs at Gilman Falls dam following an instream flow study (BHE 1991c).

Flow in the west channel below Gilman Falls is uncontrolled (Figure F-11). Flow in the controlled channel at Gilman Falls would be subject to a constant discharge from the Taintor gates (Figure F-11); therefore the study team, comprising representatives of state and fishery agencies, the PIN, and BHE, agreed that there was no need to assess this area. The study team agreed to assess habitat in channels 1 and 2 as one unit (BHE 1990). Habitat was evaluated in these channels under five different flow regimes using releases from temporary gates in the flashboards. The study team concluded that a minimum flow of 60 cfs to the two channels would be sufficient to protect this bypass reach from degradation and provide adequate habitat for juvenile Atlantic salmon.

We concur that the proposed flows would be adequate to protect existing salmon habitat in the Stillwater River. Continued run-of-river operations at the Milford development would maintain existing habitat downstream of that development.

Physical Habitat Modification

Veazie. BHE proposes to construct Plant C at the east end of the dam. Figure F-4 shows the lay-out of Plant C and its tailrace, superimposed on the existing structures and shoreline. Most of the physical structure of Plant C and its associated facilities would be constructed in or on existing shoreline and impoundment habitat and would not affect existing salmon habitat. Excavating a portion of the tailrace would deepen about 600 square yards of existing boulder/rubble shoreline habitat (BHE, 1990h, Appendix F). We conclude that salmon nursery habitat below Veazie dam would not be physically altered by the construction of Plant C.

Creating a deep, high-velocity tailrace area approximately 150 feet by 50 feet (Figure F-4) would create new salmon resting/holding habitat. As discussed under Flow Modification, we conclude that this new resting/holding habitat would provide the opportunity to create one or more new salmon lies through placement of physical structures, such as tetrapods, as proposed by BHE to mitigate the effects of the proposed Veazie development on existing salmon lies.

Habitat modifications associated with Plant C construction activities (e.g., cofferdam construction, dewatering) would be limited to a small portion of the area below Veazie and would be temporary.[13] The area affected does not contribute to salmon production in the Penobscot River; therefore, we conclude that construction activities would have no lasting, significant effect on Atlantic salmon.

Basin Mills. Construction of Basin Mills dam would modify the existing riffle/run habitat between the proposed dam site and the Veazie impoundment and would inundate

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[13] BHE expects to complete construction of Plant C within a 3-year period (BHE, 1990a).

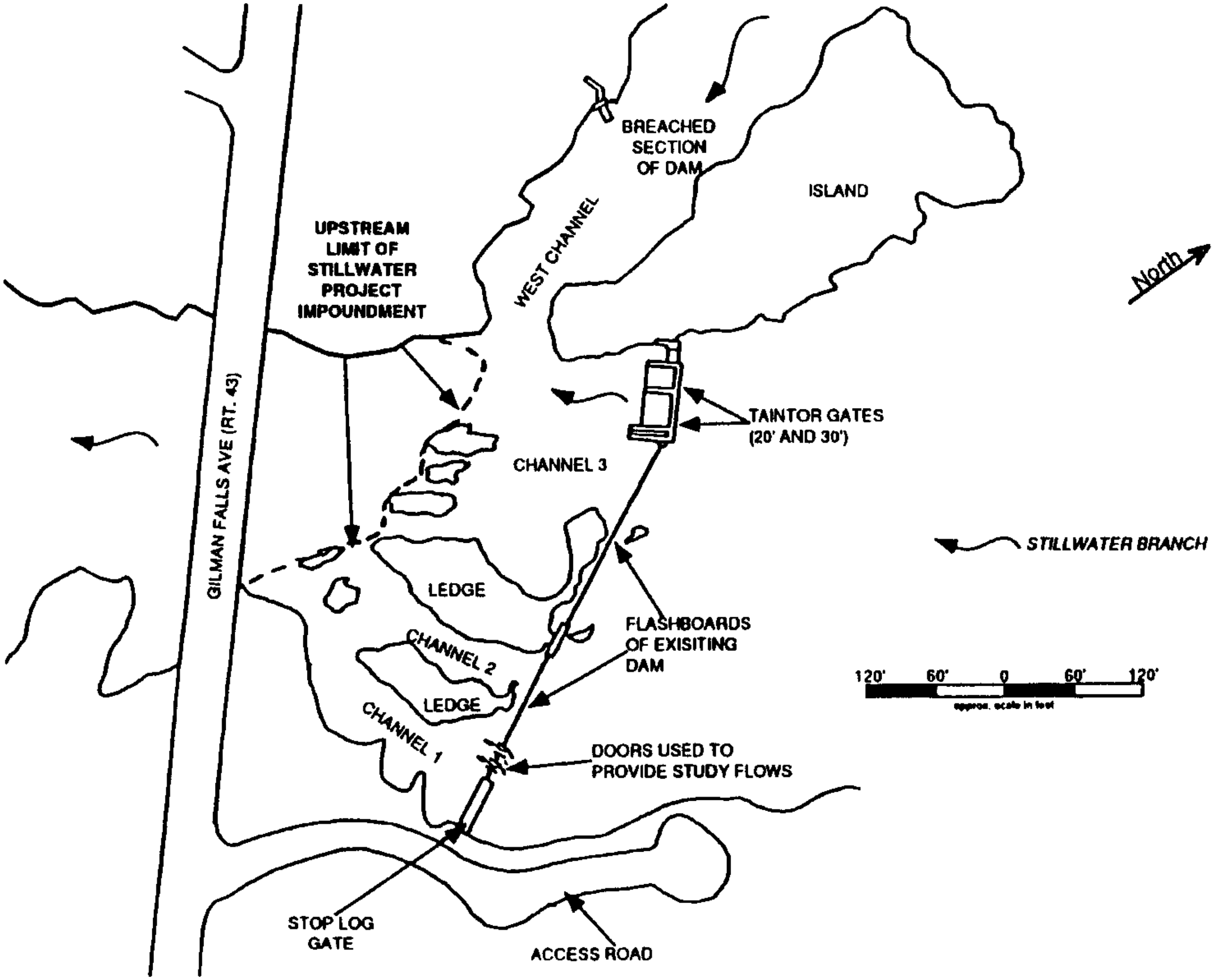

Figure F-11. Diagram of the Gilman Falls Dam area (part of the Milford Project; Source: BHE 1989).

riverine habitat upstream of the proposed dam site. The new Basin Mills impoundment would extend upstream to the tailrace of Great Works dam (see figures 1-1 and 2-2).

Creating the Basin Mills impoundment would inundate approximately 3.6 miles of existing riffle/run habitat. Water depths in the inundated river reach would increase from 1 foot at the head of the impoundment near the Great Works tailrace to 15 feet or more behind the dam, and water velocities would decrease.[14] In Section 4.1.2, we discuss the effects of creating the impoundment on water quality parameters (DO and temperature) and we discuss effects on salmon are discussed below.

As described in Section 3.5.1.2, nursery habitat for juvenile salmon is characterized by depths of 2 inches to several feet (depending on fish size and age), relatively high velocities (about 2 fps) typical of riffle and run areas, and rubble substrate. Although creating the impoundment would not alter substrate, changes in water depth and velocity would alter the suitability and function of existing salmon habitat in the affected river reach.

The 1985 ASRSC habitat survey documented approximately 8255 Atlantic salmon smolt production units between the proposed site of the Basin Mills dam and the Great Works tailrace. All those habitat units would be inundated by the Basin Mills impoundment. We conclude that constructing the development would eliminate all smolt production units in the area.

The ASRSC survey also documented about 303 units of spawning habitat in this river reach. Most of that habitat is in the Great Works tailrace area, where some salmon spawning has been observed (Section 3.5.2). These spawning areas probably would not be affected by the Basin Mills impoundment; however, eliminating nursery habitat by creating the Basin Mills impoundment limits the value or importance of this spawning habitat to some extent. Unlike the situation below Basin Mills dam, however, several tributaries below Great Works have been documented as salmon nursery habitat (Section 3.5.2), and juveniles produced from the Great Works tailrace spawning areas probably use that habitat. We conclude that the Basin Mills impoundment would not significantly affect salmon spawning habitat in the river reach below Great Works or the potential productivity of that habitat.

Changes in water depth and velocity in the impoundment area would also affect salmon resting/holding habitat and salmon lies. PIN (letter from J. Pardilla, PIN, March 26, 1993) expressed concern that inundating potential salmon holding areas by creating the Basin Mills impoundment could adversely affect salmon spawning success (salmon often remain in holding areas near spawning sites for some time prior to spawning to conserve and build up energy required for spawning). Interior (letter from W. Patterson, DOI, March 24, 1993) and conservation intervenors (letter from R.G. Dreher, Conservation Intervenors, March 29, 1993)

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[14] Water velocities would decrease in proportion to the cross-sectional area of the impoundment; therefore, velocity would be affected least near the head of the impoundment and most in the vicinity of the dam.

expressed concern regarding the elimination of 33 percent of the salmon fishing lies and 39 percent of rods of by creating the Basin Mills impoundment. Interior's (letter from W. Patterson, DOI, March 24, 1993) 10(j) recommendations suggest that the proposed project should increase recreational opportunities.

The 1985 ASRSC habitat survey did not document any pools that would provide adult resting or holding habitat in the project area, except the Great Works and Veazie tailrace areas (all habitat in the entire area was characterized as riffle or run; BHE, 1990h, Appendix F). The BHE salmon angling opportunity study (BHE 1990h, Appendix D), in which a team of expert salmon anglers and fisheries biologists identified potential salmon lies in the project area, identified 37 boat lies and 7 shore lies in the river segment that would be affected by the Basin Mills impoundment (Figure F-12). Unlike below Veazie dam, however, where extensive salmon fishing has occurred for many years and locations where salmon can be caught are relatively well known, very little salmon fishing takes place in the river reach illustrated in Figure F-12 (see Section 4.8). The lies depicted in the figure represent <u>potential</u> locations where salmon might be taken, not specific locations known for successful salmon fishing. The survey provided no data to document that salmon would actually be found in the identified lies, or that, if present, they would be likely to strike a fly.

Lies cannot exist without resting or holding areas; therefore, there is a significant discrepancy between the results of the habitat survey and the fishing opportunity survey. The discrepancy is probably due to the lack of rigorous scientific criteria for defining a salmon lie. Resting/holding areas are generally characterized by deep water (2 feet to more than 6 feet), low velocity, and proximity to velocity shears, as discussed previously. Inundating the 3.6-mile river reach above Basin Mills dam would clearly eliminate such sites in that river reach. We do not believe, however, that the lies depicted in the angling opportunity survey (Figure F-12) represent a valid quantification of resting or holding habitat. They may realistically represent potential for angling opportunity (see Section 4.8).

Some data about use of habitat in the affected river reach by upstream migrating salmon are available from radio-tracking studies conducted between 1989 and 1992 (BHE 1993b). In 1989 studies, one fish passed at Veazie was detected at Milford dam (having passed Great Works) 2 days later. Another passed at Veazie was found at Great Works the next day. A third was found at Milford 2 days after passing Veazie. A fourth remained in the Orono tailrace for 5 hours after passing Veazie and was then located below Milford. A fifth was found at the Orono dam 4 hours after passing Veazie, where it remained for 4 days before passing Milford. Another fish released in the Veazie impoundment was found in the Great Works fishway the next day.

Nine of 16 fish tracked during 1988 were found repeatedly at the Orono tailrace or bypass (Shepard, 1989). The pattern observed from these and subsequent studies is that fish lingered primarily in the Orono tailrace and below the Orono dam (some fish were holding below the Basin Mills rips during 1987). Fish that did not remain in those areas passed

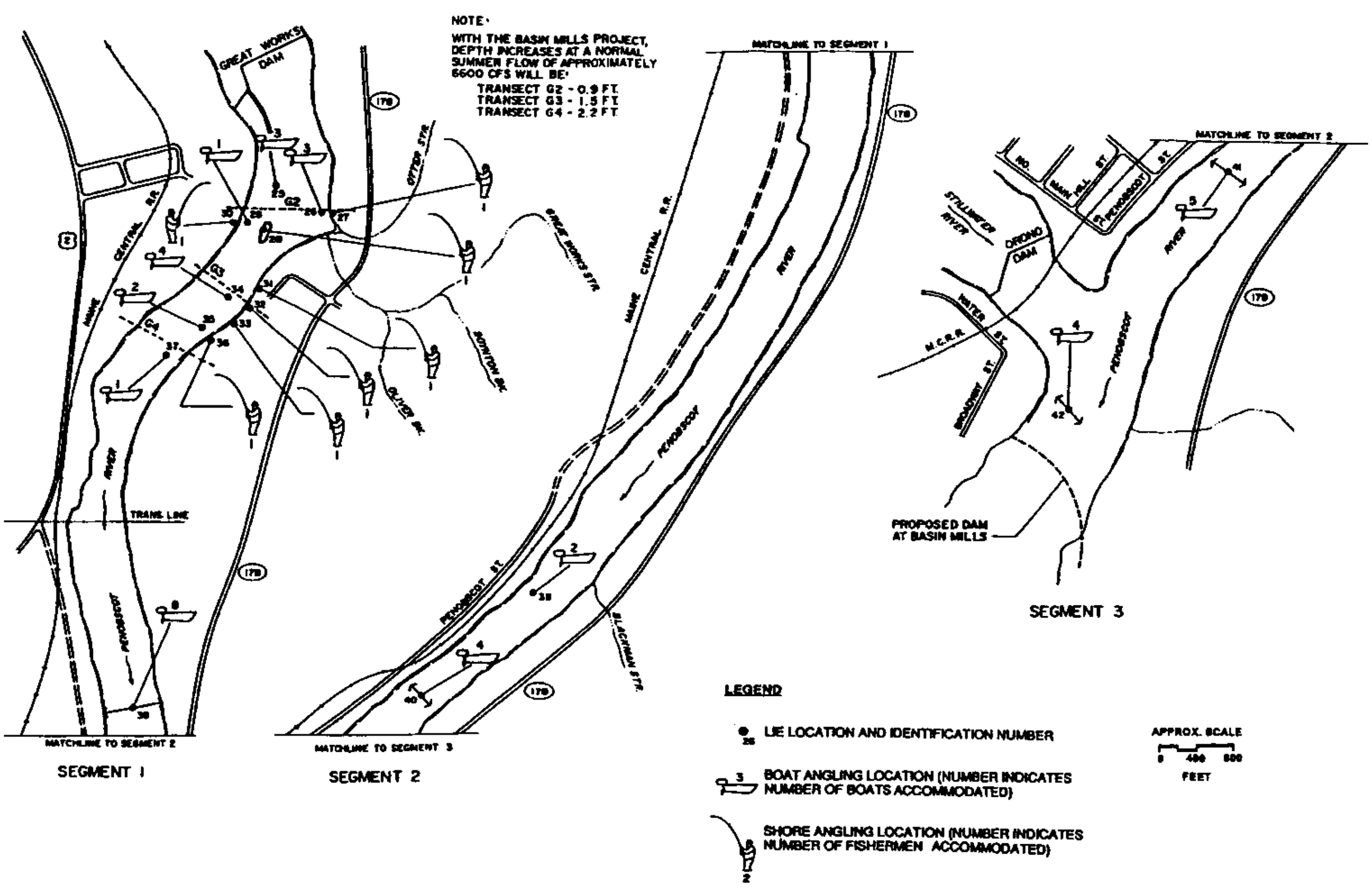

Figure F-12. Atlantic salmon fishing opportunity study area and lie locations (existing Basin Mills area to Great Works Dam; Source: BHE 1990h, Appendix D) rapidly through the area to be impounded and spent varying periods of time at the Great Works Project or at the Milford Project. Because the tracked salmon did not linger or remain at any of the locations in the main stem that were identified as potential salmon lies, we believe that the data strongly support the conclusion that no resting or holding areas exist in the river area to be affected by the Basin Mills Project. The locations in which tagged fish were found (Orono tailrace and bypass, and Basin Mills rips) were not identified as potential salmon lies in the angling opportunity study.

Adult salmon usually occupy holding habitat before they spawn, and holding habitat is usually close to spawning habitat (Knight and Greenwood, 1981). Given that the only spawning habitat in the affected river reach is near the Great Works tailrace, we conclude that loss of any holding habitat in the more downstream areas that would be inundated by the Basin Mills impoundment would have no biological effect on Atlantic salmon. Fish spawning in the Great Works tailrace probably use the unaffected, deep-water tailrace area or the deeper portions of the river at the head of the Basin Mills impoundment as holding areas.

Resting areas are areas of lower velocity where migrating adults literally rest between migratory movements over long distances; through higher velocity, turbulent river reaches; or prior to moving up through such reaches (Knight and Greenwood 1981). Creating the Basin Mills impoundment would eliminate much of the high velocity and turbulence that challenges upstream migrating fish. As discussed with regard to holding areas, fish probably would occupy resting areas in the Great Works tailrace as they stage for movement through fish passage facilities at that dam. Similarly, the continuous flow over the Orono dam probably would create resting areas in the Stillwater River below the Orono dam.

We conclude that the loss of possible resting areas in the area to be inundated by the Basin Mills impoundment would not have a biological effect on the salmon population.

Habitat modification during construction of the Basin Mills development would be extensive. BHE proposes a construction schedule extending over three years, including construction and dismantling of separate cofferdams for the powerhouse, the spillway segment, and the main dam segment of the development (BHE, 1990a). Although these construction activities would substantially alter the physical habitat in the affected portion of the Penobscot River, effects would be temporary and would be superseded by the permanent habitat modifications already discussed.

Fish surveys in the proposed impoundment area did not document significant numbers of smolts using that area of the river (Section 3.5.2), and no smolt stocking occurs in the area. We conclude, therefore, that the 3-year disruption of habitat associated with construction activity would cause no effects greater than those already addressed from permanent habitat modification.

Orono. BHE proposes to decommission the Orono Development, remove the generating turbines and penstocks, and divert all Stillwater River flow over the Orono dam. Removing the generating facilities and penstocks would not physically affect any salmon habitat. There would be no physical habitat effects or enhancements beyond those discussed under Flow Modification as a result of the Applicant's Proposal.

Stillwater. BHE proposes no physical modifications of the Stillwater Development; however, BHE would construct fish passage facilities. (We discuss fish passage facility requirements under Upstream Migration Blockage.) Although no detailed passage design has been finalized to date, we expect that some habitat near the dam and generating station would be altered temporarily during construction of the passage facilities (e.g., cofferdam construction, excavation), and some habitat would be altered permanently in the immediate vicinity of the passage facilities. Given the limited area involved, we conclude that these activities would not affect Atlantic salmon significantly.

The potential removal of a berm in the east channel of the Stillwater bypass reach is a physical alteration of habitat that must be studied to determine whether it would enhance salmon habitat. We conclude that this physical alteration may enhance salmon habitat; however, the magnitude of enhancement cannot be quantified.

Milford. BHE proposes no physical modifications of the Milford Development (the new turbines would be installed in the existing generating facility). Some modifications of fish passage facilities are planned, however, and some habitat would be modified at the base of the dam near the center of the spillway. This area is very small and has not been identified as salmon habitat. We conclude that modifying habitat at the Milford development would not affect salmon.

Water Quality Modification

Veazie. BHE's proposed construction and operation of Plant C at the Veazie development could alter water quality by shifting flow from spillage over the top of the dam to deeper water discharge through Plant C, as described under Flow Modification. Because turbine water is withdrawn from near the bottom of the reservoir, whereas spillage is withdrawn from the surface layers, a shift from spillage to turbine discharge could change both DO and temperature below the Veazie dam.

The Veazie impoundment demonstrates no vertical stratification of temperature or DO, even under low-flow, summer conditions, when such stratification is expected to be greatest (see Section 4.2). Lowest DO values exceed Class B water quality standards (greater than 7 ppm). Although summer temperatures can be high enough to be stressful for salmon, existing data demonstrate that project operations do not significantly alter temperature regimes (Section 4.2). We believe that the lack of stratification is due to the high flushing rate through the impoundment (about 4 hours under average flow regimes; Table 3-5). The high flushing rate would not be altered under the Applicant's Proposal.

With no change in flushing rate, we conclude that the lowest DO values would remain well above those required by both adult and juvenile salmon (minimal oxygen requirements for salmonids are generally defined as 7 to 8 ppm, criteria used widely in designating areas suitable for coldwater fisheries), and temperature regimes would not change. We conclude, therefore, that with the Applicant's Proposal there would be no biologically meaningful change in water quality below Veazie dam.

Turbidity and suspended solids could increase temporarily during construction of Plant C while cofferdams are being installed and removed. The high energy of the river below Veazie (as evidenced by the lack of silt or mud substrate anywhere in the area) suggests that suspended solids would be transported downstream rapidly and probably would settle out at the upstream extent of tidal influence, where no significant spawning or nursery habitat exists. Adult salmon can tolerate turbid water and also could move out of the areas of highest turbidity. Such movement might alter salmon availability to anglers (i.e., fish may move out of lies along the east shore of the river during construction), but no mortality would be expected. We conclude that temporary, construction-related increases in turbidity would not affect salmon.

Basin Mills. Creating the Basin Mills impoundment would change 3.6 miles of existing pool, riffle/run habitat into impounded riverine habitat. As discussed above regarding potential water quality-related effects on salmon at the Veazie Development, water quality characteristics of true riverine and impounded riverine waters may differ as a function of the flushing rate of the impoundment. PIN (letter from J. Pardilla, PIN, March 26, 1993) expressed concerns that, because summertime temperatures in the Penobscot are already marginal for Atlantic salmon (because of existing impoundments upstream and other human-induced warming), any further warming front creating the Basin Mills impoundment would be "disastrous" for salmon restoration efforts. PIN noted that fish below Veazie would experience the effects of additional exposure to lethal or near-lethal temperatures; therefore, the consequences might not be detected. EPA (letter from D. Turin, EPA Region 1, March 26, 1993) and Interior (letter from W. Patterson, DOI, March 24, 1993) reiterated PIN's concerns regarding temperature-related effects on salmon caused by construction of the Basin Mills impoundment.

Based on our analysis of water quality data provided by both BHE and PIN (sections 3.4 and 4.2), we conclude that constructing the Basin Mills impoundment probably would not cause a biologically significant change in the temperature of the lower Penobscot River and that changes in DO would be small. In sections 3.4 and 4.2, we established that there are no statistically significant upstream-downstream trends in temperature and DO from above Milford dam to below Veazie dam, even under summer low-flow conditions. There are no statistically significant trends over a river reach encompassing three different impounded river segments. We conclude that existing data are insufficient to determine if a small effect of individual impoundments on temperature exist. It is likely that any effects would be small and undetectable within the natural variability. We note that most of the salmon run occurs during June and July (Figure 3-8), whereas maximum temperatures and lowest DO values normally occur late during summer and early fall (Figures 3-3 through 3-5). To place our projected temperature changes in a biological perspective, we note that Brungs and Jones (1977) report that 23°C or less represents optimal temperatures for adult salmon migration. During 1994 on the Sheepscot River, 3 of 20 salmon counted at a weir were found dead upstream, presumably due to high water temperatures (USASAC, 1995). Daily water temperatures that year regularly exceeded 25°C from late June through August, and the daily maximum was 30°C or higher for seven days in July. As can be seen in Figures 4-1 and 4-2 in section 4, Penobscot River temperatures only infrequently exceed 25°C and did not exceed 28°C in the time period over which data were collected. Taking 23°C as a milestone temperature level for salmon, we used the data in Figure 4-2 to estimate that our projected 0.25°C increase in temperature due to the construction of Basin Mills impoundment would increase the frequency of temperatures above 23°C by 2.5 percent, 7.4 percent, 5.9 percent and 0 percent in June, July, August and September, respectively. As noted above, the largest portion of the salmon run occurs in June, with July being the second largest percentage. As we also pointed out in section 4, there is a high degree of variation in water temperature spatially as well as temporally, and our projections based on mean daily temperatures do not convey the ranges in temperatures that may be present in various river reaches at any given time. Also, the small increase that we project does not elevate temperatures to the levels that are apparently linked to in stream mortalities. These findings are the basis for our conclusion that changes in temperature and DO due to construction of the Basin Mills development would be small and biologically insignificant.

MDEP WQC Condition 25 requires BHE to conduct a post-construction study "...to determine the effects of ambient water temperatures in the lower Penobscot River on migrating Atlantic salmon."

The response of migrating salmon to ambient water temperatures is well documented in the literature, as are ambient temperature conditions in the lower Penobscot River. We interpret this WQC condition as being directed toward a determination of whether any <u>changes</u> in water temperature that are attributable to construction of the Basin Mills Project would adversely affect salmon. We believe that, given the natural variability in water temperature, it would be very difficult to detect a change in water temperature that could be statistically linked to the project as proposed. Given the natural variability in migratory behavior, as evidenced by the results of radio-tracking studies, we also believe that it would be virtually impossible to statistically establish changes in salmon migratory behavior from year to year associated with very small changes in water temperature. For these reasons, we determine that this study is not necessary.

This same WQC condition also stipulates that MDEP reserves the right to require changes in project facilities and operation and/or other mitigation measures appropriate and necessary to correct or mitigate for any temperature effects on salmon which are detected. Our concern is that unless very specific methodologies and decision criteria are established before initiation of the study, study findings would serve as a basis for future argument and contention among the parties with interest in this project. Thus, we conclude that adoption of this condition is not warranted. However, we believe that, if such a study were done, the study plan should be developed in consultation with MDEP, FWS, and PIN, and specifically should include the following:

- plans for a statistical analysis of existing temperature data, characterizing annual, seasonal and daily temperature variability under existing conditions, and establishing the magnitude of change in temperature that would be required in order for such a change to be found statistically significant;

- the methodology to be used to establish that a statistically significant temperature change that occurs after project construction can be attributed specifically to the existence of the project;

- the salmon data that would be used as a response variable to examine temperature effects on migratory behavior; and

- the statistical methodology to be used to relate any observed temperature changes to any observed changes in salmon migratory behavior.

Extensive construction activity would occur at the Basin Mills site, including construction and dismantling of three major cofferdams. Increases in turbidity and suspended solids would be expected during this activity, although the magnitude would be limited by BHE's proposed sediment control measures. Turbidity would increase immediately downstream of the activity, and the suspended sediment would be transported downstream into the Veazie impoundment. MDEP studies indicate that the substrate in the Veazie impoundment is primarily rock with little sediment, suggesting that it is a high-energy environment. No productive salmon spawning areas would remain between Basin Mills and the Veazie impoundment; therefore, siltation of spawning redds is not a concern.

BHE proposes to truck all salmon taken at Veazie during the 3-year Basin Mills construction period above Milford. Upstream migrants, therefore, would not be exposed to any increases in turbidity and suspended solids. BHE fisheries surveys (BHE 1990h) found no salmon smolts in the construction area, and no smolt stocking occurs there. Few smolts would be exposed to temporary increases in turbidity and suspended solids; therefore, we conclude that temporary increases in turbidity and suspended solids during construction (principally during construction and dismantling of cofferdams and considering proposed sediment control measures) would have no significant effect on Atlantic salmon.

Orono. As discussed in Section 4.2, decommissioning the Orono Development and diverting all flow over the Orono dam could improve oxygen levels slightly and would not alter temperature. The aeration from Orono spill would compensate, in part, for any decline in DO attributable to the Basin Mills impoundment. We also conclude in Section 4.2 that the lowest DO expected in this river reach would remain above DO levels appropriate for coldwater fish species such as Atlantic salmon (7 to 8 ppm). This slight improvement in DO (less than 0.3 ppm) would enhance water quality but would not be biologically significant for salmon.

Stillwater. BHE proposes to release flows into the Stillwater bypass continuously. The bypass presently receives spillage only when flows exceed hydraulic capacity (see Flow Modification). Although data suggest that DO and temperature in the bypass reach are adequate for salmon, continuous flow over the dam could enhance DO and would protect against declines in DO during worst-case, low-flow/high-temperature conditions. We conclude that the proposed bypass flows would help to maintain adequate water quality conditions for Atlantic salmon.

Construction of fish-passage facilities at Stillwater could cause a temporary increase in turbidity. The high-energy nature of this environment, as indicated by the rubble/rock substrate, suggests that siltation of existing nursery habitat would be unlikely. Appropriate sediment control measures must be implemented during construction to minimize any potential impacts. We conclude that, with appropriate sediment control measures, salmon would not be affected by construction-related changes in water quality.

Milford. BHE proposes run-of-river operation at Milford; a minimum of 14 percent of the flow would be passed into the Stillwater River. As discussed in Section 4.2, the continuous flows at Gilman Falls dam would maintain water quality conditions adequate for salmon in the Stillwater River. PIN expressed concern that the decreased spillage and increased turbine discharge of water drawn from the deeper portions of the impoundment would contribute to decreased DO levels downstream of the Milford dam.

Although diverting flow to new generating turbines would reduce spillage at Milford dam by about 50 percent during summer (thus reducing aeration of summer flows), our analysis of existing water quality data (Section 4.2) suggests that the temperature regime would not be altered, and DO would not be modified to an extent that would affect Atlantic salmon at this project (i.e., minimum DO levels would remain above 7 ppm). We conclude that the minimal expected changes in water quality caused by the proposed project would not affect salmon.

Upstream Migration Blockage

Veazie. BHE's proposals for fish passage at the Veazie and Basin Mills developments evolved during the proceedings leading to the issuance of a WQC. Here we address only the final passage proposals as represented in BHE's submittals to MDEP and FERC. One controversial mitigation measure proposed by BHE is trapping salmon at Veazie and transporting them by truck to above Milford dam (instead of releasing them into Veazie impoundment). Because our assessment is organized according to development-specific modes of impact, and trap-and-truck is proposed as mitigation for passage effects at several developments and nonpassage effects of the Basin Mills development, we address trap-and-truck mitigation in Section 4.3. We do consider the potential benefits of trap-and-truck in this section as a temporary passage option during construction periods.

BHE proposes the following fish-passage facilities at Veazie Plant C (figures F-13 and F-14):

- a collection gallery with a spillway entrance and two tailrace entrances;
- duplex fish lifts[15] with crowder systems;
- two viewing facilities, one for biological monitoring and one for public viewing;
- an option to discharge fish from the lifts directly into an exit channel that opens into the Veazie impoundment or into elevated holding pools at the top of the dam;
- elevated holding pools with pumped water supply and crowders to move fish to a crowding pool;
- a crowding pool to move fish into a monitoring station; and
- biological monitoring and sorting pools that could be discharged into an exit channel to the impoundment or into the tailrace; these pools would have a pumped water supply, and a drilled well would provide cool water for trucking.

Figure F-15 summarizes the proposed Veazie fish-passage system. In the figure, fish from the trap at the existing Veazie fishway are depicted being transferred to the holding facilities at Plant C. BHE proposes to use fish pumps to move fish from the trap to the holding facilities. Interior (letter from W. Patterson, DOI, March 24, 1993) considers fish pumps to be an untested, experimental technology for fish passage that should not be used. However Interior's Section 18 prescriptions dated May 20, 1997 prescribe a fish lift or vertical slot fishway without a limitation on the use of fish pumps. NMFS' Section 18

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[15] A fish lift is an elevator. Fish are attracted into a channel below the dam (by attraction flows) and crowded into a restricted area above a submerged hopper. When the hopper is raised, some water drains from screens along its upper edges, leaving fish trapped in water remaining in the hopper. The hopper is raised to the top of the dam, where fish can either be released into the impoundment behind the dam or placed in handling or holding facilities.

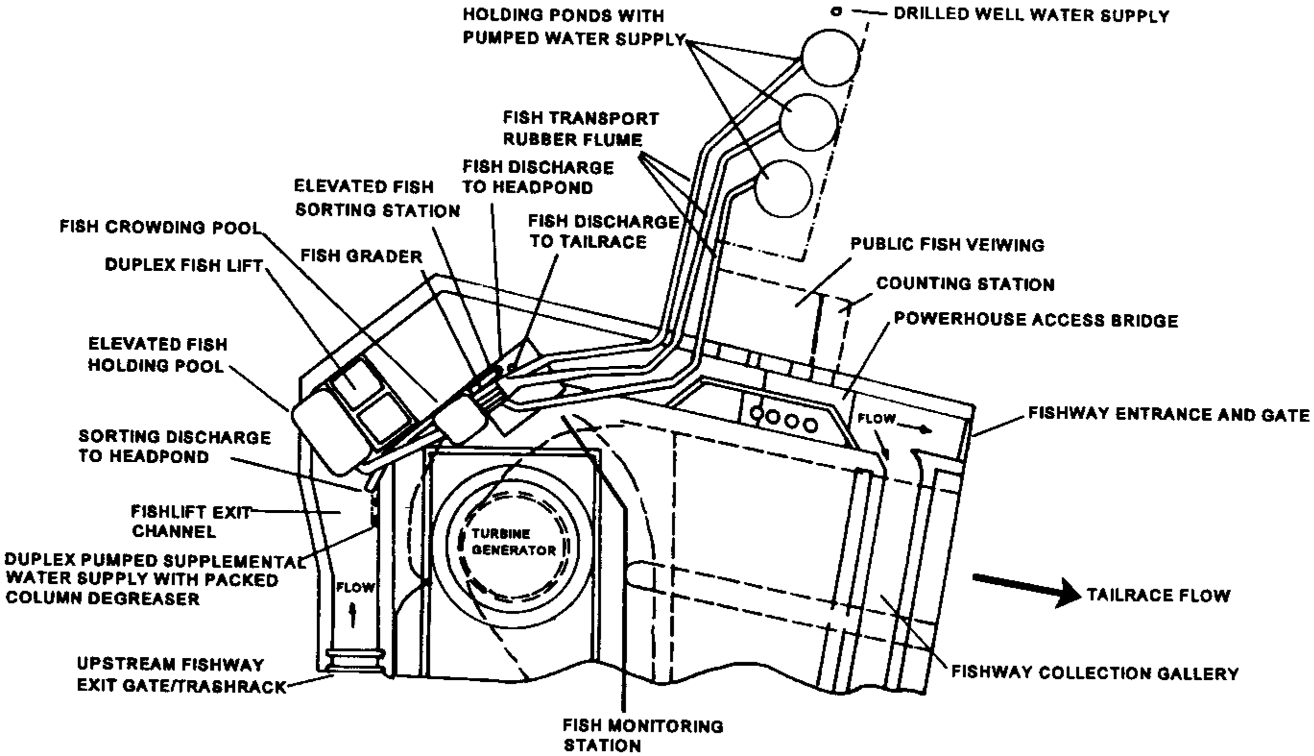

Figure F-13. Plan view of fish passage facilities at Veazie Plant C (Source: BHE 1990h).

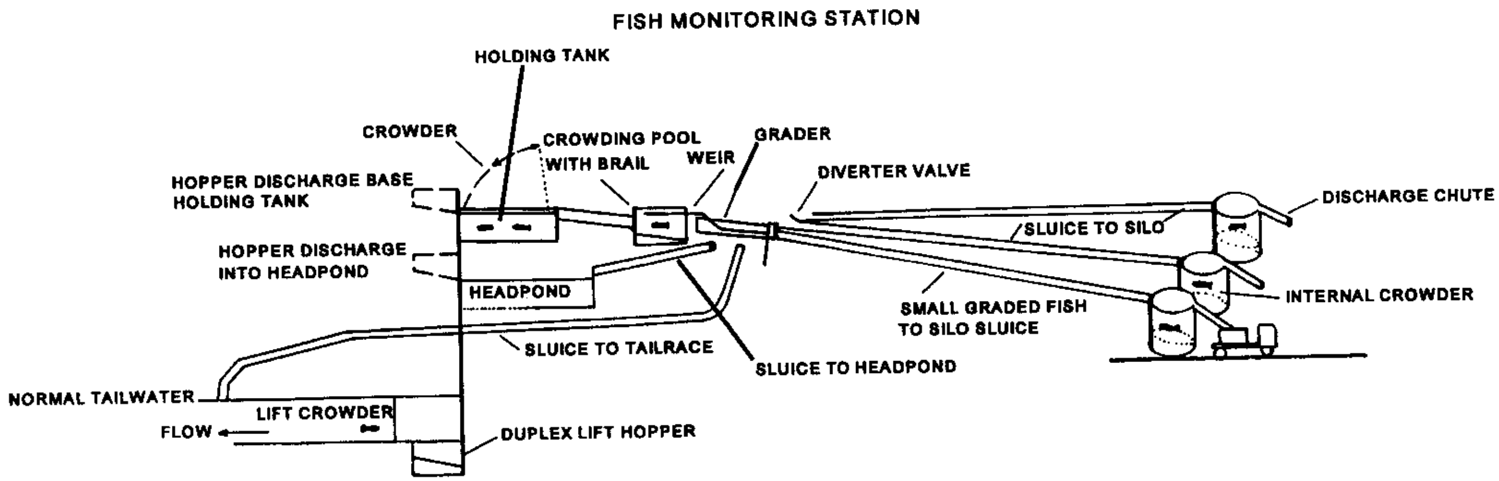

Figure F-14. Side view of fish passage facilities at Veazie Plant C (Source: BHE 1990h).

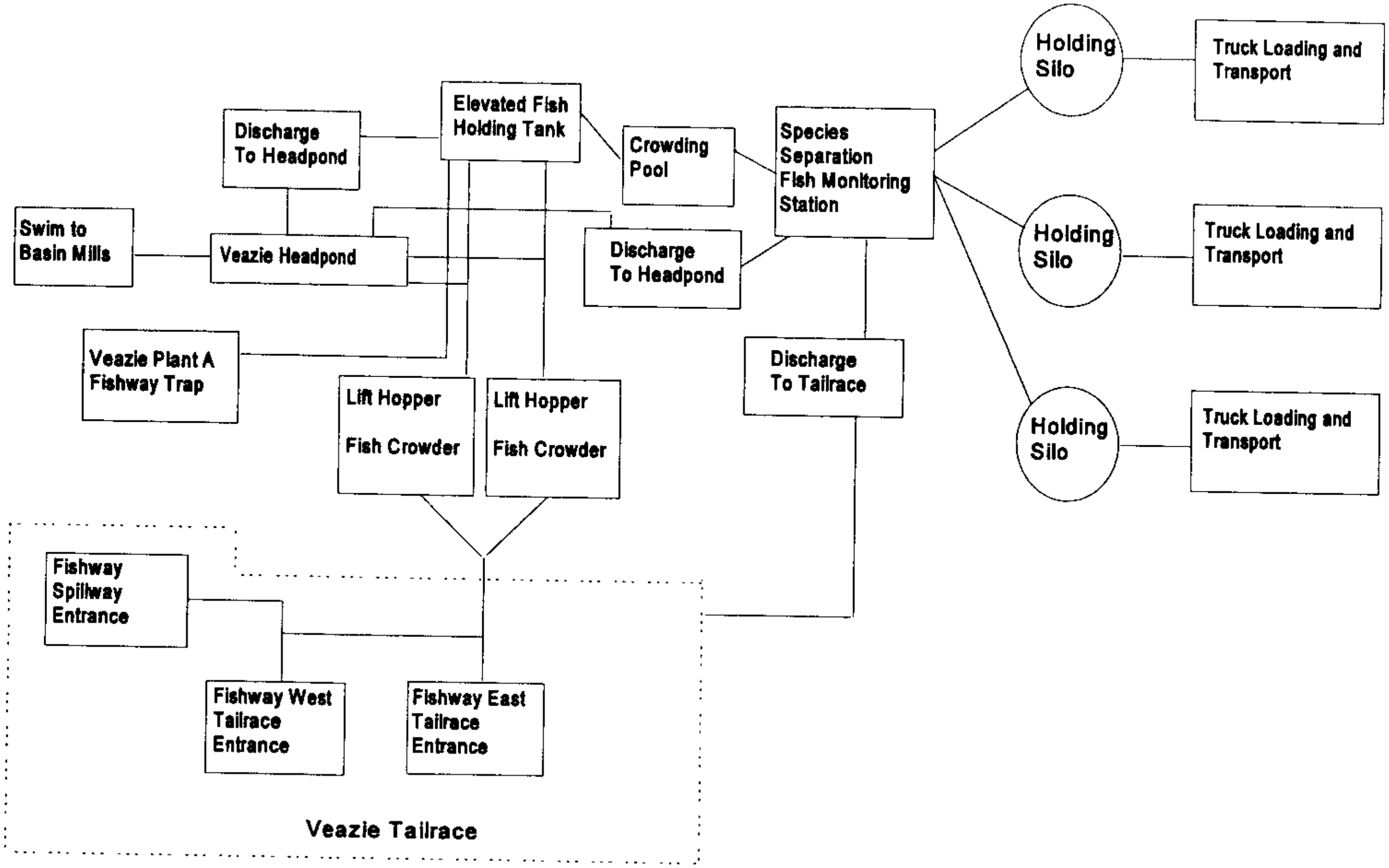

Figure F-15. Schematic diagram of Vezaie Plant C fish passage system (Source: Truebe 1993).

prescription dated February 16, 1995 prohibit the use of fish pumps. BHE claims that using a single handling/sorting facility is efficient, that pump transport is safer for personnel (using the existing barge system is dangerous at high flows), and that the effectiveness and safety (for fish) of fish pumps is well established. BHE provided several reports prepared by FWS documenting the effectiveness and desirability of using fish pumps for handling fish the size of Atlantic salmon (BHE 1991d, Appendix J). The existing fishway would continue to operate during construction of the new fish lift at Plant C. Construction activities at Veazie, therefore, would not affect fish passage.

The Plant C fish lift was designed and sized according to FWS criteria to accommodate 50 percent of the long-term Atlantic salmon restoration goal for the Penobscot River, or 6,000 fish. The existing vertical slot fishway would have to be upgraded (but BHE proposes no improvements) to accommodate the other 50 percent of the run, if run size approaches the goal. Maximum annual runs to date have been about 4,500 fish; returns in recent years have been less than 3,000 (Figure 3-7).

BHE proposed a lift at Plant C because lifts are the most effective kind of passage for all species of anadromous fish, and the Maine Division of Marine Resources (DMR) is pursuing restoration of shad and river herring in the Penobscot. BHE anticipates salmon passage efficiency of 85 percent to 98 percent at the proposed Plant C fish lift (Treube, 1993).

ASRSC, Interior (letter from W. Patterson, DOI, March 24, 1993a), FWS, NMFS (Haley 1993), and PIN (letter from J. Pardilla, PIN, March 26, 1993) recommended that BHE also consider constructing passage facilities at Plant B, along the west shore. BHE responded that radio-tracking studies documented unimpeded movement of salmon from below Plant B to Plant A and the existing fishway via a dredged channel connecting the two tailraces; therefore, BHE concluded that a passage facility at Plant B is not warranted at this time. BHE proposes to study the need for such a facility in the future.

BHE proposes to operate Plant C on a first-on, last-off basis at flows of less than 6,000 cfs, and various combinations of units from plants A and B at flows between 6,000 cfs and 13,525 cfs. Most migrating salmon pass Veazie during June and July; the rest of the run passes during late summer and fall (Figure 3-8). River flows during those periods are generally less than 10,000 cfs (Table 3-4). Under BHE's proposed operating regime, therefore, Plant C would operate continuously throughout the annual run, and plants A and B would operate during portions of that period.

BHE proposes this operating regime to enhance the efficacy of upstream passage at Veazie. Upstream migrating salmon and other anadromous species are attracted to high-velocity, point discharges and, thus, to tailrace areas of operating generating units. Operating Unit C would attract salmon and other anadromous species to the new Plant C fish lift, which is projected to have a higher passage efficiency than has been demonstrated for the existing vertical slot fishway.

Several intervenors expressed concern that first-on, last-off operation of Plant C would shift flow away from plants A and B during much of the salmon fishing season, thereby eliminating fishing opportunity at some salmon lies along the west shore, as discussed under Flow Modification. These concerns did not relate to potential effects on successful upstream passage of salmon, only to effects on angling opportunity.

The existing fishway at Veazie, which was constructed during 1970, is a vertical slot facility[16] near the center of the dam at the site of a former log sluiceway (Figure F-16). A trap is at the exit of the fishway. Access to the fish trap is by a small barge moving along a cable from the truck-loading area (Figure F-16) to the trap.

Fish are removed from the trap by ASRSC staff and placed in holding facilities on the barge, transported back to shore, processed (e.g., measured, weighed, scale samples for aging, checked for tags), and then either transported by truck to federal hatchery facilities to serve as brood stock or released into Veazie impoundment. The fishway was designed to operate effectively at flows as high as 40,000 cfs; however, tending the fish trap at flows exceeding 20,000 cfs is dangerous, and the trap is often not operated or tended at higher flows (Treube 1993).

Radio-tracking studies[17] suggest that passage efficiency at the existing fishway is not high. Shepard (1989) noted that radio-tagged salmon took an inordinate amount of time (up to 100 days) to return to and pass over the Veazie dam.[18] Average passage efficiency over 4 years of study was 76 percent for radio-tagged fish (Shepard and Hall 1991), whereas only 46 percent of conventionally tagged control fish passed during 1987 and 1988 (Shepard 1991b). Low returns of tagged fish may be attributable to fisheries harvest, mortality from high temperatures and stress from handling during tagging, tag loss, and other factors unrelated to effectiveness of the passage facility. Both BHE and the fisheries agencies assumed a 92 percent passage efficiency at Veazie in their salmon population modeling.

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[16] A vertical slot fishway consists of a step-like series of pools with vertical openings at alternating sides of sequential pools, such that water passing through the slot at the left side of one pool swirls through the pool and exits through a slot at the right side of the next pool.

[17] Radio-tracking studies are conducted by placing a radio transmitter in the stomach of a fish and then tracking the movements and location of the fish using directional radio receivers.

[18] Long delays before passage may contribute to a buildup of fish and increase availability of fish to anglers; therefore, delayed passage of salmon at Veazie may contribute to relatively high angling success at salmon lies located in that river reach.

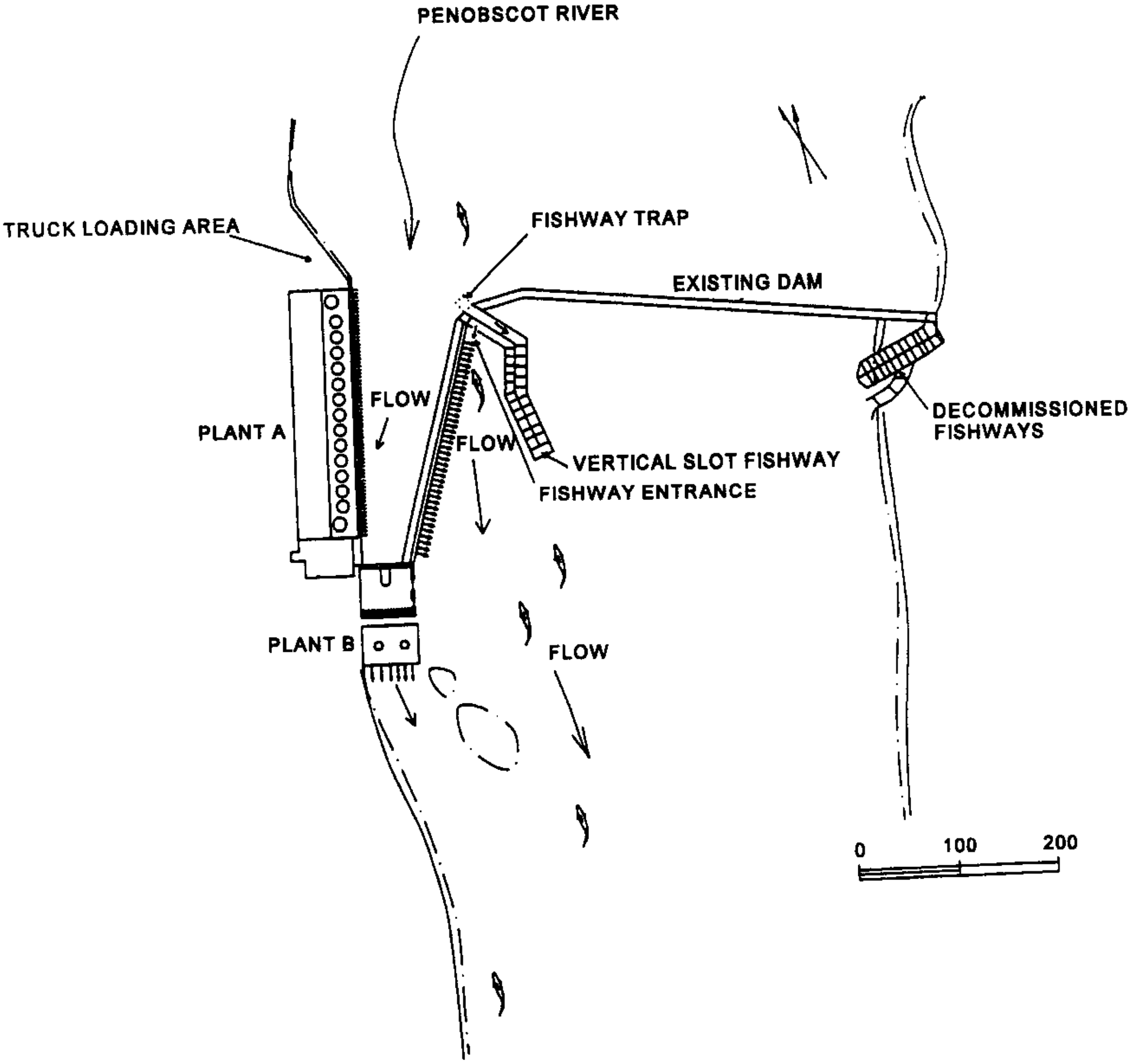

Figure F-16. General site plan for Veazie Dam showing existing fishway and water flows (Source: Truebe 1993).

Since 1984, BHE has enhanced the fish passage facilities by smoothing edges to reduce fish injuries, modifying slots to enhance hydraulics, and dredging a channel between the tailraces of plants A and B to allow free movement of fish from below Plant B to the existing fishway entrance. Radio-tracking studies showed that salmon used the dredged channel extensively, moving freely between the tailraces of plants A and B (Shephard 1991b).

Interior's Section 18 prescriptions dated May 20, 1977 require further modifications to the existing Plant A fishway, including a new gated spillway entrance on the east side of the fishway and fish counting facilities at the upstream end.

We conclude that fish passage facilities must be constructed at Plant C because fish would be drawn away from the existing passage facility and attracted to Plant C when it is operating. With new, state-of-the-art passage facilities at Plant C, and improved facilities at Plant A, fish passage efficiency at Veazie dam is likely to be substantially higher than under current conditions.

We also conclude that BHE's proposed fish lift with handling and sorting facilities is the appropriate kind of passage facility for use at Plant C, given that continued salmon restoration entails capturing hatchery brood stock, that numbers of returning anadromous fish are expected to increase over time, and that restoration of shad and alewife is a stated goal of DMR. Operating practices at the existing vertical slot fishway indicate that using wire mesh traps to capture and handle fish at the exit of a fishway is time consuming, difficult, and dangerous. Designing handling and sorting facilities into a lift facility eliminates many logistical difficulties and provides the capability to handle and sort large numbers of fish efficiently. Such facilities also provide flexibility to support a variety of management options, including removal and transport of brood fish to hatchery facilities, transport of fish for release in other portions of the river basin, and release into the Veazie impoundment. A fish lift is also more effective than alternative fish passage facilities (e.g., Denil or vertical slot fishways) for passing shad and river herring (Bell 1986). We conclude that the design of the proposed Plant C fish lift is consistent with FWS design criteria and sufficient for attainment of the fisheries management goals established for the Penobscot River.

Radio-tracking study data discussed earlier suggest that loss of upstream migrating adults at Veazie under present conditions may be as high as 24 percent. The agencies and BHE assume a loss of only 8 percent under existing conditions. BHE suggest that passage efficiency with the new Plant C fish lift would range between 85 percent and 98 percent (the same as is assumed under present conditions). We conclude that passage efficiency at Veazie with two operating passage facilities and with Plant C operated first-on, last-off would be significantly higher than under existing conditions.

Construction and operation of the Plant C fish lift and continued operation of the existing vertical slot fishway would provide sufficient capacity to pass salmon runs of the size expected for many years. The existing fishway has passed maximum numbers of about 4,500 fish, and the fish lift is designed to handle as many as 6,000. Although a stated restoration objective of the agencies is to achieve 12,000 salmon returning to the Penobscot River, those same agencies consider a fully restored salmon stock to consist of about 8,000 fish at Veazie. The combined capacity of the existing fishway and BHE's proposed Plant C facilities provides sufficient capacity to meet management goals.

We conclude that constructing fish-passage facilities at Plant B is not necessary to provide additional passage capacity at this time. Agencies argue that facilities are needed at Plant B to ensure efficient and timely passage.[19] BHE proposes the Plant C first-on, first-off operational regime as a means of ensuring high passage efficiency. We believe that attracting salmon to flows from Plant C (and lack of or minimal flows from plants A and B) during much of the migration period would result in much higher efficiency and much shorter migration delay than exists currently at Veazie. Radio-tracking studies show that fish move freely between the discharges of plants A and B, suggesting that fish are unlikely to hold for long periods in the Plant B tailrace. We conclude, therefore, that immediate construction of a Plant B passage facility is not warranted to enhance passage efficiency. A facility could be constructed at Plant B in the future if fish populations increase to a level that requires additional passage capacity, or if BHE's proposed monitoring studies show that a significant percentage of salmon below Veazie are delayed as a result of holding below Plant B. MDEP WQC Condition 10 requires BHE to conduct studies to assess the need for passage facilities at Plant B and at Orono. We agree that a study of passage needs at Plant B is appropriate in order to develop conceptual plans which could be implemented at a later date if such passage were deemed necessary based on study results.

We conclude that use of a fish pump to transport fish trapped at the exit of the existing fishway to handling and sorting facilities at the Plant C fish lift would alleviate the current logistical problems involved in handling fish from the existing facility and make optimal use of the new Plant C handling facilities.

BHE examined several alternatives to the existing barge transport system, in addition to the fish pump, during 1984 (BHE 1990e, Appendix A). All were evaluated assuming continued fish handling on the west shore. Of the alternatives considered (including trap/hopper lift and sluice to shore, automated elevation and transport of a trap/hopper from the fishway to shore, and a fish pump), the fish pump was deemed to be the most efficient and logistically feasible. No specific designs have been presented for a pumping system that would extend from the existing fishway to Plant C, a distance of about 600 feet. Considering the safety of field personnel, the additional cost of duplicating handling facilities at both ends of the dam, and the FWS reports about the safety (for fish) and efficiency of fish pumps for handling salmonids, the fish pump alternative is the most appropriate means of handling fish passing up the existing fishway, if such handling is required.

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[19] Delaying migrating salmon is considered to be detrimental to spawning success.

Basin Mills. For permanent passage at Basin Mills, BHE originally proposed to maintain a spillway steeppass passage facility (installed to provide passage during the 3-year construction period) and construct a standard Denil fishway at the powerhouse with two entrances to a collection gallery (Figure F-17). The facility, designed in accordance with FWS criteria, would be operational at flows up to 40,000 cfs and would have the capacity to pass between 8,000 and 10,000 Atlantic salmon. In a subsequent submittal to DEP (filed with FERC; see Section 2.1.2.1), BHE modified its proposal, retaining the spillway steeppass Denil but proposing construction of a vertical slot fishway instead of a Denil at the powerhouse.[20] The vertical slot facility would be designed to meet the same operational criteria as the originally proposed Denil facility and would use the same entrance design.

During the 3-year Basin Mills construction period, BHE proposes to truck all salmon taken at Veazie to release points upstream of the Basin Mills site, except for those required as hatchery brood stock. To ensure the capability of passage for any fish released into Veazie and for any fish that drop back downstream after release, BHE proposes to install a steeppass Denil fishway at the west end of the site on the shoreward side of the gated spillway (Figure F-18).

BHE proposes a phased construction schedule (BHE 1990a, Appendix C). The gated spillway and steeppass Denil fishway would be constructed during the first year; the rest of the cross section of the river would not be altered during this time. During the remaining 2 years of construction, cofferdams would block passage across major portions of the river, and flow would be restricted either to the gated spillway or to segments of the ungated spillway. The steeppass Denil fishway would be operational after the first year of construction.

The potential effectiveness of the spillway steeppass Denil fishway during Basin Mills construction is difficult to assess, given the extensive construction activity and the severe modifications of the physical structure of the river during construction. The steeppass Denil fishway probably would not have a high passage efficiency when river flow was radically altered, or when those alterations changed substantially between years. This facility, however, would still provide opportunity for the upstream return of some released fish that fall back downstream after release (BHE estimates a fall back rate of 20 percent; BHE 1990e).

Potential losses of adults at Great Works and Milford dams would be avoided by trucking fish above Milford. If an 8 percent loss of upstream migrants at each development is assumed (as is assumed by fisheries agencies and BHE), the estimated 20 percent fall back rate is nearly compensated for by eliminating losses of upstream migrants at the two developments. Given that all salmon can be trapped at Veazie dam, we conclude that BHE's proposal to truck all fish taken at Veazie to a release point upstream of Milford during

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[20] The passage efficiency of vertical slot fishways remains consistent over a wider range of river flow than does the efficiency of a Denil fishway, and vertical slot facilities appear to be more efficient than Denil fishways for shad and alewife.

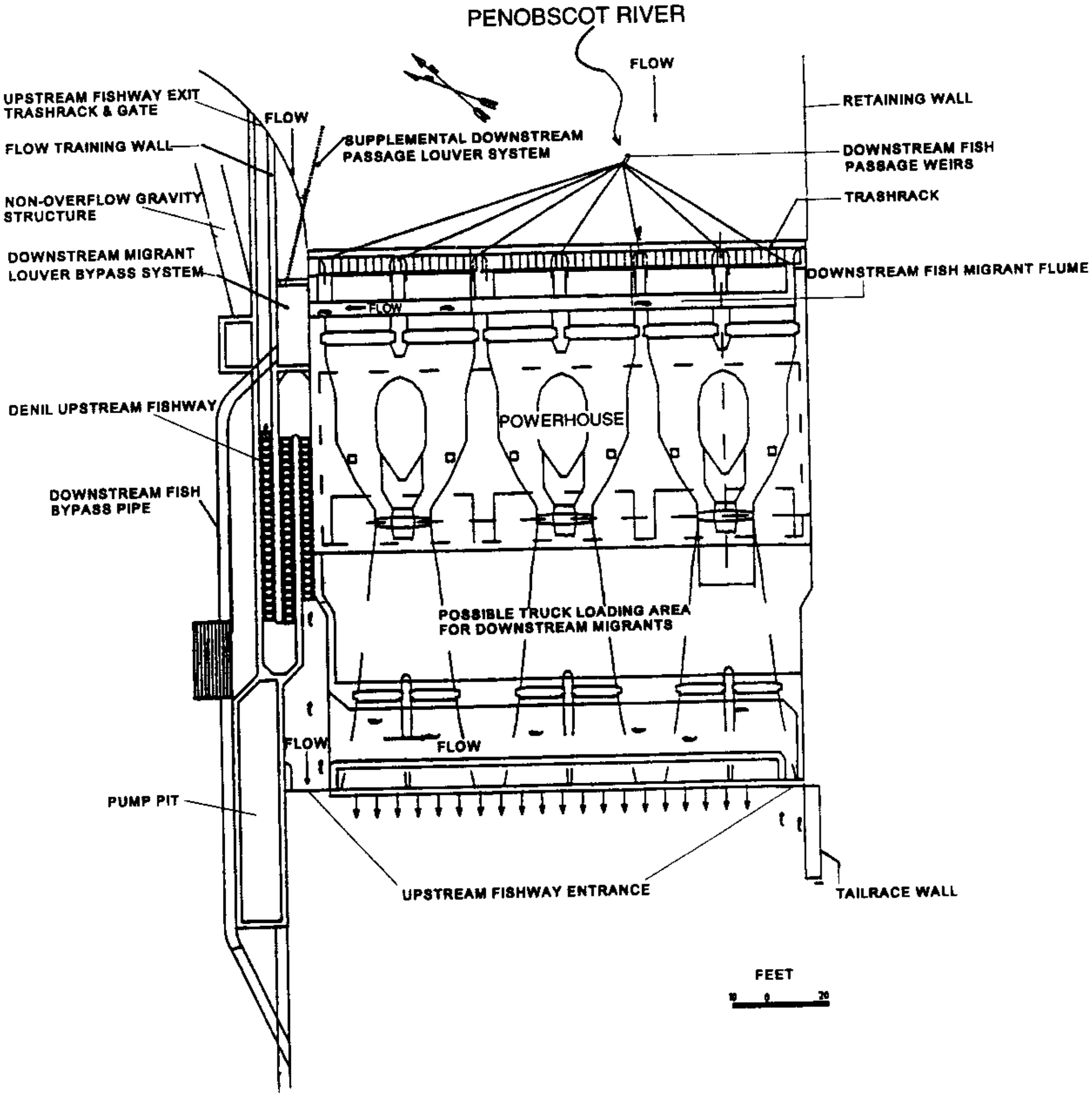

Figure F-17. Plan view of fish passage facilities at the proposed Basin Mills powerhouse (Source: BHE 1990a).

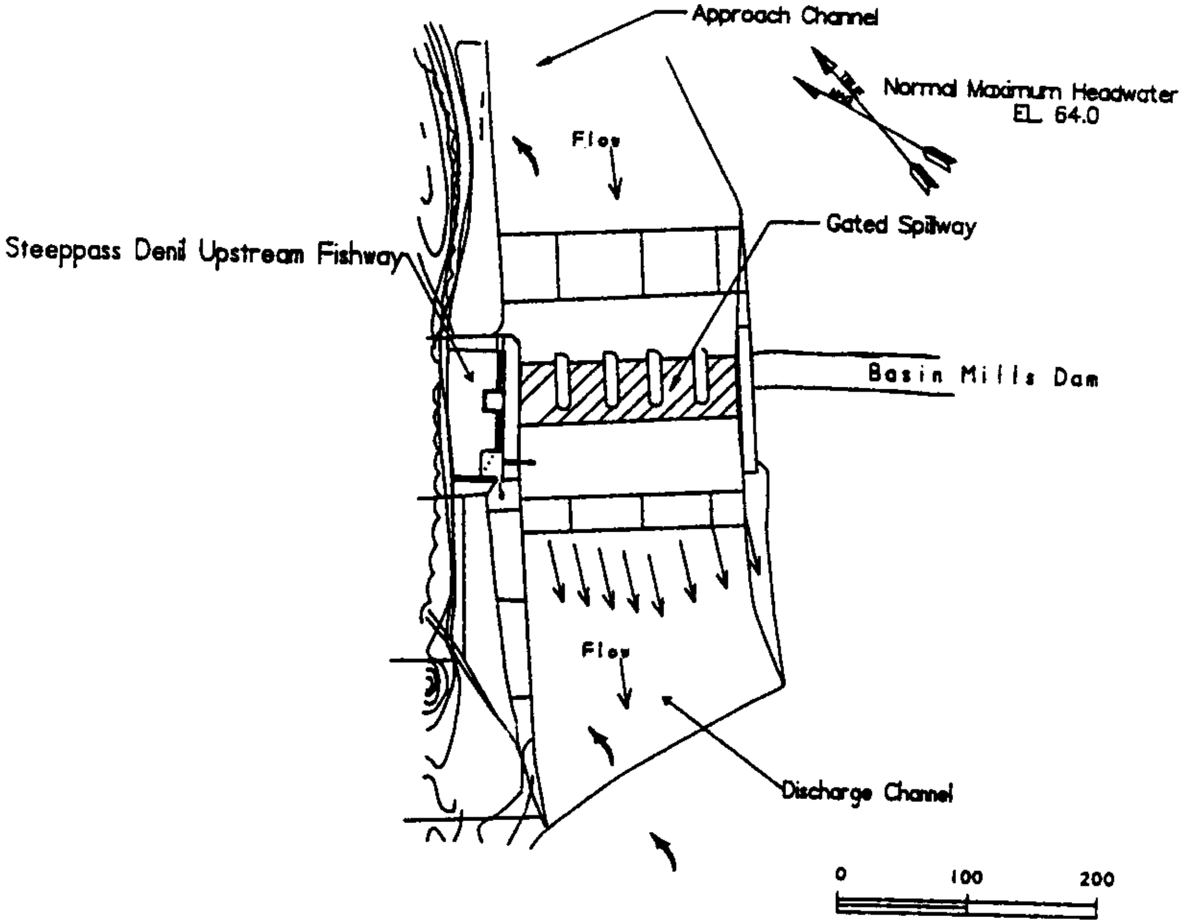

Figure F-18. Plan view of the upstream fish passage facilities at the proposed Basin Mills gated spillway (Source: BHE 1990a).

construction would provide the greatest possible degree of protection for spawning runs during construction. The vertical slot fishway proposed for the powerhouse would be similar to the relatively new vertical slot fishway at BHE's West Enfield facility. Ongoing radio tracking studies at that facility show that it provides for very fast and efficient passage of upstream migrants. Shepard and Hall (1991) reported that the passage rate could be as high as 100 percent. As discussed under Flow Modification, under normal seasonal patterns, all river flow would pass through the Basin Mills generating turbines during about 70 percent of the year, encompassing nearly the entire salmon migration period. Nearly all migrating salmon would be attracted to the powerhouse area and to the entrances to the fishway, as is the case at West Enfield. Between flows of 20,000 and 40,000 cfs, gated spillway flows could attract migrating fish to the west end of the dam, where the steeppass Denil fishway would provide passage. We conclude that BHE's proposed vertical slot fishway at the powerhouse and steeppass Denil at the spillway would provide effective passage of Atlantic salmon at the Basin Mills dam. Both BHE and the agencies assume that passage efficiency for state-of-the-art facilities would average 92 percent and range between 85 percent and 98 percent. Based on radio-tracking studies at West Enfield, we believe that efficiency is likely to be higher than 92 percent.

MDEP WQC Condition 6 requires that BHE construct a vertical slot fishway or fish lift at the spillway instead of the steeppass Denil proposed by BHE. While our analysis of upstream passage requirements for salmon suggests that such a replacement is not necessary, in our discussion of passage needs for shad and alewife we conclude that a vertical slot fishway or fish lift would enhance passage for those species. Thus, we conclude that this WQC condition is warranted for the benefit of anadromous alosids.

Interior's and NMFS' Section 18 prescriptions require vertical slot fishways or fish lifts at both the powerhouse and the spillway. As we stated above, we concur that the spillway fish lift or vertical slot fishway is warranted.

Orono. BHE proposes to decommission Orono, remove the powerhouse and penstocks, and divert all Stillwater flow over the Orono dam. BHE proposes no passage facilities at Orono dam. PIN (letter from J. Pardilla, PIN, March 26, 1993) and EPA (letter from D. Turin, EPA Region 1, March 26, 1993) requested BHE to provide fish passage facilities at Orono. Radio-tracking studies have shown that many fish released above Veazie remained for varying periods either at the Orono tailrace or in the Orono bypass (Shepard and Hall, 1991). In many cases these fish later moved through the upstream passage facilities at Great Works and Milford. Other fish remained in the river between Veazie and Great Works; Shepard and Hall (1991) speculated that such fish may have been reared in this portion of the river and, thus, had no motivation to move further upstream.[21]

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[21] Salmon that are reared in a certain tributary or portion of a river have been documented to home to the area in which they were reared when they return as adults.

BHE's fisheries surveys in the Stillwater River documented the presence of salmon smolts only in the Orono bypass below Orono dam, suggesting that salmon are not reproducing in the Stillwater River upriver of Orono. Also, although there is some suitable habitat for various life stages of salmon in the Stillwater River, restoration planning efforts do not assume any smolt production or stocking in the Stillwater River. For all these reasons, it appears unlikely that a significant number of upstream migrating adult salmon would home specifically to the Stillwater River. Because the Stillwater River is a branch of the Penobscot, however, fish destined for areas upstream of the Milford development probably would be attracted into the Orono bypass by flows passed over Orono dam and would move into the Stillwater River as an alternative to moving up the main stem. The radio-tracking studies mentioned earlier suggest that such behavior is occurring.

To the extent that fish remain in the bypass, their migration may be delayed, and delays are detrimental to spawning success.[22] The effects of migration delays at Orono probably would not be substantial because of the relatively short distance between Orono dam and the confluence of the Stillwater and Penobscot rivers (less than 1,000 feet) and the fact that passage is available over Great Works and Milford dams. Given the extent of basinwide efforts to improve upstream passage at all blockages on the river, however, it would be prudent to install passage at Orono. We conclude that BHE's proposal not to construct passage facilities at Orono would adversely affect Penobscot River Atlantic salmon, although we cannot quantify the magnitude of the effect.

MDEP's WQC Condition 10 requires BHE to conduct studies of the need for fish passage at Orono. In our evaluation of Alternative 3, below, we conclude that BHE should immediately begin design of passage facilities at Orono. The required studies would establish potential entrance design and appropriate phasing of capacity and construction. We believe that passage capacity can be phased in a manner consistent with realistic salmon, alewife, and shad population growth estimates. Both Interior and NMFS prescribe either a vertical slot fishway, standard Denil, or fish lift for Orono dam. We concur that this prescription would be desirable for salmon as well as clupeid restoration efforts and therefore would recommend upstream fish passage be provided at Orono under any alternative beyond decommissioning and removal of Orono dam. However, we disagree that full capacity facilities are necessary immediately and recommend staged construction.

Stillwater. BHE proposes a staged construction and study to implement and evaluate upstream passage at the Stillwater development. In Stage 1, the initial fishway configuration would consist of a steeppass Denil at the powerhouse. The steeppass would be monitored for both effectiveness and efficiency for 3 years after initial operation. If the upstream fishway meets passage requirements, based on consultation with fisheries agencies, no further fishway

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[22] Salmon and other anadromous fish are believed to be genetically programmed to reach their spawning area at the time their ova are fully matured and ready for spawning; delays in upstream migration could desynchronize that relationship, potentially decreasing spawning success.

modifications or studies would be made. An additional steeppass would be installed or alternative fishway designs would be considered if studies documented that the initial steeppass did not provide adequate passage for all species.

The modified passage facilities would be monitored for an additional 2 years, after which further passage modifications would be made, if required. Finally, a comprehensive report summarizing the entire upstream study process and describing the results, along with fishway operation and maintenance plans, would be developed in consultation with and reviewed by the fishery agencies, and submitted to the Commission for approval. A fish trap would also be incorporated in the design of the fishway to monitor passage through the project.

The state agencies (DMR and DIFW) accept the staged approach to fish passage outlined in BHE's proposal, including the installation of a steeppass Denil as the initial upstream passage system and included it as a condition in the MDEP WQC.

Interior does not agree with the proposed use of steeppass fishways at the Stillwater development (letter from W. Patterson, Interior, March 24, 1993; letter from R. Lamberston, Interior, May 20, 1997). FWS and PIN (letter from J. Pardilla, Pin, March 26, 1993) believe that BHE's proposed steeppass Denil is inadequate because it would produce an insufficient attraction flow; would have a tendency to become clogged with debris; and has not been proven to pass large numbers of clupeids, particularly American shad effectively.

In reviewing the conditions in the WQC and Interior's fishway recommendations included with its prescription under Section 18 of the FPA, we initially concluded that they were in conflict. The MDEP WQC approved BHE's phased approach to implementation of upstream passage at the powerhouse, whereas Interior called for immediate installation of conventional Denil, vertical slot, or fish lift facilities at both the powerhouse and the spillway. FERC sent a letter to both agencies, dated July 20, 1993, requesting that they resolve the apparent conflicts between their respective mandatory requirements. Interior responded on August 11, 1993, that they did not call for immediate construction of conventional facilities at Stillwater and did not entirely object to a phased approach for constructing fish passage at Stillwater, given the unresolved status of fish passage at the downstream Orono Development. MDEP responded in an August 25, 1993, letter that its consultation with FWS confirmed that Interior did not object to a phased construction approach but desired additional consultation with BHE to resolve disagreements over fishway designs and implementation schedules.

We concluded in our analysis of upstream passage needs at the Orono development that passage facilities should be constructed immediately to meet existing passage needs of salmon and other species, particularly alewife. We also concluded that construction can be phased to account for the relatively limited current passage needs and the possible greater future passage needs that could arise from future growth of salmon, shad, and alewife populations. Based on our conclusion that passage at Orono is necessary immediately, we also conclude that immediate construction of passage facilities at Stillwater is required. As we discussed regarding salmon passage at Basin Mills, we believe that a steeppass Denil fishway would be adequate for passage of Atlantic salmon at Stillwater; however, because steeppass Denil fishways may not be adequate for passage of alewife, we conclude that the first phase of construction should consist of a standard Denil or vertical slot fishway or a fish lift at the powerhouse. We also conclude that the phasing of capacity should be coordinated with phased construction of passage at the Orono dam, and that studies should be conducted to develop final passage design and establish capacity requirements. Interior and NMFS prescribe both a powerhouse fishway and a spillway fishway and that these fishways be either standard Denil, vertical slot, or fish lift/elevator (but not steeppass). Although BHE opposes the restriction on steeppass Denil, we believe that this prescription is warranted and discuss our reasons under the shad and alewife sections of this appendix.

Milford. An existing standard Denil fishway passes anadromous fish from the Milford powerhouse tailwaters to the headpond. BHE installed an additional Alaskan steeppass Denil fishway at the center of the Milford dam spillway during 1989 as an interim measure to pass Atlantic salmon that had been observed "dead ending" at the spillway during periods of spillage (Figure F-19). Operating the additional turbine at the Milford powerhouse would reduce but not eliminate the potential for upstream passage inefficiencies due to dead ending (BHE 1988).

BHE estimated that only 12.5 percent of the annual salmon run would require spillway passage because most spillage occurs during May, and most salmon would be present in the Milford area during June and July (letter dated March 24, 1993, page 15).

Joint radiotelemetry studies conducted by BHE and the ASRSC between 1987 and 1991 indicated that 43 of 45 (96 percent) tagged Atlantic salmon successfully passed through the standard Denil fishway. Three of five radio-tagged salmon monitored during spillage since July 1989 have successfully ascended the steeppass Denil fishway.

BHE proposes to implement a phased approach to upgrade upstream passage at the Milford development. The first part of Stage I would involve upgrading the existing standard Denil fishway (Figure F-20). These upgrades, developed in consultation with fishery resource agencies, would include the following:

- improving the entrance configuration so that it is oriented parallel to the flow in the tailrace instead of perpendicularly;
- increasing the attraction flow to 210 cfs;
- increasing the height of the walls in the lower section to make the fishway operational at flows up to 20,000 cfs;

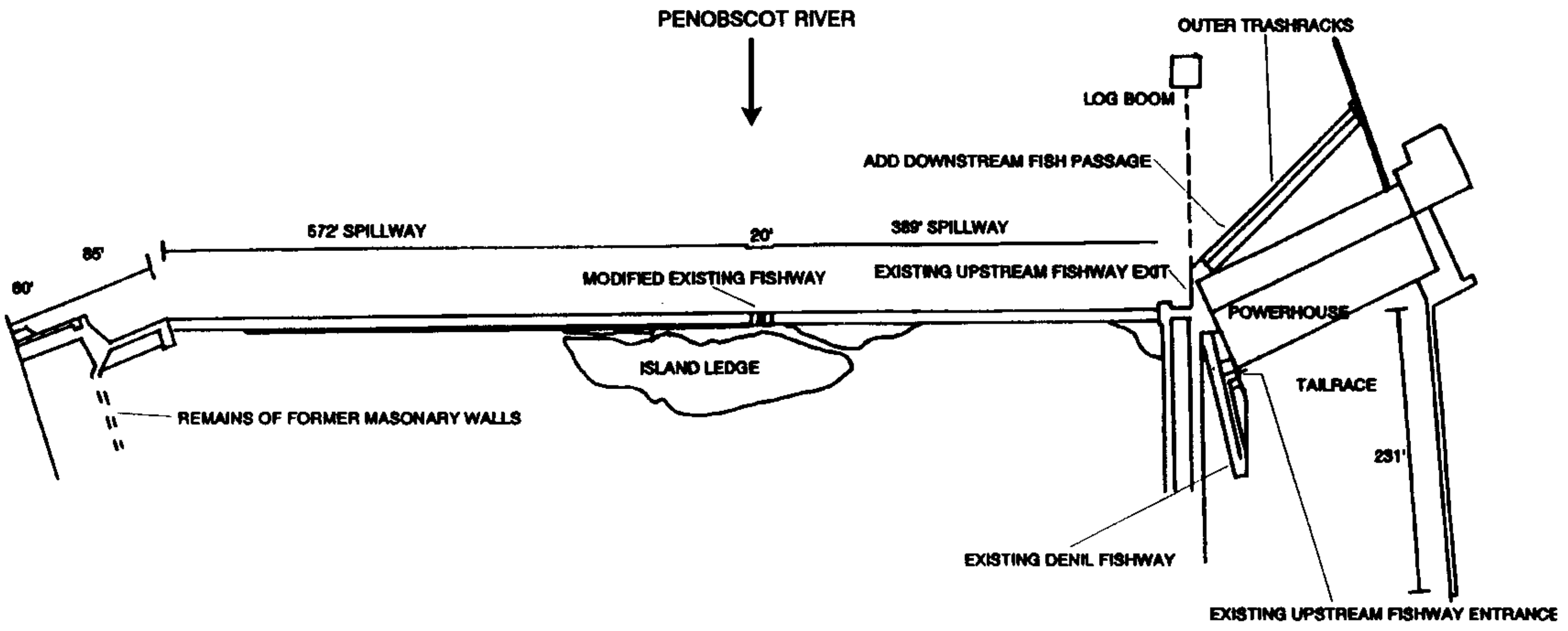

Figure F-19. General site plan of the Milford Dam and powerhouse.

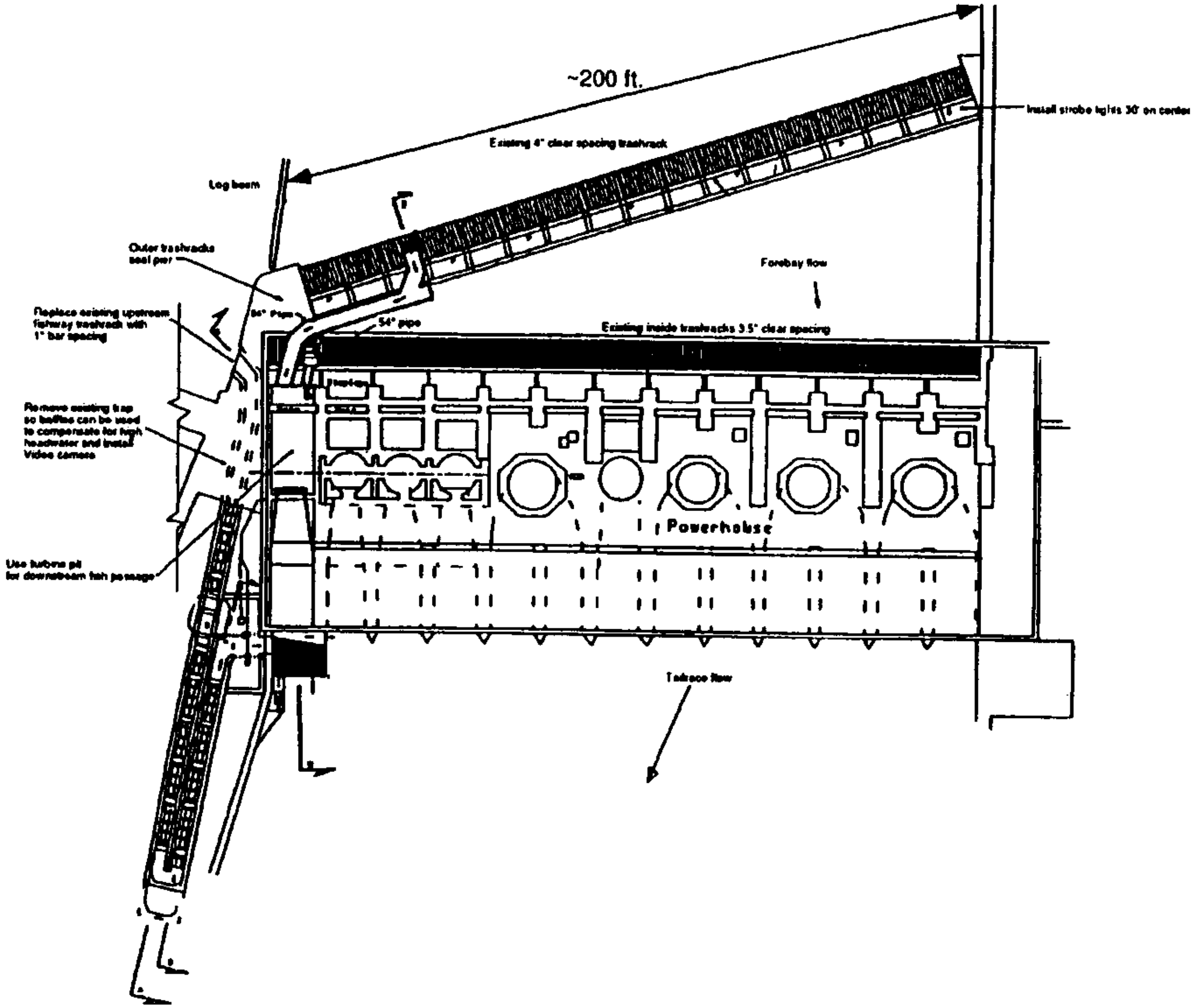

Figure F-20. Plan view of upstream and downstream fishways at the Milford Project.

- correcting the baffling near the exit to make the fishway more effective during high flows (this modification has already been completed);
- installing a counting and monitoring system (BHE proposes to use a vertically mounted video system); and
- installing a new exit trashrack.

BHE would implement these improvements within 12 months after receiving a license. In addition, BHE proposes to continue to operate the Alaskan steeppass fishway at the center of the spillway (Figure F-19) and to evaluate its effectiveness. No counting or monitoring facilities are proposed at this fishway, although BHE would continue to evaluate the effectiveness of the facility by radiotelemetry. A second stage of fishway enhancements relates to passage of shad and river herring; see our later discussion of those species.

Interior & NMFS in their Section 18 prescriptions for Milford require BHE to modify the powerhouse Denil fishway by adding a spillway entrance near the existing log sluice and install additional baffles in the upstream end of the fishway to facilitate operation at high headpond levels. The agencies also prescribe a new fishway (conventional Denil, vertical slot, or fish lift) at the west end of the spillway and the replacement of both the existing and the new fishways when the annual number of fish using them exceed 20,000 American shad or 200,000 river herring.

The PIN indicated that it is working with Interior Solicitor's Office and the Bureau of Indian Affairs to draft section 4(e) conditions. These conditions have not yet been filed with the Commission.

MDEP's WQC does not require a new west bank fishway, a new spillway entrance to the existing standard Denil fishway, or future replacement of the existing standard Denil fishway. The WQC does require studies to establish passage capacity of the existing Denil fishway, with future fishway modification if capacity is exceeded.

In response to agency and intervenor comments, BHE (1993c) agreed to install access walkways and railings at the existing powerhouse fishway and to actively investigate the possibility of obtaining ownership of the state-owned fishway. Transfer of the fishway to private ownership would require legislative action (BHE 1993c). BHE proposes the equivalent of a side-view video camera system by using a top-mounted camera with a side mounted mirror.

Although BHE does not believe that an immediate need for additional spillway passage facilities has been demonstrated, it proposes to improve the effectiveness of the existing steeppass fishway by excavating natural pools or pouring concrete weirs in the ledge outcrop and deepening the existing channel to the pool below the dam. BHE opposes

Interior's restriction on steeppasses Denils and the shad capacity calculation for standard Denils. We believe the Section 18 prescriptions are warranted for shad and alewife and discuss our reasons under those respective sections of this appendix.

We concur with MDEP's WQC condition requiring BHE to operate the existing Denil fishway with the following minimum modifications: 1) improving the fishway entrance orientation to be in line with the tailrace flow; 2) increasing the attraction flow to 210 cfs; 3) raising the height of the walls in the existing fishway to make it operative at flows greater than 20,000 cfs; 4) installing a new exit trashrack; and 5) installing a new video counting/monitoring system. We agree that BHE's proposal to use an overhead mounted video system with a mirror to enable side-view monitoring would ensure relatively accurate counting and identification of fish passing through the facility and should satisfy concerns expressed by Interior.

The upstream passage issue is complex because the passage needs for alewife, shad, and salmon are different; the dates when meaningful populations of shad and alewife would be established are unknown; and the overlap in seasonal run timing at this site is uncertain. Considering only Atlantic salmon, however, we believe that the existing facilities, enhanced as suggested by BHE in their response to agency comments, would ensure efficient salmon passage at the project. Studies of the existing passage facilities, without any improvements, documented efficiency of 96 percent.

Downstream Passage Mortality

Mortality of downstream migrating salmon is a function of both the percentage of fish that actually passes through the turbines and the percentage that dies. Downstream migrants prefer to pass over dams in spillage rather than through turbines when spillage is available. At facilities with extensive spillage throughout the smolt migration period (generally May, see Section 3.5.1.2), downstream passage mortality would be low (survival of fish passing over dams in spillage is generally 100 percent). At facilities where flows are passed through turbines throughout the migration period, mortality would be a function of the turbine operating characteristics.

The magnitude of turbine mortality depends on the type of turbine, fish size, wicket gate setting, rotation speed, and the elevation of the turbine above the tailwater. Generally, between 3 and 6 percent of downstream migrating salmon smolts are killed when they pass through operating turbines (Shepard 1993a). Previous assessments of hydroelectric impacts on salmon smolts in the Penobscot River have assumed a turbine mortality rate of 5 to 9 percent (Truebe 1993).

The objective of downstream passage facilities is to divert migrating smolts away from turbines and into bypass flumes, which transport fish to the project tailrace. FWS estimated development-specific downstream mortality rates based on annual river flow patterns and turbine types for each of the developments, assuming that state-of-the-art downstream passage diversion facilities were in place at most of the developments (see Appendix D, Table D-7). We used those figures in our assessment of development-specific impact on downstream migrating smolts.

Downstream passage of kelts (adult salmon in that have spawned and are returning to sea) has been evaluated in several studies performed at various developments on the Penobscot River. Because they are larger than smolts, kelts that pass through turbines are more likely to be killed than downstream migrating smolts; however, kelts readily pass projects in spillage over dams and are more likely than smolts to be directed to bypass facilities by diversion structures. The abundance of kelts is quite low, and none of the quantitative evaluations of Penobscot salmon restoration have assumed any contribution to the spawning stock from repeat spawners (i.e., kelts that returned to sea and survived to return and spawn again). We conclude, therefore, that downstream passage facilities for smolts would be adequate for kelts, and we do not address downstream survival of kelts further in this assessment.

Veazie. Under existing conditions, river flow at Veazie dam exceeds the hydraulic capacity of plants A and B during most of the smolt migration period (see May flows in Figure F-1). For this reason, low downstream mortality generally would be expected at Veazie, except during years of low spring flow. BHE estimated that turbine mortality at plants A and B would be 9 percent and that, accounting for the high proportion of downstream migrants that would avoid turbine passage by passing over the dam in spillage, total downstream mortality at Veazie would average 0.75 percent of the annual migrants (Ritzi 1992).

With the installation of Plant C, normal May flows would still exceed the combined hydraulic capacity of all the generating units, but spillage probably would be eliminated more frequently than it is presently. BHE estimated 5 percent average turbine mortality at Plant C.[23] BHE estimates 1.35 percent total downstream mortality at the proposed Veazie development with Plant C (assuming 70 percent effectiveness of proposed diversion facilities).

BHE proposes several steps to ensure that the assumed percent diversion can be attained or exceeded. Radio-tracking studies show that the trashracks at Plant A form a natural lead to the Plant B intake, where a trash gate adjacent to the trashrack is an effective surface-weir passage point.[24] This gate would be operated throughout the downstream migration period. BHE also originally proposed to install multiple surface weirs and transport

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[23] New turbines tend to be more efficient and cause lower mortality than older turbines.

[24] In 1989 studies, although smolts selected routes of passage primarily in proportion to comparative volumes of water flow, 12 percent of the smolts passed out this weir with only 0.2 percent of the flow. This appeared to be due to the unique configuration of the forebay and the location of the sluice near the Plant B intake (Shepard 1991b).

flumes at the Plant C powerhouse intake (Figure F-17; identical downstream passage facilities are proposed for both Basin Mills and Veazie Plant C; BHE 1990e). Reduced-spacing (generally 1-inch) trashracks in the upper portion of the water column act as a screen or behavioral diversion to direct fish into the bypass flume. Subsequently, BHE proposed to design Plant C to allow for installation of a louver diversion system (Figure F-21). The diversion efficiency of surface weirs was estimated at 70 percent, whereas diversion efficiency of louvers for salmon smolts at a project in Nova Scotia was 80 percent over 2 years (Truebe 1993). If louver diversion efficiency is higher than that of surface weirs, the estimated average downstream mortality at Veazie would be lower than the 1.35 percent estimate presented above.

Contrary to the estimates of diversion efficiency used by BHE and FWS in assessments of project impacts on downstream migrants, several studies suggest that state-of-the-art facilities may be relatively ineffective in diverting smolts from turbine entrances. In studies at BHE's West Enfield Project conducted during 1990 under conditions of very little spillage, 82 percent of fish (41) passed through turbines, 8 percent passed with spillage, and only 2 percent passed through the downstream passage facilities (Shepard 1991a). In similar studies conducted during 1991, 22 percent used the downstream fishway (Shepard 1991c), whereas during 1992, only 12 percent used the facility (Bangor-Pacific Hydro Associates, 1993). Studies on the Merrimack River found that over 2 years, only 13 of 279 smolts used passage facilities employing 1-inch screen barriers (Saunders 1992). The poor diversion efficiency of downstream passage facilities as currently designed and operated has lead to studies of additional enhancements, such as the use of vertical louvers (discussed below) and "herding" devices such as strobe lights, which are intended to startle fish, causing them to move into downstream passage entrances (Ruggles 1993).

These findings suggest that smolt mortality at Veazie may be higher than the FWS' estimate. They also suggest, however, that downstream mortality at all projects may be underestimated.

Interior and NMFS, in their Section 18 prescriptions, require the installation of trashracks with 1-inch clear opening at Plants A & B, both a surface and bottom bypass at Plant B, and either 1-inch trashracks, angled bar racks, or louvers at Plant C with appropriate gated surface and bottom bypasses.

We conclude that the diversion structures and downstream passage facilities proposed for Veazie, and required under Section 18, represent state-of-the-art technology for reducing turbine mortality of migrating salmon smolts, and that the potential loss of smolts at Veazie (assuming full production from all suitable nursery habitat upstream of Veazie) would increase by about 0.6 percent annually as a result of the construction of Plant C and associated downstream passage facilities. We believe, however, that total mortality rates with state-of-the-art facilities may be higher than those assumed by both BHE and the fisheries agencies.

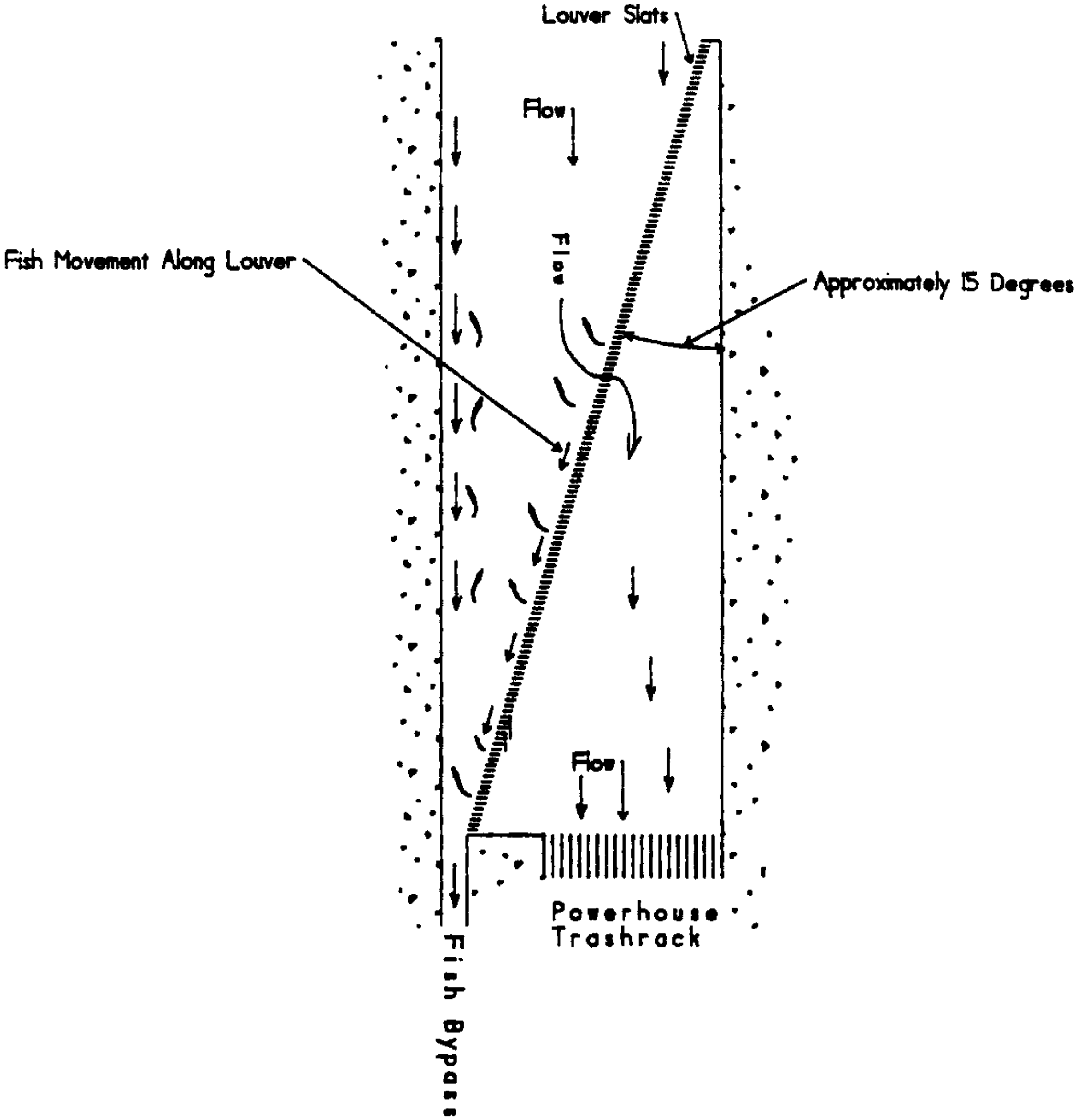

Figure F-21. Downstream fish passage facilities at Veazie Plant C (Source: BHE 1990).

Basin Mills. BHE proposes downstream passage facilities at Basin Mills similar to those proposed for Veazie Plant C (Figure F-17). The principal difference between the developments is that the hydraulic capacity of Basin Mills turbines (20,000 cfs) is higher than the combined capacity of Veazie turbines (13,252 cfs). Spillage would occur less frequently at Basin Mills, and more smolts would pass through the turbines without diversion facilities. BHE estimated that turbine mortality at Basin Mills would be 5 percent. Assuming 70 percent diversion from turbines resulting from downstream passage facilities, mean annual mortality of downstream migrating smolts would be 1.4 percent (Ritzi 1992). FWS used this downstream mortality figure in its population modeling, (see our discussion in Section 4.3 FWS 1989).

Interior and NMFS require angled bar racks or louvers at the powerhouse, and appropriate gated surface and bottom bypasses in their Section 18 prescriptions.

As we discussed regarding downstream passage at Veazie, we believe that ongoing studies of current downstream diversion devices suggest that diversion efficiency may not be as high as both BHE and the fisheries agencies expect. Although we agree that the proposed passage structures represent the state-of-the-art and are appropriate for the Basin Mills development, mean annual mortality may be greater than the 1.4 percent estimated.

Orono. BHE proposes to decommission the Orono development and divert all Stillwater River flow over the Orono dam, thus eliminating all current downstream smolt mortality. Smolt radio-tracking studies show that 30 to 40 percent of smolts originating above the Milford dam pass downstream through the Stillwater River (see the Stillwater development discussion, below). Assuming that spillage occurs at Orono during 50 percent of the smolt migration period, and that turbine mortality at the existing development would be about 10 percent,[25] BHE estimates that, under existing conditions, the Orono development could result in 1.7 percent mortality of passing smolts (Ritzi 1992). No alternative estimates of mortality downstream of the Orono development are available because neither FWS nor BHE incorporated upstream or downstream passage impacts of the Stillwater and Orono developments on the Stillwater River (FWS 1989) in population modeling to evaluate the potential success of salmon restoration.

If Orono is not decommissioned, Interior and NMFS require 1-inch trashracks and gated surface and bottom bypasses at the powerhouse.

We conclude that decommissioning Orono would reduce the loss of downstream migrating smolts by about 1.7 percent of the fish that would pass Orono. Using rough estimates of potential smolt production upstream of Milford dam, and assuming that 30 percent pass down the Stillwater River, the elimination of 1.7 percent mortality would

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[25] Older turbines, such as those at Orono, typically cause higher turbine passage mortality than newer, more efficient units.

represent production of fewer than 500 additional smolts. See Section 4.3 for our discussion of the significance of those additional smolts for potential success of Penobscot River salmon restoration.

Stillwater. BHE proposes to install downstream passage facilities at the Stillwater development in a staged approach. As Stage 1, BHE has already installed a new flume, which began operation in May 1993. The flume consists of a 3-foot-wide collection weir adjacent to the trashrack that terminates in a square flume running along the east side of the powerhouse. A flow of approximately 30 cfs (2 percent of the turbine capacity) is directed into the flume, which discharges downstream migrants into the tailrace. BHE installed incandescent lighting at the weir box to attract migrants and monitored downstream migration through this facility during the 1993 run.

In Stage 2, BHE proposes to modify the existing collection weir at the beginning of the flume to serve as both the starting point to carry downstream migrants to the tailrace and the exit/trap of the upstream steeppass Denil. The implementation schedule for this phase of downstream passage depends on the schedule for constructing the upstream steeppass Denil. Studies to determine the effectiveness and efficiency of constructed facilities would be completed within 3 years of the initial operation of the fishway.

In Stage 3, state and federal fisheries agencies would use the results of Stage 2 studies to determine if the downstream passage facility must be modified to achieve the recommended efficiency at the project. Modifications that may be appropriate as a result of these studies include designing and installing strobe lights or noise generators to repel fish from the powerhouse intake. Again, the modified downstream passage facilities would be monitored for effectiveness and efficiency if warranted (as determined by the state and federal fisheries agencies). Depending on the results of these studies, this stage would be completed within 2 years of installation. This stage would be repeated by modifying and restudying the installed passage facilities until the system meets site passage requirements (as defined by the state and federal fisheries agencies).

In Stage 4, BHE proposes to prepare a comprehensive report summarizing the entire downstream study process and describing the results, along with fishway operation and maintenance plans. Fishery agencies would review this report, and it would require Commission approval.

The DMR and the ASRSC support BHE's proposals to install downstream fish passage facilities at the Stillwater development as indicated in the MDEP's WQC. Interior, PIN, and NMFS commented on the downstream fish passage plan proposed by BHE. Interior's Section 18 fishway prescription requires reducing the trashrack spacing to 1 inch to minimize entrainment of downstream migrants. Interior also stated that approach velocities in front of the trashrack should not exceed 2 fps. Interior indicates that additional entrances to the downstream fishway may be required if the entrance proposed by BHE does not collect fish adequately from the front of the powerhouse. PIN and NMFS concurred with Interior's recommendations and prescriptions.

In response to the agencies' comments, BHE replaced two of the four sections of trashracks with 1-inch, clear-spacing racks and agreed to replace the remaining two sections with 1-inch spacing. Approach velocities at all turbine intakes are below the 2 fps Interior criterion; therefore, BHE believes that its proposed downstream passage facilities would meet all stated agency recommendations and that the proposed four-stage passage plan, with its provisions for study and modifications (if included) would ensure adequate downstream passage at the Stillwater Project.

Radiotelemetry studies of Atlantic salmon (hatchery) smolt and kelt migration conducted by BHE in cooperation with the ASRSC documented that approximately 30 to 40 percent of the smolts and kelts released above Milford dam migrated down the Stillwater Branch (Hall and Shepard 1990; Shepard 1991b); this figure roughly approximates the allocation of flow between the Penobscot main stem and the Stillwater Branch at the time of study. Neither BHE nor the fisheries agencies estimated potential mortality of downstream migrating smolts at Stillwater. Because the Stillwater development has 10 percent less hydraulic capacity than the Orono development, and river flows past both developments are the same, we estimate that downstream mortality would be 10 percent lower than at Orono (i.e., 1.6 percent).

We conclude that installing the proposed downstream passage facilities, followed by monitoring and further enhancements, probably would significantly reduce downstream mortality at Stillwater to less than 1.6 percent; however, we cannot estimate the amount of reduction.

Milford. BHE proposes to add a 4-foot-wide surface weir to the downstream end of the existing 4-inch clear-space, outer trashrack with a 54-inch-diameter transport pipe discharging to an unused turbine pit and then to the tailrace (Figure F-20). A 4-foot surface weir also would be added to the outer end of the existing 3.5-inch-spaced, inner trashrack. This weir would discharge into the same unused turbine pit as the outer trashrack transport flume. In addition, BHE proposes to install strobe lights on the inner trashrack to move downstream migrants to the surface weir.

FWS estimated that downstream mortality at Milford under existing conditions is 1.02 percent, and that mortality with state-of-the-art passage facilities would be 0.63 percent (FWS 1989). We conclude, therefore, that BHE's proposed downstream passage facilities, when monitored and modified based on monitoring results, would significantly reduce downstream passage mortality of salmon smolts at the Milford Project.

Interior requires 1-inch clear spacing on the outer trashracks for the upper 12 feet of the rack, twin 4-foot wide weirs at the outer trashrack, and a gated bottom intake to the bypass facilities for American eels. MDEP's WQC requires no additional modifications, but does require studies of fishway effectiveness.

BHE (1993c) requested permission to study the effectiveness of the bypass system without the 1-inch trashracks recommended by Interior. BHE also noted that the one-weir system has the capacity to pass the specified 140 cfs at normal headwater elevation.

We concur that studying the effectiveness of the bypass system with strobe lights for 3 years prior to installing the 1-inch trash racks is reasonable, given the limited effectiveness of 1-inch trashracks demonstrated in studies at other projects. The fisheries agencies considered the proposed use of strobe lights to direct downstream migrants to the bypass weirs to be experimental but concluded that BHE could use lights to supplement the 1-inch trashrack. The studies of the effectiveness of strobe lights for repelling smolts at Weldon Dam that BHE referred to are not considered conclusive because the sampling effort was limited. If studies at Milford demonstrate that effective passage is not attained with existing trashracks and strobe lights, 1-inch trashracks could be installed at a later date.

The MDEP WQC includes a condition requiring BHE to study possible measures to compensate for unavoidable losses of Atlantic salmon due to fishway inefficiencies, and BHE agreed to consult with resource agencies regarding appropriate compensation measures (BHE 1988). ASRSC does not consider stocking to be acceptable compensation for lost spawning and nursery habitat in the Penobscot River but feels that stocking may be appropriate to mitigate fishway passage losses (BEP 1993). Other measures might include creating or restoring nursery habitat elsewhere in the river basin.

BHE does not propose to perform the studies required by the WQC to identify potential compensation for smolt losses due to passage inefficiencies. Feasible compensatory measures, such as smolt stocking or nursery habitat creation or rehabilitation, however, could further reduce the contribution of the Milford development to total basinwide cumulative loss of downstream migrant smolts. We conclude, therefore, that such a study and implementation of compensation measures identified in the study would benefit Penobscot River salmon restoration efforts and is warranted.

American Shad

Veazie. Construction of the Plant C tailrace and flow modifications would alter shad habitat below Veazie, similar to effects on salmon habitat. Because only 1.5 percent of potential shad production habitat is located between Veazie and Bangor dam, and the potential habitat modifications would be restricted to the immediate vicinity of the Veazie dam, we conclude that American shad would not be adversely affected by habitat modification. We also conclude that the flow alterations discussed in detail regarding salmon would increase the habitat suitability of the area in the immediate vicinity of the dam under all potential operating scenarios other than existing conditions (OS-1; Figure F-22), which represents a very small enhancement for shad.

The design capacity of the proposed fish lift at Veazie is 1 million shad, and handling/trucking facilities are designed to handle up to 30,000 shad. BHE proposes to truck all shad taken during the 3-year construction period for the Basin Mills development for release upstream of Milford dam. Trucking after that time would be at the discretion of DMR.

Fish lifts are used as passage facilities in two of the major shad restoration programs along the East Coast, on the Susquehanna and Connecticut rivers. Lifts have proven effective and may provide higher passage efficiency than other types of facilities; expected efficiency approaches 80 percent (Mathur 1993).

The design capacity of 1 million shad would appear to be more than adequate, given the low current abundance of shad below Veazie and the expected population growth rate under DMR's passive restoration plan. The proposed facilities would comply with Interior's and NMFS' Section 18 prescriptions for Plant C.

BHE's proposal to truck up to 30,000 shad taken at Veazie to upstream of Milford would eliminate the potential loss of 50 percent or more of upstream migrants due to failure to pass existing facilities (assuming an 80 percent passage efficiency at each facility). We conclude that BHE's proposed fish lift, with associated handling and trucking facilities, represents a significant enhancement of existing passage capability for American shad in the lower Penobscot River. See Section 4.3 for our discussion of the consequence of this enhancement for shad population growth.

Although downstream passage diversion devices are effective for salmon smolts are generally believed to be similarly effective for downstream migrating juvenile shad, confirmation studies on the Penobscot River have not been possible because of the absence of juvenile shad. Recent studies suggesting that turbine mortality rates for juvenile shad may be as low as 5 percent (Mathur 1993), together with the installation of state-of-the-art downstream passage facilities at Veazie, lead us to conclude that DMR's downstream passage goal for American shad (10 percent mortality) would be met at this development. Studies of passage efficiency, however, should be conducted when juvenile shad are sufficiently abundant in the Penobscot River to provide meaningful test results. Based on population modeling, such abundances are unlikely for many years and perhaps for the term of the license under the planned passive restoration effort.

Basin Mills. Because no American shad presently ascend the Penobscot River above Veazie, construction of the Basin Mills development would not affect the existing shad stock. Only 5.7 percent of potential production habitat is located in the Basin Mills area. EPA (letter from D. Turin, EPA Region 1, March 26, 1993) and Interior (letter from W. Patterson,

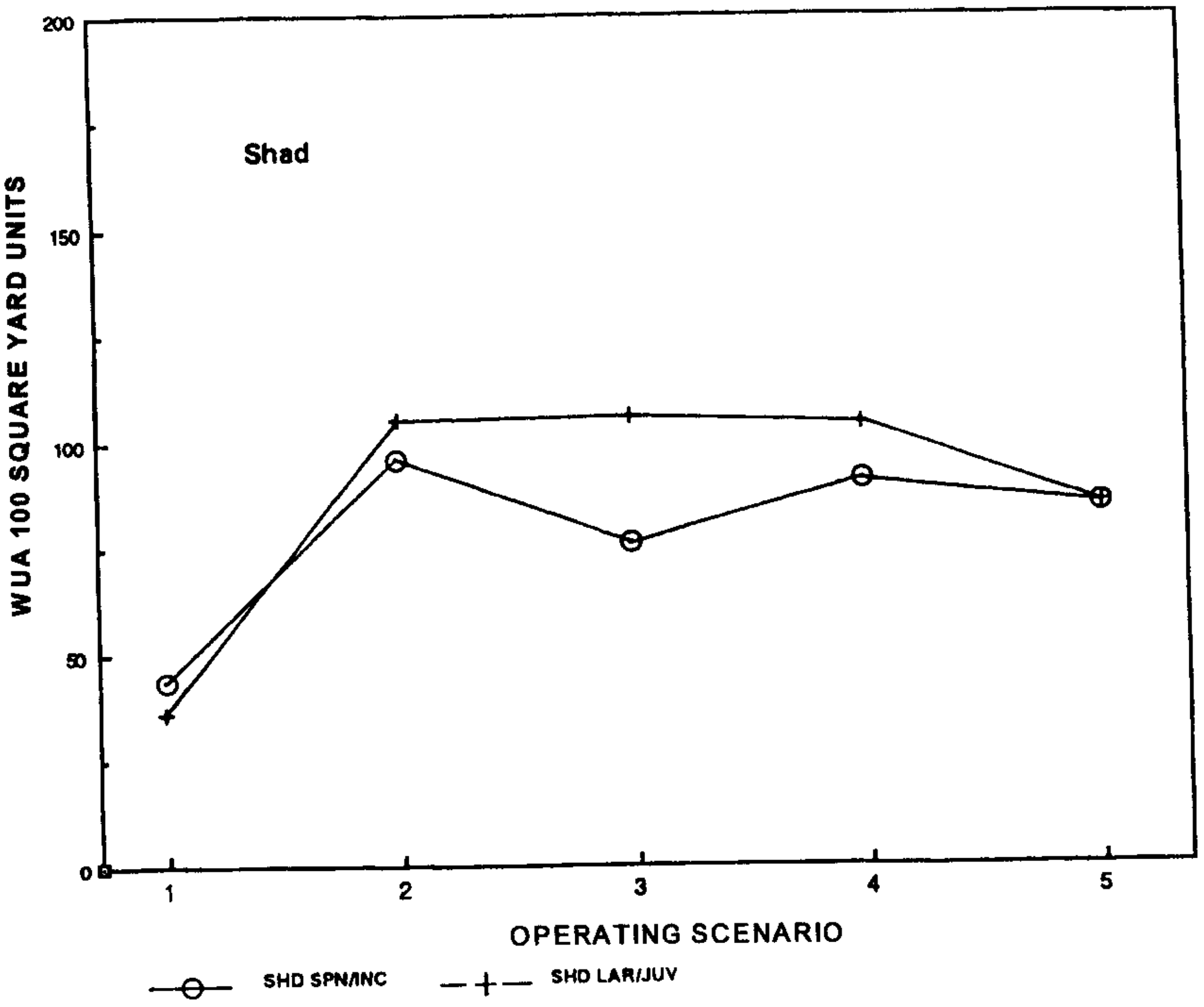


Figure F-22. Predicted weighted usable area for American shad spawning and early life stages in the Veazie tailrace under various operating scenarios (SPN/INC = spawning/incubation; LAR/JUV =larval/juvenile; Source: BHE 1992f).

DOI, March 24, 1993) stated that although most spawning habitat is upstream of Milford, the Basin Mills development would significantly reduce the little spawning habitat remaining downstream of Milford and the possibility of successful shad restoration. American shad use large mainstem waters as spawning areas; therefore, we contend that some usable spawning area could continue to exist at the head of the Basin Mills impoundment and below Basin Mills dam at the head of the Veazie impoundment after construction of Basin Mills. Because an estimated 5.7 percent of potential shad spawning habitat is between the Milford and Veazie dams, we conclude that the construction of Basin Mills would affect less than 5 percent of potential shad production habitat in the basin and would have little effect on the potential success of future shad restoration.

Placing Basin Mills dam between Veazie and Great Works would create an additional barrier to upstream and downstream migration for shad moving between those facilities. Vertical slot fishways, as proposed for the powerhouse, are generally believed to pass American shad more readily than standard Denil or steeppass Denil fishways (Bell 1986). BHE's design capacity for the facility is 1 million shad, the same as for the proposed Veazie Plant C fish lift. Given the projected rate of population growth for the Penobscot River shad stock, and BHE's proposal to truck up to 30,000 shad upstream from Veazie, we conclude that the proposed design capacity for the Basin Mills fishway is adequate for the term of the project license.

BHE proposes a steeppass Denil fishway for the gated spillway at Basin Mills. The annual shad spawning migration is earlier than the salmon migration; most shad move upstream during May. Flows during that month are generally higher than the 20,000 cfs hydraulic capacity of the Basin Mills turbines (Figure F-1), resulting in substantial flow over the gated spillway for most of the migration period. Those spills probably attract upstream migrant shad to the vicinity of BHE's proposed steeppass Denil fishway, which is known to be less efficient than other fish passage facilities for passing shad (Bell 1986).

Vertical slot fishways and fish lifts are generally considered to be more consistently efficient than steeppass and standard Denil fishways under a wider range of river flows, for most species (Bell 1986). In addition, vertical slot fishways appear to be somewhat more effective than standard or steeppass Denil fishways for passing shad and river herring (and other potentially migrating species, such as striped bass). Atlantic salmon, however, are robust migrants and efficiently pass through all kinds of facilities, including steeppass Denil fishways. Also, we noted earlier, with Basin Mills development hydraulic capacity of 20,000 cfs, all flow would originate from the powerhouse during virtually the entire salmon migration period (see average river flows presented in Figure F-1). We do not believe that replacing the steeppass Denil with a vertical slot fishway at the gated spillway would significantly enhance upstream passage efficiency for salmon at the Basin Mills development. A vertical slot fishway or fish lift at the Basin Mills gated spillway, however, would provide the highest passage efficiency possible for other anadromous species, such as shad and alewife and, therefore, is desirable. We conclude that replacing the steeppass Denil with a vertical slot or fish lift facility at the gated spillway is warranted. Furthermore, Interior and NMFS require either of these two types of fishways in their Section 18 prescriptions for the Basin Mills spillway.

Although BHE (letter to FERC from John A. Whittaker IV, August 7, 1997) disputes the necessity of a vertical slot or fish lift fishway at the spillway, the citations that they provide do not document the desirability of a steeppass Denil for clupeid passage. Rather, they merely demonstrate that steeppasses have been used in some cases. We, therefore, have not modified our conclusion that replacing BHE's proposed steeppass with either a vertical slot fishway or fish lift is warranted.

BHE's proposed downstream passage facilities at Basin Mills are identical to those proposed for Veazie Plant C. Our conclusions are the same as for Veazie: the proposed facilities probably would be adequate for passage of juvenile shad, but efficiency studies should be conducted when sufficient juvenile shad become available.

See Section 4.3 for our discussion of the effects of new incremental increases in upstream and downstream mortality on the basinwide shad stock caused by constructing of the Basin Mills development.

Orono. BHE proposes to decommission Orono and divert all Stillwater River flow over Orono dam. Because the Basin Mills impoundment would back up to the base of Orono dam, no significant shad production habitat would be created in the Orono bypass, given the water depths expected. No potential production habitat for shad was documented in the vicinity of the existing Orono tailrace; therefore, none would be lost. We conclude that decommissioning the Orono development would have no affect on shad production habitat.

Diverting all Stillwater River flow from passing through turbines to spilling over the Orono dam eliminates the potential for downstream passage mortality of juvenile American shad, which may migrate downstream via the Stillwater River in the future. Although no shad are currently produced upstream of Orono, 90 percent of the potential production area is upstream of Milford. Radio-tracking studies of salmon smolts and kelts suggest that 30 percent of fish originating upstream of Milford pass downstream along the Stillwater River. It is reasonable to assume a similar distribution of migrating alosids, including shad; therefore, we conclude that decommissioning the Orono development could benefit a future American shad population, when juvenile production begins to occur upstream of Milford.

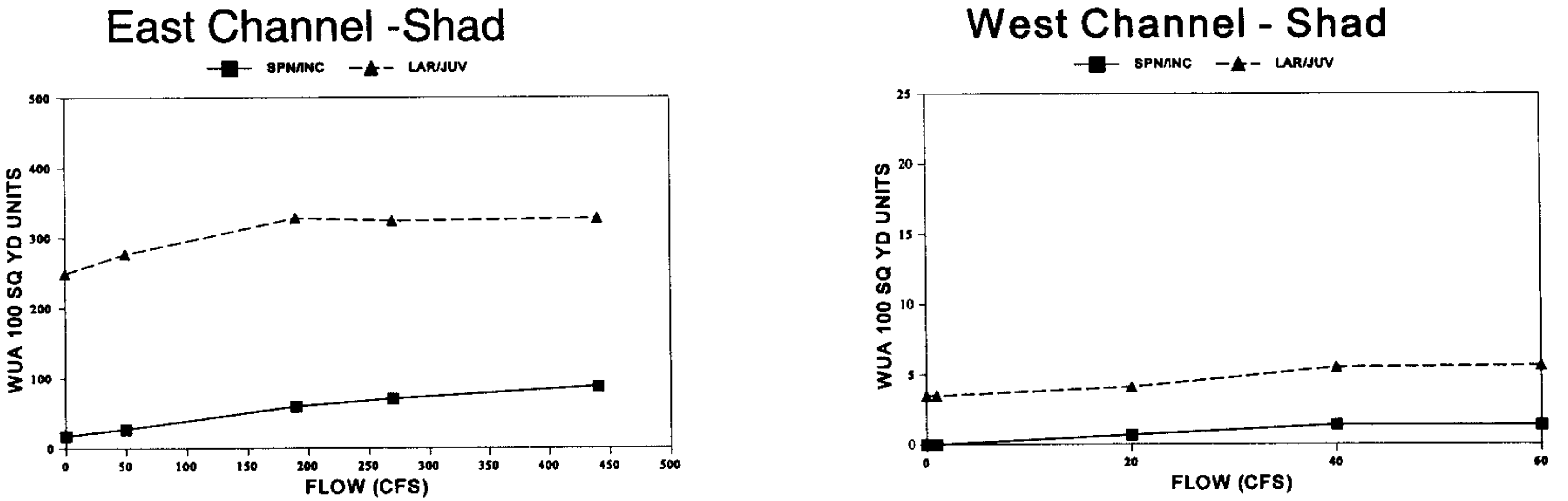
BHE proposes no upstream passage at Orono dam, contending that adequate passage for all anadromous fish is provided on the mainstem Penobscot River at the Great Works and Milford dams. Some upstream migrating salmon appear to be attracted to the Orono bypass reach, and such attraction would probably increase with continuous flow over the dam. To the extent that migrants are attracted and delayed at that point, reproductive success may be adversely affected. We believe that shad also would be attracted to the Orono bypass;

however, no shad presently occur upstream of Veazie, and projections of population growth suggest that no significant number of upstream migrating American shad would be present below Orono dam for many years. We conclude that although the lack of fish passage facilities at Orono would have no immediate effect, it could impede future growth of a shad stock undergoing restoration and therefore would recommend upstream fish passage be provided at Orono under any alternative beyond decommissioning and removal of Orono dam. Interior and NMFS require either vertical slot fishway, standard Denil, or a fish lift at the Orono dam. Considering our projection of slow shad population growth under the present passive restoration scenario, we conclude that a Denil fishway would be adequate as a first stage, followed by a vertical slot fishway or a fish lift if future runs exceed 20,000 shad.

Stillwater. Figure F-23 presents the results of shad habitat evaluations conducted in the east and west channels of the Stillwater bypass. No rapid, significant improvement in habitat occurs over the range of flows tested, and the total amount of WUA is relatively small for both spawning adults and larvae, even under the highest flow level. American shad do not use habitat in the vicinity of the Stillwater development, and DMR has not characterized the Stillwater area as providing significant potential shad production in shad management plan. Other species would benefit from the intermediate 70 cfs flow, and the additional gain for American shad at higher flows is limited. We conclude, therefore, that a total minimum flow of 70 cfs would provide adequate enhancement for American shad and would not impede restoration of shad in the Penobscot River.

The steeppass Denil proposed as the first stage of Stillwater passage for salmon would not be adequate for shad. Steeppass Denil facilities have relatively poor passage performance for large numbers of anadromous alosids (letter from W. Patterson, DOI, March 24, 1993). BHE proposes to evaluate the adequacy of the steeppass Denil after 3 years of monitoring to determine whether additional passage modifications are necessary. Because of the projected slow growth of American shad stocks under passive restoration, the need for passage of American shad at the Stillwater development could not be defined in 3 years. We conclude, therefore, that BHE's proposal would not be adequate to meet passage needs for future American shad restoration.

Interior's and NMFS' Section 18 prescriptions include either a vertical slot fishway, standard Denil, or a fish lift at both the powerhouse and the spillway. BHE (letter to FERC from John A. Whittaker IV, August 7, 1997) maintains its position that a steeppass Denil would be adequate, but as discussed for the Basin Mills development, the citations it provides in its comments responding to the Section 18 prescriptions do not demonstrate the desirability of steeppasses for clupeids passage, but merely that they are used for clupeids in some cases. We, therefore, have not changed our conclusion that a steeppass Denil would be inadequate for the Stillwater project and we consider the Section 18 prescriptions warranted for shad and alewife restoration.


East Channel -Shad

West Channel - Shad

Figure F-23. Total weighted usable area (WUA) in the Stillwater bypass for American shad life stages (SPN/INC = spawning/incubation; LAR/JUV = larval/juvenile; Source: BHE 1991b).

Milford. We concur that a phased construction and expansion of Milford fishways, as we described for upstream salmon passage, would account for the passage needs of future American shad populations. However, BHE's proposal would not comply with Interior's Section 18 prescription. Interior's Section 18 prescriptions require BHE to make modifications to the existing powerhouse Denil, install a new Denil fishway on the west end of the spillway, and replace both of these fishways with either vertical slot fishways or fish lifts when shad numbers exceed 20,000 annually. While BHE disputes Interior's objection to steeppass Denils and Interior's capacity calculations for standard Denils, we believe that Interior's positions on these issues are warranted. While steeppasses have been used in some cases to pass clupeids, and sometimes in numbers marginally greater than the 20,000 figure used by Interior, the literature does not strongly support BHE's objections. Thus, we concur with Interior's prescription.

Alewife

Veazie. Because all identified primary production habitat is in tributary ponds and streams, BHE's proposal for Veazie would not affect flow or habitat for alewife.

Alewife can pass through the existing Veazie fishway, as evidenced by their appearance above the Milford development. BHE's proposed upstream passage facilities for Veazie would improve alewife passage efficiency. The proposed fish lift, described in detail in our discussion of salmon upstream passage, would have a passage design capacity of 38 million alewife. Because alewife is considered to have passage capability between that of salmon and shad and to be passed readily in fish lifts (Ritzi 1992), we conclude that the Veazie fish lift, as proposed, would be a significant enhancement of alewife passage capability at the Veazie dam.[26] We consider the planned alewife passage capacity to be adequate given the potential growth rate of the Penobscot River alewife population under current restoration plans.

BHE proposes to truck alewife from Veazie during the 3-year construction period for Basin Mills and subsequently to truck up to 150,000 alewife per year to support DMR's alewife restoration program. BHE does not propose trucking as a permanent passage alternative, most likely because of the logistical difficulties associated with handling such larger numbers of fish. In Section 3.5.2, we note that DMR identified Phase I alewife waters, which would be targeted for immediate restoration, and Phase II waters, which are being studied to determine whether restoration is warranted. In most alewife restoration programs, gravid adults are stocked into lakes and ponds where restored runs are desired, and we presume that DMR would direct such releases into Phase I waters on the Penobscot River.

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[26] No passage efficiency studies of the kind conducted for Atlantic salmon and American shad (i.e., radio-tracking studies) have been conducted for alewife anywhere in its geographical range, and none appear in existing literature. This undoubtedly results from the relative abundance of the species and its well-established facility for actively passing upstream over any type of passage facility.

Interior (letter from W. Patterson, DOI, March 24, 1993) stated that no feasible trucking program could handle the number of river herring arriving at Veazie without excessive losses or delays. BHE's transport assumptions are: a capacity of 1,000 alewife per truck, using 6 trucks per day over a 30-day migration period. Single-tank transport of as many as 1,000 fish might stress the transported fish. Given that the transport is likely to be short, and double tanks would allow numbers to be reduced to as low as 500 fish per tank, however, we conclude that BHE's proposed transport of up to 150,000 fish per year is feasible.

As discussed for downstream passage requirements for American shad, turbine mortalities for both species may be as low as 5 percent (Mathur 1993), and with the high diversion efficiency of state-of-the-art downstream passage facilities, DMR's total downstream mortality goal of 10 percent may be attained. We conclude that BHE's proposed passage facilities represent state-of-the art technology, would minimize downstream passage mortality of alewife at Veazie, and are consistent with Interior's and NMFS' Section 18 prescriptions.

Basin Mills. Because all potential alewife production habitat consists of lakes and ponds on tributaries of the Penobscot River, habitat modifications associated with creating Basin Mills dam and impoundment would not affect potential alewife production in the Penobscot River.

BHE proposes to install a vertical slot fishway designed to pass 3.8 million alewife at the Basin Mills powerhouse. This capacity is consistent with design capacity at Veazie and with a feasible restored stock size. Standard Denil fishways are the most commonly used passage structures for restoring alewife to small streams and rivers throughout New England, but a vertical slot fishway may provide slightly better passage efficiency, particularly under fluctuating flows. We conclude that BHE's proposed vertical slot fishway would provide efficient upstream passage for alewife at the Basin Mills powerhouse.

BHE proposes a steeppass Denil fishway for the gated spillway area. Alewife migrate somewhat earlier than American shad and would most likely be present in the project area during late April and May. During that time, river flow generally exceeds the 20,000 cfs hydraulic capacity of Basin Mills turbines, and water spills continuously at the gated spillway. This spill is likely to attract alewife to the spillway area. Steeppass Denil fishways are less efficient than other types of passage facilities for passing large numbers of migrating alewife and shad (Bell 1986). We conclude, therefore, that BHE's proposed steeppass Denil facility at the gated spillway may not provide maximum upstream passage efficiency for alewife. Interior's and NMFS' Section 18 prescriptions, discussed in the salmon and shad sections, would adequately provide alewife passage and therefore are warranted.

Downstream passage facilities at Basin Mills are the same as proposed for Veazie. As in the case of Veazie, we conclude that BHE's proposed passage facilities represent state-of-the-art technology and would minimize downstream passage mortality at this development.

Orono. Because all alewife production habitat in the basin exists in lakes and ponds on tributaries, habitat modifications associated with decommissioning Orono and diverting flow would not affect potential alewife production in the Penobscot River.

Diverting all Stillwater River flow over Orono dam after decommissioning would eliminate the Orono development as a source of mortality for any juvenile alewife moving downstream through Stillwater River. We conclude that diverting flow would reduce downstream passage mortality of juvenile shad produced upstream of the development.

BHE proposes no upstream passage facilities at Orono dam. Although DMR has identified no alewife production in the Stillwater River upstream of Orono dam, Pushaw Lake (accessible via Pushaw Stream), which enters the Stillwater River above Gilman Falls dam (Figure 3-9), represents a major potential alewife production area (potential production of 1.2 million fish). Alewife have been observed in Pushaw Lake, despite the circuitous passage route required to reach that water body (i.e., over Milford dam, westward movement and dropdown Stillwater River to Gilman Falls; Figure 2-3). Anadromous fish identify their natal waters by olfaction and home to waters originating from their natal areas. Most Pushaw Stream discharge probably passes down the Stillwater River and over Orono dam; consequently, alewife originating from Pushaw Lake probably would be attracted to the Orono bypass if all river flow is diverted over the Orono dam. Unlike American shad or salmon for which the Orono bypass represents an alternative migration route, the bypass may represent a primary migration route for both an existing, small alewife population from Pushaw Lake and for a potentially large future population. For this reason, we conclude that BHE's proposal not to install passage at Orono could hinder increases in the alewife population and reduce the potential for further alewife restoration in the Penobscot River and therefore would recommend upstream fish passage be provided at Orono under any alternative beyond decommissioning and removal of Orono dam. Interior's and NMFS' prescriptions under Section 18, as we discussed in the salmon and shad sections, would adequately provide for alewife passage.

BHE noted public opposition to full restoration of alewife in Pushaw Lake and suggested that enhancing restoration may not be desirable (Ritzi 1992). Fisheries management agencies must resolve the issue, and such objections do not preclude us from making fish passage recommendations that would assist those agencies in attaining fisheries management goals.

Stillwater. Considering the cost of flow and the potential benefits for all species, we concluded that a total bypass flow of 70 cfs would be appropriate at the Stillwater development. DMR does not consider the Stillwater River to offer significant alewife production potential or to constitute critical alewife habitat; therefore, we consider the proposed 70 cfs bypass flows adequate for alewife at this project.

With regard to downstream passage, we believe that post-spawning and juvenile alewife from upstream of Milford would move past the Stillwater development in a proportion similar to that of salmon (i.e., 30 to 40 percent). The number of alewife that might use the

Stillwater impoundment as a spawning and nursery area is not known, but some reproduction may occur in the impoundment if spawners drop downstream via Gilman Falls dam before reaching production areas farther upstream. Juveniles resulting from such reproduction would pass downstream past the Stillwater development; however, production habitat in riverine impoundments is considered to be of lesser quality than that in lakes and ponds (BHE 1991b), and DMR does not identify the Stillwater River as a potential alewife production area. The Stillwater River is probably the primary downstream migration route for juvenile alewife produced in Pushaw Lake.

We contend that the effectiveness of BHE's proposed downstream passage facilities for alewife would be the same as that for shad, discussed above. We conclude, therefore, that the proposed facilities would probably result in attainment of the DMR's goal of 10 percent maximum mortality.

BHE proposes phased construction of upstream passage facilities at Stillwater based on the absence of passage at Orono. Although we conclude that studies of the need for passage at Orono and phased construction of facilities there would be appropriate for salmon and shad, construction of passage at Orono to assist upstream migration of alewife is needed immediately. We believe that upstream passage for alewife at Stillwater is also required now. A steeppass Denil facility, which BHE proposes as the first phase of upstream passage, may not be the most effective device for passing significant numbers of alewife. We conclude that although phased construction of upstream passage facilities at Stillwater coordinated with phased construction at Orono is appropriate, steeppass Denil is not the appropriate facility for the first phase of construction. Interior's and NMFS' prescriptions under Section 18, as we discussed in the salmon and shad sections, would adequately provide for alewife passage, because they require a vertical slot, standard Denil, or a fish lift at both the powerhouse and the spillway.

Milford. Because proposed flows at the Milford development would not affect alewife production waters, we conclude that this project would not affect alewife by altering habitat or flows.

We believe that the proposed downstream passage facilities at Milford represent state-of-the-art passage technology and, as discussed for the other developments, probably would result in attainment of DMR's goal of 10 percent downstream passage mortality for alewife.

Although BHE's proposed upstream passage facilities appear to meet requirements for salmon, some question remains regarding whether the existing steeppass Denil at the spillway is adequate to provide efficient passage for alewife that currently pass the Milford development. We conclude that lack of immediate improvement of spillway passage may be adversely affecting upstream passage of alewife at this project. Interior's prescription under Section 18, as we discussed in the salmon and shad sections, would adequately provide passage for alewife because it includes a more appropriate facility for clupeids (vertical slot, standard Denil, or fish lift) and has provisions for capacity expansion if and when the alewife run reaches 200,000 annually.

Resident Fisheries

Veazie. With the Applicant's Proposal, flow would be modified in the 1,000-foot reach immediately below Veazie, and a small amount of habitat would be modified along the east shoreline, including the creation of a substantial, deep-water tailrace.

The Habitat Evaluation Procedures (HEP) analysis discussed regarding Atlantic salmon was performed in the areas immediately downstream of Veazie dam. According to that analysis, the only effects on smallmouth bass would be beneficial; potential effects were not assessed quantitatively. Another HEP analysis conducted below Veazie dam during 1991 to determine the potential affect of the proposed Plant C on fish habitat and fishing opportunity indicated that Plant C would increase the WUA for all life stages of smallmouth bass (Figure F-24).

The proposed Plant C would eliminate a portion of the tailrace area on the east side of the river, where the new plant would be built. As shown in Figure F-3, constructing Plant C would eliminate an area of approximately 110 feet by 60 feet, or 6,600 square feet. Most of this area is not usable as fish habitat because it is dominated by exposed bedrock; therefore, the effects of constructing the new facilities would be minor.

Creating a new deep-water tailrace probably would enhance the smallmouth bass population below Veazie. Very high-quality smallmouth bass fisheries exist in the tailraces of every other dam on the lower Penobscot. We conclude, therefore, that the project as proposed would enhance smallmouth bass populations below Veazie. Few data are available about other resident species; however, given the minimal habitat alterations expected from the project, we expect that no other resident species would be affected significantly.

Basin Mills. The proposed Basin Mills dam would form a 3-mile impoundment in previously riverine habitat. Although the effects on Atlantic salmon habitat are well-quantified based on habitat inventories, no such habitat quantification exists for smallmouth bass and other resident species within the project area. Even less is known about the effects of habitat change on nongame species such as sculpin, dace, or the variety of minnow species that inhabit the project area. A net beneficial effect for some species and a net adverse effect for other species can be expected, as is common in any hydropower development project. At the proposed Basin Mills site, species (or life stages of species) that prefer deeper, lower-velocity, riverine habitat would benefit, and species that prefer existing conditions would lose habitat; consequently, a shift in community structure is one probable effect.

Based on habitat preferences (Smith 1985) smallmouth bass, pickerel, white perch, pumpkinseed, redbreast sunfish, and burbot probably would benefit from the change. Habitat

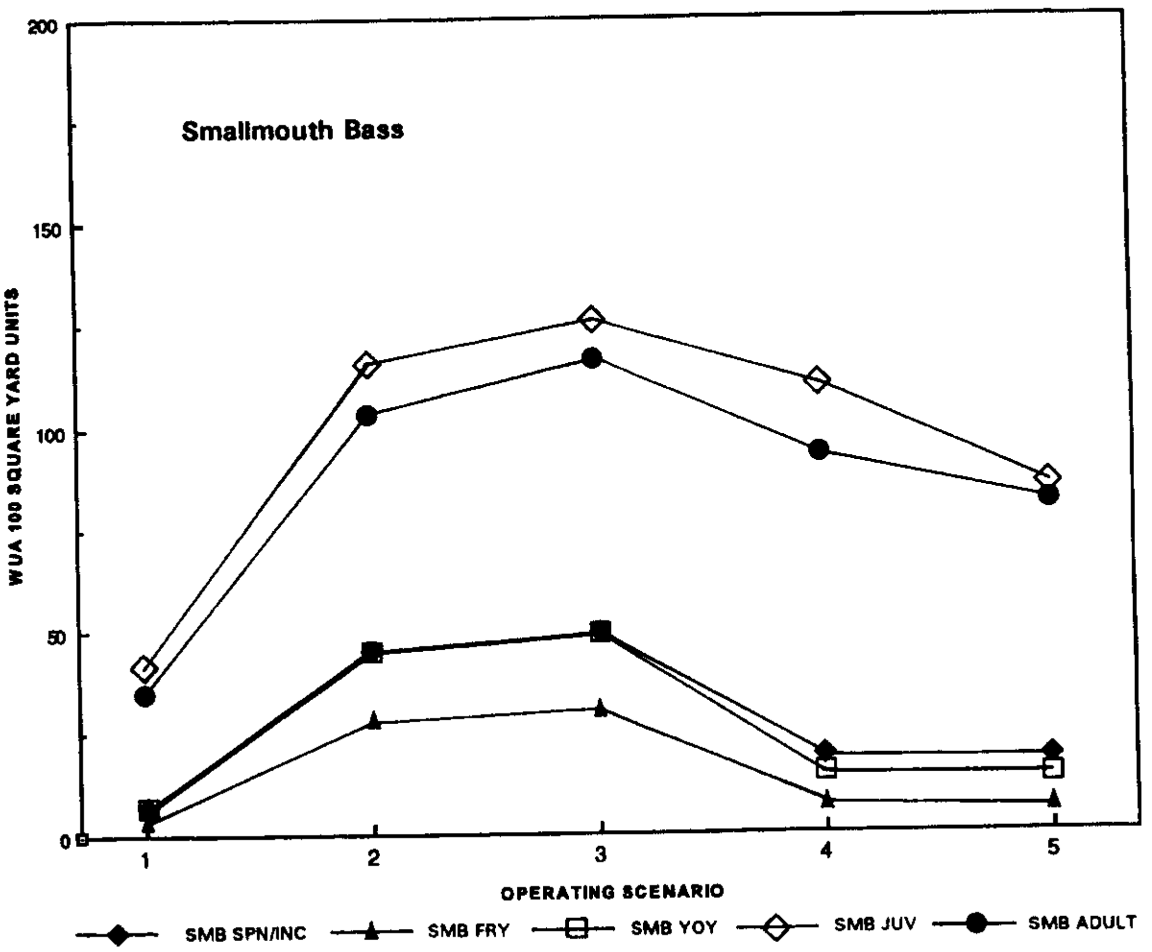

Figure F-24. Predicted weighted usable area for all life stages of smallmouth bass in the Veazie tailrace during various operating scenarios (SPN/INC = spawning/incubation; YOY = young-of-year; JUV = juvenile; Source: BHE 1992f).

preferred by brook trout and blacknose dace would be reduced. Numerous other species are tolerant of such a wide range of habitat that the effects would probably be minimal (Table 3-8). The restoration of flows to the Orono bypass reach would partially mitigate the loss of habitat for riverine species.

The PIN (letter from P. Bisulca, PIN, December 20, 1993) presented data about smallmouth bass growth rates and population size-class composition of fish from within the Veazie impoundment and other sections of the mainstem. The sample population of fish from Veazie impoundment had a lower proportion of fish larger than 11 inches (52 percent versus 75 percent), and older year classes had a lower growth rate (based on back-calculated lengths from scales). The PIN suggested that the lack of indigenous submerged aquatic vegetation, which does not grow well in the deeper waters of the impoundment, could explain the differences.

Submerged vegetation grows better in slower moving sections of the main stem, and according to PIN, these beds of vegetation provide the preferred habitat for larger smallmouth bass. PIN offered this analysis for its potential implications regarding the proposed Basin Mills impoundment, which PIN hypothesizes may have characteristics similar to the Veazie impoundment.

PIN also believes that enhancement of smallmouth populations in the Penobscot River would adversely affect efforts to restore Atlantic salmon. Predation on young salmon by smallmouth is documented in the literature (Warner 1972) and we discuss this potential impact in Section 4.3. Competition between smallmouth and Atlantic salmon for food and space, especially during juvenile life stages, is also likely based on the habitat suitability curves for the two species. Modifications in habitat that favor smallmouth bass may indirectly affect salmon.

BHE conducted a HEP assessment of the effects of the proposed Basin Mills development on smallmouth bass habitat. Available habitat suitability curves indicate that the habitat in the Penobscot River is of poor quality, even though smallmouth bass are abundant in the Penobscot River (BHE 1990h). During the consultation phase of the study design, all parties involved agreed that habitat for smallmouth is good and would probably improve under BHE's proposal. Because valid suitability curves would be needed to quantify the magnitude of any potentially beneficial effects, however, BHE chose to accept the agency's "no impact" opinion and did not assess the effects of habitat modification on smallmouth bass quantitatively.

Given what is known about the resident fisheries resources in the proposed Basin Mills development area, we conclude that the overall effect of Basin Mills dam would be beneficial for smallmouth bass, pickerel, and white perch populations. Preferred habitat for brook trout, blacknose dace, and common shiner would be lost; however, these species are abundant and widely distributed throughout the basin.

Orono. BHE proposes to leave the dam in place but remove the turbines and penstocks so that all flows would be released over the dam. MDEP requested that BHE evaluate the costs and benefits of lowering the Orono impoundment elevation by modifying or removing the dam. The study, conducted in 1991, examined the effects of reducing impoundment elevation on smallmouth bass habitat within the impoundment. Depth and velocity were measured at 13 transects within the impoundment. By comparing these measurements with the accepted suitability curves for all life stages of smallmouth bass, the study indicated that the suitability of the habitat would decrease as elevation decreases due to increased velocity and decreased depth. Comparing the different elevation scenarios (range: 72.4 feet to full breach) quantitatively is difficult because BHE did not calculate WUA.

BHE conducted an instream flow study of the Orono bypass reach (BHE 1991a). The objectives were to quantify the amount of habitat for various life stages of Atlantic salmon, smallmouth bass, and American shad at flows ranging from leakage (approximately 10 cfs) to 346 cfs. We discussed results for the two anadromous species in the previous section. Smallmouth bass habitat increased for young-of-year fish up to 86 cfs, then stabilized before declining at flows greater than 258 cfs. Habitat for juvenile and adult smallmouth bass increased steadily up to 258 cfs and declined at higher flows. Larger flows to the bypass reach clearly would benefit smallmouth bass of all life stages, up to 258 cfs. See Table 3-8 for species that also probably would benefit from larger flows in the bypass reach based on their habitat preferences, although the study considered only the three species mentioned above. We conclude that decommissioning Orono and leaving the impoundment in place would protect existing fisheries resources and enhance habitat below Orono dam.

Stillwater. The IFIM study conducted by BHE (see discussion under Flow Modification for Atlantic salmon) included an assessment of the habitat improvements expected for smallmouth bass in the east and west channels of the Stillwater bypass at different flow levels. For life stages other than juveniles, increases in WUA are limited at a range of flows beyond those proposed by BHE and included in the WQC. For juveniles, east channel habitat is maximized at about 300 cfs, at a level about 30 percent greater than at 50 cfs (Figure F-25). In the west channel, juvenile habitat is maximized at about 40 cfs, and the number of habitat units is only about 15 percent greater than at 20 cfs (Figure F-25). Based on these IFIM results, the healthy state of the smallmouth bass population in the Penobscot River, and the fact that the flows proposed by BHE appear to be optimal for other species, we conclude that the 70 cfs total bypass flow rates represent an enhancement of existing conditions for smallmouth bass at the Stillwater development, and that larger flows are not needed to further enhance conditions for this species.

There are no other important resident fish species in the Stillwater development area. We believe that flows adequate for protection and enhancement of the anadromous species and smallmouth bass also would be adequate for enhancement of the aquatic ecosystem, including forage fish species.

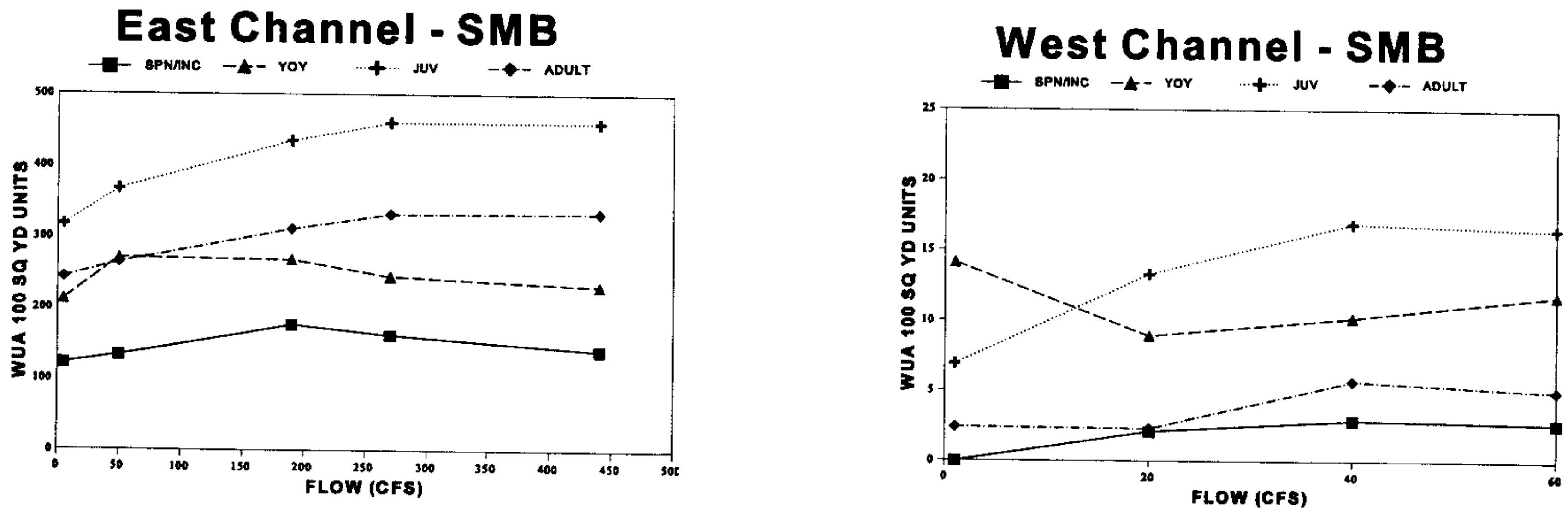

Figure F-25. Total weighted usable area (WUA) in the Stillwater bypass for smallmouth bass life stages (SPN/INC = spawning/incubation; YOY = young-of-year; JUV = juvenile; Source: BHE 1991b).

Milford. BHE conducted an IFIM study to establish suitable minimum flows in an approximately 200-foot-long reach of the river immediately downstream of Gilman Falls dam (see Figure 2-3). Flow in the west channel is uncontrolled. Flow in Channel 3 would be subject to a constant discharge from the Taintor gates; therefore, the study team, which comprised representatives of the state fishery agencies, PIN, and BHE, agreed that there was no need to assess this area. The study team agreed to assess habitat in channels 1 and 2 as one unit (BHE 1990). Habitat was evaluated in these channels under five different flow regimes using releases from temporary gates in the flashboards. The study concluded that a minimum flow of 60 cfs to the two channels would be sufficient to protect this bypassed reach from degradation. Fish evaluated included Atlantic salmon, American shad, and smallmouth bass. From our evaluation of the data and observations during the staff site visit, we conclude that the proposed flow regimes would be adequate to protect resident fish species in the project area.

III. ALTERNATIVE 3: Applicant's Proposal with Staff Modifications

In this section, we present additional detailed analysis relating to fish handling at the Veazie Plant A fishway. We concluded in our analysis for Alternative 2 that using a fish pump to transport fish trapped at the exit of the existing fishway to handling and sorting facilities at the Plant C fish lift is technically feasible and acceptable.

BHE examined several alternatives to the existing barge transport system in 1984 (BHE 1990, Vol. IV, Ex. E, Sect. 3.1, App. A). All were based on continued fish handling on the west shore. Of the alternatives considered (including trap/hopper lift and sluice to shore, automated elevation and transport of a trap/hopper from the fishway to shore, and a fish pump), the fish pump was deemed to be the most efficient and logistically feasible. No specific designs have been presented for a pumping system that would extend from the existing fishway to Plant C, a distance of about 600 feet. Considering the safety of field personnel, the additional cost of duplicating handling facilities at both ends of the dam, and FWS reports about safety (to fish) and efficiency of fish pumps for handling salmonids, the fish pump appears to be the most appropriate means of handling fish moving up the existing fishway.

Alternatively, trapping could be eliminated at that fishway when the Plant C lift becomes operational, and fish passage could be monitored at the fishway electronically. Given the Plant C operating regime, sufficient numbers of fish to meet agency brood stock needs probably would be taken at the Plant C lift. Eliminating trapping would reduce handling stress and enhance upstream movement; however, such an action would have to be approved by the agencies managing the Penobscot River salmon restoration. Also, releasing fish into the Veazie impoundment during construction of Basin Mills may not be desirable; trapping may be necessary at least during the 3-year period of Basin Mills construction.

IV. ALTERNATIVE 4: Do not construct Basin Mills dam, relicense Veazie with or without increased capacity, refurbish or decommission Orono

Atlantic Salmon

Flow Modification

Veazie. Considering only the effects of modifying flow below Veazie, this alternative is identical to **Alternative 1** without expansion, or to **Alternative 2** with expansion. For the Veazie expansion option, our conclusion is the same as for **Alternative 2**: impacts on salmon resting areas below Veazie would be minimal, and juvenile habitat would be somewhat enhanced. Without expansion, this alternative is the same as No-action Alternative, and flow regimes below the project would not change.

Basin Mills. Under this alternative, the Basin Mills Development would not be constructed, and flow regimes in this portion of the river would not change.

Orono. If Orono were decommissioned under this alternative, all Stillwater River flow would be redirected from the Orono tailrace, over the Orono dam and into the existing Orono bypass reach. Unlike under **Alternative 2**, however, there would be no Basin Mills impoundment, and water depths in the bypass reach would be controlled solely by normal river bed topography. The total length of the Orono bypass is about 1,000 feet before it joins the mainstem Penobscot, and the bypass is about 500 feet wide. Calculating from these dimensions, the absolute maximum increase in nursery habitat possible, assuming that the entire bypass reach would exhibit suitable habitat attributes, would be 555, 100-square yard habitat units. Accounting for expected variations in water depth, velocity, and substrate in the area, we conclude that the actual number of salmon nursery habitat units produced under this alternative probably would be less than half that amount, or about 250.

If Orono were refurbished under this alternative, we would require a minimum flow over Orono dam. Based on IFIM studies conducted by BHE (BHE 1992), weighted usable area (WUA) for most life stages of salmon, smallmouth bass, and shad would increase as flows increase from leakage to between 189 cfs and 258 cfs (Figure F-26). The rate of habitat gain for most species with further increases in flows declines, and, for some life stages, the amount of habitat actually decreases with additional flow. For these reasons, we selected 200 cfs as an appropriate minimum flow to optimize habitat for all fish species in the Orono bypass if the Orono development were to be refurbished and continue to generate electricity. Later discussions with Interior staff at our February 1996 10(j) meeting (see Section 5.2.1.5) lead to our adapting 250 cfs as the minimum flow.

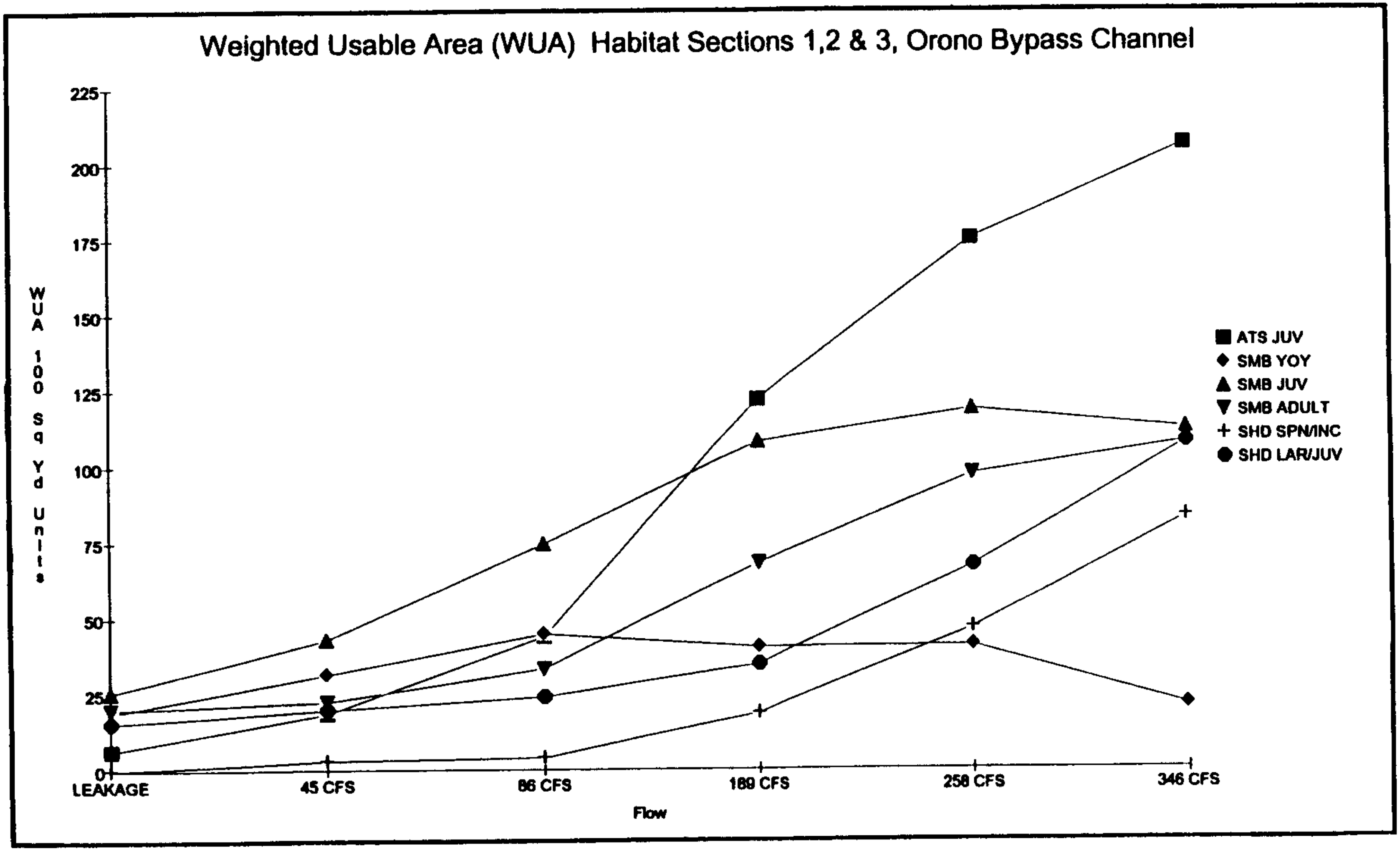

Figure F-26. IFIM Study results for the Orono bypass channel (Source: BHE, AIR response Item 13, January 27, 1992).

Physical Habitat and Water Quality Modification

For this alternative, the development-specific effects of habitat modification would be the same as either **Alternative 1** without Veazie expansion, or **Alternative 2** with Veazie expansion. We describe site-specific effects in our discussions of those two alternatives.

Upstream Migration Blockage

Under this alternative, improved upstream fish passage facilities would be constructed at Veazie, with or without Plant C. As in the case of **Alternative 2**, new passage facilities would be constructed at the east end of the dam. We also include trap-and-truck facilities in this alternative because of the benefit of trucking for potential growth rates of alewife and American shad stocks. We include upstream passage facilities at Orono, primarily to benefit alewife stocks, but also to provide some enhanced upstream passage efficiency for Atlantic salmon and, potentially, American shad.

Veazie. As discussed in detail for **Alternative 2**, a fish lift would be the most appropriate passage facility for the east end of the Veazie spillway. All parties to this licensing process concur with the assumption that the existing Plant A fish ladder results in upstream passage efficiency of 92 percent, with a range of 85 percent to 98 percent. Some study findings suggest that upstream passage may, in fact, be substantially lower (as low as 76 percent). A new fish lift at the east end of the spillway would substantially enhance upstream passage efficiency at Veazie, both by increasing the percentage of upstreammigrants that pass successfully and by reducing upstream passage delay. With Plant C, dam discharges probably could be controlled more effectively to attract fish to the entrance of the fish lift and thus maximize upstream passage.

Interior (letter from W. Patterson, DOI, December 20, 1993) indicated that it would require construction of a spillway fish passage facility at Veazie if the development is relicensed at existing capacity. Addition of a spillway fish lift probably would increase upstream passage efficiency and decrease migration delays at Veazie. Because spillage would be distributed along the length of the dam, in contrast to almost point-source turbine discharges from Plant C, however, we conclude that passage efficiency with this alternative probably would be between efficiency under existing conditions (greater than 75 percent) and that under the Applicant's Proposal (greater than 92 percent).

Trap-and-truck would be of significant value for shad and alewife. We discuss these benefits, in terms of potential population growth, in detail under **Alternative 2**.

Orono. Based on our evaluation of **Alternative 2**, we conclude that fish passage facilities should be installed immediately at the Orono dam. Such facilities would benefit Atlantic salmon and other anadromous species. Phased construction of such facilities is warranted, because no data exist to document the number or proportion of salmon that would use such a facility now, and ultimate passage capacity would be required only when stocks are at fully restored levels. Facility design also must account for passage needs for other species, in particular alewife (we discuss alewife passage needs in detail below).

We evaluate upstream passage at Stillwater and Milford under **Alternative 2**. No additional detailed analysis is required to evaluate this alternative.

Downstream Passage Mortality

Veazie. Downstream passage mortality at Veazie without expansion would be the same as under existing conditions. With Plant C, potential mortalities would be the same as expected for **Alternative 2**. We did not conduct further detailed analysis for this alternative.

Downstream mortality at Orono (if decommissioned), Stillwater, and Milford under this alternative would be the same as under **Alternative 2**, and we did not conduct additional detailed analysis. If Orono were to be refurbished under this alternative, state-of-the-art downstream passage facilities, of the type proposed for Stillwater should be installed to minimized downstream passage mortality. We assume that passage efficiency at a refurbished Orono development with downstream passage facilities would be the same as would occur at Stillwater under Alternative 2. Thus, we estimate that downstream passage mortality of juvenile anadromous fish at a refurbished Orono would be on the order of 0.5 percent, substantially less than our estimate of 1.7 percent under existing conditions.

American Shad, Alewife, and Resident Fisheries

The summary statements in Section 4.3 for this alternative for these species groups are drawn from the development-specific analyses presented in our evaluation of **Alternative 2**; we performed no additional detailed analysis for this alternative.

V. ALTERNATIVE 5: Do not construct Basin Mills dam, decommission and remove Veazie Dam, and refurbish Orono

Atlantic Salmon

Flow Modifications

Veazie. Considering only the effects of flow modification below Veazie, this alternative would cause minimal change in river flows, resting pools, and rods and lies located more than 1,000 to 1,500 feet downstream of Veazie. As described in our analysis of **Alternative 2**, the Veazie project is operated as run-of-river; therefore, the presence or absence of Veazie dam would not alter existing seasonal and daily flow patterns.

The elimination of the dam would, however, dramatically alter the flow distribution across the river in the immediate vicinity of the dam at times when river flows are below the hydraulic capacity of plants A and B, primarily during July and August (Figure F-1). During that time, flow would be distributed across the river according to natural river bed topography and would not originate solely along the east shore, where the existing units discharge. This change in flow probably would permanently eliminate several existing lies (e.g., Figure F-3, lies 1, 2, 14, and 12). Eliminating the Veazie impoundment, however, would create about 3.5 miles of riverine habitat and, thus, new holding and resting areas. These changes would significantly alter the distribution of salmon among resting and holding pools in the lower Penobscot River and locations of successful recreational angling. We conclude that the productivity of existing fishing lies below Veazie would decline significantly, but that new fishing lies would be created upstream of Veazie dam, and productivity of lies located below Great Works dam would increase. We cannot quantify these changes.

Juvenile nursery habitat below Veazie would be enhanced as a result of a lateral redistribution of river flow and a decrease in the high-velocity flows associated with turbine discharge and spillage, as is discussed above for the Applicant's Proposal (we discuss creation of new juvenile habitat by eliminating the Veazie impoundment under Physical Habitat Modification).

Basin Mills. Under this alternative, the Basin Mills development would not be constructed, and flow regimes in this portion of the river would remain as they are currently. There would be no flow modification effects.

Orono. Flow modification effects at Orono under this alternative are the same as under **Alternative 4** with Orono refurbished: a potential increase of about 120 WUA salmon nursery habitat unit, assuming a 200 cfs minimum flow release.

Physical Habitat Modification

Veazie. Under this alternative, the central portion of Veazie dam would be removed. The objective of removing the dam would be to restore the river, as closely as possible, to its natural contours. Under such a scenario, existing physical habitat below Veazie would not be altered; however, eliminating the Veazie impoundment would change about 3.8 miles of a presently impounded river reach into riverine habitat, with consequent decreases in water depths and increases in velocity.

Additional pool, riffle, and run habitat would be created. We assume that the river gradient in the Veazie development area is similar to that in the Basin Mills area. We conclude, therefore, that creating an additional 3.8 miles of riverine habitat could create additional salmon nursery habitat about equivalent to that in the 3.6 miles of river at Basin Mills: about 10,500 smolt production units. Additional resting/holding pools and salmon lies would also be created, but they cannot be quantified without detailed information about river topography beneath the Veazie impoundment.

Basin Mills. Regarding physical habitat modification at the Basin Mills development, this alternative is the same as the No-action Alternative. Existing adult or juvenile salmon habitat in the Basin Mills reach of the lower Penobscot River would not be modified.

The modifications of physical habitat at Orono, Stillwater, and Milford would be the same for this alternative as under **Alternative 2**. No additional detailed analysis was done for this alternative.

Water Quality Modification

Veazie. Removal of Veazie dam would change a 3.8-mile river reach from impounded riverine into pool, riffle, and run riverine habitat. Such an alteration would increase potential aeration of this portion of the river and, thus, increase assimilative capacity. As described in sections 3.4 and 4.2, we found no statistically significant difference in temperature or DO vertically within the existing impoundments or longitudinally through the three lower Penobscot River impoundments. We conclude, therefore, that removing Veazie may increase the potential for enhanced DO but would offer no consistent water-quality benefit for salmon.

In Section 3.4 and in our evaluation of **Alternative 2**, we note that although an impoundment might reduce diurnal temperature variation, data from the lower Penobscot suggest that there would no discernable impoundment effect on water temperature. This finding is most likely explained by the high flushing rates in the lower Penobscot River impoundments. As we concluded for DO, removing Veazie would increase the potential for a more natural riverine temperature regime, but would offer no consistent water-quality benefit for salmon.

The modifications of water quality at Orono, Stillwater and Milford would be the same for this alternative as under **Alternative 2**. We performed no additional detailed analysis for this alternative.

Downstream Passage Mortality

Veazie. Removing the dam would eliminate downstream passage mortality at Veazie. BHE estimated total annual mortality of downstream migrants to be 0.75 percent under existing conditions. Although a small proportion, this loss is significant because Veazie is the most downstream development in the Penobscot River Basin, and all salmon smolts produced throughout the basin pass by it. As discussed in detail in Section 4.3, average annual smolt production in the Penobscot River Basin would be on the order of 290,000 smolts if all nursery habitat were occupied. Although not all of these smolts would survive to reach

Veazie (some are lost at each dam that they pass before reaching Veazie), removing Veazie and eliminating its 0.75 percent mortality rate would be equivalent to increasing annual production by approximately 1,500 smolts. Section 4.3 discusses the significance of this gain in to success of salmon restoration in the Penobscot River.

Removing Veazie dam also would eliminate existing capability for trapping, monitoring, and sampling salmon at this development. Installation of such facilities at the next dam upstream (Great Works) would have to be negotiated with the owner of that facility.

The modifications of downstream mortality at Stillwater and Milford would be the same for this alternative as under **Alternative 2**. At Orono, state-of-the-art downstream passage facilities would be installed when the development is refurbished. As we described for **Alternative 4**, we estimate that mortality of downstream migrating juvenile anadromous fish would decline from about 1.7 percent under existing conditions to about 0.5 percent with Orono refurbished and with new passage facilities. No additional detailed analysis was done for this alternative.

Upstream Migration Blockage

Veazie. Removing Veazie dam would eliminate the greatest barrier to upstream migration in the Penobscot River. Because the entire Atlantic salmon stock must pass Veazie dam, we conclude that removing it would eliminate all loss of salmon because of passage inefficiency at that project. Fisheries agencies and BHE assume an average loss of 8 percent; radio-tracking and tagging studies suggest losses of up to 24 percent. Section 4.3 discusses the benefit to the salmon stock of reducing total adult mortality by 8 percent or more. We describe the existing impacts of Veazie on upstream passage losses in our discussion of **Alternative 2**. We conducted no additional detailed evaluations.

The modifications of upstream migration effects at Stillwater, and Milford would be the same for this alternative as under **Alternative 2**. At Orono, upstream passage would be required immediately, and effect on upstream migration would be as described for **alternatives 3 and 4**. We performed no additional detailed analysis for this alternative.

American Shad

Removing Veazie would eliminate upstream passage loss of between 10 percent and 20 percent, and downstream mortality of about 10 percent. The potential consequence of this alternative for shad population growth can be assessed by considering BHE's model runs that used a high assumed passage efficiency.[27] BHE's model results suggest that a run of

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[27] Expected "good" passage efficiency for American shad is 80 percent. BHE made some model runs assuming 90 percent passage efficiency. A model run with 90 percent efficiency at three dams results in about the same number of fish reaching spawning grounds above Veazie as a model run with 80 percent

100,000 fish could be attained under this scenario in 31 years, compared with more than 100 years with Veazie (Mathur 1993). We conclude, therefore, that this alternative would significantly enhance the potential rate of restoration of the Penobscot River American shad stock.

Alewife

The primary habitat modification caused by this alternative would be the conversion of 3.8 miles of impounded riverine environment into free-flowing riffle, run, and pool habitat above Veazie dam. Because all primary alewife production waters are in tributary lakes and ponds, this creation of riverine habitat would not enhance alewife production potential.

Removing Veazie would eliminate upstream passage loss of between 10 percent and 20 percent, and downstream mortality of about 10 percent. Because of the large number of barriers that alewife must ascend to reach many of the primary production waters, we conclude that removing one barrier (Veazie) would result in some enhancement of potential population growth but would not cause in a rapid rate of restoration.

Resident Fish

Decommissioning and removing Veazie dam would have both adverse and beneficial effects on resident fisheries resources, depending on the individual species being considered. As discussed for the Applicant's Proposal, some species prefer riverine habitat and others prefer lacustrine habitat. By removing Veazie dam, a portion of the river that is currently impounded would be restored to free-flowing river, thus benefiting species that prefer riverine habitat (Table 3-8).

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efficiency at two dams. The model runs we cited in describing population growth for BHE's proposal used the realistic 80 percent efficiency value.

APPENDIX G

BIOLOGICAL ASSESSMENT FOR SHORTNOSE STURGEON

Basin Mills Project
Biological Assessment for Shortnose Sturgeon

NMFS (Haley 1993) stated that, for the Basin Mills Project, the shortnose sturgeon (*Acipenser brevirostrum*) should be considered under Section 7 of the Endangered Species Act. Although approximately 5000 to 6000 adult shortnose sturgeon spawn in the Kennebec-Androscoggin estuary south of the Penobscot River, only one shortnose sturgeon has been reported in the Penobscot River system. This specimen was captured in Penobscot Bay at Northport (approximately 35 miles downriver from the Veazie development) in 1978. Recently, BHE submitted a photograph supposedly of the reported specimen that strongly indicated that it was an Atlantic sturgeon rather than a shortnose sturgeon (Morrell 1994); however, Maine Department of Marine Resources (MDMR) stated that the photo was not of the subject specimen and that morphometric and meristic data from the captured sturgeon definitely identifies it as a shortnose sturgeon (Squiers 1994). MDMR sampled for shortnose sturgeon with bottom set gill nets in May and June 1994 in the Bangor area and between Winterport and Bucksport (about 10 miles downstream of Bangor) during the summer of 1994 (Squiers 1994). No sturgeon were captured.

MDMR, however, believes that the river is suitable for shortnose sturgeon and that the species could thrive in the area up to Bangor dam (Haley 1993). Both MDMR (Flagg 1991) and Atlantic Sea Run Salmon Commission (Baum 1991) have stated in the past that completely removing Bangor dam would benefit anadromous fish species, including sturgeon. MDMR (Flagg 1991) suggested that although the dam is breached, shortnose sturgeon probably could not pass above the breach during spring spawning migrations (in late April) because of the high water velocities in the breach. BHE (1992a) proposes to remove the remnants of Bangor dam as a mitigation/enhancement measure for anadromous fish species. More recently, NMFS (Roe and Giedt 1993) stated that because Bangor dam is badly deteriorated, most of the habitat has already been reclaimed and that, if BHE removes the remnants of the dam, sturgeon might migrate farther upstream and could be affected by expanding Veazie development.

For this assessment, we assumed that shortnose sturgeon could be present below Veazie dam (i.e., if present in the Penobscot River, they either pass Bangor dam now or would be able to do so if BHE removes it). To assess the possible effects of proposed construction and operation of Veazie Plant C on shortnose sturgeon without river-specific information we (1) characterized critical habitats and patterns of use of those habitats in other river systems for all life stages; (2) characterized the general habitat available below Veazie dam; (3) identified the portions of the river below Veazie expected to be affected by the proposed project and characterized the nature of those effects; (4) identified potential patterns of habitat use based on information from the literature; and (5) determined which life stages and life history elements might be affected by project modifications based on predicted patterns of habitat use.

Life History and Critical Habitat Characteristics

Adult shortnose sturgeon generally move upriver to spawn during the spring and downriver during the summer and early fall, after spawning (Squiers and Smith 1979; Kieffer and Kynard 1993a). If the distance between wintering areas and spawning areas is long (more than 50 km), fish may migrate to spawning areas during the fall (Kieffer and Kynard 1993a). During the summer, adults in the Kennebec River concentrate in the lower to middle estuary regions, where salinity ranges from 10 to 21 ppt, on mud flats with rooted aquatic plants (Squiers et al. 1982). In the Merrimack River, adults concentrate near the area of maximum upstream salt penetration (0 to 3 ppt) during the summer (Kieffer and Kynard 1993a).

Shortnose sturgeon generally spend the winter in deep (more than 30 feet), halocline areas of the lower estuary (Dadswell 1979); however, adults of some populations overwinter in deep (more than 20 feet), freshwater sites near spawning areas (Buckley and Kynard 1985; Dovel et al. 1992; Geoghegan et al. 1992). Larvae and juveniles are benthic and occupy deep channels, where currents are strong (Dadswell et al. 1984; Squiers et al. 1993).

In estuarine and freshwater areas, adults forage over shallow (3 to 16 feet), sandy or muddy bottoms with macrophytes (Dadswell 1979; Squiers et al. 1982; Dadswell et al. 1984). Juveniles prefer to eat crustaceans and insects. Adults in Saint John River eat mostly molluscs, whereas in the Connecticut and Hudson rivers, benthic crustaceans and insects are more important (possibly more because of availability than preference; Dadswell et al. 1984). In the estuarine complex of the lower Kennebec River, the stomachs of adult shortnose sturgeon have been found to contain sand shrimp, clams, and small winter flounder (McCleave at al. 1977).

Optimal conditions for spawning include (1) temperature of 10 to 16°C; (2) velocity of 30 to 76 cm/s; (3) depth of 15 to 40 feet; and (4) substrate of gravel to cobble/rubble (less than 1 inch to 10 inches; Crance 1986). These values were obtained from habitat suitability index (SI) curves (curves were based on literature and professional opinion -- category one). The SI curves were based on all available information about shortnose sturgeon throughout the eastern seaboard (Canada to Florida). Studies in Maine confirm much of this information and recent studies indicate shortnose sturgeon can spawn in shallower waters at higher velocities. Squiers et al. recently documented spawning in the Androscoggin River within 600 feet of the Brunswick hydroelectric dam at depths of approximately 8 to 12 feet on substrate of ledge, boulder, and cobble, interspersed with sand and gravel at velocities of approximately 150 cm/s (Squiers et al. 1993; Squiers 1994).

Spawning runs peak as freshet subsides, and the peak generally occurs when water temperature is between 9 and 12°C (Dadswell et al. 1984). Squiers et al. (1993) found that adults in spawning condition converged on spawning grounds in the Androscoggin River at temperatures between 7 and 12°C, and they found eggs at temperatures between 15 and 17°C. In Maine waters, these temperatures occur from late April to mid May. Shortnose sturgeon broadcast eggs in the water, but the eggs adhere to bottom substrates within a short distance from spawning, even under high water velocities (152-244 cm/s)(letter from C. Mantzaris, NMFS, December 12, 1994). Eggs hatch within several days in freshwater (most eggs would occur in non-tidal freshwaters) (Dadswell et al. 1984). Squiers et al. stated that larvae are likely to leave the spawning area before August; however, they found only one larvae and no juveniles during their recent survey of Androscoggin River (possibly due to inadequate sampling or poor survival) and thus, do not present definitive data to document larval movement (Squiers et al. 1993). Kieffer and Kynard (1993b) stated that larvae begin to migrate downriver 10 days after hatching. Juvenile shortnose sturgeon have been found in the stomachs of yellow perch taken from the tidal portion of the Androscoggin River, suggesting that this life stage uses tidal freshwater areas as nursery habitat (Squiers 1994).

Habitat Below Veazie Dam

In the Penobscot River, salinity extends upstream to Orrington (approximately 10 miles downstream of Veazie; McCleave and Kleckner 1982; Mitnik 1984), and head of tide occurs near Bangor (approximately 3 miles downstream of Veazie). Near the downstream side of Veazie dam, the substrate is predominantly cobble (rocks 4 to 10 inches in diameter) with some gravel and boulders and a 100-foot-wide rock ledge extending downstream approximately 1,200 feet (Figure G-1; BHE 1992b). Under high flow conditions (34,000 cfs), the maximum depth within 700 feet of the dam is 12 feet. The highest river flow for which water velocities have been measured below Veazie is approximately 6,000 cfs (velocities 700 feet downstream of the dam ranged from 30 cm/sec to 120 cm/sec across the river). We estimated that the average velocity at that same location at a river flow of 30,000 cfs (the river flow as freshet subsides, see table G-1), would be approximately 230 cm/s[1]. The average velocity closer to the dam (e.g., 400 feet downstream) would be greater (estimated at 253 cm/s) due to shoals on the west side of the river.

Table G-1. Average monthly flows at Veazie dam for the years 1940 through 1987 (Source: BHE 1990a)

Month	Mean Monthly Flow (cfs)
January	10,000
February	9,800
March	12,800
April	34,300
May	27,100
June	13,000
July	8,400
August	7,400
September	7,700
October	9,300
November	14,000
December	13,700

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[1] Our calculated velocity was derived using a river width of 457 feet (based on data in BHE 1992b), an average depth of 8.7 feet (based on recorded depth measurements at river flow 6,000 cfs (BHE 1992b) and adjusting the depth for a flow of 30,000 cfs with tailwater curve data (BHE 1990b)).

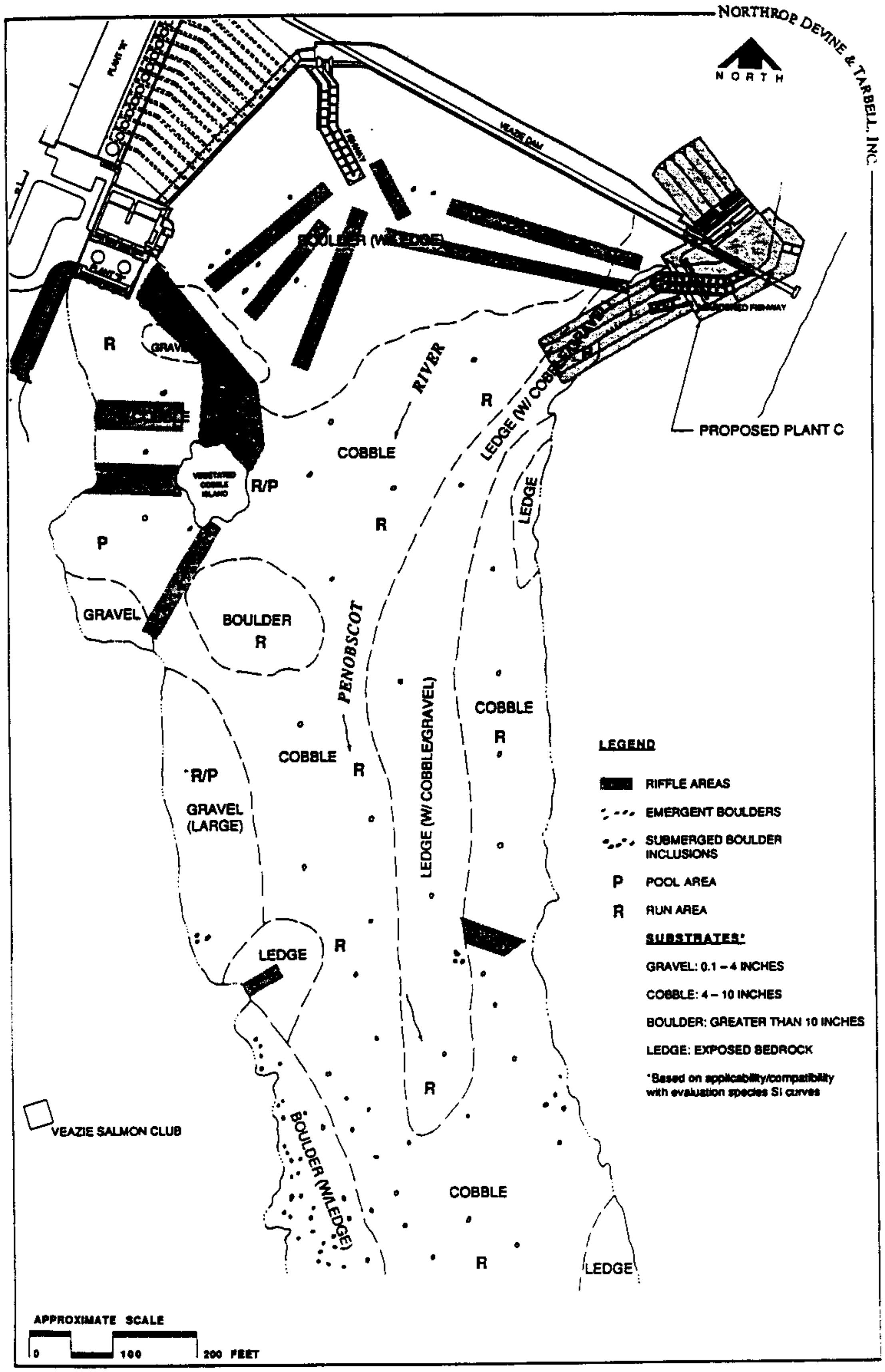

Figure G-1. Substrate below the Veazie development (Source: BHE 1992b)

Although no benthic invertebrate surveys have been conducted in the riverine habitat downstream of Veazie dam, PIN (Bisulca 1994) surveyed riverine portions of the Penobscot River upstream of Veazie and found a community dominated by insects (caddisfly and mayfly); molluscs represented less than 2 percent of the catch. We assume that the invertebrate community in the riverine habitat below Veazie would be similar.

Project Effects on Physical Habitat

Constructing Veazie Plant C would require excavating a tailrace on the east side of the existing development (Figure G-2). The new tailrace would be 170 feet long by 60 feet wide. The discharge point from the draft tube would be at approximately elevation -21 feet, and the tailrace would slope up to river-bottom elevation (7 feet) at the downstream end.

BHE proposes to continue operating the expanded Veazie development as a run-of-river facility and to sequence the operation of all 18 units at Plants A, B, and C to maximize fish passage while maintaining or enhancing fish habitat and fishing opportunity below the dam. BHE proposes the following operating regime:

Flows (cfs)	Plants/Units Operating
Up to 6,000	Plant C/Unit #18
6,000 - 6,950	Above plus Plant A/Units #1 and 6
6,950 - 8,160	Above plus Plant B/Unit #17
8,160 - 9,170	Above plus Plant A/Units #2-5 and 7
9,170 - 10,920	Above plus Plant B/Unit #16
10,920 - 13,525	Above plus Plant A/Units #8-15

The dam would spill flow in excess of the total turbine capacity of 13,525 cfs. Inflows would exceed capacity about 31 percent of the time. The Basin Mills development also would be operated as run-of-river; therefore, the proposed Basin Mills operating regime would not alter flows below Veazie. The Veazie flashboards would be hinged, which limits failure when it occurs. The flashboards could be righted without significantly drawing down the impoundment, and the impoundment could be refilled without significantly altering run-of-river operation. Installing Plant C would reduce the frequency and volume of flow over the flashboards, thus reducing the probability of flashboard failure. Thus, we conclude that there would be no significant alteration of natural river flow rate past the Veazie dam due to the Veazie expansion.

Installing and operating Plant C would reduce the portion of the year during which water flows over the dam and would shift that flow to the east bank of the river under some flow conditions, thus altering the distribution of flow laterally across the river below the dam. Under existing conditions, Plants A and B pass flow up to 7,525 cfs (combined turbine capacity) and release the flow to the west side of the river; spillage begins at flows above 7,525 cfs. Plant C would pass flow up to 6,000 cfs and release it on the east side of the river. Flows between 6,000 and 13,525 would be passed through all plants (i.e., flows on both the east and west sides). Plant C, therefore, would change the flow pattern from the west side to the east side at

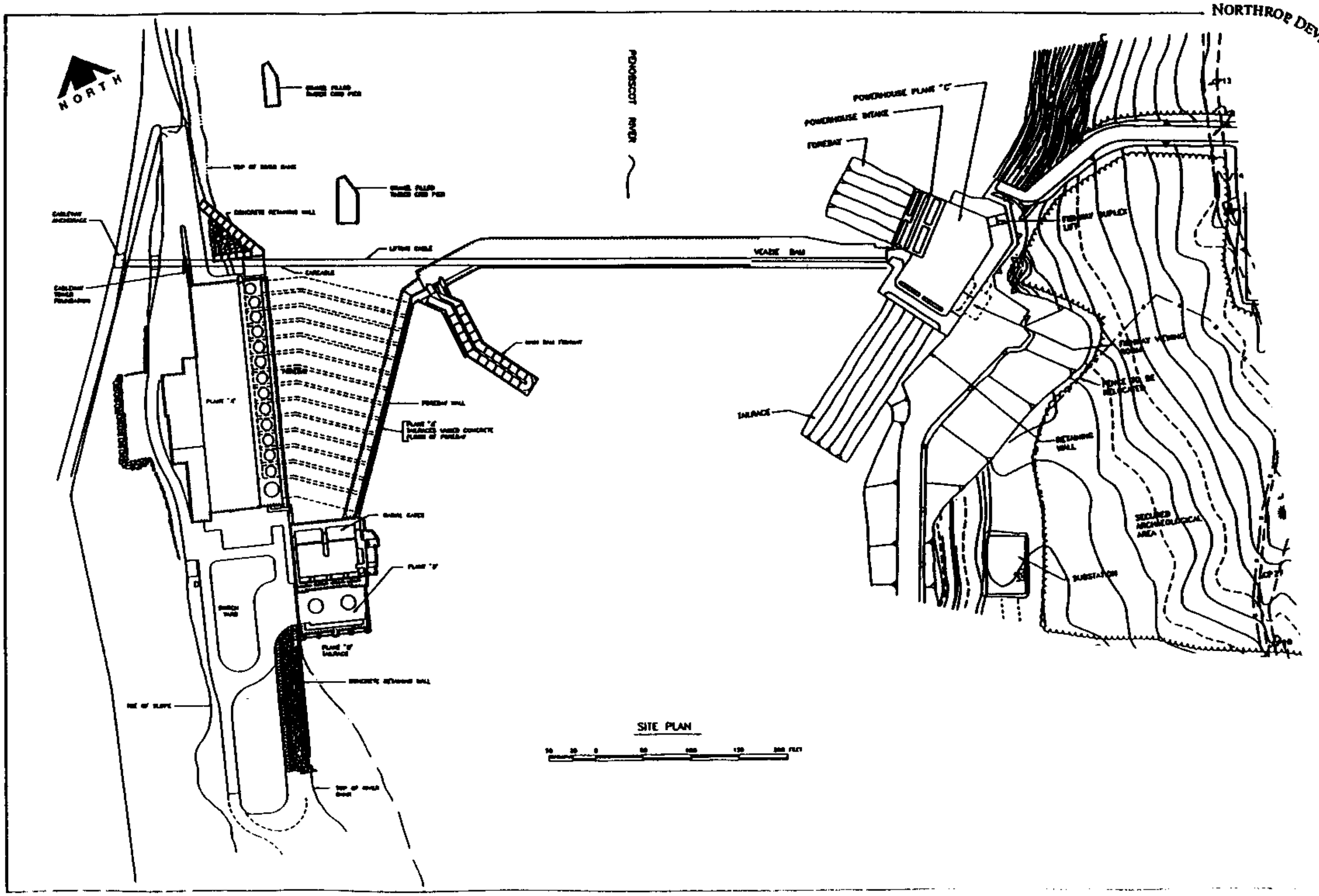

Figure G-2. Proposed site plan for Plant C Veazie Development (Source: BHE 1992b) river flows up to 6,000 cfs and eliminate spillage at river flows between 7,525 and 13,525 cfs. Because flow typically exceeds total hydraulic capacity during the spring, spill would be continuous, and all units would operate fully during spawning season (mid-April to mid-May; Figure G-3). With Veazie expansion, spill would be reduced, and the flow distribution across the river would be altered (i.e., the shift from spill to discharge through Plant C) from late spring through mid-winter, when river flow usually does not exceed the combined capacity of Plants A, B, and C.

BHE (1992b) studied the water velocities, depths, and flow patterns immediately downstream of Veazie dam under different operating scenarios to evaluate possible changes caused by operating Plant C. Flashboards on the east end of dam were lowered to approximate the flow conditions expected with Plant C. The east-side discharges did not affect depths beyond approximately 350 feet of the dam; depths appeared to be a function of total river flow only and not to be related to location of discharge at Veazie development. Changes in flow direction were restricted to within 500 feet of the dam (Figure G-4). Changes in water velocity were restricted to within 600 to 800 feet of the dam because of flow convergence and river constriction. We conclude that habitat changes associated with expanding the Veazie development would be restricted to depth, velocity, and flow direction within 800 feet of the dam.

Water quality data collected by PIN suggest a small increasing trend in temperature (0.5°C) in two impoundments (Great Works and Milford); however, analysis of these data shows no statistically significant difference between the free-flowing site and either of the impounded sites. The expansion at Veazie would decrease spillage and reaeration, creating the potential for a small decline in dissolved oxygen (DO) levels below the dam at river flows between 7,500 cfs and 13,500 cfs. Assuming construction of the proposed Basin Mills impoundment and decommissioning of the Orono development, DO levels are expected to decrease by 0.2 mg/l during low flow conditions; however, DO levels would continue to meet Class B standards. These slight changes in water quality due to the proposed Basin Mills and Veazie developments would not significantly affect water quality below Veazie.

Potential Effects on Shortnose Sturgeon

During the winter when river flow is on the order of 11,000 cfs (see table G-1), the maximum depth within 800 feet of Veazie is approximately 9 feet. Based on patterns of habitat use by shortnose sturgeon in other New England river systems, this depth would be marginal for supporting an overwintering population of shortnose sturgeon. Constructing a new tailrace at Veazie would create deep-water habitat that could increase potential overwintering habitat. Operating Plant C during winter would eliminate spillage (at river flow less than 13,525 cfs) and divert water to Plant C on the east side (flow up to 6,000 cfs). With lower flow through Plants A and B, tailwater elevation on the west side of the river, near the small vegetated island, would drop; however due to the shallow nature of this part of the river, this area probably would not provide adequate overwintering habitat under existing conditions and so any changes in depth associated with operation of Plant C would also not alter existing potential overwintering habitat.

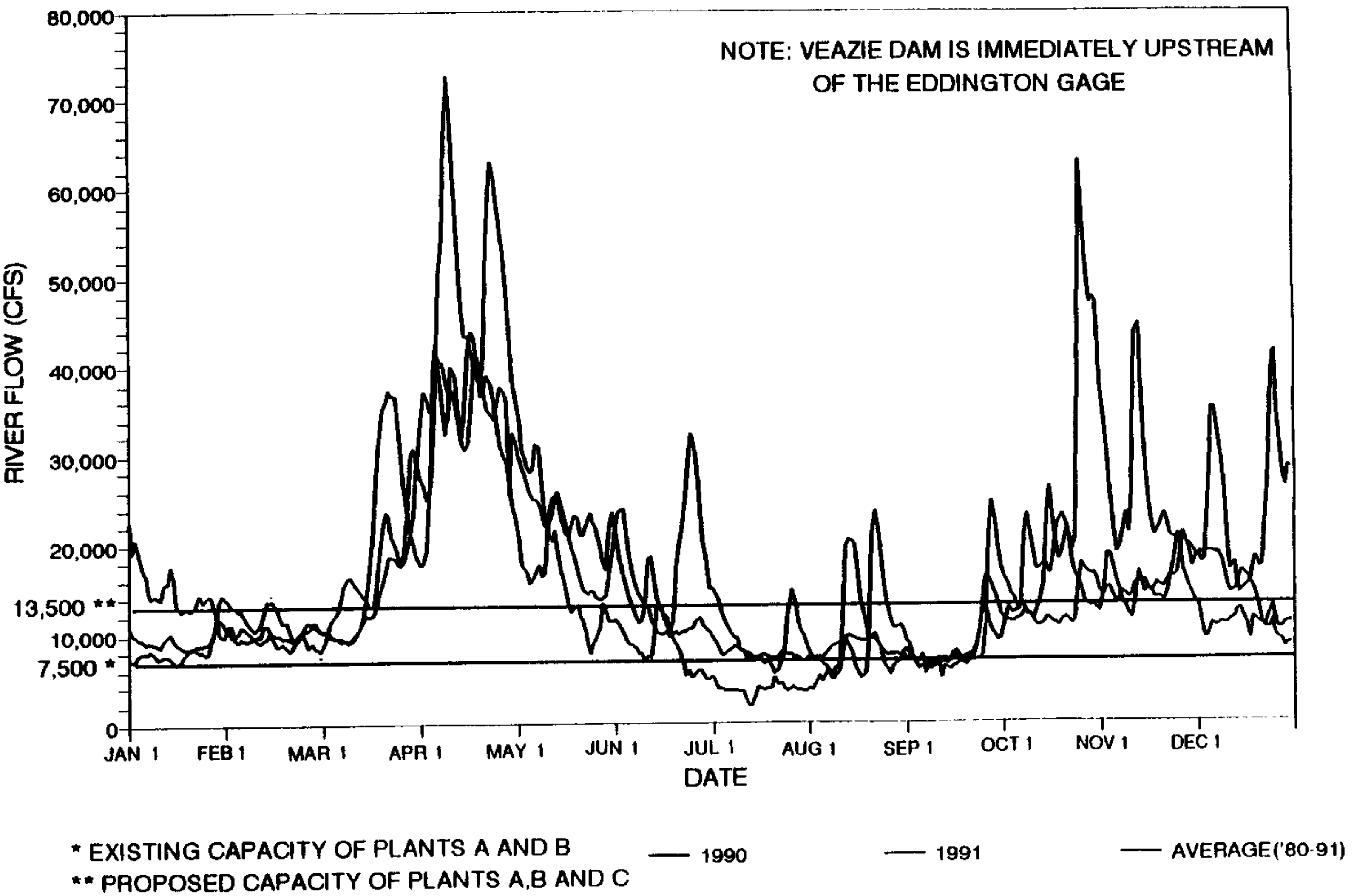

Figure G-3. Average daily flow at the Eddington USGS gaging station (Source: BHE 1993)

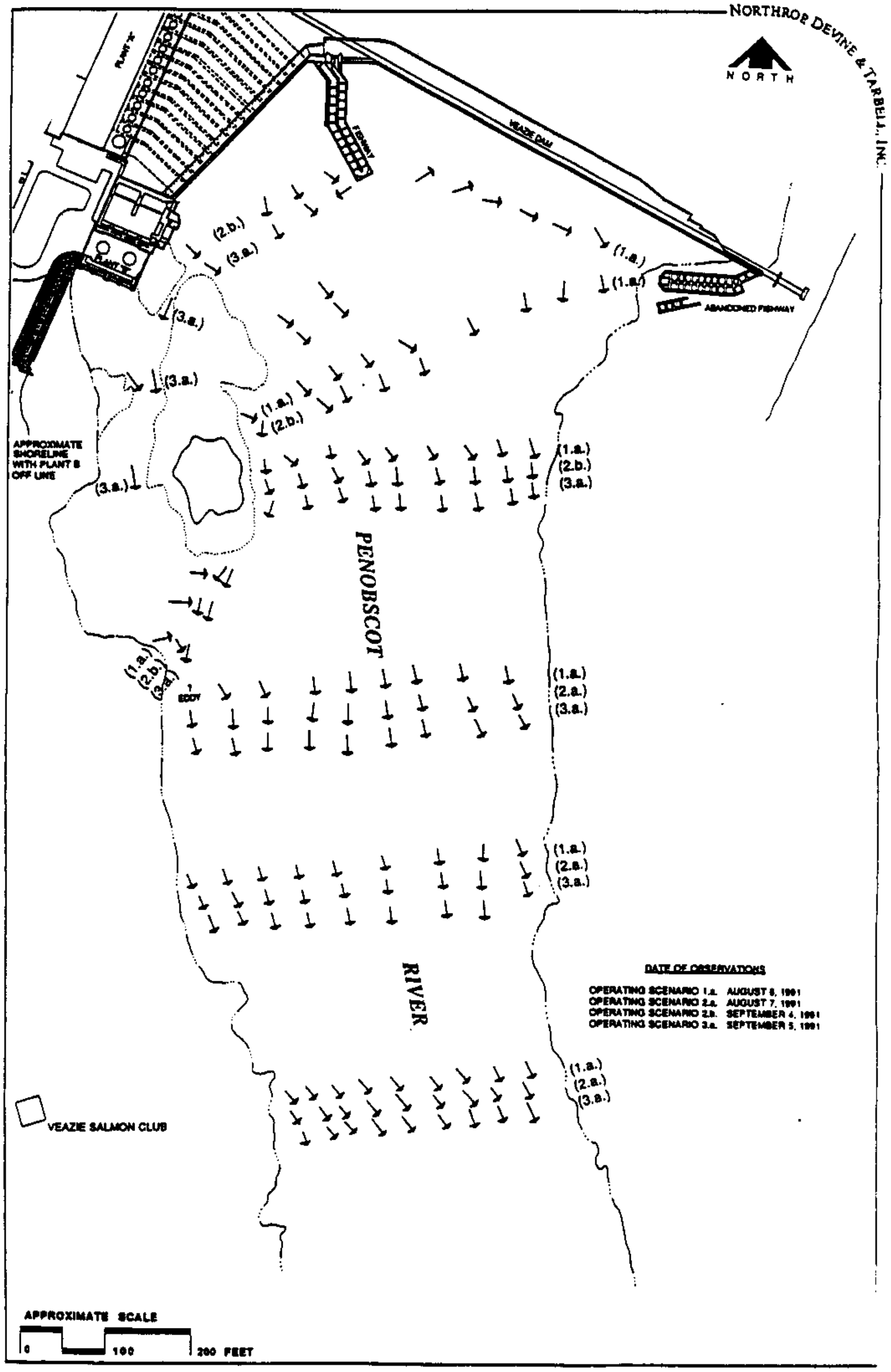

Figure G-4. Compass documented flow directions under three operating scenarios at the Veazie development. Scenario 1 - units in Plants A and B operating, no discharge at east end of dam; Scenario 2 - units 1 and 6 in Plant A operating, Plant B not operating, discharge at east end of dam; Scenario 3 - Plant A and B not operating, all river flow discharged at east end of dam. (Source: BHE 1992b)

Spawning of shortnose sturgeon in other rivers has been reported in locations where substrate characteristics and depths are similar to those found below Veazie. However, the average velocities (230 cm/s and higher) we estimate to occur within 800 feet of the dam during the sturgeon spawning period are higher than velocities documented at known spawning locations in other river systems (e.g., 150 cm/s in the Androscoggin River). Although it does not appear that all habitat characteristics of the area in which flows below the dam may be modified with Veazie expansion are ideal for shortnose sturgeon spawning, it is not known whether the higher velocities currently present in the area would preclude spawning there.

The benthic invertebrate community at a documented spawning site on the Androscoggin River (Squiers et al. 1993) consisted of almost 40 percent molluscs (Normandeau Associates 1993). If the invertebrate community in the riverine area below Veazie is similar to that found in riverine areas upstream, the Veazie habitat may have a low abundance of prey preferred by adult sturgeon. Although the extent to which the benthic invertebrate community influences the selection of overwintering or spawning sites by shortnose sturgeon is not known, the existing information suggests that if it were of importance, the area in which flows are likely to be affected by Veazie expansion is not likely to be used as a forage area by adult sturgeon.

Veazie expansion would not alter depth, velocity, or flow patterns below the dam during the shortnose sturgeon spawning season because river flows would exceed turbine capacity and spillage would occur. Although velocities immediately below the Veazie dam may be higher than optimal for sturgeon spawning, if spawning does occur in that area, some larvae might be present until August and subsequently emigrate to preferred deeper waters (i.e., downstream areas where no habitat characteristics will be affected by Veazie expansion). Operation of Plant C would change water depth, velocity, and flow patterns within 800 feet of the dam from late spring until mid-winter, thus during a period when some larvae might be present. However, the very limited nature of the flow direction, depth, and velocity modifications (i.e., a change in lateral distribution of flow across the river) suggest that little or no impact to any larvae that may be present is likely. In addition, the small river reach over which those changes would occur (within 800 feet of the dam), suggests that if any impact were to occur, it probably would affect only a small portion of the 3 to 4-mile riverine reach below Veazie in which a substantial amount of potential sturgeon spawning habitat may be present.

Summary and Conclusions

Only one shortnose sturgeon has been reported in the Penobscot River system -- in Penobscot Bay (approximately 35 miles downriver from the Veazie development); however, we assumed the presence of the species and identified potential patterns of use in project waters based on the species' known preference and local habitat characteristics. The proposed Basin Mills development would not substantially affect habitat characteristics (either physical or water quality) below the Veazie dam. Expanding the Veazie development would alter water depths, velocities, and flow direction within a short distance of the dam (800 feet), from late spring through mid-winter, when spillage would be eliminated and flow would be diverted to turbine discharge on the east side.

The habitat below Veazie dam is marginal for overwintering based on known habitat preferences. The proposed project could slightly enhance the marginal overwintering habitat below Veazie by creating additional deep-water habitat in the new tailrace.

The substrate and water depths below Veazie may be appropriate for spawning, although estimated water velocities during the spring in the area affected by Veazie expansion are greater than those at documented spawning locations. Habitat changes attributable to Veazie expansion (i.e., changes in velocity, flow direction, depth) would occur after spawning is completed. Although eggs adhere quickly, some of the eggs spawned within 800 feet of the dam could be transported downstream, out of the affected area before they adhere to the bottom. If the larvae produced from spawning immediately below Veazie remain with 800 feet of the dam past mid-spring before moving downstream to deeper waters, they would experience altered flow direction. Velocity, flow direction, and depth alterations attributable to Plant C are not likely to affect larvae.

We conclude that the proposed Basins Mills Project (including the Veazie expansion) is not likely to adversely affect shortnose sturgeon if the species is present in the Penobscot River.

Acknowledgements

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Literature Cited

Baum, E.T. 1991. Letter from E.T. Baum, Atlantic Sea Run Salmon Commission to E. Stumpfel, City of Bangor. 22 July 1991.

BHE. 1990a. Basin Mills hydroelectric project application for license. Volume II.

BHE. 1990b. Basin Mills hydroelectric project application for license. Volume I.

BHE. 1992a. Modifications to the proposed mitigation/enhancement measures for fish resources as a result of proposed removal of the Bangor Waterworks Dam.

BHE. 1992b. Response to FERC's December 5, 1990 additional information request item 3 Veazie development downstream habitat/flow study. 27 January 1992.

BHE. 1993. Direct testimony of Timothy A. Lukas. *In*: Applicant's responses to resource agencies and interested parties. Appendix B. 401 Water Quality Certification and Maine Waterway and Development Conservation Act Permit. 11 May 1993.

Bisulca, P. 1994. Letter from P. Bisulca, Penobscot Indian Nation to L.D.. Cashell, FERC. 18 January 1994.

Buckley, J., and B. Kynard. 1985. Yearly movements of shortnose sturgeons in the Connecticut River. *Trans. Am. Fish.* 114:813-820.

Crance, J.H. 1986. Habitat suitability index models and instream flow suitability curves: shortnose sturgeon. U.S. Fish and Wildlife Service. Biological Report 82(10.129).

Dadswell, M.J. 1979. Biology and population characteristics of the shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818 (Osteichthyes:Acipenseridae), in the Saint John River Estuary, New Brunswick, Canada. *Can. J. Zoo.* 57(11):2186-2210.

Dadswell, M.J., B.D. Taubert, T.S. Squiers, D. Marchette, and J. Buckley. 1984. Synopsis of biological data on shortnose sturgeon, *Acipenser brevirostrum* LeSueur 1818. NOAA Technical Report NMFS 14. FAO Fisheries Synopsis No. 140.

Dovel, W.L. A.W. Pekovitch, and T.J. Berggren. 1992. Biology of the shortnose sturgeon (*Acipenser brevirostrum* LeSueur 1818) in the Hudson River Estuary, New York. *In*: Estuarine Research in the 1980s. C.L. Smith, ed. Albany: State University of New York Press. [As cited in Normandeau Associates 1993]

Flagg, L.N. 1991. Letter from L.N. Flagg, Maine Department of Marine Resources to E.M. Stumpfel, City of Bangor. 10 July 1991.

Geoghegan, P., M.T. Mattson, and R.G. Keppel. 1992. Distribution of the shortnose sturgeon in the Hudson River Estuary, 1984-1988. *In*: Estuarine Research in the 1980s. C.L. Smith, ed. Albany: State University of New York Press. [As cited in Normandeau Associates 1993]

Haley, N.J. 1993. Letter from N.J. Haley, NMFS to D.L. Shumway, FERC. 17 February 1993.

Kieffer, M.C., and B. Kynard. 1993a. Annual movements of shortnose and Atlantic sturgeons in the Merrimack River Massachusetts. *Trans Am. Fish. Soc.* 122:1088-1103.

Kieffer, M.C., and B. Kynard. 1993b. Shortnose sturgeon use of the Deerfield River: Spring-summer 1992. Unpublished report attached to letter from J.C. Rittgers, Acting Regional Director, NMFS, January 27, 1995.

McCleave J.D., and R.C. Kleckner. 1982. Selective tidal stream transport in the estuarine migration of glass eels of the American eel (*Anguilla rostrata*). *J. Cons. int. Explor. Mer.* 40:262-271.

McCleave, J.D., S.M. Fried, and A.K. Towt. 1977. Daily movements of shortnose sturgeon, *Acipenser brevirostrum*, in a Maine estuary. *Copeia* 1:149-157.

Mitnik, P.E. 1984. Waste load allocation for the lower Penobscot River 1984. Maine Department of Environmental Protection. *In*: Basin Mills Hydroelectric Project application for license, Volume II, Exhibit E, Appendix B. 1990.

Morrell, D. 1994. Letter from D. Morrell, BHE to L. Cashell, FERC. 18 January 1994.

Normandeau Associates, Inc. 1993. On-site biological assessment of the shortnose sturgeon (*Acipenser brevirostrum*): Overwintering and benthic resource studies. Prepared for Maine Department of Transportation.

Roe, R.B., and A.P. Giedt. 1993. Letter from R.B. Roe and A.P. Geidt, NMFS, to L.D. Cashell, FERC. 26 March 1993.

Squiers, T.S. 1994. Comments on the draft biological assessment for shortnose sturgeon. Letter from L.N. Flagg, Maine Department of Marine Resources to J.H. Clements, FERC. 7 September 1994.

Squiers, T.S., and M. Smith. 1979. Distribution and abundance of shortnose and Atlantic sturgeon in the Kennebec River estuary. Maine Department of Marine Resources. Completion Report Project #AFC-19.

Squiers, T. S., M. Smith, and L. Flagg. 1982. American shad enhancement and status of sturgeon stocks in selected Maine waters. Maine Department of Marine Resources. Completion Report Project #AFC-20.

Squiers, T.S., M. Robillard, and N. Gray. 1993. Assessment of potential shortnose sturgeon spawning sties in the upper tidal reach of the Androscoggin River. Prepared by Maine Department of Marine Resources for Maine Department of Transportation.

APPENDIX H

BIOLOGICAL ASSESSMENT FOR BALD EAGLE

BIOLOGICAL ASSESSMENT FOR BALD EAGLE

BASIN MILLS PROJECT
(FERC NO. 10981)

MAINE

July 26, 1995

Introduction

FERC staff prepared a draft Environmental Impact Statement on the proposed licensing of three existing and proposed hydroelectric projects in the lower Penobscot River Basin in southeastern Maine. These projects include Basin Mills (FERC No. 10981), Stillwater (FERC No. 2712), and Milford (FERC No. 2534) (Figure 1). The Basin Mills project, as proposed by Bangor Hydro-Electric (BHE), includes construction of a new Basin Mills development, expansion of the existing Veazie development, and retirement of the existing Orono development. The proposed Basin Mills development would create a new reservoir with a surface area of 292 acres and eliminate approximately 3.5 miles of free-flowing river. BHE proposes to operate Basin Mills in a run-of-river mode. The Stillwater Project and the Milford Project are operated in a run-of-river mode; no change in operation is proposed by BHE. Consequently, this BA evaluates only potential impacts to bald eagle from proposed construction and operation of the Basin Mills project.

Bald eagle (*Haliaeetus leucocephalus*), a federal-listed threatened[1] and state-listed endangered species, is a year-round resident of the Penobscot River Basin. As of 1990 there were 123 known nesting pairs of bald eagles in the state of Maine (Welch 1991). The U.S. Fish and Wildlife Service (FWS) (letter from G.E. Beckett, FWS, December 30, 1992) stated that bald eagle should be considered under Section 7 of the Endangered Species Act for the Basin Mills development. FWS indicated that its major concern relating to bald eagle at the Basin Mills Project is that the new impoundment created by the proposed dam would freeze in winter, eliminating free-flowing stretches and displacing eagle activity.

The Maine Department of Inland Fisheries and Waterways (MDIFW) also stated that "The Basin Mills project will have an effect on eagles, although not significant, by shifting their feeding activity downstream to ice-free sites below the dam. Bald eagle winter range is generally quite flexible as eagles adjust their distribution to match food availability" (letter from N.E. Trask, MDIFW, to F. Ayer, BHE, May 25, 1990). The MDIFW also subsequently expressed concerns that a pre-nesting pair of eagles was exhibiting territorial behavior in the Orono-Bradley area during 1994 and might establish a nest in 1995 (letter from C. Todd, MDIFW to S. Hall, Bangor Hydro-Electric Company (BHE), January 18, 1995).

General Life History and Critical Habitat Characteristics

The preferred habitats of the bald eagle are rivers, lakes, and estuaries (DeGraaf et al. 1980); it is rarely associated with smaller streams or ponds (Leighton et al. 1979). Swenson et al. (1986) found that bald eagle movements, breeding success, nest site selection, and nesting chronology are primarily due to differences in the amount and timing of food availability. The bald eagle is known to consume a wide range of food items, ranging from seabirds to fish and sea otter pups. Research on bald eagles in Maine showed that they took as carrion or preyed

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[1] FWS officially downgraded the status of bald eagle under the Endangered Species Act from Endangered to Threatened in July, 1995 (Federal Register, Vol. 60, No. 133, 36000-36010, July 12, 1995).

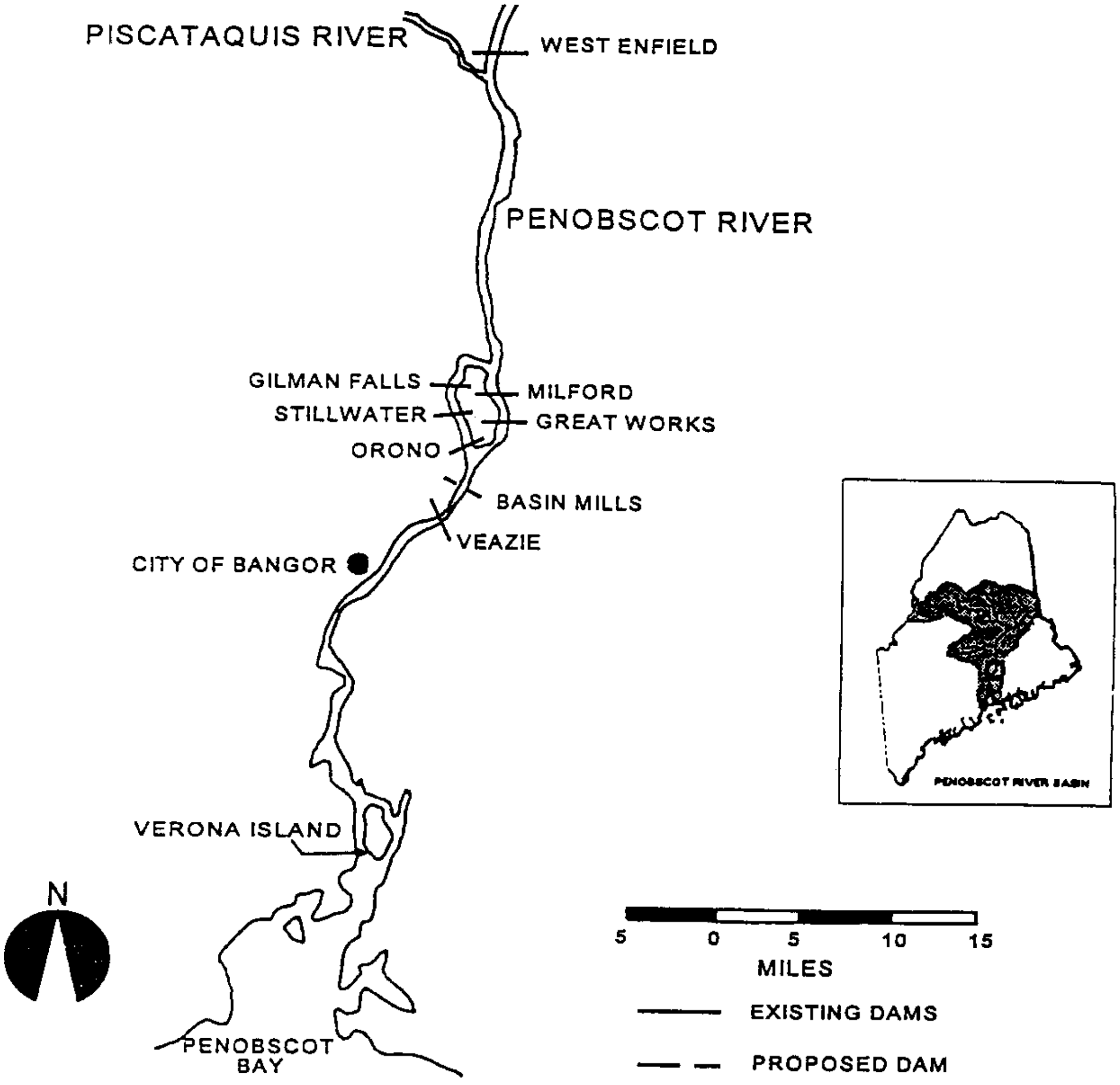

Figure 1. Location of existing hydroelectric projects and the proposed Basin Mills Project in the lower Penobscot River Basin, Maine (Source: Staff).

upon 34 species of birds, 18 species of fish, 11 species of mammals, and at least two species of invertebrates (Todd et al. 1982). Fish composed approximately 77 percent of the food item remains collected at bald eagle nests in interior Maine; eagles nesting in offshore islands and along coastal areas fed primarily on seabirds and waterfowl (Todd et al. 1982). Bald eagle prey selection is determined by availability. Todd et al. (1982) also found that in Maine, eagles focused on the chain pickerel (*Esox niger*) spawning run in April, then on the sucker (*Catostomus* spp.) spawning run in May.

Breeding areas are concentrated along the coast or are widely dispersed inland (Owen et al. 1991). Bald eagles prefer to nest in dominant trees of a variety of species, and in areas that are primarily mature or old-growth timber (Mosher and Andrew 1981; Anthony et al. 1982). They are also primarily shoreline nesters (Mathisen 1983; Stocek 1985). However, bald eagles may show some reluctance to nest right at the shoreline. Even in relatively undisturbed areas of Alaska, the average distance of nest to water is approximately 36 meters (Robards and Hodges 1977). Although the level of human disturbance often has no effect on productivity of bald eagles at existing nest sites, eagles prefer to nest in areas with little or no human disturbance (Fraser 1985). Jaffee (1980) and Lehman et al. (1980) have suggested that bald eagles will relocate their nests to avoid human disturbance associated with shorelines. The studies indicated that, although nesting bald eagles were not affected by low degrees of human disturbance, habitat suitability decreased as human disturbance increased. Further, the greatest densities of bald eagles were always reported in areas with minimal human activity.

Nest desertion by bald eagles is more likely early in the nesting cycle than late in the cycle (Mathisen 1968), and they will react differently to different kinds of disturbance. However, disturbances that eagles may not directly recognize as human, such as railroads, planes, and unused buildings, may be tolerated (Peterson 1986). Generally, the winter population of bald eagles is dispersed and transient (Owen et al. 1991).

Site Specific Life History and Habitat Changes

No nesting of bald eagles has ever been observed along the Penobscot River between the Veazie and Milford developments. The closest nests to the proposed Basin Mills development on the Penobscot River as of March 1993 were approximately 16 miles to the north and 4.5 miles to the south (approximately 1 mile southwest of the Veazie development). Results of the most recent nesting survey in the project area revealed the nest located 1 mile south of Veazie was partly tipped and unoccupied in 1995 (letter from S. Hall, Biologist, BHE, May 4, 1995).

Winter surveys conducted during the late 1970's found bald eagles in the project area only irregularly, whereas the area downstream of Bangor (approximately 9 miles downstream from the Basin Mills development site; Figure 1) was a significant wintering ground (Todd 1979). The lower portion of the Penobscot between Bangor and Verona Island (Figure 1) is the only large part of the river that regularly remains open during winter due to tidal action, salinity, river traffic, and Coast Guard icebreaking activities (Young 1979). During the late 1970's, only 17 percent of the midwinter eagle population resided in interior Maine, and most were sighted near pools of open water below dams or rapids (Todd 1979). Some eagles appear to over-winter in their nesting territories (Todd 1979; Young 1979).

Todd et al. (1982) noted that interior-dwelling eagles occupying nests from March through autumn feed primarily on fish, whereas the few eagles wintering in interior Maine rely on avian and mammalian prey away from nesting territories. During winter, eagles often scavenge waterfowl that have been killed or crippled by hunters and carcasses of domestic cows, beaver, moose, and white-tailed deer.

Eagles are known to forage along the Penobscot river in winter, although there were no recent survey data to document the magnitude of use of the project region at the time of license application for the Basin Mills Project. In consultation with FWS and MDIFW, BHE prepared a winter survey study plan, and in cooperation with MDIFW, conducted four aerial surveys between January 11, 1995 and March 3, 1995 between West Enfield (approximately 23 miles upstream of the Basin Mills development) and Verona Island (Figure 1). Between five and nine eagles were observed during each of the four surveys, with one eagle on each of three flights found in the Basin Mills project area (letter from S. Hall, BHE, May 4, 1995). Most of the eagles were concentrated near Verona Island/Bucksport (25 miles downstream of the proposed Basin Mills site) and Bangor/Brewer (8 miles downstream of the proposed Basin Mills site), with a smaller number near West Enfield (26 miles upstream of the proposed Basin Mills site).

Prior to BHE's 1995 winter surveys, MDIFW stated that winter populations of eagles probably had doubled since the surveys in the 1970's (letter from C.S. Todd, MDIFW, to F. Stroup, Versar, Inc., January 5, 1994). The number of eagles observed during each flight in 1995, however, is similar to that observed during surveys in 1977 and 1978 (seven eagles on each of two flights during the winters of 1977 and 1978; Todd 1979). The results of the recent surveys are consistent with historical patterns of a dispersed bald eagle winter distribution; it should be noted, however, that the Penobscot River upstream of Bangor may not have been as widely frozen during the winter of 1995 as might occur under more rigorous winter conditions.

Assessment of Potential Impacts and Effects

Project-Specific Environmental Modifications

Because the relicensing of the Milford and Stillwater Projects will not result in any substantive modification of the impoundments and run-of-river operations of these projects, no environmental changes will occur that have any potential for impact to bald eagle. State and federal wildlife agencies did not express any concerns regarding impacts from relicensing of these projects on bald eagle.

In the case of the Basin Mills Project, the major environmental modifications that will occur of potential relevance to impact to bald eagle include: construction activities associated with installation of Plant C at Veazie development; construction and operation of Basin Mills development; and, decommissioning of the Orono development. Primary impact concerns expressed by wildlife agencies, described in the introduction, are associated with potential effects on nesting eagles in the vicinity of Veazie and Basin Mills, and potential affects on winter foraging at Basin Mills. No agencies expressed concerns about the consequences of Orono retirement for bald eagle. Retirement of that development will entail limited construction activity associated with removal of the existing turbines and powerhouse. That location is in a residential area and is not used by bald eagles. Shift in Stillwater River flow from the Orono tailrace to over the Orono dam may create a small amount of new high velocity riverine habitat of potential foraging value to bald eagle. However, because of the developed nature of the area, the Orono development modifications are not likely to be of any significance to bald eagle.

Based on this characterization of expected environmental modifications, this BA addresses only potential foraging and nesting impacts associated with the proposed Veazie and Basin Mills developments.

Impacts on Foraging

Recent and historical data discussed above indicate that only a small proportion of Maine's bald eagles winter in the interior, and the 1995 lower Penobscot River survey data show very little use of the site of the proposed Basin Mills development. Thus, all existing data support the conclusion that the Basin Mills site is not of special or great importance for overwintering eagles in the lower Penobscot River. As a result, only a small proportion of the regional eagle population would be exposed to any potential negative effects that a frozen impoundment might have on the ability of eagles to forage in the area.

Two characteristics of the existing environment within the Basin Mills Project area may explain why use of this area for foraging by overwintering bald eagles is presently limited and why no significant impact on foraging is likely in the future. First, although the Basin Mills rips remain ice-free in winter because of the existing high velocity flow associated with the steep river bed gradient at that location, lower-velocity water provides the best foraging opportunities for fish. Fish are unlikely to be in shallow waters and vulnerable to eagle predation during the coldest winter period, when the Basin Mills impoundment (i.e., 3.5 river miles) may freeze; all fish species over-winter in deep waters, where they generally remain until spring, when water temperatures begin to warm (Moyle and Cech, 1988). Continuous release of water from the Basin Mills powerhouse would still maintain an area of open water in the project area. Some waterfowl (e.g., common merganser, goldeneye) may be attracted to this ice-free area during the winter. Over-wintering waterfowl (either by direct predation or harassment of mergansers to release their catch) may be a source of food for eagles, partially offsetting potential foraging displacement from the Basin Mills rips area.

Secondly, the Penobscot River within the project area is fringed by light industrial and low-density residential uses. Although bald eagles appear to be more tolerant of human proximity during the winter than during nesting (Todd 1979), the existing level of human disturbance may preclude extensive use of the area for winter foraging. The Northern States Bald Eagle Recovery Plan (FWS 1983) suggests a minimum buffer of 1,320 feet for human presence in feeding areas and a larger zone if eagles have line-of-sight view of activities beyond 1,320 feet. Substantial portions of the Penobscot River that would be impounded are within 1,320 feet of human disturbances such as the James River Corporation paper mill complex, Striars Mill, Orono Wastewater Treatment Plant, the towns of Orono and Webster, and traffic on Route 178.

We conclude that the Basin Mills development would not adversely affect bald eagles due to impacts on foraging and feeding.

Nesting Impacts

The single bald eagle nest closest to the three developments comprising the Basin Mills project is located approximately 1 mile downstream of Veazie. The Northern States Bald Eagle Recovery Plan's (FWS 1983) most expansive buffer zone around a bald eagle nest is 0.5 miles. Within this zone some activities are permissible except during the most critical period of nesting (courtship activities and nest building). Considering that the Veazie development is located twice this distance from the nest, we conclude that no impact to that nesting site would occur during the construction of Veazie Plant C. Owing to its distance from the Veazie development and the rolling topography of the area, this nest is visually screened from the Veazie development. We also note that the nest was found to be tipped and unoccupied during the 1995 survey, and thus may have been abandoned.

No eagle nests have historically been present in the vicinity of the Orono and Basin Mills sites, and no nesting activity was observed in those areas during the 1995 survey. Thus, we conclude there would be no impact to bald eagle nesting from construction of Basin Mills and retirement of Orono.

Summary and Conclusions

Historical and recent data indicate that the Basin Mills project area is not a significant habitat for either nesting or overwintering bald eagles. The 1995 surveys for bald eagle in the vicinity of Basin Mills demonstrated that no eagles currently nest within or directly adjacent to the boundaries of the project. The closest bald eagle nests to the proposed Basin Mills development currently are approximately 16 miles to the north of Basin Mills and about 1 mile southwest of the Veazie development (that nest was unoccupied in 1995). Only three eagles were observed in the Basin Mills area during the four separate flights of the 1995 winter survey (it is not known whether these three sightings were of the same or different individuals), indicating that present use by eagles of the Basin Mills area for winter foraging is very limited. A considerable amount of human activity exists in the vicinity of the Basin Mills Project, including paper mills and other industry, towns, and roads. In light of the Northern States Eagle Recovery Plan's suggested minimum buffer zone of 1,320 feet from human presence in eagle feeding areas, we conclude that this high level of human activity may preclude significant nesting or winter foraging from occurring at this site in the future, even without construction of Basin Mills.

Any minor impact on eagle foraging that might result from loss of open (but high velocity) waters in the Basin Mills rips area due to construction of the Basin Mills development may be partially offset by open waters that would be maintained in the Basin Mills tailrace after project construction. Tailrace waters may attract overwintering waterfowl, which are an important winter food source for eagles.

We conclude that the proposed Basin Mills Project, including construction of Basin Mills dam, the expansion of the Veazie development and the decommissioning of Orono development, will not adversely affect bald eagles.

LITERATURE CITED

Anthony, R.G., R.L. Knight, G.T. Allen, B.R. McClelland, and J.I. Hodges. 1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. *Trans. N. Am. Wildl. Nat. Resour. Conf.* 47:332-342.

Degraaf, R.M., G.M. Whitman, J.W. Lancier, B.J. Hill, and J.M. Keniston. 1980. Forest habitat for birds of the northeast. Broomall, PA. U.S. Forest Service Northeast Forest Experimental Station.

Fraser, J.D. 1985. The impact of human activities on bald eagle populations - a review. In: The bald eagle in Canada. J.M. Gerrard and T.M. Ingram, eds. Proc. 1983 Bald Eagle Days, August 18-20, Winnipeg, Manitoba, Canada.

FWS (U.S. Fish and Wildlife Service) 1983. Northern states bald eagle recovery plan.

Jaffee, N.B. 1980. Nest site selection and foraging behavior of the bald eagle in Virginia. Master's Thesis, William and Mary College, Williamsburg, VA.

Lehman, R.N., D.E. Craigie, P.L. Collins, and R.S. Griffen. 1980. An analysis of habitat requirements and site selection for nesting bald eagles in California. Report to U.S. Forest Service, No. 43-9158-9-1871.

Leighton, F.A., J.M. Gerrard, P. Gerrard, D. Whitfield, and W.J. Maher. 1979. An aerial census of bald eagles in Saskatchewan. *J. Wild. Manage.* 43(1):61-69.

Mathisen, J.E. 1968. Effects of human disturbance on nesting of bald eagles. *J. Wildl. Manage.* 43(1):61-69.

Mathisen, J.E. 1983. Nest site selection by bald eagles on the Chippewa National Forest. In: Biology and management of bald eagles and ospreys, 95-100. D.M. Bird, ed. Harpell Press, Ste. Anne de Bellevue, Quebec, Canada.

Mosher, J.A., and J.M. Andrew. 1981. Nesting habitat and nest site selection by the bald eagle in Maryland. Maryland Power Plant Siting Program Rep. P55-78-04. Appalachian Environmental Laboratory, Frostburg State College. Frostburg, MD.

Moyle, P.B., and J.J. Cech. 1988. Fishes: An Introduction to Ichtyology. Prentice Hall, Englewood Cliffs, N.J. 559 pp.

Owen, R.B., Jr., C.S. Todd, M.A. McCollough, and F.J. Gramlich. 1991. Nesting history and population status of Maine's bald eagles. *Trans. Northeast Sect. Wildl, Soc.* Vol 48.

Peterson, A. 1986. Habitat suitability index models: bald eagle (breeding season). U.S. Fish and Wildlife Service Biological Report 82(10.126).

Robards, F.C., and J.I. Hodges. 1977. Observations from 2,760 bald eagle nests in southeast Alaska. U.S. Fish and Wildlife Service Eagle Management Studies, Progress Report 1969-1976.

Stocek, R.F. 1985. The bald eagle in New Brunswick in the 80's. In: The bald eagle in Canada. J.M. Gerrard and T.M. Ingram, eds. Proc. 1983 Bald Eagle Days, August 18-20, Winnipeg, Manitoba, Canada.

Swenson, J.E., K.L. Alt, and R.L. Eng. 1986. Ecology of bald eagles in the greater Yellowstone ecosystem. *Wildl. Monogr.* 95:1-46.

Todd, C.S. 1979. The ecology of the bald eagle in Maine. M.S. thesis, University of Maine, Orono.

Todd, C.S., L.S. Young, R.B. Owen, and F.J. Gramlich. 1982. Food habits of bald eagles in Maine. *J. Wildl. Manage.* 46(3):636-645.

Welch, L. 1991. Contaminant burdens and reproductive rates of bald eagles breeding in Maine. A research proposal submitted to the faculty of the graduate school University of Maine at Orono in partial fulfillment of the requirements for the degree of Master of Science in Wildlife Management.

Young, L.S. 1979. Aspects of the feeding ecology of the bald eagle in Maine. Honors thesis, University of Maine, Orono.

APPENDIX H-1

U.S. Department of the Interior Comments on Bald Eagle with regard to Lower Penobscot River Basin DEIS

The following summarizes Interior's comments on bald eagle with regard to the Lower Penobscot River Basin DEIS, from their letter dated February 16, 1995 (page and paragraph numbers cited are from this letter), and staff's response.

1. Comment: (p. 24, par. 5 and p. 25, par. 1, 2, and 3). The MDIF&W informed the FWS that another, non-nesting pair has established a territory in the immediate vicinity of the Basin Mills Dam site. An increase in the wintering bald eagle population in the lower Penobscot River, including the area covered by the DEIS, is a near certainty.

FERC Response: The Biological Assessment has been modified to reflect the most recent data available; additional information concerning winter distributions of bald eagles along the Penobscot River and nesting eagles in the Basin Mills project area generated by the 1994-1995 winter survey is included.

2. Comment: (p. 48, par. 6). The FWS has reviewed the Commission's [bald eagle] Biological Assessment...and does not concur that the proposed projects "are not likely to adversely affect" the endangered bald eagle. Shortcomings in the BA identified by FWS include reliance upon extremely dated bald eagle winter survey data.

FERC Response: The Commission consulted with FWS and the Maine Department of Inland Fisheries and Waterways (DIFW) in December 1994 and February 1995 and requested that BHE conduct winter surveys of bald eagle distributions along the Penobscot River and a nesting survey of the Basin Mills Project area. Results of these studies are discussed in the Biological Assessment.

The following summarizes Interior's (U.S. Fish and Wildlife Service, New England Field Office) comments on bald eagle with regard to the Lower Penobscot River Basin DEIS, from their letter dated December 15, 1994, and staff's response.

1. Comment: [The DEIS relies upon] extremely dated, bald eagle winter survey data.

FERC Response: Refer to FERC's response to Comment #2 of Interior's letter dated February 16, 1995.

2. Comment: [There is a] lack of discussion on the potential effect throughout the construction of Plant C on foraging behavior and activity patterns on a pair of bald eagles nesting one mile south of the Veazie project.

FERC Response: The nest to which FWS refers was found to be partially tipped and unoccupied during the 1995 winter survey. Further discussion on this topic is provided in the bald eagle BA.

3. Comment: [There is a] lack of discussion on the cumulative effects of these projects on the quality and quantity (i.e, availability of ice-free water) of bald eagle foraging habitat.

FERC Response: Survey data collected in 1995 suggest that the Basin Mills area is not of major importance to overwintering eagles in the project area. Further discussion of this issue is presented in the BA.

4. Comment: [There is an] insufficient discussion of availability and quality of prey items for wintering bald eagles (i.e., benefits to wood duck nesting habitat are not applicable to the eagle's diet. Fish entrainment and mortality are also unlikely during the winter months).

FERC Response: Our discussion of the availability and quality of prey items for wintering bald eagles has been clarified and expanded in the bald eagle BA. We have concluded that waterfowl attracted to the ice-free water below the powerhouse may be a winter food source that could partially offset foraging displacement from the Basin Mills rips area.

Federal Energy Regulatory Commission

Office of
Hydropower
Licensing

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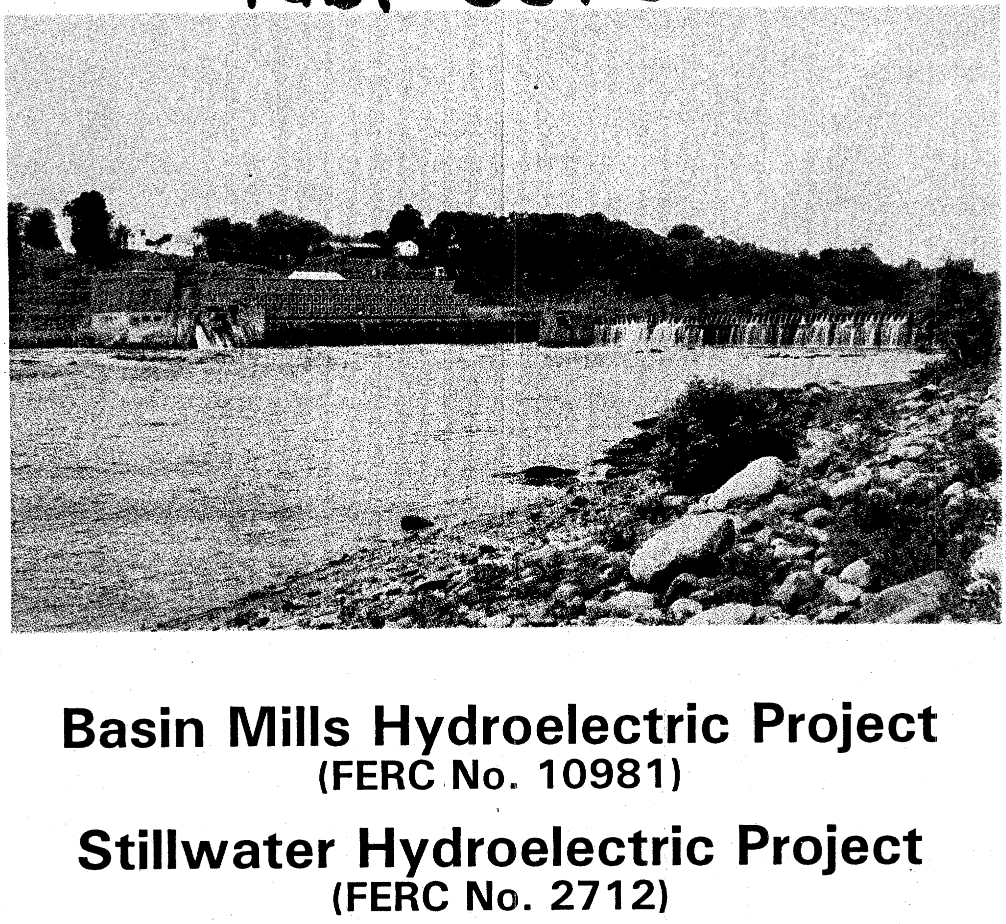
Filed: 12\3\1997

FINAL ENVIRONMENTAL IMPACT STATEMENT

Lower Penobscot River Basin

Maine

Part 3 of 3



Basin Mills Hydroelectric Project
(FERC No. 10981)

Stillwater Hydroelectric Project
(FERC No. 2712)

Milford Hydroelectric Project
(FERC No. 2534)

APPENDIX I

MAPS OF EXISTING WETLAND AND RIFFLE HABITAT IN THE AREA OF THE BASIN MILLS DEVELOPMENT

BHE (1993a) prepared the following wetland maps based on its jurisdictional delineations. Staff overlaid information concerning the distribution and extent of riffle habitat on these maps. We obtained information about riffle habitat from the 1985 HEP study performed by BHE (1990h).

TABLE 8. SUMMARY OF COMPUTATION OF HABITAT UNITS (HU'S) FOR ATLANTIC SALMON (JUVENILE) HABITAT EVALUATION PROCEDURES (HEP) ASSESSMENT FOR PROPOSED BASIN MILLS PROJECT

RIVER SECTION	Total[1] Potential Habitat (sq ft)	EXISTING CONDITION SCENARIO						POST-IMPOUNDMENT CONDITION SCENARIO						Differences In HU's Between Assessment Scenarios
		Median[2] Depth (ft)	Mean[2] Channel Vel. (fps)	SI AND HSI VALUES			HU's (sq ft)	Median[2] Depth (ft)	Mean[2] Channel Vel. (fps)	SI AND HSI VALUES			HU's (sq ft)	
				[3] Depth	[3] Vel.	HSI[2]				[3] Depth	[3] Vel.	HSI[2]		
G2-G3	360,200	3.4	2.4	0.93	0.59	0.93	334,986	4.9	1.8	0.73	1.00	0.73	262.946	(-) 72,040
G3-G4	315,000	3.4	2.6	0.93	0.40	0.61	192,150	4.9	1.8	0.73	1.00	0.73	229,950	37,800
G4-G5	270,000	3.4	2.9	0.93	0.10	0.30	81,000	7.0	1.8	0.73	1.00	0.73	197,100	116,100
G5-G6	247,800	4.2	2.9	0.83	0.10	0.29	71,862	8.7	1.5	0.16	1.00	0.16	39,648	(-) 32,214
G6-G7	240,000	6.0	2.2	0.57	0.80	0.57	136,800	13.4	1.1	0	1.00	0	0	(-) 136,800
G7-G8	262,800	5.6	2.1	0.63	0.91	0.63	165,564	13.4	0.8	0	1.00	0	0	(-) 165,564
G8-G9	300,000	4.9	2.1	0.73	0.91	0.73	219,000	13.2	0.7	0	1.00	0	0	(-) 219,000
G9-G10	346,000	5.0	2.1	0.72	0.91	0.72	249,120	14.3	0.7	0	1.00	0	0	(-) 249,120
G10-G11	355,000	5.1	2.0	0.70	1.0	0.70	248,500	14.8	0.6	0	0.95	0	0	(-) 248,500
G11-G12	317,800	5.8	2.1	0.60	0.91	0.60	190,680	15.9	0.7	0	1.00	0	0	(-) 190,680
G12-G13	260,500	5.7	2.2	0.61	0.80	0.61	158,905	16.1	0.7	0	1.00	0	0	(-) 158,905
G13-G14	294,000	5.2	2.2	0.69	0.80	0.69	202,860	15.7	0.7	0	1.00	0	0	(-) 202,860
G14-G15	307,800	4.4	2.3	0.80	0.70	0.80	246,240	15.6	0.7	0	1.00	0	0	(-) 246,240
G15-G16	307,800	5.6	2.0	0.63	1.00	0.63	193,914	16.8	0.6	0	0.95	0	0	(-) 193,914
G16-G17	303,750	7.8	1.7	0.31	1.00	0.31	94,163	19.9	0.6	0	0.95	0	0	(-) 94,163
G17-G18	330,000	5.3	2.0	0.67	1.00	0.67	221,100	18.0	0.6	0	0.95	0	0	(-) 221,100
G18-G19	300,000	5.7	2.0	0.61	1.00	0.61	183,000	19.3	0.5	0	0.85	0	0	(-) 183,000
G19-G20	255,300	7.0	1.8	0.43	1.00	0.43	109,779	21.4	0.5	0	0.85	0	0	(-) 109,779
G20-G21	180,000	6.5	2.0	0.50	1.00	0.50	90,000	22.0	0.6	0	0.95	0	0	(-) 90,000
G21-G22	0	6.5	2.7	0.50	0.30	0.39	0	22.0	0.6	0	0.95	0	0	0
G22-G23	138,900	5.5	3.0	0.64	0	0	0	22.2	0.6	0	0.95	0	0	0
G23-G24	25,000	6.5	2.1	0.50	0.91	0.50	12,500	23.7	0.5	0	0.85	0	0	(-) 12,500
G24-G25	306,000	4.5	2.1	0.79	0.91	0.79	241,740	23.5	0.4	0	0.78	0	0	(-) 241,740
G25-G26	345,000	4.5	2.2	0.79	0.80	0.79	272,550	23.6	0.4	0	0.78	0	0	(-) 272,550
G26-G27	330,000	4.9	1.6	0.73	1.00	0.73	240,900	25.7	0.3	0	0.68	0	0	(-) 240,900
G27-G28	236,250	5.6	1.4	0.63	1.00	0.63	148,838	27.9	0.3	0	0.68	0	0	(-) 148,838
TOTALS	6,934,900						4,306,151						729,644	(-)3,576,607
TOTALS IN ASRSC PRODUCTION UNITS (100 sq yd)	7,705						4,785						811	(-) 3,974

1/ From 1985 habitat inventory and ASRSC criterion that all riffle and run habitat with course substrate (excluding ledge) is suitable nursery habitat

2/ See Section 6.0 METHODS for derivation

3/ See SI curves in Appendix D for derivation

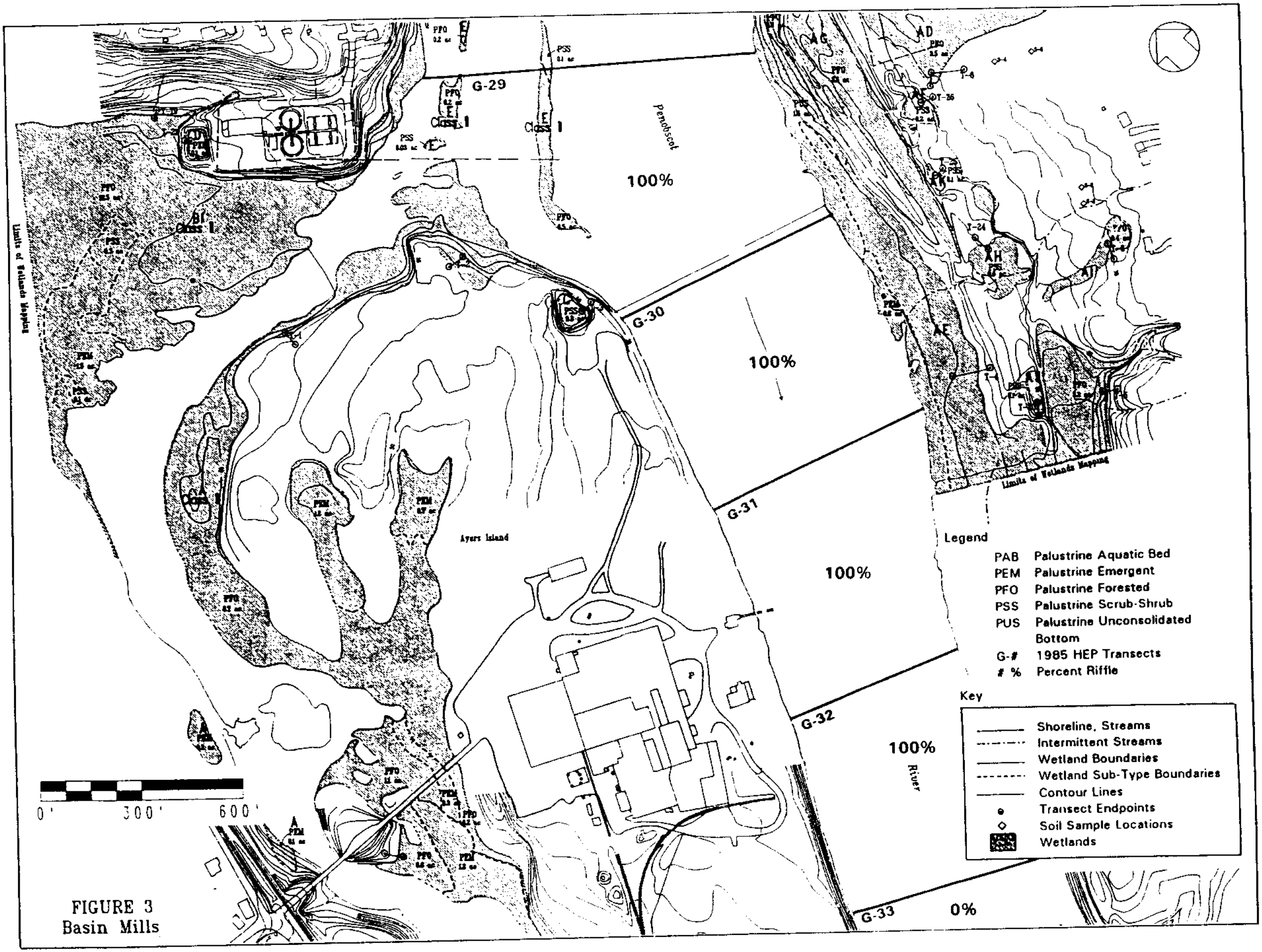


FIGURE 3
Basin Mills

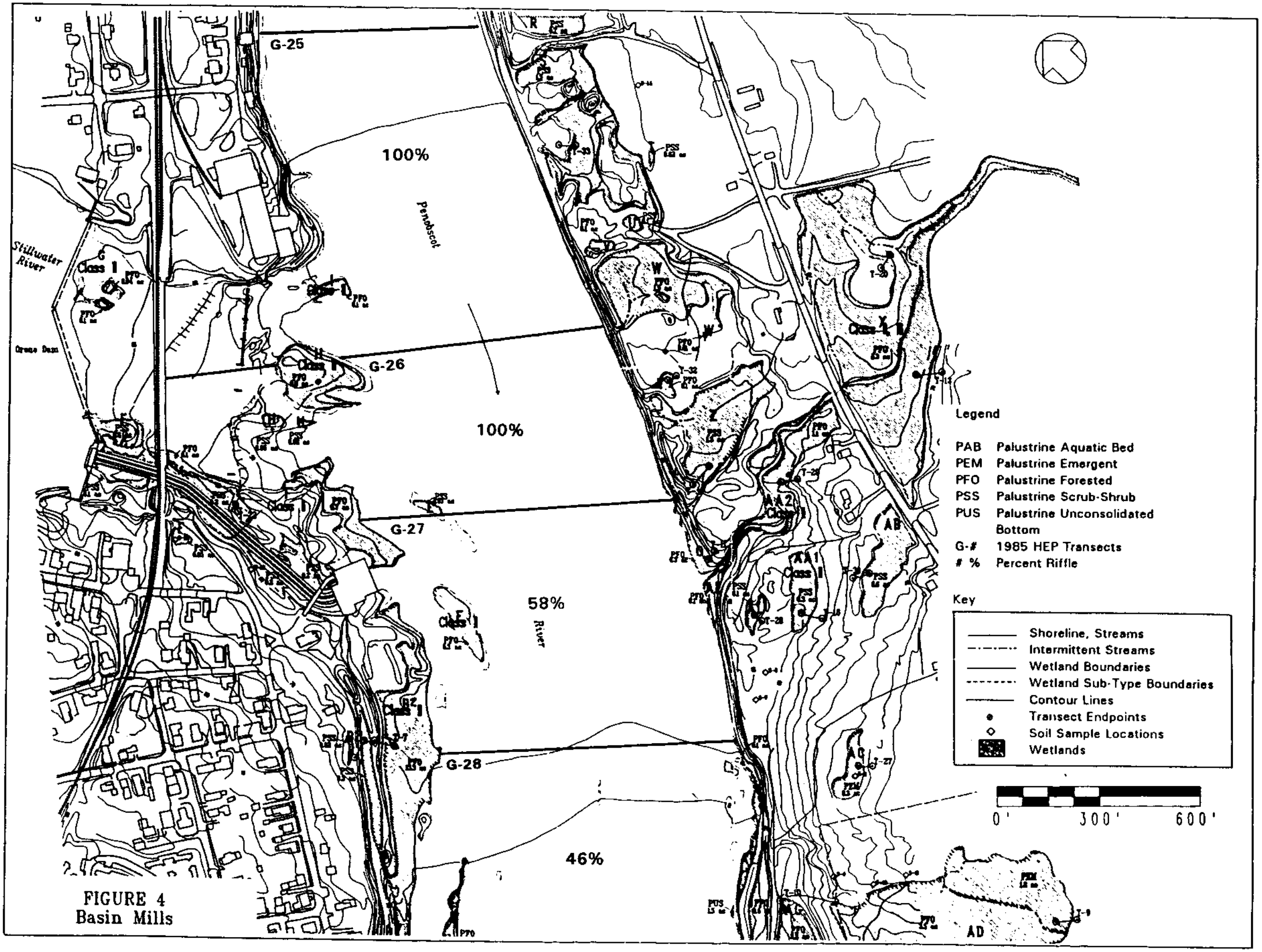


FIGURE 4
Basin Mills

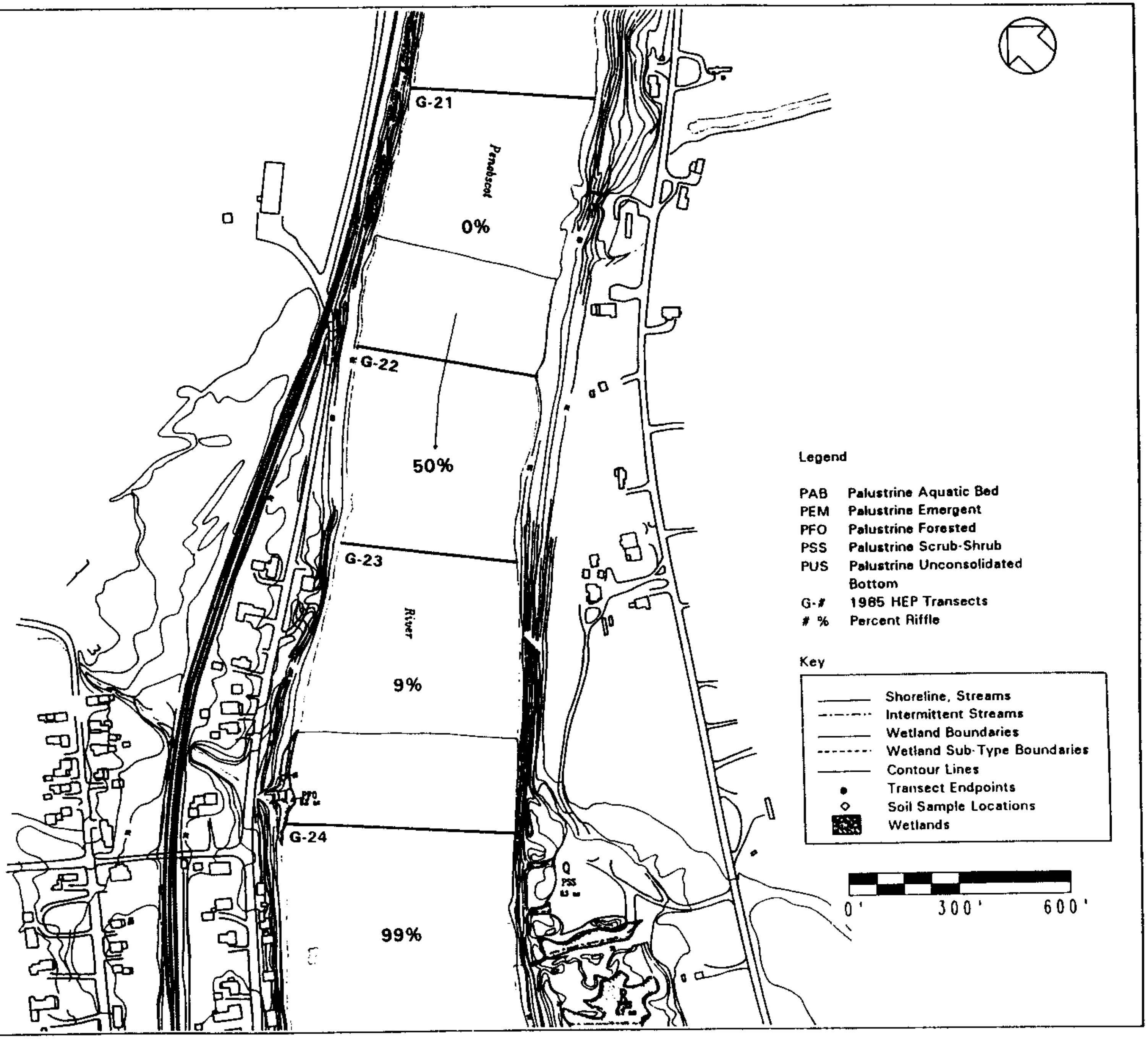


FIGURE 5
Basin Mills

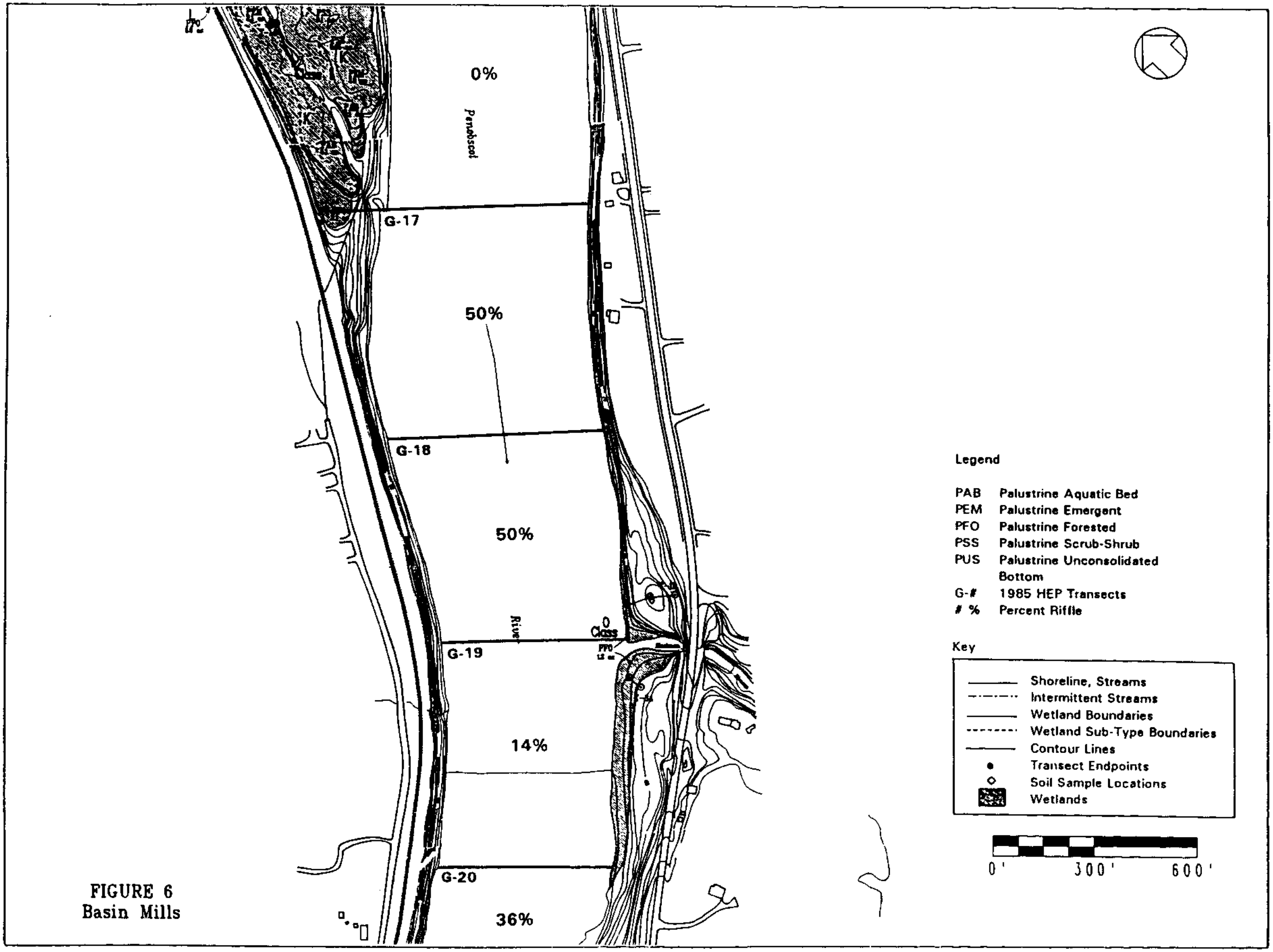


FIGURE 6
Basin Mills

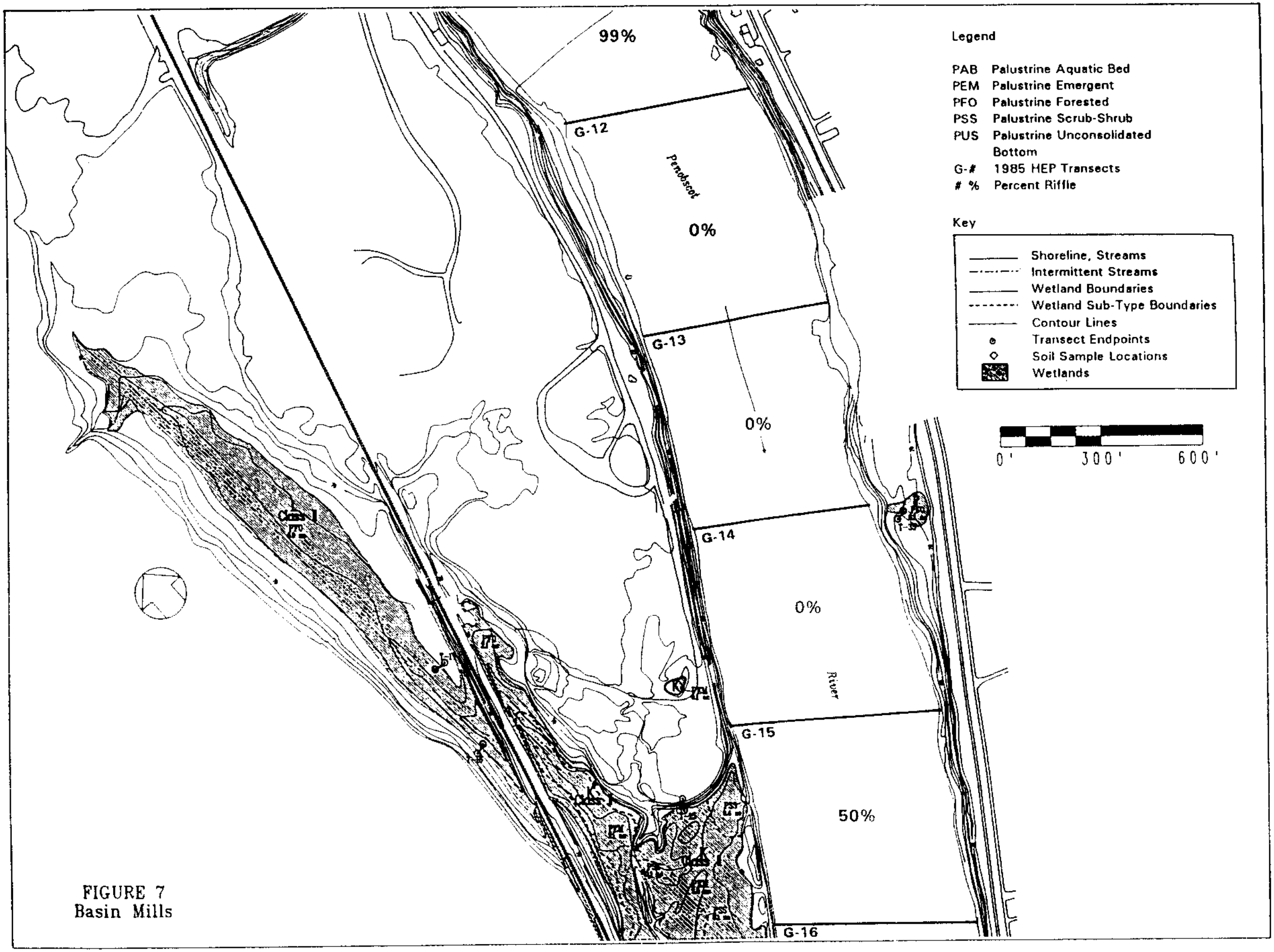


FIGURE 7
Basin Mills

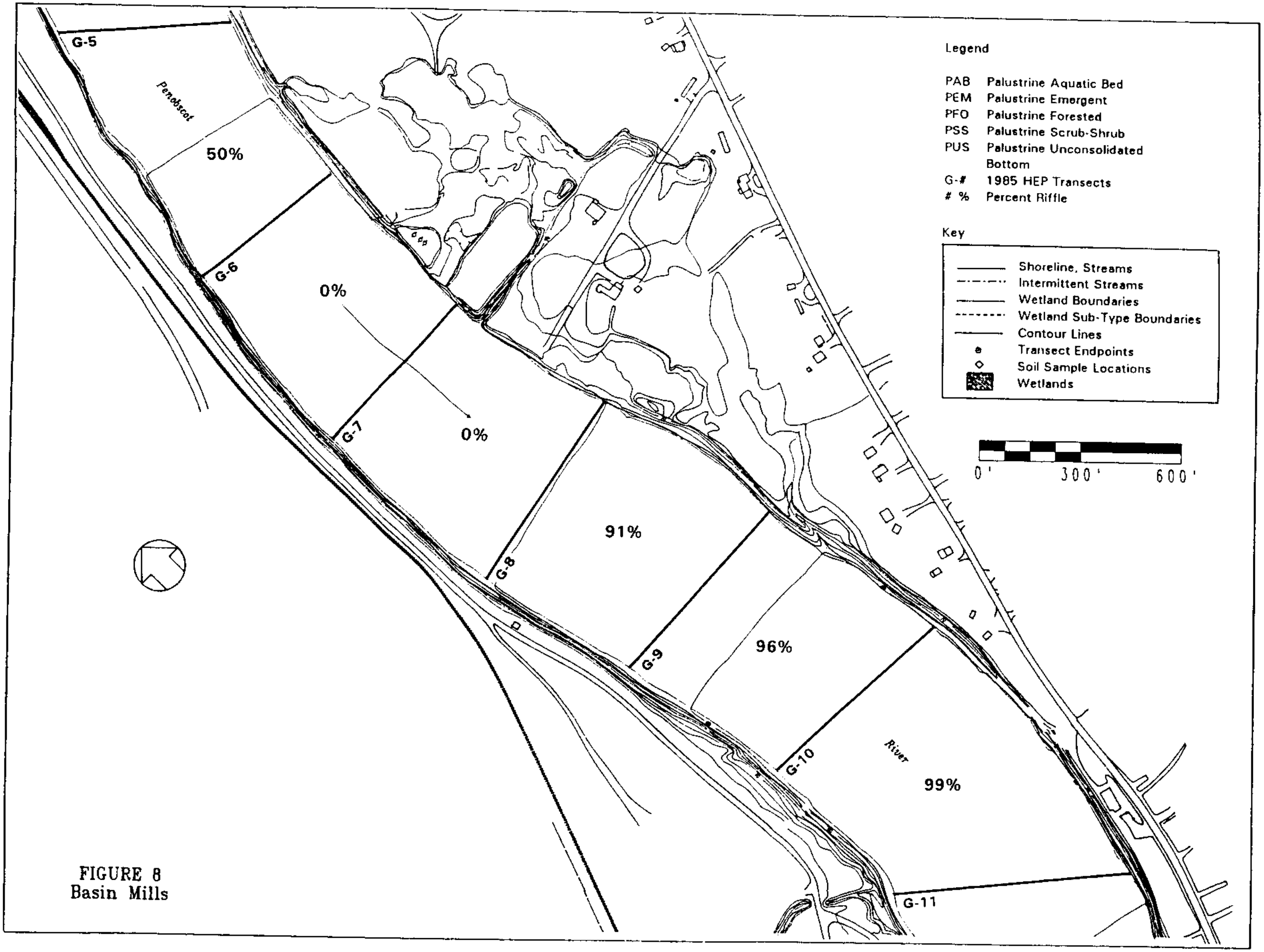


FIGURE 8
Basin Mills

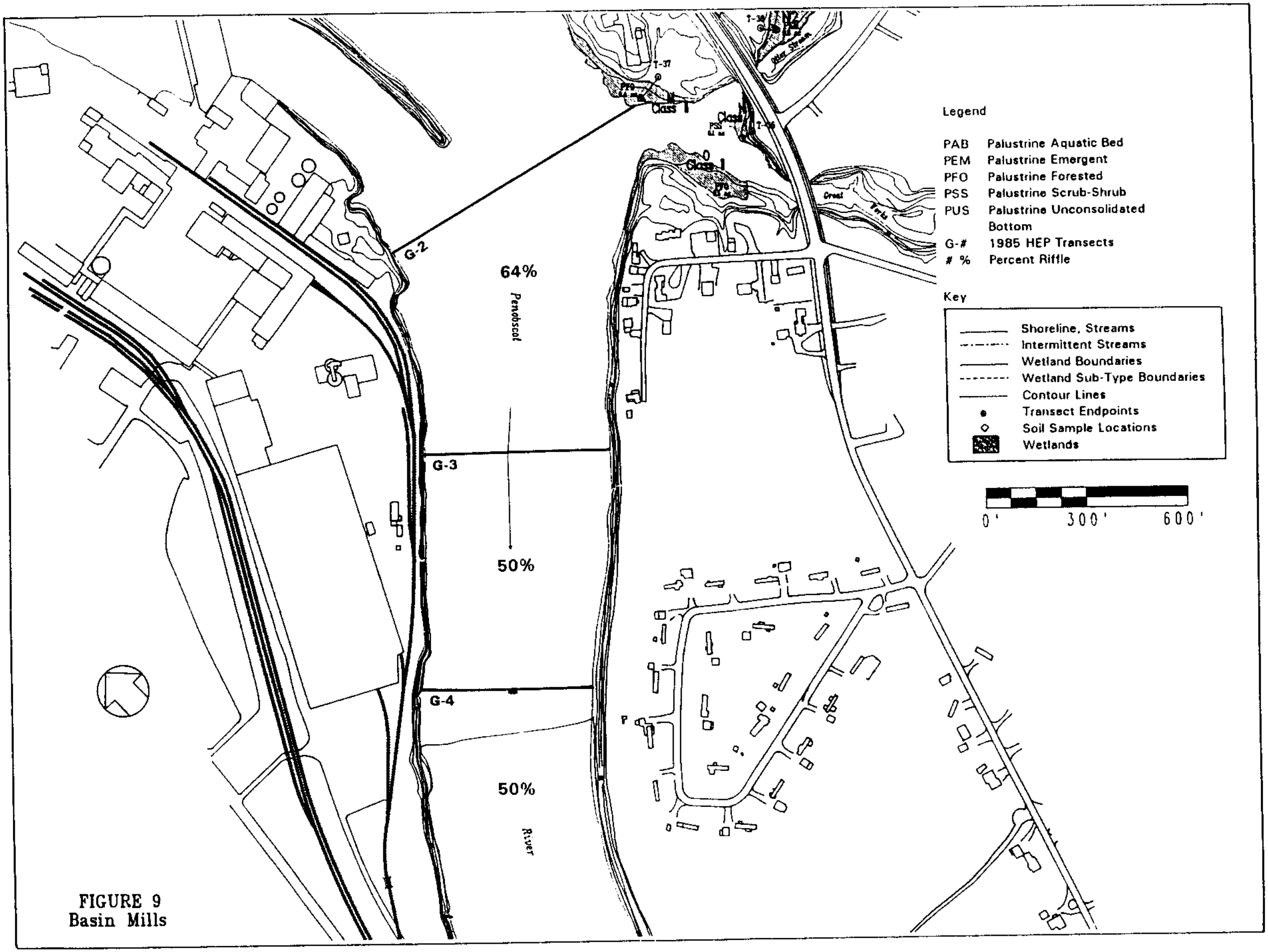


FIGURE 9
Basin Mills

APPENDIX J

BASIS FOR SECTION 4(E) COST ESTIMATES PRESENTED IN TABLE 5-15

BHE did not provide to the Commission specific cost estimates for the 4(e) conditions submitted by Interior. Interior provided costs for some, but not all, of their 4(e) conditions (letter from E.B. Cohen, Interior, April 9, 1997). Thus, in order to evaluate the consistency of these Interior recommendations with the requirements of Section 10(a) of the FPA, staff developed rough estimates of costs based principally on professional experience and judgement for those items for which Interior did not provide costs. We compute the annual cost as the annual payment necessary to pay off a 30-year loan at the assumed interest rate (8.5%), and with a principal equal to the 1997 dollar cost of each condition. The cost is only that of measures extending beyond what BHE has proposed. Any condition which calls for measures already proposed by BHE would have zero cost in Table 5-15.

Below, we list how we derived the cost estimates for each of Interior's Section 4(e) conditions listed in Table 5-15.

- Number 1: (withdrawn).

- Number 2: (withdrawn).

- Number 3: (withdrawn).

- Number 4: There would be no additional costs associated with run-of-river operation or minimum flows since BHE has proposed this mode of operation.

- Number 5: There would be no additional costs associated with giving priority to fish passage flows, since these costs are already included in BHE's proposal or the Section 18 prescriptions addressed above.

- Number 6: (withdrawn).

- Number 7: Interior estimated a cost of $480,000 to implement this condition, which is annualized to $66,900.

- Number 8: (withdrawn).

- Number 9: Interior estimated a cost of $100,000 to implement this condition, which is annualized to $13,900.

- Number 10: We assumed there would be no additional costs associated with this item beyond what BHE would spend to comply with the CRMP.

- Number 11: The specific cost of this item could not be estimated; however, staff expect that this effort would be conducted by existing BHE staff and that additional costs would be minimal.

- Number 12: Interior estimated a capital cost of $100,000 and an annual cost of $12,000 to implement this condition. The total annualized cost is $25,900.

- Numbers 13-15: There would be no cost to BHE in providing PIN with recovered artifacts, providing PIN with access to project lands, or consulting with PIN.

- Number 16: Interior estimated an annual cost to implement this condition at an initial rate of $50,000.

- Number 17: (withdrawn).

- Number 18: There would be no cost associated with a reservation of authority.

APPENDIX K

RESPONSES TO COMMENTS

LETTERS OF COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND FERC STAFF RESPONSES

The Notice of Availability of the draft environmental impact statement (DEIS) was published in the Federal Register on November 18, 1994. The DEIS was mailed to federal, state, and local agencies, and individuals for comments immediately prior to the public notice date.

All timely letters of comment that address the analyses in the DEIS were reviewed by the FERC staff. Suggestions for correcting text or data and requests for further discussion of a subject have been given consideration. Those editorial changes and suggestions which were practicable, reasonable, and which improved the quality of the final environmental impact statement (FEIS) are incorporated herein.

Constructive criticism presenting a major point of view or one different than staff's, when persuasively supported, is treated by making revisions in the appropriate part of the FEIS. When the major point of view is not persuasive, reasons are given why the staff did not change its point of view in the space opposite the comment. The sections of the FEIS that have been modified as a result of comments that raised no questions concerning treatment of subject matter in the environmental impact statement have been identified in our responses. Enclosures and attachments received with comment letters are not included in this appendix except those attachments that provide new relevant information or require responses.

The respondents and the page on which their letter occurs are:

RESPONDENT	**DATE**	**SYMBOL**	**PAGE**
Bangor Hydro-electric Company	2/16/95	BHE	K-5
Conservation Intervenors (Atlantic Salmon Federation, Maine Council of Atlantic Salmon Federation, American Rivers, Inc., Maine Audubon Society, Sportsmen's Alliance of Maine, Trout Unlimited, and Maine Council of Trout Unlimited)	2/17/95	CI	
Corps of Engineers, Department of the Army	2/15/95	COE	
Department of Interior	2/16/95	DOI	
Environmental Protection Agency	2/15/95	EPA	
Fish and Wildlife Service	3/12/96	FWS	

Maine Council of the Atlantic Salmon Federation	1/10/95	ASF	K-204
Maine Department of Environmental Protection	2/15/95	DEP	K-213
National Geodetic Survey	12/8/94	NGS	K-233
National Marine Fisheries Service	2/16/95	NMFS	K-236
Penobscot Indian Nation	2/16/95	PIN	K-287
Penobscot River Coalition	1/9/95	PRC	K-328
U.S. Geological Survey	12/5/94	USGS	K-329

COMMENTS FROM BANGOR HYDRO-ELECTRIC COMPANY ON LOWER PENOBSCOT RIVER BASIN DEIS

BANGOR
HYDRO ELECTRIC
COMPANY

33 State Street, P.O. Box 932, Bangor, Maine 04402-0932 Tel. 207-945-5621

VERSAR, INC.
ECOLOGICAL SCIENCES AND ANALYSIS

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FEDERAL ENERGY
REGULATORY COMMISSION

16 February 1995

COPY

FEDERAL EXPRESS NO. 3031178220

Lois Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, NE
Mail Code: DPCA, HL-21
Washington, DC 20426

RE: COMMENTS OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE LOWER PENOBSCOT RIVER
BASIN MILLS 10981, MILFORD ~~2434~~& STILLWATER 2712 - 004
P-2534-005

Dear Secretary Cashell:

In accordance with the Commission's order of 10 January 1995, the following are the applicants's (Bangor Hydro or BHE) comments on the Draft Environmental Impact Statement for the Lower Penobscot River (DEIS). Clearly, staff has done a thorough job in its analysis of the various issues surrounding these projects. We generally support its conclusions. Our comments are presented sequentially following the DEIS.

Executive Summary, Page xxv

BHE-1 The first bulleted item in the middle of the page notes that ". . .since 1968 the salmon run has increased from zero to about 3,500 fish in 1993. . ." and on Figures 3-8 and 4-2 the historic run size is plotted. However, these figures do not show the 1993 run size. Much effort has been devoted to accurately characterizing the Penobscot salmon run. Therefore, we recommend that the final EIS be updated to include the runs of 1993 and 1994, which were 1,774 and 1,049 fish, respectively.

Executive Summary, Page xxvi, bullet point

BHE-2 Although 54.4 MW of new capacity would be added to the capacity in the region, the net addition of capacity is 52.1, since 2.3 MW at Orono would be decommissioned.

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-1 Information on the Penobscot salmon run size in 1993 and 1994 has been added to the executive summary and to figures 3-8 and 4-2.

BHE-2 The executive summary has been revised to indicate the correct value for the net addition of capacity.

COMMENTS FROM BANGOR HYDRO-ELECTRIC COMPANY ON LOWER PENOBSCOT RIVER BASIN DEIS

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Proposed Action and Alternatives - Page 2-10

BHE-3 In the third sentence under "Loss of Angling," the DEIS reads "If these additional measures do not fully mitigate for lost fishing lies above Basin Mills, BHE proposes to create additional artificial lies in the Basin Mills and Veazie Plant C tailraces and further downstream of Veazie to provide full mitigation." The matter of fishing lies and the loss/creation of lies in the draft EIS differs from the material contained in Bangor Hydro's license application information. Bangor Hydro has not indicated that if additional lies are needed they will be added in the Basin Mills and Veazie Plant C tailraces. Bangor Hydro has included a specific number of lies to be created in the tailraces and has said that if additional lies are required they will be created in the reach of river from Veazie Dam downstream to the area of the Bangor Waterworks Dam. This is a major point, because additional lies being created in the tailraces of Basin Mills and Plant C at Veazie will adversely affect the hydraulics at these sites and reduce the energy production (increased tailwater elevations resulting in a reduced net head on the turbines).

Economic Comparison of Alternatives - Page 2-24 Through 2-27

BHE-4 The listed alternatives misstate the alternatives to the proposed projects and the consequences of the alternatives. As a result, the DEIS understates the environmental consequences of the alternatives. For example, natural gas facilities have both particulate matter and greenhouse gas emissions that, if valued at traditional externality values used in New England, may result in significant air pollution externality damages. Similarly, biomass facilities air emissions are similar to new coal facilities (except for much reduced SO_2 emissions). RFD facilities also have air emissions of potential consequence. The environmental consequences of the "no action" alternative, at least in terms of air pollution, should be included in the summary Table E-1.

Economic Comparison of Alternatives - Page 2-23

BHE-5 FERC's estimates of ratepayer savings from the projects are insufficiently documented and appear to be understated. The FERC estimates are based on data in Appendix B, but these materials are insufficient to clearly and fully document the computation of ratepayer savings. Also, in Table 2-2 (page 2-29), levelized annual net benefits of Alternative 2 are listed as $10.79 million ($1995). The present value of this 50-year stream at 8.7% discount rate is $124 million rather than the $98 million reported in Table E-1. Both of these figures are below the net benefits estimated by the applicant using documented methods with appropriate alternatives and with uncertainty analysis and which amount to about $145 million. We recommend inclusion of additional documentation for these calculations, and for the differences between these calculations and the most recent calculations by Bangor Hydro.

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-3 The language in Section 2.1.1.1 has been corrected to more accurately reflect BHE's proposal.

BHE-4 We have revised and expanded Section 2.4.2 but did not expand our discussion of potential environmental impacts of the alternative energy sources. We point out in our discussion that combined cycle gas turbine generators would be the most likely means of generating the energy needed to meet power needs should the projects not be licensed as proposed. As we note in that section, impacts associated with such facilities would, for the most part, be minor for the resources considered. Thus we believe our presentation provides sufficient information to support our comparison of alternatives.

BHE-5 FERC has implemented a new approach to analyzing project economics (see Mead Corporation, Publishing Paper Division, 72 FERC Para. 61,027, July 13, 1995). Your comments on the economic comparison of alternatives presented in the DEIS are no longer applicable. See our revision of section 2 of the FEIS.

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BHE-6

Economic Comparison of Alternatives - Page 2-29

The first description of Alternative 5 appears on page 2-23 and reads "...Refurbishing/relicensing Orono at present capacity, decommissioning and removing Veazie, and not constructing Basin Mills..." The descriptions in the environmental sections would indicate that these include relicensing/refurbishing Orono Dam.

Table 2-2, Alternative 5 indicates that the Orono Development will be "relicensed and refurbished," however, under the Average Annual Generation (GWh) there is no (0.0) energy generation listed. Based on the other material in the DEIS, it appears that this number should be 17.7. We are not clear why Alternative 5 is described differently than in the other portions of the DEIS. As an example, on page 2-30 it states under Alternative 5 that it includes ". . .relicensing the Orono development and refurbishing it after 4 years of operation. . ." Compare this with footnote 17 on page B-12 which reads that Alternative 5 ". . .assumes that Orono would continue to operate for four years after the assumed licensed date of January 1995. At that time, the facility would be decommissioned. . ."

The third paragraph under section 2.6.1.3 at the top of the page reads ". . .The net benefit for Alternative 5 is negative because there is no generation to offset the cost of the proposed dam decommissioning and removal and the cost of minor enhancements. . ." If Alternative 5 does include relicensing/refurbishing of Orono, then this statement will need to be revised.

BHE-7

Affected Environment - Page 3-19

At the end of the second paragraph, there is a reference to Figure 3-8 which shows a plot of the total Atlantic salmon run at Veazie along with a breakdown of the trap catch and the rod catch through 1992. The figure should be updated to show the years 1993 and 1994. The 1993 trap catch was 1,650 with a rod catch of 574 (124 killed). The 1994 trap catch was 1,042 with a rod catch of 182 7 killed).[1] This is important when you consider that the 1994 run was from historically high smolt stocking, additional hatchery fry plantings, and no loses to marine fisheries as a result of a complete high seas fishing moratorium. The same update would apply to Page 3-51 (third paragraph).

---

[1] Fish killed in the sport fishery should be added to the trap catch to obtain the total run size.

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-6 We concur with your comment. We have revised the text in section 2.6 and elsewhere to make the description of this alternative consistent throughout the FEIS.

BHE-7 The text, figures and tables in the FEIS have been updated to include the 1993 and 1994 salmon run size data.

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Affected Environment - Page 3-27

BHE-8 The paragraph of text following table 3-8 identifies MDMR's alewife restoration goal for the Penbscot River as 14.5 million fish. MDMR's goal is made up of two stages--Phases 1 and 2. Its goal for Phase 1 is 8.9 million fish. However, Bangor Hydro's modeling has shown the Phase 1 goal to be over optimistic by about 32%, i.e., the river can practically sustain only 6 million fish (Ritzi prefiled testimony for criteria 7(B) at pages 60-61). Lewis Flagg, testifying on behalf of MDMR at the 401 WQC hearings for Basin Mills accepted Bangor Hydro's modeling results. (Transcript at pages 1776-1777). Therefore, the final EIS should reflect this reduction in alewife potential.

Affected Environment - Page 3-28

BHE-9 In the second paragraph at the bottom of the page under American shad, there is a reference to the MDMR's restoration goal as being 1.4 million fish, which is based on the estimated production of shad from existing suitable habitat in the basin. During the 401 WQC hearings MDMR revised its goal downward to between 500,000 and 700,000 fish. (Flagg, Transcript page 1718) The restoration numbers in the final EIS should reflect this revised agency goal.

Figure 3-14, Page 3-48

BHE-10 This figure and associated text (e.g., 4-122) should be revised to note existing canoe portage trails around Milford Station and Orono Dam.

Staff Conclusions - Page 4-19 and Page 5-8

BHE-11 The genetics/biology of trapping and trucking of salmon is discussed on 4-19 and again on Page 5-8. While we wholeheartedly agree with the intuitive nature of the conclusion (genetics have nothing to do with the mode of passage) we do note that the reader is pointed to further discussion of this matter in Appendix F. We could not readily find it.

Environmental Impacts - Page 4-23

BHE-12 At the end of the first paragraph, the USFWS's FEIS (1989) is referenced and the goal of a self-sustaining population of Atlantic salmon by the year 2021 is noted. However, the reference does not mention the retention of 30 percent of the existing hatchery component as a goal of the FEIS. FERC's final EIS should reflect this extremely important point, as it is central to the definition of a self-sustaining population and the use of hatchery fish for mitigation.

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-8 The text on page 3-27 has been corrected.

BHE-9 The text on page 3-28 has been corrected.

BHE-10 Figure 3-14 has been corrected and the text has been corrected in Section 3.9.2.3.

BHE-11 Our expanded discussion of this issue appears in section 4.3.3.2 of the FEIS.

BHE-12 We have incorporated that information into the text that you cite.

COMMENTS FROM BANGOR HYDRO-ELECTRIC COMPANY ON LOWER PENOBSCOT RIVER BASIN DEIS

Environmental Impacts - Page 4-37

BHE-13 At the bottom of this page, it is noted that the removal of the Bangor Dam would not improve upstream migration efficiency (for Atlantic salmon). The MDMR and ASRSC are on record that the removal of the dam will improve upstream fish passage for all anadromous species of the Penobscot River.

Environmental Impacts - Page 4-74

BHE-14 The first paragraph discusses the restoration of Atlantic salmon and the results of the ASAL model runs for the DEIS. We recommend that the final EIS be clarified to state that the ASAL modeling did include mortality associated with trap and transport, as well as fallback at the dams, i.e., the 24% elimination of passage losses represents a net number.

Environmental Impacts - Page 4-110

BHE-15 In the fourth paragraph, it is noted that 71 rods of fishing opportunity will be lost with Basin Mills constructed. However, in our studies we reported that this was the maximum number of potential rods that could be impacted. The study suggests that 54 potential rods is the actual impact. Staff has selected the maximum possible as the actual impact. The final EIS should acknowledge this point.

BHE-16 At the bottom of the page, it is noted that "...Creating lies in this area would be reasonable mitigation for some of the resting areas lost to inundation by the Basin Mills impoundment; however, BHE does not quantify the number of lies that might be created." The draft EIS then goes on to calculate that the tailrace could provide for one boat lie and one shore lie. Bangor Hydro's responses to FERC's December 5, 1990 Request for Additional Information filed in March 1991 (pages 18 - 20) provide the determination of lies in the Basin Mills and Veazie Plant C tailraces (10 and three lies, respectively). This discrepancy should be resolved in the final EIS.

4.0 Environmental Impacts - Page 4-115

BHE-17 At the bottom of the page under "*Basin Mills*," it reads that ". . .BHE proposes the following recreation facilities in the Basin Mills project area to be completed by the end of the third year of the license:. . ." The draft EIS then lists the 9 recreational areas that were included in the mitigation proposal. The schedule for the construction of the recreational facilities does not specify that they will be completed by the end of the third year of the license. In some cases it will not be possible to complete the recreational facilities until the end of the construction activity in a certain area (i.e., the day use park at the west end of the Basin Mills Dam cannot be

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BHE-13 We reviewed the material in the record from MDMR and ASRSC on this issue and found that at the time of their comments, Bangor Dam was breached, but a substantial portion of the structure remained. During Staff's site visit in 1993, our observation was that the dam remnants had degraded significantly and the majority of the dam structure had been removed by natural forces. The text explains why our position differs from the earlier views of MDMR and ASRSC.

BHE-14 We have expanded the discussion of the ASAL model to indicate that these factors were accounted for. We note that such information is provided in the ASAL model documentation in Appendix E.

BHE-15 The language of the EIS states that "as many as" 71 lies would be lost and does not state that all 71 lies "will" be lost. The 1989 CRA Study concluded that, of the 81 potential rods identified above the proposed Basin Mills impoundment: 46 will definitely be lost to inundation; 8 will probably be lost; 17 may or may not be lost; and 10 will remain unchanged. The number 71 is the maximum that would be lost. Present use of this reach of river for salmon fishing is 95 user days per year (Risk 1991 and Rowe et al. 1989).

BHE-16 The text in Section 4.8.2.1 has been corrected to reflect the information provided in BHE's response to the Commission's December 5, 1990 Additional Information Request.

BHE-17 The text has been corrected to reflect the proposed construction schedule for recreation facilities.

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BHE-17 Cont'd

completed until the construction activity at the west end of the dam is completed and the contractor has vacated the area following completion of the recreation site).

The schedules in Volume I of XIV of the license application (Exhibit C) depict the schedule for the construction of the recreation areas that will be part of the Veazie expansion (years 2 and 3 of the construction schedule), and the Basin Mills recreation sites (years 5 and 6 of the construction schedule). These could be years 4 through 10 of the new license (assuming BHE has 2 to 4 years to start construction.

BHE-18

4.0 Environmental Impacts - Page 4-120

On this page, the DEIS recommends the following requirements for resolving the Atlantic salmon fishing opportunity/angling impacts of the Basin Mills Project:

While we agree that there is a need for postconstruction monitoring of fishing activity and monitoring of angler use of the artificially created lies stipulated in the WQC, more explicit guidelines for the study are needed, and preconstruction monitoring of salmon angling should be done to establish baseline data against which to compare the postconstruction effectiveness of existing or newly created lies.

We recommend, therefore, that BHE develop a salmon angling monitoring plan, consistent with the requirements of WQC conditions 9, 15 and 16 and in consultation with MDEP, ASRSC, FWS, and Penobscot River salmon angling clubs, that at a minimum includes:

- *a definition of measurable and quantifiable criteria that will be used to measure angling opportunity and salmon angling;*
- *a statistical design that will allow for lie/rod specific quantification of angling use and angling success; and*
- *a statistical analysis approach that will allow for pre- and post-construction comparisons of salmon angling activity and for factors unrelated to project operation and effects (e.g., fluctuations in salmon abundance, changes in salmon fishing regulations) to be taken into account in assessing project impacts on salmon angling.*

The study design should be filed with the Commission at least 90 days before the beginning of the first salmon fishing season following issuance of a project license, together with documentation of consultation with all parties noted above. The study should be initiated in the first year after

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-18 Our recommended guidelines for a salmon angling monitoring plan are necessary to provide a statistical, quantifiable, and objective method of measuring angling opportunity. The methods used in the 1989 CRA study can be improved to meet these more scientifically based criteria.

BHE-18
Cont'd

the project license is issued (before construction begins) and continued for 5 years after completion of project construction. Reports of study findings shall be filed with the Commission annually. The Commission reserves the right, as does MDEP in WQC Condition 9, to require creation of additional artificial salmon lies or implementation of additional riverine modifications as are deemed necessary to achieve angling opportunity goals, based on the results of the monitoring. We recommend that BHE file plans for Bangor dam removal and for monitoring fishing enhancements pursuant to Conditions 9, 15, and 16 with the Commission for approval.

Bangor Hydro believes these DEIS study requirements are more detailed then necessary to assess impacts and the effectiveness of the mitigation proposed. To make this argument we have only to track the chronology and logic of the assessment of fishing opportunity impacts.

BHE-18
Cont'd

We inventoried existing Atlantic salmon fishing opportunity by a 1989 study (CRA 1989) which used the consensus opinion of expert Atlantic salmon anglers to identify potential lies and quantify fishing opportunity. The ultimate standard unit selected to quantify fishing opportunity was a "rod," with each boat lie accommodating two rods and each shore lie one rod. Further, each rod required a minimum physical area for safe casting and angling aesthetics:

> Boat: Each boat requires a rectangular area approximately 70 feet long and 40 feet wide, with the long axis in line with the current.
>
> Shore: Each angler requires an area of approximately 50 feet by 35 feet, with the 50 foot dimension along the shoreline and the 35 foot dimension extending from the shore towards midstream.

The overall definition of fishing opportunity was "the reasonable certainty that a competent angler can catch a salmon." Using this definition, and the criteria for lies and rods, the expert angler team identified potential lies and quantified potential rods above the Veazie Dam, and essentially tallied the historic and proven lies below--Veazie, and assigned rods. There was no attempt to identify potential lies in the Orono bypass or to assess the impacts of various degrees of inundation in the Basin Mills reach. The important point here is that the existing lies downstream of Veazie, are known to qualify as fishing opportunity, while the potential lies identified upstream of Veazie have yet to be shown to actually provide fishing opportunity.

Furthermore, the DEIS notes that the Maine WQC requires the following conditions related to Atlantic salmon fishing opportunity:

BHE-18
Cont'd

9. ***Bangor Dam Removal:*** *The applicant shall completely remove the remains of the breached Bangor Waterworks dam and shall preserve the site from future development after removing the dam. The applicant shall also monitor and report on the angling opportunity.*

15. ***Angling Opportunity:*** *The applicant shall create artificial salmon lies in the Veazie Plant C tailrace and Basin Mills tailrace and shall monitor and report on the effectiveness and permanence of these lies. The Department reserves the right to require additional angling mitigation actions based on the results of the monitoring. [BM, V]*

16. ***Veazie Design and Operation:*** *The applicant shall conduct a hydraulic modeling study and shall design and construct the Veazie Plant C tailrace to minimize the effect of Plant C discharges on existing angling opportunity. The applicant shall also operate the Veazie development to maximize salmon angling below the dam without unacceptably impairing fish passage. [V]*

BHE-18
Cont'd

Conditions Nos. 9 and 16 are not questioned by the DEIS, however, the DEIS recommends very detailed and complicated monitoring studies to satisfy Condition No. 15. Not only is it highly questionable that there could be a study design and data collection that would result in the definitive results considered essential by the DEIS, but a review of the original study (CRA 1989) goals and results raises serious concern whether the DEIS monitoring requirements are necessary to assess post-project fishing opportunity and mitigation results.

The key to this discussion is the 1989 study definition of fishing opportunity, i.e., "the reasonable certainty that a competent angler can catch a salmon," (CRA 1989 at page 5), the DEIS does not challenge the competence of the team of expert anglers to identify proven or potential lies, nor the concepts of two rods per boat lie and one rod per shore lie, nor the physical dimensions for each rod (as shown by citing of these criteria at page 3-51, Footnote 16, of the DEIS). Clearly, the DEIS accepts the quantification of fishing opportunity in the 1989 study and the license application.

Therefore, it would appear logical to make any additional pre-project assessments and all post-project assessments using the same study methods as the original 1989 study, with the obvious need to document <u>where</u> salmon are being caught, but without the need for all the detailed quantitative data indicated by the DEIS. It should be necessary only to document that salmon are indeed being caught at a location to establish that location as a true lie. Then the physical requirements established for boat and shore rods can be applied to determine the total number of rods of fishing opportunity, which is the quantification needed for valid assessment of impacts and mitigation.

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BHE-18 Cont'd

It is not necessary to rate each lie as to the actual number of salmon taken each year, and indeed, with all the complicated variables involved, it would be a herculean and probably hopeless task to attempt such comparative quantification. Therefore, the Licensee proposes that the only monitoring studies necessary or practical are those necessary to establish where salmon are caught, with the possible exception that after consideration of study effort, it might be concluded that an area where only one salmon had been caught might not qualify as a lie.

BHE-19

Staff Conclusions - Page 5-11

In the last paragraph, the number of rods is incorrect. The paragraph also presents the case that 71 rods of fishing opportunity would be lost because the fishing lies would be flooded out. As noted above, this represents a maximum potential number of lies. In reality the lies in the upper end of the impoundment would have additional depth of water, but may not be lost.

BHE-20

Staff Conclusions - Page 5-32 and 33

There appears to be a discrepancy regarding the type of fishway that FERC will allow at Stillwater. On page 5-32 in the last bulleted item, it notes that a vertical slot or fishlift is required; however, in the second paragraph on page 5-33, it lists a standard Denil, vertical slot or fishlift as required.

BHE-21

Appendix D - Page D-11

The third bullet notes a 4.2 percent loss of upstream migrating adults. On Table D-5, existing conditions for upstream migration is listed at 70.6 percent and with Basin Mills it is listed as 64.3 percent (difference of 5.3 percent). In addition, on Table D-7 the percent upstream survival with and without Basin Mills shows 55.78 percent versus 51.32 percent (difference of 4.46 percent).

BHE-22

4.12.2.2 - Page 4-161

Second paragraph should be "...the present tax rate of 1.98 percent," not 19.8

BHE-23

4.12.4 - Page 4-163

Fifth paragraph. Reference at the end of the paragraph to Alternative 3 should be to Alternative 4.

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE-19 See response to 15 and 16 above.

BHE-20 We have revised the text to eliminate the discrepancy in the FEIS. The required fishway types are those specified in DOI and NMFS Section 18 prescriptions for the project.

BHE-21 We have corrected these discrepancies in the text.

BHE-22 The EIS has been changed to indicate that the tax rate in Orono is 1.98 percent or $19.80 per $1,000 of value.

BHE-23 We have corrected this typographical error in the FEIS.

COMMENTS FROM BANGOR HYDRO-ELECTRIC COMPANY ON LOWER PENOBSCOT RIVER BASIN DEIS

Lois Cashell, Secretary
Page 10
16 February 1995

Thank you for the opportunity to comment on the DEIS. Please call if you have any additional questions.

Sincerely,

Alan M. Spear
Environmental Compliance Specialist

AMS/jak
xc: Service List
    D. Morrell
    C. Ritzi
    J. Tarbell
    J. Whittaker

RESPONSES TO BANGOR HYDRO-ELECTRIC COMPANY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COPY

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Bangor Hydro-Electric Company) Project No. 10981-000
Basin Mills Project)

COMMENTS OF INTERVENORS ATLANTIC SALMON FEDERATION, THE MAINE COUNCIL OF ATLANTIC SALMON FEDERATION, AMERICAN RIVERS, INC., MAINE AUDUBON SOCIETY, THE SPORTSMEN'S ALLIANCE OF MAINE, TROUT UNLIMITED, AND THE MAINE COUNCIL OF TROUT UNLIMITED ON FERC DRAFT ENVIRONMENTAL IMPACT STATEMENT, LOWER PENOBSCOT BASIN

Intervenors the Atlantic Salmon Federation, the Maine Council of the Atlantic Salmon Federation, American Rivers, Inc., Maine Audubon Society, the Sportsmen's Alliance of Maine, Trout Unlimited, and the Maine Council of Trout Unlimited (collectively "Conservation Intervenors") offer the following comments on the Federal Energy Regulatory Commission's Draft Environmental Impact Statement, Lower Penobscot River Basin (Projects Nos. 10981, 2712, 2534) (the "DEIS").

CI-1

Conservation Intervenors believe that the DEIS is fundamentally flawed, and that the pervasive errors and omissions in the draft document preclude either the Commission or the public from fairly evaluating the environmental impacts of the projects it covers. We believe, accordingly, that the Commission must circulate an entirely new draft EIS that addresses and corrects the many fundamental problems in the current DEIS. Conservation Intervenors also believe that the action recommended by the staff in the DEIS -- construction of the Basin Mills project essentially as proposed by the applicant -- would violate the Commission's responsibilities under the Federal Power Act.

CI-1 Opinion noted.

COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-1 Cont'd

We discuss the serious problems in the DEIS, and state our views concerning the staff's recommended action, in detail below.

CI-2

Project purpose and need.

The DEIS's discussion of the purpose and need for the proposed actions is inadequate and misleading. The Council on Environmental Quality's regulations implementing NEPA require an EIS to specify "the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." 40 C.F.R. § 1502.13. The DEIS defines the purpose of the proposed action in circular terms as "whether the Federal Energy Regulatory Commission ... should issue new licenses for the projects...." DEIS 1-1. Although the DEIS cites the Commission's authority under § 10 of the Federal Power Act to license developments that are best adapted to a comprehensive plan for improving or developing a waterway for a wide range of beneficial public uses, including the "adequate protection, mitigation, and enhancement of fish and wildlife," the only need that apparently underlies the Commission's present action is Bangor Hydro-Electric Company's asserted interest in generating hydroelectric power on the Penobscot River. The DEIS's discussion of need is exclusively focused on the need for power, without identification of other needs of equal importance to a comprehensive plan for improving the Penobscot, such as improved fish passage and habitat restoration.

Conservation Intervenors believe that the DEIS should identify the <u>applicant's</u> purpose as the generation of electricity, thus

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-2 The Purpose of Action (1.1) and Need for Power (1.2) sections of the FEIS have been revised in response to your and similar comments from other respondents. In addition, various issues relating to Purpose of the Action will be addressed in the orders to be issued for these projects. Also, see our response to Interior's comment, DOI-12.

CI-2
Cont'd

permitting the Commission and other agencies, such as the Corps of Engineers, to evaluate whether there are feasible alternatives to fulfill the applicant's purpose with less environmental impact. Conservation Intervenors believe that the mandate of the Federal Power Act requires the Commission, however, to consider <u>other</u> needs affecting the comprehensive development and improvement of the Penobscot River such as the need for "adequate protection, mitigation, and <u>enhancement</u> of fish and wildlife (including related spawning grounds and habitat)." 16 U.S.C. § 803(a)(1).

On the record before FERC, there is overwhelming need to restore a proper balance between development and fish and wildlife protection within the Penobscot basin. As the DEIS openly acknowledges, "[w]ith the construction of more than 117 dams in the Penobscot River Basin over time, anadromous fish species, including Atlantic salmon, American shad and alewife, historically have been affected to the point of extirpation (for salmon and possibly American shad) or severe stock reduction (for alewife)." DEIS 5-7. <u>See</u> DEIS 3-18 - 19 (describing loss of habitat and impact of dams on fish passage). The near-total destruction of the Penobscot's once-flourishing fish resources has had severe impact on public enjoyment of the river and on the Penobscot Indian Nation. <u>See</u> DEIS 3-63, 4-148 (describing dependence of PIN on salmon for sustenance and spiritual value).

The present application concerns a proposal to build yet <u>another</u> mainstem dam on the Penobscot River, further damaging the prospects for restoration of the river's fish populations. The

CI-2
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CI-2
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Basin Mills Dam would convert the entire lower mainstem of the Penobscot River, from Veazie to the upper limit of the Milford impoundment, into a stair-step sequence of impoundments, without <u>any</u> free-flowing river habitat. The proposal to construct an additional barrier on a river already so impounded that natural populations of fish have virtually been extirpated, and can hope to be restored only through a massive combined effort of the state and federal fish and wildlife agencies, should raise an obvious issue for the Commission: whether a comprehensive plan for development and improvement of the Penobscot River's resources should focus instead upon removal of obstacles, and restoration and enhancement of fish passage and habitat within the basin. Conservation Intervenors believe that § 10 of the Federal Power Act requires the Commission explicitly to identify that need in this document, and to develop alternatives to meet that need.

In the absence of such explicit identification of other urgent resource needs within the Penobscot River basin, the Commission risks according power generation, the <u>applicant's</u> need, an overriding weight that is contrary to the Federal Power Act's mandate for equal consideration of development and protection of fish resources. 16 U.S.C. § 797(e). That implicit deference to power generation appears to have occurred in the staff's evaluation of alternatives in the DEIS. Alternative 5 was the <u>only</u> alternative considered in the DEIS that would substantially enhance and restore fish passage and habitat through the removal of an existing barrier, Veazie Dam. Yet Alternative 5 was rejected by

CI-2
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the staff simply on the grounds that it was too costly in terms of foregone economic benefits from power generation. If the Commission were to explicitly recognize a need to restore and enhance fish passage and habitat on the Penobscot River, however, Alternative 5 would be the only alternative in the present scope of analysis to serve that need, precluding its rejection on economic grounds alone.

Even as limited to the applicant's interest in generating power, the DEIS's discussion of the need for such generation is wholly inadequate to justify the Commission's issuance of a license. The DEIS presents only the most superficial analysis of the need for new generating capacity in New England, relying on outdated NEPOOL forecasts and general state-wide economic growth projections. The DEIS fails altogether to identify a need for additional capacity in BHE's own service territory. Moreover, the regional need identified in the DEIS for new capacity extends only to the year 2002; the proposed Basin Mills project will likely come on line after that date, and will provide generation for 50 years into the future. A reasoned discussion of the need for additional capacity in that time frame is necessary to justify construction of such a long-lived project. Similarly, as discussed below, the DEIS must consider and evaluate the energy generation technologies, and demand side management measures, that may be available as alternatives to this project during that lifespan in order to assess whether the project will in fact provide any net economic benefits.

COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-3

Alternatives.

As the CEQ regulations observe, the discussion of alternatives "is the heart of the environmental impact statement." 40 C.F.R. § 1502.14. Unfortunately, the present DEIS's consideration of alternatives is so deficient that the equivalent of a heart transplant -- the circulation of an entirely new draft -- is required.

First, the DEIS fails to provide a true baseline alternative against which the Commission could properly evaluate the cumulative impacts of existing and proposed dam development within the lower Penobscot River basin. The "No-Action" alternative identified by the staff is an arbitrary construct, assuming the continued operation of all existing dams on the lower river under a perpetual series of annual licenses from FERC. That assumption is plainly unrealistic: the Commission would not, and cannot lawfully bypass the legal requirement of relicensing, and the consideration of needed improvements in fish passage and other areas, through issuance of annual licenses indefinitely. While the "No-Action" alternative identified in the DEIS may serve a purpose in describing the current benefits and impacts of the dams on the lower Penobscot River, it plainly does not establish a true environmental baseline.

To establish an appropriate baseline, Conservation Intervenors believe that FERC should describe the "without-project" alternative: that is, the environmental and socioeconomic conditions that would exist in the lower Penobscot River in the

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-3 The baseline for environmental evaluation is the existing condition of the waterway (Platte River Whooping Crane Critical Habitat Maintenance Trust v. FERC,). 876 F.2d109 (D.C. Cir. 1989) provides that the Commission institute "temporary, rough and ready measures" to prevent irreversible environmental damages caused by any project operating on an annual license. This comment will be further addressed in the orders to be issued for these projects.

COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-3 Cont'd absence of any of the projects under consideration for licensing. The "without-project" alternative would permit the Commission to accurately evaluate the cumulative impacts that these projects have inflicted upon the resources of the Penobscot River, and to weigh whether a comprehensive plan for the river should be directed toward restoration and enhancement of those resources, rather than generation of additional power. The without-project alternative may be seen as the no-action alternative if no-action is defined as denial of licensing and decommissioning of the existing projects (in contrast to the staff's unrealistic assumption of continued annual licenses without relicensing at all). In any event, the without-project alternative must be separately described in order to establish an appropriate baseline for analysis of cumulative impacts.

CI-4 Second, the DEIS fails to evaluate obvious alternatives that may provide a more appropriate balance of power generation benefits and resource protection than the proposed action. As the Commission is aware from the previous comments of intervenors Atlantic Salmon Federation et al., and from the record of the proceedings before the Maine Board of Environmental Protection concerning the Basin Mills project, the consistent position of the Conservation Intervenors and of the responsible federal and state fish and wildlife agencies has been that Basin Mills could be constructed if its impacts on fish passage and habitat were fully mitigated by removal of an existing mainstem dam (or a combination of a mainstem dam and a dam on a tributary to the Penobscot River).

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-4 While NEPA requires that an EIS include a consideration of alternatives, a discussion of the alternatives need not be exhaustive and need only provide sufficient information to permit a reasoned choice among alternatives[1]. Appendix D of the DEIS evaluates the "new" alternatives (1) & (3) that you have presented. We conducted a preliminary economic and biological evaluation of several to determine whether they represented viable alternatives to our preferred alternative. The results of our evaluation can be found in Sections 2.3 of the FEIS. None of these new alternatives offered a combination of fishery and power benefits significantly outside the range of our original reasonable alternatives evaluated in the DEIS. On this basis, we did not pursue these alternatives further.

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[1] See Richard Balagur, 57 FERC ¶ 61,315 at p. 62,018, citing State of North Carolina v. Federal Power Commission, 533 F.2d 702, 707 (D.C. Cir. 1976). See also the analysis in Marysville Hydro Partners, 63 FERC ¶ 61,271 pp. 62,74-44 (1993).

CI-4
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That alternative could offer a true "win-win" possibility for the Commission, the applicant, the federal and state fishery agencies, conservationists, and the Penobscot Indian Nation: the benefits of a modern, efficient hydroelectric facility could be combined with removal of an obsolescent barrier on the river, offsetting any impact on fish passage and potentially improving fish habitat.

Despite the fact that public debate over the Basin Mills project has centered on this mitigation possibility, however, the DEIS inexplicably fails <u>even to consider</u> an alternative that joins construction of Basin Mills with the removal of any dam. Alternative 5 in the DEIS evaluates the removal of Veazie Dam, but it does not do so in conjunction with the construction of the Basin Mills project. As a result, Alternative 5 incurs substantial economic costs in foregone power generation benefits, leading the staff to reject it altogether. An alternative that joined construction of Basin Mills with removal of a mainstem dam such as Veazie or Great Works and a tributary dam such as Howland could result in a substantial net gain in power generation, significant economic benefits, and significant enhancement, or at least full mitigation, for fish passage and habitat. Conservation Intervenors discuss below their view that the DEIS unfairly exaggerates the cost of dam removal; realistic appraisal of the potential for removal of aging dams on the Penobscot River confirms that dam removal is an obvious mitigation measure that must be fully evaluated by the Commission in the DEIS's alternatives.

Conservation Intervenors believe, therefore, that the

CI-4
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CI-4 Cont'd

Commission must evaluate at least the following alternatives:

(1) construction of Basin Mills while removing Veazie;

(2) construction of Basin Mills while removing Veazie and Howland dams;

(3) construction of Basin Mills and expansion of Veazie while removing Great Works dam;

(4) construction of Basin Mills and expansion of Veazie while removing Great Works and Howland dams.

CI-5

Conservation Intervenors also note that the Commission staff's definition of alternative 4 is arbitrary in including trapping and trucking as a mitigation measure, despite excluding the proposed Basin Mills project. Neither the applicant nor any agency has ever proposed implementing trap and truck as mitigation for the expansion of Veazie, since the new power station at that dam will not impose significant impacts on (and indeed will likely benefit) fish passage. Given the open opposition by the responsible federal and state fish and wildlife agencies to the use of trap and truck as a permanent component of their management of the fish populations on the Penobscot River, the staff's inclusion of trapping and trucking in Alternative 4 seems purely arbitrary, and suggests the staff's intention simply to overrule the responsible fishery agencies concerning the appropriate techniques for salmon restoration. The inclusion of trap and truck in Alternative 4 imposes significant mitigation costs on that alternative, and presents a misleading picture of the comparative benefits of expanding Veazie and/or Orono while not constructing Basin Mills.

CI-5 Trap-and-truck was included in Alternative 4 because our analysis indicated that it would provide for significant enhancement in growth of American shad and alewife populations that would not occur otherwise. L. Flagg, Maine Division of Marine Resources, indicated during his testimony in the state WQC hearings, that trap-and-truck would be of value in its anadromous fish restoration efforts. Under Alternative 4, FERC would require BHE to make the resources for trap-and-truck operations available to the fisheries management agencies. Whether the agencies would avail themselves of those resources would be their own choice. As shown in Table 2-8, we estimated the cost of trap-and-truck capability at $401,400, a figure that does not include operation and maintenance costs. This represents from about 6 to 26 percent of the total mitigation costs of the Alternative 4 options. Thus the cost is not major for several of the options.

CI-6 Indeed, the DEIS's analysis of Alternative 4 appears to conclude that expansion of Veazie has negative economic value, since the benefits of every variation considered in Alternative 4 are less than those of the No-Action alternative. The obvious question, therefore, is why the DEIS does not consider an alternative in which Basin Mills dam is constructed but Veazie C station is not built. If the economic analysis in the DEIS is to be believed (we note below that the DEIS's economic analysis is deeply flawed), the alternative with the highest economic benefits is building Basin Mills alone.

CI-7 Finally, the DEIS's explicit exclusion from consideration of energy conservation and renewable energy sources is a fatal, and inexplicable flaw that mandates recirculation of a new draft. The DEIS states that, as part of the No-Action alternative, the staff evaluated alternative energy sources that would replace the construction of the Basin Mills development and the expansion of Veazie and Milford dams. (Consideration of alternative energy sources also forms an integral part of Alternatives 4 and 5, which must evaluate replacement power for Basin Mills and/or Veazie). The staff immediately excluded from consideration, however, any source that does not burn fossil fuels, including energy conservation, improvements in efficiency of existing hydropower generation, reduction of loss during transmission and distribution, and wind generation. DEIS 2-25. The staff labels such sources of demand side management and innovative generation "nonexclusionary energy sources," asserting that all such sources "would be

CI-6 Economics for all developments and projects have been revised in the FEIS to reflect the current value approach currently employed by FERC as discussed in Mead Corporation Publishing Paper Division, 72 FERC ¶61,027, July 13, 1995. As can be seen in Section 2.6, all alternatives except no action now show negative net annual benefits.

CI-7 In Appendix D, Table D-9 we present our evaluation of an alternative including construction of Basin Mills and removal of Veazie. As we point out in section 2.4.1, conservation as an alternative energy source is fully accounted for in both the DEIS and FEIS need for power analyses. We discussed wind energy in section 2.4.2. We found wind power to be non-competitive in price and unreliable since Keneteck Windpower, Inc., the only windpower firm in Maine, declared bankruptcy in early 1996. We conclude that, in our analysis, we compared the proposed project to all reasonable alternative energy sources without exclusion.

CI-7
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constructed or implemented in addition to hydropower rather than replace hydropower, because all such energy sources have low marginal costs and would be used to displace higher cost fossil fueled generation rather than to displace each other in actual practice." Id. The staff also excludes purchased power from consideration on the grounds that it is included in such nonexclusionary sources. Id.

As the attached letter from Paul L. Chernick, President of Resource Insight, Inc., observes, the staff's conclusions defy reality, and are fundamentally arbitrary. Letter from Paul L. Chernick to Robert G. Dreher (February 17, 1995) (attached as Exhibit A). In reality, investment in a major new generation facility will deter a utility from investment in other available measures to meet its capacity needs, including cost-effective demand side management measures and innovative alternative generation technologies, such as windpower. Indeed, as Mr. Chernick points out, the current glut of energy capacity within New England has led many utilities to defer or delete energy conservation measures that they had identified as cost-effective. The staff's assumption that all forms of non-fossil-fueled generation will be fully developed is simply naive.

The effect of excluding every form of non-fossil fueled generation from consideration as an alternative to Basin Mills is to unfairly skew the economic benefits of the project, precluding the Commission or the public from making an informed decision concerning the relative benefits and costs of the project. By

CI-7
Cont'd

COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-7 Cont'd comparing the benefits of low marginal cost hydropower only against high marginal cost fossil-fuel generation, the DEIS exaggerates the true economic benefits of the Basin Mills project; comparison with energy conservation or windpower would produce a far smaller apparent advantage. As we discuss below, the staff's analysis of fossil-fueled technologies, such as gas combined-cycle turbines, is also fundamentally flawed, exaggerating the costs of such generation and thereby inflating the benefits of the Basin Mills project.

CI-8 The DEIS thus:

(1) fails to define an appropriate without-project baseline;

(2) fails to consider any alternative that combines construction of Basin Mills dam with removal of any dam;

(3) arbitrarily includes an expensive and inappropriate mitigation measure, trapping and trucking, in an alternative that does not include Basin Mills;

(4) fails to consider building Basin Mills without expanding Veazie, despite the fact that such an alternative would appear to offer the highest economic benefits; and

(5) arbitrarily and unreasonably excludes from consideration every alternative form of energy generation that does not involve combustion of fossil fuels.

The combined effect of these fundamental errors and omissions is to preclude the Commission, other agencies, and the public from making a reasoned evaluation of the relative benefits and costs of the Commission's proposed action. For this reason, Conservation Intervenors believe that the Commission must circulate a new draft EIS that gives appropriate consideration to the neglected alternatives (and that corrects the many other errors in the DEIS's analysis discussed below).

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-8 We concluded that new data and information submitted by respondents with comments on the DEIS were insufficient to warrant preparation of a supplemental DEIS.

Economic Benefits

CI-9 Conservation Intervenors believe that the DEIS's economic analysis is so fundamentally flawed that it cannot serve as a basis for the Commission or the public to evaluate the relative benefits and costs of different alternatives. Conservation Intervenors submit herewith an analysis of the DEIS prepared by Paul L. Chernick, President of Resource Insight, Inc. (Exhibit A). Mr. Chernick, who has substantial experience as a utility analyst, concludes that the DEIS:

1. Does not establish the need for Basin Mills power;
2. Relies improperly on BHE's estimate of replacement costs, which are based upon unsuitable, and expensive resources.
3. Improperly excludes several of the most cost-effective resources (including conservation and wind).
4. Understates the cost of Basin Mills by understating the costs of financing the unit.

Conservation Intervenors rely upon and incorporate Mr. Chernick's analysis. Conservation Intervenors call to the Commission's attention Mr. Chernick's conclusion that, if Basin Mills is compared against a more appropriate form of replacement energy, such as gas combined cycle turbines or wind power, <u>the perceived economic benefits of the project are entirely eliminated</u>, leaving the net benefits of No Action as the highest alternative. Letter from Paul Chernick to Robert G. Dreher (February 17, 1995) at 9.

CI-10 Conservation Intervenors also believe that the DEIS commits

CI-9 See response CI-6, above. All economics analyses have been revised using the current value approach. Our results show, as you describe, No-action yielding the highest net annual benefits. However, as the Commission explains in <u>Mead</u> and we discuss in Section 5, project economics is only one factor that we take into account in our public interest balancing.

CI-10 We acknowledge that the existence of an Atlantic Salmon run in the Penobscot unassisted by man would have intrinsic value to the PIN and others. We also recognize that various methods have been developed that attempt to express existence values in dollars. However, the efficacy of attempts to quantify such values is a matter of continuing debate.

We are aware of only one existence value study directly pertinent to wild salmon: <u>The Economic Benefits of the Restoration of Atlantic Salmon to New England Rivers</u> by David L. Kay, Tommy I. Brown, and David H. Allee, Dept. of Natural Resources, Cornell University, prepared for the U.S.F.W.S., 1987.

That study places a one-time lump sum value of $20 million on salmon restoration. We neither endorse nor evaluate that study.

While we do not attempt to reduce the value of a restored wild Atlantic salmon run to dollars, we have considered in qualitative terms the potential existence values associated with restoration of a wild Atlantic Salmon population in the Penobscot River. Your comments and comments from other respondents on this issue resulted in our reconsideration of the value of potential numerical increases in salmon versus the value of an unassisted salmon run. As a result, we have selected Alternative 4 as our recommended alternative.

CI-10
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fatal error in recognizing, but failing altogether to quantify, the substantial existence values that the public and the Penobscot Indian Nation perceive in a wild, self-sustaining run of salmon. Trap and truck, combined with BHE's proposal for perpetual stocking of hatchery smolts, threatens the loss of an intangible, but very real, value underlying the entire restoration program. As Clinton B. Townsend testified to the MBEP:

> The program represents human kind's effort to make amends to a fellow inhabitant of the planet brought almost to the verge of extinction by our activities. The Atlantic salmon is to the waters as the eagle is to the air or the grizzly bear is to the land, a symbol both of humanity's ability to destroy and to rebuild.
>
> The vision of the restoration program is to recreate, to the greatest extent possible, natural conditions as they once were.
>
> ...
>
> Bangor Hydro-Electric Company proposes, as mitigation for the Basin Mills dam, a program that is as far in philosophical concept from the restoration program ... as it could possibly be. It proposes a permanent artificial process.
>
> ...
>
> The company's proposal reduces the Atlantic salmon from the status of a wild creature to a commodity, no different in concept than the kilowatts which it extracts from the river's waters and sells to the public.

The objections voiced by Mr. Townsend are in part matters of philosophy, as BHE claims in brushing them aside. But they are far more than simple intellectual disagreements, for they go to the very purpose of attempting to restore a wild species. Economists testifying before the Board repeatedly acknowledged that the public places very high economic value, termed "existence value," on the existence and protection of animals in the wild. MBEP Hearing

CI-10
Cont'd

1027-28 (Boyle); 3002-04 (Freeman); 3310-12, 3396-97 (Colgan). As those economists acknowledged, the manner in which such species are managed and protected can be of great importance to the public's sense of their value; an eagle in a zoo would not generate the same value as one in the wild, nor would salmon trucked and manipulated in their migration to spawn. Colgan 3310; Freeman 3002-03.

BHE's own witness, Professor Boyle, concluded that "a wild stock [of salmon] is much more important to the Penobscot River salmon anglers than is a large run of salmon." Appl. V. 44, "Angler Evaluations of Potential Management Programs", 103. Professor Boyle also concluded that the salmon restoration program on the Penobscot could not be justified economically unless through existence values placed by the public at large on the restoration of a wild salmon run, and that those values would exist only for a unique, wild run. Appl. V. 45, "Benefit-Cost Analyses of Atlantic Salmon Restoration on the Penobscot," E-4, E-7, 78, 81, 86. Similarly, Dr. Rowe's analysis of management options for the river found that the option ranked highest by anglers was to increase the wild component of the salmon run. MBEP 2961.

The emphasis placed by the public on a unique, wild run suggests strongly, as Professors Freeman and Colgan acknowledge, that human intervention and manipulation of the salmon through continuous trapping and trucking may destroy the very value placed by the public on the restoration program. In that case, public support and funding will dwindle. The FWS has openly suggested that it may be forced to reexamine its commitment to the

CI-10
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CI-10 Cont'd

restoration program on the Penobscot if the Basin Mills dam, and its trap and truck mitigation strategy, are approved by this Board. Lambertson Prefiled Testimony at 10.

Existence values can be estimated, and where, as here, they appear to play a critical role, there is no excuse for the DEIS's failure even to attempt their quantification.

CI-11

Impacts on Fisheries Resources

As the DEIS recognizes, the central issue posed by Bangor* Hydro's desire to construct a major new hydroelectric dam on the Penobscot River is whether that project would impede or preclude restoration of populations of anadromous fish in the Penobscot River. DEIS xxvi. The overarching importance of the fish resources of the Penobscot River is obvious, as the DEIS also acknowledges:

- The Penobscot River was targeted by state and federal fisheries agencies for restoration of a self-sustaining run of Atlantic salmon (also American shad and alewife); since 1968 the salmon run has increased from zero to about 3,500 fish in 1993, and the agencies contend that restoration will be successful (i.e., run size will increase to 8 to 11 thousand fish) if there is no further hydro development

- The Penobscot River presently supports the largest and most intense Atlantic salmon recreational fishery in the U.S.; anglers and agencies believe the fishery will expand with their predicted increases in the salmon run size, if there is no further hydro development

- Penobscot Indian Nation (PIN) considers salmon to be of high spiritual value and desire to recover their cultural heritage through restoration of runs of wild salmon

CI-11 No response required.

CI-11 Cont'd

- Fisheries measures proposed by BHE to mitigate for construction of Basin Mills (trap-and-truck, stocking) are unacceptable to Interior, PIN and Conservation Intervenors because the resultant anadromous fish runs are not considered to be self-sustaining (i.e., consisting of wild fish that are not dependent on human intervention for their existence); those parties propose removal of a mainstem dam as the most desirable measure for enhancement of anadromous fish restoration

DEIS xxv-xxvi (emphasis in original). As the DEIS later acknowledges:

> Fully-restored self-sustaining populations of anadromous fish in the lower Penobscot River could benefit society by maintaining and enhancing the nationally recognized salmon recreational fishery, providing socioeconomic enhancements associated with recreational angling, and enhancing the cultural environment of the PIN by increasing their opportunity to harvest salmon from the river.

DEIS 5-1.

The staff's response to these preeminent public values associated with the Penobscot's fish resources is to dismiss them in favor of the economic benefits that it perceives from the proposed Basin Mills project. DEIS 5-22-23. As Conservation Intervenors have discussed above, the staff's economic analysis from which it derives the perceived benefits of the Basin Mills project is deeply flawed, and the benefits of the project greatly exaggerated. But the DEIS's analysis of fisheries impacts is equally flawed, and cannot support the staff's conclusions.

CI-12

The essential underpinning for the staff's recommendation for construction of the Basin Mills project is the DEIS's conclusion that successful restoration of Atlantic salmon and other anadromous fish populations cannot be achieved with or without the project.

CI-12 A large number of factors, other than the presence or absence of the Basin Mills dam, play a significant role in determining the fate of the Penobscot River salmon restoration effort. However, in response to your comment, we have modified our language in Section 4.3.3.1 and elsewhere to clarify the logic of our discussion and the sequence of our analyses.

COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-12 Cont'd DEIS 4-30 - 31. In effect, the FERC staff propose a "no-harm, no-foul" scenario, in which the substantial adverse impacts of a major new mainstem dam on fish passage and habitat in the Penobscot River are held to be irrelevant, since (in the staff's view) it is pointless even to try to restore a fully self-sustaining run of anadromous fish in the river. That critical conclusion allows the staff freely to recommend construction of the project, with its associated (and exaggerated) economic benefits, since the trade-off in environmental impact is simply between futures where restoration of the salmon and other anadromous fish has failed to greater or lesser degree.

The staff's conclusions regarding the likelihood of successful fishery restoration on the river are in direct conflict with the expert judgment of the federal and state agencies engaged in that restoration effort, and are based upon assumptions and modelling that also directly conflict with those agencies' expert conclusions. With respect to Atlantic salmon, the DEIS's conclusion is based upon the staff's "independent" analysis of the likelihood of salmon restoration, using a model developed by the U.S. Fish and Wildlife Service. In performing their analysis, however, the staff substituted their own values for the values that had been developed <u>by consensus</u> among the expert state and federal fish and wildlife agencies for critical variables in the model: marine survival, upstream passage, and downstream mortality. CI-13

CI-14 The FERC staff's assumption that they are better qualified than <u>all</u> of the federal and state agency personnel who bear

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-13 In portions of FEIS Section 4 (and in Appendix D), we present the results of ASAL model runs using all of the model parameters specified by NMFS and FWS. We also include the outputs of model runs we made using parameter values other than those specified by NMFS and FWS (Section 4.3.3.1 and Appendix F). In their DEIS comments, NMFS identified one model run we made using existing marine survival values that used an incorrect in-river survival rate; NMFS also provided additional input on interpretation of model output. NMFS input contributed to our recommending Alternative 4 as our preferred alternative in the FEIS.

CI-14 The marine survival rates we employed in our ASAL modeling are consistent with the information entered into the record by all parties. However, since publication of the DEIS, marine survival rates, while remaining low, have doubled, with an associated increase in run size in 1995 and 1996. This new information suggests that the future trends in marine survival rates are very uncertain. In consideration of this uncertainty, we are now recommending Alternative 4 as our preferred alternative.

CI-14
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responsibility by law for fish management on the Penobscot River is breathtaking in its arrogance. Moreover, it is plainly arbitrary. First, the "realistic" values that the DEIS adopts for marine survival are based on survival of stocked smolts on the Merrimack River, despite the Fish and Wildlife Service's expert conclusion that wild smolts show far higher survival, and that smolts on the Penobscot River, including even stocked smolts, have far better survival than smolts on the Merrimack River. Second, the "realistic" values that the staff favor are based simply on historic rates of return, and entirely discount the fact that marine survival will improve in the future as a direct result of the buyout of the former commercial fisheries in Greenland and Canada. The state and federal fishery agencies reasonably concluded that these factors, and others, warranted higher increased survival values for the Penobscot run of salmon in the future. FERC's disregard of these factors, and of the expertise of the state and federal fishery agencies, is simply arbitrary.

CI-15

Indeed, the FERC staff's conclusions are contradicted even by the applicant. Although Bangor Hydro submitted analyses of marine survival in its application that criticized the "optimistic" assumptions made by the state and federal fish management agencies, its most recent views on the subject of marine survival and of the likelihood of successful restoration are markedly more positive, and directly contradict the conclusions of the DEIS. In its comments responding to the joint notice of the Departments of Interior and Commerce that those agencies had received a petition

CI-14
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CI-15 Cont'd

for listing the Atlantic salmon as endangered under the federal Endangered Species Act, Bangor Hydro asserted that "[l]isting Atlantic salmon under the ESA is unnecessary due to the relative success of current salmon management." Letter from Kathleen C. Billings to Paul Nickerson (April 20, 1994) (relevant excerpts attached as Exhibit B) at 3. Bangor Hydro went on to discuss marine survival issues at length, stating that "5% or less of all the wild smolts emigrating from a typical North American salmon river would be expected to return as adults of various ages." Id. at 13. Bangor Hydro expressly acknowledged that such returns, if maintained, "would be a healthy condition for a salmon population," and that even a "much lower" return rate could still sustain a viable population. Id. The "optimistic" assumption employed by the state and federal fish agencies in their modelling, and dismissed by FERC's staff, was that returns of wild smolts would average 1.5%, well within Bangor Hydro's own estimate of 5% or less. On this record, FERC's adoption of lower values -- 2.5% or 0.76% -- is simply unfounded.

CI-16

Bangor Hydro's listing comments also assert that the most promising theory concerning declining marine survival rates for hatchery stocked smolts is based upon cyclic phenomena related to marine wintering habitat. Id. at 14. As Bangor Hydro observes, "If the current trend is indeed a cyclic phenomenon, then survival will increase and more fish will eventually return." Id. In addition, Bangor Hydro notes that as much as 70% of the salmon from the Penobscot River may have been harvested by commercial fishermen

CI-15 We did not adopt Bangor's assertions in drawing our conclusion regarding marine survival rates.

CI-16 Bangor's comments are consistent with those of NMFS's Dr. Rago (see NMFS comment letter, Attachment C), and we have taken this information into account in recommending Alternative 4 as our preferred alternative.

CI-16 Cont'd

from Canada and Greenland, and concludes: "Based on these data, it is likely that returns to Maine's rivers would more than double in the absence of these fisheries." Id. As the company notes, the commercial fisheries in both Canada and Greenland have been closed in the past two years. Id.

CI-17

Finally, Bangor Hydro discusses the history of stocking efforts on the Penobscot River, and concludes that smolt stocking has been largely unsuccessful in restoring a substantial run of "wild" salmon. As the company observes, however, the fishery agencies are moving increasingly toward fry stocking, with far better results. Bangor Hydro notes that wild spawners are more than seven times as effective than hatchery spawners at producing wild returning adults, and predicts substantial increases in the numbers of wild salmon in the Penobscot River. As the company concludes: "Clearly, relatively recent changes in the restoration program have resulted in a significant increases [sic] in 'wild' fish escapement and natural reproduction, the real measure of restoration success." Id. at 17.

It was plainly appropriate for the Fish and Wildlife Service and the Maine Atlantic Sea-run Salmon Commission to consider such improvements in marine survival and in other factors leading to increasing returns of fish in the future. The FERC staff's decision to ignore all of these factors strongly supporting increased survival rates and increasing salmon runs within the Penobscot River, and to substitute historic figures based on returns of stocked smolts prior to the buyout of the commercial

CI-17 See response CI-14 above.

CI-17 Cont'd fisheries, is simply arbitrary.

CI-18 The staff's substitution of its own values for other critical factors -- upstream fish passage efficiency and downstream mortality -- is equally egregious and erroneous. No one disputed the values derived by the interagency and applicant working group for those factors; they represent the consensus of every party engaged in the restoration program and of the applicant itself. The decision of the FERC staff to override the expert judgment and experience of the Fish and Wildlife Service on issues of fish passage, in the face of agreement by all parties concerning those values, is inexplicable.

CI-19 The bottom line is that the state and federal fish management agencies adopted reasonable assumptions, supported by reasonable evidence, in modelling the impacts of the Basin Mills dam on the restoration program for Atlantic salmon. FERC's staff has no basis to override the expert judgment of those agencies in order to concoct a revisionist scenario that would make it easier to sweep the adverse impacts of the Basin Mills project under the rug.

CI-20 In any event, the staff's use of the ASAL model developed by the Fish and Wildlife Service to derive absolute likelihoods of success or failure for the restoration program is an abuse of the model, as the Fish and Wildlife Service has plainly stated. The model contains a multitude of sensitive variables; the values assigned to each of those factors could reasonably be increased or decreased to reflect differing assumptions, data, and projections of future change. For this reason, the principal value of the

CI-18 See response CI-13, above.

CI-19 See responses CI-13 and CI-14, above.

CI-20 Dr. Rago, author of the ASAL model, states (NMFS comment letter, Attachment C, pg. 4) that "ASAL was designed as both a tactical and strategic planning tool...As a strategic model ASAL can be used to evaluate long term prospects for restoration with respect to variation in underlying rates e.g., upstream, downstream, marine survival etc. and to assess changes of viable population in the future...." This is the purpose to which we applied the ASAL model in our analysis.

CI-20 Cont'd

model derives in its ability to identify relative impacts of projects such as Basin Mills. Changes in underlying assumptions might alter the absolute numbers derived from the model for the likelihood of successful restoration, but the relative spread between scenarios including or excluding the new dam should stay constant, permitting a reasoned assessment of the impact of the project.

In this case, however, the FERC staff decided to interpret the model outputs as absolute probabilities that the salmon restoration effort will succeed. As the Fish and Wildlife Service has repeatedly stated, the model is of little value in determining such absolute probabilities, since the variables and assumptions it contains are so sensitive and subject to change. The DEIS's conclusion that the salmon restoration effort is doomed to failure is thus based on a misuse of the model, as well as upon serious errors in the values relied upon by the staff.

CI-21

The DEIS's conclusions regarding restoration of American shad are similarly entirely misplaced. The DEIS assumes that neither the federal nor state fishery agencies would ever attempt active efforts to restore shad, and concludes that successful restoration is therefore unlikely with or without the Basin Mills project. In fact, however, staff from the Maine Department of Marine Resources had testified to the Maine Board of Environmental Protection that the agency intended to begin active restoration of shad and alewife on the Penobscot in the future, as soon as funds permitted. MBEP Hearings 1714, 1719, 1744 (testimony of Lewis Flagg) (Jan. 11,

CI-21 At the time we prepared the DEIS, nothing in the licensing record suggested that any shad restoration effort was planned for the Penobscot River. With their DEIS comments (February 16, 1995), the Penobscot Indian Nation (PIN) enclosed a Cooperative Agreement between FWS, PIN, and the State of Maine (Attachment 1), in which they agree to coordinate their programs and activities for the benefit of the Penobscot River shad stock. We have taken this plan into account in this FEIS. We recommend under Alternatives 3 and 4 that BHE provide capability to trap shad at the new fish lift at Veazie and truck those fish to any location in the river to provide guaranteed support to shad restoration efforts not available by any other means.

We would also recommend construction of upstream and downstream passage facilities at all developments that are licensed which would substantially enhance potential passage for American shad relative to potential passage under existing conditions. Trucking is not proposed as a "stand alone" means of providing for passage of shad.

CI-21 Cont'd

1993). It is our understanding that the Fish and Wildlife Service, DMR, and the Penobscot Indian Nation have now concluded a cooperative agreement to actively restore shad to the Penobscot. The DEIS's entire analysis regarding shad is thus in error, and its conclusion that Basin Mills would not pose a serious impact on shad restoration is thus entirely unfounded. Similarly, the DEIS's conclusion that Bangor Hydro's commitment to trap and truck only 30,000 shad was sufficient is in error, since an <u>active</u> restoration effort may generate runs of several hundred thousand, far beyond Bangor Hydro's capabilities. DEIS 4-31, 4-45 (MDMR goals for restoration are 459,000 shad; even with limited trap and truck, shad populations will reach 37,792 in 25 years). Finally, the DEIS's suggestion that there may be no remnant population of shad in the river is pure speculation; substantial shad populations have been discovered in other rivers once adequate fish passage was provided.

CI-22

Finally, the DEIS's conclusion that trapping and trucking would contribute to the fishery restoration goals of the agencies and the Penobscot Indian Nation simply by increasing the numbers of fish in the Penobscot's salmon and shad runs fundamentally misunderstands the nature of the restoration effort. As the DEIS acknowledges, the state and federal agencies, and the Penobscot Indian Nation, are committed to restoring self-sustaining populations of wild fish in the Penobscot River. That goal -- of an ecosystem in which fish populations are maintained as closely as possible to natural conditions -- is of fundamental importance to

CI-21 Cont'd

We concur that statements regarding the presence or absence of shad in the Penobscot are pure speculation. PIN, in their DEIS comment letter, has identified sources of anecdotal information suggesting the presence of shad, and we have revised our text to reflect this new information.

CI-22

As we state in response CI-21, above, trap-and-truck is included in Alternatives 3 and 4, not as the sole means of upstream passage but to mitigate for unavoidable inefficiencies in the state-of-the-art passage facilities that would be in place if Basin Mills dam were constructed and/or provide a management tool for the restoration and expansion of alosid populations. Our recommendation that BHE provide the resources necessary for trapping and trucking provides the fisheries management agencies with a capability that they might not otherwise have available to enhance anadromous fish population growth. See CI-10.

CI-22 Cont'd the agencies, to the PIN, and to the public. The FERC staff's willingness to shrug away the loss of that essential wildness under a regime of permanent trapping, trucking, and stocking betrays its indifference to the values that the agencies, public, and PIN place on restoration. As we have noted above, the failure of the DEIS even to attempt to quantify the existence values attributable to the restoration of a self-sustaining run of wild salmon similarly undermines its conclusion that the Basin Mills project will have substantial economic benefits.

CI-23 The DEIS's analysis and conclusions regarding the impacts of the Basin Mills project upon the effort to restore anadromous fish populations in the Penobscot River is thus fundamentally flawed. The staff's substitution of their own values and judgment for the expert views of the state and federal fish management agencies concerning the appropriate modelling for the restoration effort is plainly unreasonable. Similarly, the DEIS is plainly in error in assuming that federal and state agencies will never attempt actively to restore shad populations; such active restoration is now underway. The DEIS's conclusion that fish restoration efforts are doomed to failure is thus simply erroneous, and that fundamental error undermines the staff's entire reasoning in favor of the Basin Mills project.

CI-24 **Mitigation.**

The DEIS's treatment of mitigation proposed by the applicant is also fundamentally flawed. To begin with, the DEIS fails even

CI-23 Opinion noted. Also see CI-12 and CI-21.

CI-24 We have clarified the language in the FEIS to eliminate any confusion and indicate that we would recommend BHE provide the resources necessary for implementation of the specified mitigation, but that implementation itself would be within the purview of the appropriate fisheries management agencies.

CI-24
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to understand the mitigation proposal that is associated with the Basin Mills project. The DEIS discusses the various proposals of the applicant for trapping and trucking salmon and for hatchery stocking, and notes that the Maine Board of Environmental Protection imposed conditions upon the state's Water Quality Certificate for such mitigation. DEIS 2-11, 4-36. Inexplicably, however, the DEIS then assumes that the mitigation proposal before FERC is a "hybrid" mitigation alternative consisting of stocking 30,000 smolts (or equivalent fry or parr) and trapping and trucking up to 50% of the annual salmon run. DEIS 4-36 - 37.

The DEIS misunderstands the actual mitigation proposal contained in the MBEP's final order, however. The MBEP's order, and the state's WQC based on that order, simply requires the applicant to <u>provide all necessary funds or other resources</u> for the <u>state Atlantic Sea-Run Salmon Commission and the Department of Marine Resources</u> to trap and truck <u>up to 12,000 salmon, 30,000 shad, and 150,000 alewife annually</u>. MBEP Order at 65. (In addition, Bangor Hydro is to stock 30,000 smolts or the equivalent number of fry or parr). Thus, contrary to the assumptions of the DEIS, the MBEP order does <u>not</u> require or authorize Bangor Hydro to trap and truck any fish itself; to the contrary, the Order notes that the ASRSC and DMR are responsible for the management of all anadromous fish restoration activities on the river, including any trapping and trucking. <u>Id</u>. That concession is dictated by state law, for the state agencies bear independent statutory responsibility for management of the fish populations in the river,

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CI-24 Cont'd including any handling or stocking of fish. Without authorization from these agencies, neither Bangor Hydro, the MBEP, nor this Commission may lawfully trap and truck salmon or place hatchery-raised salmon in the Penobscot River.

CI-25 Moreover, the MBEP order does not limit the potential trap and truck program to only 50% of the run. The MBEP noted in its discussion that allowing "some of the runs to swim upstream from Veazie" would, in its view, resolve concerns about trapping and trucking effectively bypassing the public and the Penobscot Indian Nation along the lower Penobscot River. MBEP Order at 25, 28. But the Board's Order, and the state WQC that is based on that order, do not require the release of any fish for that purpose, and do not limit the applicant or the state agencies from trapping and trucking 100% of the salmon and other anadromous fish runs.

CI-26 These misunderstandings have profound consequences for the DEIS's analysis. First, the fact that implementation of trap and truck as mitigation for the Basin Mills project remains entirely in the discretion of the state and federal fish management agencies that have vehemently opposed the permanent use of that management tool raises an obvious, and enormous, question concerning the feasibility of the mitigation relied upon by the MBEP, and now by FERC. The ASRSC, the DMR, and the FWS made absolutely plain in their comments and testimony before the MBEP that they firmly opposed the use of trapping and trucking and permanent stocking, and that they would not in fact implement those measures.

CI-27 The agencies testified forcefully that hatchery stocking was

CI-25 As we discuss in Section 2.1.2.1 of the DEIS, at its August 25, 1993 meeting, Maine DEP requested BHE to develop alternative fisheries mitigation strategies to their original proposal to trap and truck 100% of the salmon run. The two alternatives BHE submitted were to transport only 50% of the run and replace their proposed Denil fishway at the powerhouse with a vertical slot fishway, or to eliminate trap and truck and increase the number of smolts stocked from 30,000 to 100,000 fish. The WQC eventually issued by Maine DEP specifies that BHE stock the equivalent of 30,000 smolts, install vertical slot fishways or lifts at both the powerhouse and spillway, and also provide capability to truck up to 12,000 salmon, a number greater than the fully restored run size. As we state in response CI-24 above, the requirements imposed on BHE would provide the resources necessary to implement these measures.

CI-26 See response CI-24, above.

CI-27 Alternative 3 does not stipulate stocking of smolts, only that the stocking program implemented results in the production of 30,000 smolts. As we point out in Appendix F, hatchery-based stock enhancement in the Penobscot River presently relies on returning Penobscot River fish as brood stock and has evolved toward a program of fry rather than smolt stocking. Both of these measures minimize hatchery influence on fitness of the resultant smolts.

CI-27 Cont'd

fundamentally inappropriate as a permanent component of the restoration program, which seeks to restore self-sustaining runs of wild fish, and posed genetic dangers as well. Prefiled Testimony of Ronald Lambertson at 10; Final Agency Comments of ASRSC, at 5; MBEP Hearings 1079, 1081, 1086-87, 1093, 1096, 1227, 1698 (testimony of Edward Baum); 1240 (Lambertson); 1264, 1267, 1302-03, 1378 (Kimball). At the conclusion of the Board's proceedings, both the FWS and the ASRSC reiterated their unwillingness to comply with any mitigation proposal that involved perpetual hatchery stocking. Noting that "[t]he fishery agencies and PIN [the Penobscot Indian Nation] have consistently rejected long-term smolt stocking because this would be inconsistent with restoration and management goals for the Penobscot River," the FWS informed the BEP flatly that the use of its hatchery facilities, which constitute the only available source of genetically-acceptable juvenile salmon, "would not be authorized" for such stocking. FWS letter to MBEP (October 13, 1993) at 4, 5.[1] Similarly, the ASRSC informed the Board: "[A]s we have stated on numerous occasions, the perpetual stocking of artificially-reared salmon as a permanent replacement for wild fish is biologically unacceptable to this agency." ASRSC letter to MBEP (August 10, 1993), at 6.

CI-28

The resource agencies responsible for fishery management on the Penobscot took similarly unequivocal stands opposing Bangor

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[1] The DEIS thus errs in concluding that obtaining suitable hatchery stock will pose no problem for Bangor Hydro, omitting even to consider whether the agency controlling the hatchery will provide access to the company. DEIS 4-39.

CI-27 FWS assumes that smolts resulting from stocked fry have the same marine survival as smolts resulting from natural spawning, supporting our position (see Figure E-1 in Appendix E). We recommend that any stocking mitigation that we would require of BHE under Alternative 3 be performed in the same manner as existing restoration efforts.

CI-28 ASRSC is an agency of the state of Maine. The Governor of Maine has stipulated that the state's WQC represents the final recommendations of all state agencies. The Basin Mills WQC requires stocking of smolts, parr, or fry. Thus, the state's final position on this matter is that stocking is acceptable. Also, see CI-27.

CI-28
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Hydro's proposal to trap and truck the salmon and other anadromous fish on the Penobscot River. Although both agencies have used trap and truck as a management tool for short-term purposes,[2] the FWS and ASRSC oppose the permanent trapping and trucking of salmon and other anadromous fish for important biological and policy reasons: (1) it would bypass the public and the Penobscot Indian Nation along stretches of the lower Penobscot, MBEP Hearing 1130, 1213 (Baum); 1331 (Russell); 1400 (Kimball); (2) it would make the salmon run totally dependent upon continuous human intervention, raising the specter that human failure -- mechanical breakdown, labor strikes, etc. -- could wipe out the run, Prefiled Testimony of Lambertson, 9; ASRSC letter to MBEP (December 28, 1992), at 7; Prefiled Testimony of Townsend, at 13; and (3) it may cause serious mortality from stress, handling, temperature shock, and disorientation. ASRSC letter to MBEP (December 28, 1992), at 2; MBEP 1130, 1132, 1138, 1643-44 (Baum); 1404-05 (Gaston); 1723-24, 1745-47 (Flagg). Finally, trap and truck, combined with Bangor Hydro's proposal for perpetual stocking of hatchery smolts, threatens the loss of an intangible, but very real, value underlying the entire restoration program: the recreation of a naturally-functioning ecosystem, with wild, self-reproducing populations of fish.

CI-28
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[2] The agencies made clear that they employ trap and truck only as a limited and temporary measure, to seed remote areas while fish populations are initially being restored or areas that are inaccessible otherwise. MBEP Hearing 1130-31, 1136-38, 1666 (Baum); 1399 (Kimball); 1476-77, 1493 (Lambertson); 1491 (Kimball, Marancik); 1713 (Flagg).

The agencies made their opposition to the use of permanent trap and truck unmistakably clear to the MBEP. FWS Regional Director Lambertson testified that the FWS "do[es] not believe that permanent trapping-and-trucking of anadromous fish on the Penobscot is a viable option." Prefiled Test. of Lambertson, at 9. The FWS's comments on Bangor Hydro's revised mitigation proposals in October 1993 stated:

> The Service and other agencies have clearly stated that future management of anadromous fish populations in the Penobscot River will not include permanent stocking nor trapping-and-trucking. ... Bangor Hydro's new mitigation proposals contain one or both of these measures, and are therefore inconsistent with agency management objectives. ... For these reasons Bangor Hydro's new proposals should not receive serious consideration by the MBEP as mitigation for the project's extensive impacts.

CI-29 FWS letter to MBEP (October 13, 1993), at 1-2 (emphasis added).

The ASRSC expressed equally firm opposition to the power company's controversial trap and truck proposal. Commissioner Vail stated that the complex fish sorting and handling facilities proposed by Bangor Hydro to carry out its trap and truck program were unnecessary, since "we do not plan to trap and truck Atlantic salmon." Final Agency Comments of ASRSC, at 2 (emphasis added). The ASRSC described its serious biological objections to trapping and trucking in detail in further comments submitted to the Board, and stated that trapping and trucking "is inappropriate and unnecessary for the Penobscot River Atlantic salmon restoration program." ASRSC letter to MBEP (December 28, 1992), at 3. In its comments on the BEP staff's draft order, which adopted Bangor Hydro's trap and truck proposals, the Commission stated: "Long-term

CI-29 See response CI-25, above. As we note in CI-28, ASRSC is a Maine state agency. The Basin Mills WQC requires BHE to provide trap-and-truck resources. Thus the state's final position on this matter is that trap-and-truck is acceptable.

CI-29 Cont'd

trapping and trucking of Atlantic salmon at the Veazie Dam is unacceptable to this agency." ASRSC letter to MBEP (August 10, 1993), at 7 (emphasis added). Edward Baum, the agency's chief scientist, made the Salmon Commission's position perfectly clear to the Board: "The only scenario I would see trap-and-truck being used on a long-term basis or forever on the Penobscot would be if we -- I mean "we" collectively -- in the business concluded the river is not restoreable [sic] and this river is essentially dead as far as having the potential to produce a wild, self-sustaining run." MBEP Hearing 1144-45 (Baum).[3]

CI-30

If the state and federal agencies continue to adhere to their view that permanent trapping and trucking and hatchery stocking are not appropriate measures for the longterm restoration effort, the impacts of the Basin Mills project upon fish passage and habitat will be virtually unmitigated. A primary issue raised in Conservation Intervenors' pending appeal from the MBEP's decision

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[3] The Department of Marine Resources, which bears responsibility for the management of other anadromous fish resources in the Penobscot River, also opposed permanent trap and truck. Commissioner William Brennan stated:

> Bangor Hydro's proposal to trap and truck anadromous fish as a mitigation for the cumulative effects of multiple dams represents a departure from the management approach which has been employed on the Penobscot for the past 25 years by state and federal resource agencies. DMR is concerned about this management approach which, if adopted, would represent a setback in the restoration of anadromous fish runs to the Penobscot Basin. We feel that the Basin Mills Dam proposal as presented would result in diminishment of the existing and potential anadromous fish resources and fisheries of the Penobscot River.

Final Agency Comments of DMR, at 5.

CI-30 We are not recommending that the Commission establish fishery goals or assume management responsibility for fisheries. We are attempting to resolve conflicts and to ensure that project impacts are adequately mitigated, as the FPA requires. On that basis, we would recommend that the Commission obligate the applicant to provide the resources necessary to implement all elements of the project if it is licensed by the Commission. The Commission has no authority to require other agencies to avail themselves of the resources that we require the applicant to make available to them.

CI-30 Cont'd

is thus whether the MBEP acted arbitrarily and capriciously in relying upon mitigation measures that it had reason to believe, on the record before it, might never be implemented. Now FERC stands at risk of committing the same error. Conservation Intervenors believe that FERC must evaluate in this DEIS the possibility that the federal and state agencies may decline to implement either permanent trapping and trucking or permanent hatchery stocking, and must disclose the environmental impacts of the Basin Mills project in the event that those forms of mitigation are in fact not implemented.

CI-31

A second aspect of the DEIS's misunderstanding concerning the applicant's mitigation proposal, its confusion regarding the extent of trapping that would take place (if the agencies implement such mitigation at all), leads to critical error in the DEIS's analysis of environmental, recreational, and socioeconomic impacts. As Conservation Intervenors noted above, the state WQC does not require that any portion of the fish runs in the river be released to swim upstream. If 100% of the salmon and other anadromous fish runs are in fact trapped and trucked in a given year, then the public and the Penobscot Indian Nation will be entirely bypassed in the stretch from Veazie to above the Milford impoundment. Conservation Intervenors believe that the DEIS must evaluate the impacts of such total transport on angling opportunities, economic values, and on the cultural values and treaty rights of the Penobscot Indian Nation.

CI-32

Moreover, water temperature, rather than concerns for angling

CI-31 See responses CI-25 and CI-30 above and Appendix F.

CI-32 We have expanded our discussion of this issue in Appendix F of the FEIS. Water temperature is a major factor in determining when trap-and-truck can be safely conducted. The availability of salmon in the river segment between Veazie and Milford may vary seasonally, with more fish being transported when water temperatures are low than when they are high. We acknowledge that temperature constraints on trucking may be very variable and thus create uncertainties concerning the extent to which this mitigation measure will achieve the objectives established. This point has contributed to our recommending Alternative 4 as our preferred alternative.

CI-32 Cont'd

and subsistence, will place a fundamental biological constraint upon both the schedule and amount of any trapping and trucking. The Maine Atlantic Sea-Run Salmon Commission testified before the MBEP that salmon may not safely be trapped and handled when water temperatures exceed certain levels, as they frequently do during summer months. DEIS 4-38; MBEP Hearing 1132-36 (testimony of Edward Baum) (December 10, 1992). In those months, all fish will likely have to be allowed to swim upstream, facing the additional obstacle to passage that the Basin Mills dam represents. As a consequence, in order to achieve 50% trapping and trucking of the run as a whole, virtually the entire run will have to be transported in other months. Thus, anglers along the lower river, and the Penobscot Indian Nation, will likely be entirely excluded from access to salmon during substantial periods of the year. The DEIS fails to consider the impact of timing the trap and truck operation in this manner on recreational and cultural values of the affected people.

CI-33

Dam removal

In addition to misunderstanding the nature and impacts of the applicants' mitigation proposal, the DEIS fails to give reasonable consideration to the possibility of in-kind mitigation through removal of existing dams on the mainstem and tributaries of the Penobscot River. As Conservation Intervenors have made clear to the Commission, removal of an existing dam or dams as mitigation for the Basin Mills project offers the potential for a "win-win"

CI-33 In response to your comments, we have modified our method used to calculate the Total Cost of Dam Removal in Appendix D. The "fair market value" of the dam structures has been eliminated. Power benefits foregone are computed using the current cost method referenced in Section 2.6 of the FEIS. We assume that the private sector market accurately reflects consumers' willingness to pay. However, note that we employ a restrictive current cost approach to economic analysis which values "benefits" not at consumer validated revenue rates but at the alternative cost of power, without any attempt to forecast economic benefits. See further our discussion of dam removal in Sections 2.3.1.1 and 5.2.2.5.

CI-33
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solution to the otherwise unavoidable, and painful, conflict between the societal interests in power generation and protection of natural resources that are at issue in this proceeding. It had been Conservation Intervenors strong hope that FERC would examine the potential for achieving such innovative, but promising mitigation in this proceeding. Conservation Intervenors note that FERC has recently issued its policy statement confirming its authority to decommission and remove dams where circumstances warrant. Federal Energy Regulatory Commission, Policy Statement, Project Decommissioning at Relicensing, Docket No. RM93-23-000 (December 14, 1994). Moreover, FERC's staff has recently recommended removal of an existing dam as mitigation for relicensing a project on the Clyde River in Vermont. FERC DEIS-0085, The Clyde River Hydroelectric Project, FERC No. 2306 (February 1995).

Unfortunately, notwithstanding the substantial public and agency interest in dam removal as mitigation in this case, and the potential for serious unmitigated damage to the goals of the fish restoration effort from the mitigation proposed by the applicant, the DEIS for the project utterly fails to seriously investigate the possibility of dam removal. Although the DEIS purports to review the feasibility of removal of dozens of dams on the Penobscot River, **see** DEIS App. D, the methodology adopted by the staff, and the failure of the staff to attempt even the most minimal confirmation of their economic projections, entirely undermines the DEIS's conclusions.

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The DEIS discloses that the staff adopted an economic screen that excluded consideration of every mainstem dam in the lower Penobscot River basin (and virtually every dam on tributaries). The staff's economic analysis consisted of comparing its estimated economic valuation for each dam against the estimated present net value of the Basin Mills project; dams whose removal would incur costs exceeding the value of the Basin Mills project were dropped from further consideration (except for Veazie, which the staff considered in Alternative 5, but not in conjunction with construction of Basin Mills).

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The methodology adopted by the staff in deriving the economic values and costs for dam removal was simplistic in the extreme, however, and entirely divorced from reality. To derive the cost of removing a particular dam, the staff added together its estimates of the "fair market value" of the dam structure, the present value of the net power benefits of the project, and the estimated cost of physically removing the dam. The staff's estimates for "fair market value" and net power benefits are entirely unrealistic, however, for both ignore the plain physical fact that many of the dams on the Penobscot and its tributaries are <u>obsolescent structures that have reached the end of their useful life</u>.

The staff's estimates for the structural value of particular dams came simply from tax assessments or from actual construction cost. Neither is an accurate measure of the remaining value of a structure, for neither tax assessments nor construction cost reflect depreciation and physical deterioration over the lengthy

**CI-33
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lifespan of a dam. Similarly, the staff derives the power benefits for each project simply from its nameplate generation capacity, and assumes that those benefits can be extended without further investment or maintenance for 30 to 50 years. Again, the staff's estimates are simply divorced from the reality facing these aging projects. Upon relicensing, existing dams face significant capital expenses to upgrade fish passage and generational capacity, and to assure continued safety of dam operation. Even apart from relicensing, aging dams routinely incur significant maintenance expense, and may require substantial reconstruction.

Remarkably, the FERC staff apparently failed even to consider the effect of physical condition and relicensing upon the economic value of the dams it assessed. Equally remarkably, the staff apparently made no effort whatsoever to confirm their assumptions regarding structural value and power generation directly with dam operators. If they had done so, they would quickly have discovered that their academic projections bore no relation to reality.

While Conservation Intervenors lack detailed knowledge of the condition of many of the dams purportedly reviewed by the FERC staff, we are familiar with the condition and likely economic value of the dam that may offer the most realistic potential as mitigation for the Basin Mills project, the Great Works dam. The information we have obtained concerning that project demonstrates the extent of the DEIS's errors in estimating the value of that dam. FERC's staff could readily have obtained the same information simply by contacting the dam's owner.

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Great Works dam lies directly upstream from the proposed Basin Mills impoundment, and its removal would likely offset the impacts of the new project on fish passage, as well as offering substantial in-kind mitigation for habitat losses in the new impoundment. According to the dam's owner, the James River Corporation, the Great Works dam is of rock-filled timber crib construction, and was built prior to 1900; portions of its spillway were in existence in 1861. James River - Norwalk Corporation, Draft Application for Amendment of License, Great Works Hydroelectric Project (June 1991) (attached as Exhibit C) at A-1. The company's FERC license for the project expires in 2002, and the project thus faces relicensing in the near future. Id. at ii.

The Great Works dam is an obsolescent structure, which imposes substantial and continuing maintenance costs upon its owner. A portion of the spillway for the dam breached in 1981, requiring substantial reconstruction at a cost of $750,000. Id. at A-4. "Major rehabilitation work" has been performed upon the dam on numerous occasions, including repairs to reduce failure of the dam in 1988 at a cost of $450,000. Id. According to James River Corp., the company has spent over $2.4 million since 1978 to maintain the existing dam. Id.

James River Corporation's assessment of the future lifespan of the dam is bleak, unless it undertakes a complete reconstruction of the dam's spillway:

> A performance history of the rockfill timber crib dams in Maine indicates a relatively short life expectancy of this type of structure, considerable annual maintenance cost, susceptibility to failure especially during floods

CI-33
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> and ice flows, and uncertainty with internal structural integrity. Average period between substantial rehabilitations of these structures (replacement of structural timbers, redecking, installation of concrete aprons, etc.) can be estimated as 15 years. Available records indicate that despite considerable maintenance efforts, the timber crib sections of the Great Works dam are in a state of continued degradation.
>
> Considering the age, continuing process of decay and degradation, the expected poor condition of the original timbers and critical interconnections, the uncertainty of the long-term performance of timber crib structures in general, and instability of both the timber crib and concrete/masonry structures, the Great Works dam can be considered as having a high probability of serious damage during future flood flows or heavy ice-out conditions on the river.

Id. at A-4 - A-5.

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For these reasons, James River Corporation has considered the need to replace the entire spillway structure of the Great Works dam with a concrete gravity structure, at an estimated cost in 1991 of approximately $7.7 million. Id. at D-1. According to the plant's engineer, Ralph Webber, the company continues to contemplate replacement of the spillway in the upcoming relicensing proceeding. Personal communication with Ralph Webber (February 17, 1995).

The physical condition of the Great Works project thus undermines the economic value ascribed to the structure by FERC's staff. As Bangor Hydro's own director of hydropower operations testified before the MBEP, the assessed valuation of the dam is immaterial if the owner is faced with significant rebuild costs. MBEP Hearing 2831 (Morrell). Indeed, Mr. Morrell openly suggested that purchasing the dam in those circumstances "could be construed as ... taking a problem off their hands...." Id. In this case,

**CI-33
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the owner of the Great Works dam faces substantial reconstruction costs that exceed the assessed valuation of the project.

The FERC staff's estimate of the present worth of Great Works' power generation is similarly out of touch with reality. The DEIS estimates the power generated by the dam at 49.7 GwH, based on the project's nameplate capacity of 7.6 MW. DEIS D-7, Table D-2. The dam actually generates half that amount. According to the plant engineer, Great Works dam generated only approximately 20 GwH last year; in 1993 it generated 28 GwH. Personal communication with Ralph Webber (February 17, 1995). Three of the plant's generators are out of commission, and may not be worth salvaging. Id. None of this should have come as a surprise to FERC; the limited generation of the Great Works dam has been openly discussed in the MBEP hearings and in the press. See Exhibit C (newspaper articles quoting James River Corp. as stating power generation from dam was only 3 MW).

The staff's estimates of the economic value of the project are thus fundamentally erroneous. The power benefits attributed to the project exaggerate current generation by more than twice; no consideration is given to the physical condition of the dam or its generating equipment in assuming continued generation for 30 to 50 years; and the need for substantial and continuing maintenance expenditures is simply ignored by the DEIS. On this record, the DEIS's conclusion that Great Works is worth more than the present value of the modern Basin Mills project is plainly folly.

Conservation Intervenors believe that the Commission must

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COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-33 Cont'd reinvestigate, in good faith, the economic feasibility of dam removal throughout the Penobscot River basin, using realistic information concerning the present condition and likely future lifespan of each dam. Until it does so, it cannot conclude that dam removal is not preferrable to the mitigation proposed by the applicant.

Wetlands

CI-34 The DEIS's analysis of wetlands impacts is also flawed. First, the DEIS should not attempt to compare wetlands losses for this project against statewide wetlands resources; the proper comparison, given the scope of this DEIS and this project, would be against wetlands within the lower Penobscot River basin.

CI-35 Second, the description of affected wetlands and proposed mitigation is confusing and inadequate. Tables and text refer to differing numbers of acres affected by the Basin Mills project and other alternatives.

CI-36 Conservation Intervenors believe that the mitigation proposed by BHE is entirely inadequate for the significant losses it projects from inundation of the headpond and construction of the Basin Mills dam. The primary mitigation offered by the company is preservation of existing wetlands. Preservation of wetlands is highly disfavored by the Corps of Engineers and by EPA, since merely providing additional protection to wetlands that are already subject to the federal § 404 program, and for which there may be no likely threat of development, provides only speculative benefits.

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-34 We agree with this comment. However, watershed-level data is not available from either the Corps or MDIFW. Without quantification of wetlands throughout the Penobscot River watershed, we are forced to use information that has been quantified -- the amount of wetlands in the state. However, we have expanded the text to indicate the limitations of placing the impacts in a statewide context and accounted for this in our reevaluation of the preferred alternative.

CI-35 We have revised the wetlands section of the FEIS (4.5) in response to detailed comments from the Corps and EPA. We have clarified the text and tables, and included additional data and information, including wetlands maps.

CI-36 As the FEIS states, BHE proposes to develop detailed mitigation plans in consultation with FWS and the Corps that will satisfy all state and federal permitting and licensing requirements. Our analyses, as documented in the revised FEIS text, indicates that all unavoidable wetlands impacts of Alternative 3 are likely to be fully mitigated, but that there is uncertainty associated with the long-term function of the mitigated habitat.

CI-36 Cont'd

Similarly, the other form of mitigation offered by the company, creation of new wetlands in borrow pits, is also disfavored by the federal agencies, since the science underlying the creation and maintenance of artificial wetlands is highly uncertain. EPA based its veto of the Attleboro Mall project in Attleboro, Massachusetts in substantial part upon the improper reliance by the developer upon creation of artificial wetlands, rather than avoidance of impact on natural wetlands.

CI-37

The primary thrust of the federal § 404 program is avoidance of impact, before consideration of any mitigation that may be available. Under the § 404(b)(1) guidelines governing the issuance of permits under § 404, an applicant must demonstrate that there are no feasible alternatives to its project with less adverse impact on the aquatic ecosystem. The DEIS in this case openly concedes that alternatives for power generation exist that would have no impact on wetlands or other special aquatic sites in the riverbed. DEIS 4-93 ("Considering that the CT [combustion turbine] would require less than 1 acre of land and would be sited adjacent to an existing generating facility, we believe all impacts on wetlands could be avoided.").

CI-38

Conservation Intervenors believe that the DEIS must give particular attention to riffle and pool complexes within the stretch of the Penobscot River that would be impounded by the Basin Mills project. Riffle and pool complexes are special aquatic sites under the § 404(b)(1) guidelines, as are wetlands; projects must avoid such sites if feasible.

CI-37 The Corps is not a cooperating agency in preparation of our FEIS. Thus, the FEIS would not necessarily meet all 404(b)(1) requirements. We anticipate, however, that our FEIS would assist the Corps in making its Section 404 permit decision for a Basin Mills project, if licensed.

CI-38 Information about riffle and pool habitats has been added to Section 3.6 and 4.5 of the FEIS.

CI-39

Endangered species

Conservation Intervenors do not concur in the DEIS's conclusion that the Basin Mills project will have no adverse impact on endangered bald eagles. Bald eagles rely upon open water in the Penobscot River basin during the winter for fish; impoundments often freeze over, denying eagles food sources during the winter months when food is most scarce. The DEIS's suggestion that the availability of stunned or killed fish at other times of the year would offset this loss is speculative, and ignores the critical need for food during the winter months.

In addition, the DEIS fails to consider the potential for cumulative impact from such deprivation, when taken together with serious impacts on bald eagle populations within the Penobscot River basin from dioxin contamination. Contrary to the DEIS's conclusions, resident fish species within the lower Penobscot River are heavily contaminated with dioxin. The Fish and Wildlife Service is presently evaluating the effect of continued discharges of dioxin from one major paper mill in the lower Penobscot River. Conservation Intervenors urge the Commission and the Service to consider carefully any cumulative impact that the Basin Mills project may impose on the stressed population of bald eagles in the Penobscot basin.

CI-40

FERC Deletion of Water Quality Conditions

In the DEIS, the FERC staff undertake to review the substance and propriety of the conditions placed by the State of Maine upon

CI-39 We have updated our biological assessment for bald eagle, incorporating new survey data collected in early 1995. The complete BA is presented as Appendix H of the FEIS. FWS has concurred with the findings presented in the BA.

CI-40 As stated in Great Northern Paper, Inc., 77 FERC ¶ 61,068 (1996), under Section 401(d), states may lawfully impose only conditions related to water quality. In examining the conditions proposed in the Basin Mills, Stillwater, and Milford WQCs, we follow the principles laid out and discussed in Great Northern Paper. We have revised some of our recommendations on the WQC conditions for the Basin Mills Project and these are presented in Section 5.2.1.4 of the FEIS. The Commission will make a final determination on these conditions in the license order for the project, should they choose to license a project that includes construction of the Basin Mills dam.

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the § 401 Water Quality Certificate for this project. The staff conclude that several conditions placed by the WQC upon the Basin Mills project should not be adopted or respected by FERC: Condition 3, requiring BHE to obtain approval from the state Public Utilities Commission prior to commencing construction (as it is required to do under Maine law); Condition 12, requiring BHE to establish a trust fund for salmon management activities on the Penobscot River; Condition 25, requiring a temperature study of the effect of impoundments on salmon; and Condition 27, requiring BHE to study removal of Howland dam as potential additional mitigation for the Basin Mills project. The FERC staff conclude that Conditions 3, 12, and 27 lie outside the state's authority under § 401 of the Clean Water Act, and therefore need not be adopted by the Commission. The staff acknowledge that Condition 25, requiring study of water temperature effects, does lie within the state's authority, but conclude that the Commission should disregard the requirement because, in the staff's view, it is unnecessary as framed. DEIS 5-25 -27.

The staff's recommendations exceed the Commission's authority. The Commission, as with all federal agencies, must adhere to and honor any condition that falls within the state's authority under § 401 of the Clean Water Act. <u>See</u> <u>PUD No. 1 v. Washington Dept. of Ecology</u>, 114 S.Ct. 1900 (1994). The staff concede that Condition 25 falls within Maine's authority under § 401, and the Commission cannot ignore that condition's terms.

The staff's conclusions that the other rejected conditions do

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CI-40 Cont'd not relate to matters of water quality is in error. The requirement of funding for Atlantic salmon management was explicitly imposed by the MBEP as mitigation for the impacts of the Basin Mills project upon fishery resources within the Penobscot River, and thus relates directly to water quality. MBEP Order at 28-29 (finding that the applicant's proposals will be adequate to mitigate the impacts of the Basin Mills dam on fish habitat and passage "provided that the additional measures discussed below are taken."). Similarly, Condition 27, requiring study of removal of Howland dam, was explicitly imposed by the MBEP as potential further mitigation for the impacts of the Basin Mills project. Id.

Each of these conditions is intimately connected with the MBEP's determination that the project's impacts upon water quality and aquatic life within the Penobscot River will be adequately mitigated; each thus falls squarely within the state's authority under § 401. The Commission must honor these conditions.

Recreation

CI-41 Conservation Intervenors believe that the DEIS fails adequately to evaluate the risk that construction of the new Veazie C station may have significant and unmitigated impacts on recreational angling opportunities at the renowned Veazie and Eddington salmon pools will occur, and overlooks the failure of the company to conduct hydraulic modelling necessary to assess adequately the impacts of the project on such values.

CI-42 The salmon pools below Veazie dam, including the famous

CI-41 Opinion noted.

CI-42 The data we have reviewed (see Appendix F, e.g., Figures F-4 and F-5) lead us to conclude that impacts would not be as great as Mr. Westfall contends. Also, as we have indicated in the FEIS (Appendix F), there is an inherent conflict between plant operations that would facilitate upstream passage efficiency and operations that would enhance recreational fishing (or reduce plant impact on fishing opportunity) below Veazie. Our position is that improved upstream passage efficiency is of greater importance than improved recreational fishing because of the positive benefits to population growth. You provide no new data or information on this issue, and we thus have no basis for altering our conclusion.

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Eddington pool, have been recognized by anglers and the Maine Legislature as among the largest, most often fished, and most productive Atlantic salmon pools in the country. The MBEP noted in its order that "[t]he Penobscot River below the Veazie Dam is the most heavily fished area for Atlantic salmon in the United States." MBEP Order at 31. According to Claude Westfall, an expert salmon angler and Professor Emeritus at the University of Maine, the proposed Veazie C station would destroy upper parts of the Eddington pool, and the 6000 cubic feet per second discharge from the new plant along the Eddington shore would disrupt and significantly degrade the existing flows in the Penobscot River segment below Veazie dam. Westfall concluded that the flows from the new powerhouse would likely eliminate the entire Eddington pool, would impact Beach, Guerin, and Club pools, and may have additional adverse effects on downriver areas. Prefiled Testimony of Westfall, at 6; MBEP Hearing 1577-78. The proposed Veazie C station would thus result in a net loss, and would create a substantial risk of a devastating impact, on the Atlantic salmon recreational fishery on this specially-protected segment of the Penobscot River. Prefiled Test. of Westfall at 7; MBEP Hearing 1576, 1578.

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Bangor Hydro's small steps toward assessing the impacts of Veazie C station in its license application were plainly inadequate. Despite explicit requests from the FWS and Conservation Intervenors, Bangor Hydro refused to develop and use a hydraulic flow model of the new plant's discharges in order to

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permit accurate evaluation of the impacts of the powerhouse on fishing opportunity. Prefiled Test. of Westfall, at 6; MBEP Hearing 2602 (Tarbell). The applicant did not conduct such modelling, however; instead, it attempted to simulate the impact that the new powerhouse would have on the waters below the Veazie Dam by simply lowering flashboards along the top of the dam. MBEP Hearing 2626 (Lukas). Bangor Hydro conceded, however, that its efforts did not constitute an effective physical model of the new plant's discharges; indeed, its witnesses refused even to describe its study as a "simulation," insisting that the term "flow provision" was more accurate. MBEP Hearing 2628 (Tarbell) ("[Y]ou're talking about discharging water over a dam versus discharging it out of a powerhouse. The two are not even comparable."); MBEP Hearing 2638-39 (Ritzi) (not a simulation; instead a "flow provision."). In addition, Bangor Hydro failed to utilize a team of expert anglers in the 1991 assessment of fishing opportunity impacts below Veazie dam. MBEP Hearing 2626 (Lukas); 2634-36 (Tarbell).

The MBEP openly recognized that the applicant has "only partially simulated, and has not fully modeled, the effect of Plant C operation on existing flow conditions below the dam." Order at 33. The Board also noted that the applicant's existing studies indicated only that an "undetermined number" of boat and shore fishing sites would be destroyed due to the effect of the new plant's discharges. Id. at 32. The BEP's response to this inadequacy in the record was not to order the applicant to conduct

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CI-42 Cont'd

such modeling as a part of its application, however, but instead to model the impacts of the project *after issuance of the license*. Order at 34, 67-68. The Board instructed Bangor Hydro to "design and construct the Veazie Plant C tailrace to minimize the effect of Plant C discharges on existing angling opportunity," and to operate the plant "to maximize salmon angling below Veazie Dam without unacceptably impairing fish passage at the site. *Id*. at 67-68.

Requiring the applicant to conduct modeling *after* the Board approves construction is pointless, however, if, as appellants believe and their expert angler, Claude Westfall, testified, the new discharges will *inevitably* cause major changes in the circulation below the dam, thus disrupting the famous salmon pools. A post-permit study is plainly inadequate, for it cannot inform the Board's decision whether the project should be constructed in the light of potentially severe impacts to recreational values, and thus cannot substitute for adequate information in the record at the time the Board acts on the permit application. Conservation Intervenors are currently appealing the MBEP's decision in this respect to the Maine Supreme Judicial Court, on the grounds that by approving the project in advance of detailed information concerning the level of its impacts, the Board acted irresponsibly.

The DEIS purports to adopt the Board's requirement for post-construction modelling of flow impacts, DEIS 5-25, but appears to convert the physical modelling contemplated by the state into a study of the *impacts* of the changed flows from new plant on angling opportunities. DEIS 4-118 -120. Conservation Intervenors continue

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COMMENTS FROM CONSERVATION INTERVENORS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-42 Cont'd to believe that pre-construction physical modelling is urgently needed in order to assess the risk of irretrievable damage to the most famous salmon fishing pools in the nation.

CI-43 Conservation Intervenors also disagree strongly with the DEIS's conclusion that BHE's provision of only 3 rods of fishing opportunity in the Basin Mills impoundment adequately compensates for the inundation of 71 out of 81 rods of Atlantic salmon fishing opportunity now existing within that stretch of the river. DEIS 110-111. As the DEIS repeatedly acknowledges, angling opportunities below Veazie dam are in great demand; crowding and waiting time in this stretch will increase as the salmon run and the number of anglers increases. DEIS 4-108. The DEIS concludes that angling will increase upstream from Veazie. DEIS 4-108, 113.

Conservation Intervenors believe that the angling lies identified within the proposed Basin Mills impoundment will provide increasingly important fishing opportunities as the angling population grows, and, of equal importance, as access is provided to that stretch of the river. The principal reason the Basin Mills rips stretch is currently little-used by salmon anglers is difficult access. Conservation Intervenors believe that the DEIS fails adequately to assess the significance of the loss of angling opportunity in the Basin Mills stretch, offering vague generalizations about fishermen moving upstream from Veazie without concrete discussion of how the lost fishing opportunity can be replaced as angling pressure increases in the basin.

RESPONSES TO CONSERVATION INTERVENORS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

CI-43 Our projections of growth in recreational angling for salmon do not support your statement. However, we concur that the extent to which the salmon lies lost if Basin Mills dam were constructed might be used by fishermen in the future is inherently difficult to predict, and that, once lost, there would be a permanent decrease in future potential recreational opportunity. This perspective has contributed to our recommending Alternative 4 as our preferred alternative.

Conclusion

Conservation Intervenors believe that the present DEIS is deeply flawed, and that the Commission must circulate a new draft in order to correct the many errors and omissions in the present document. Conservation Intervenors believe that correction of the obvious errors committed in the DEIS's economic analysis, analysis of environmental impacts, and investigation of dam removal will dramatically transform the picture the present document paints of the benefits and environmental impacts of the Basin Mills project, and should lead to recommendation of new proposed action.

CI-44 In the event that the Commission fails to address these concerns through a new draft EIS, Conservation Intervenors state for the record their position in opposition to the staff's recommended action, approval of Basin Mills. Conservation Intervenors submit to the Commission that, in the face of the urgent need to redress the balance in the lower Penobscot River between power generation and the protection and enhancement of fishery resources, the Commission's mandate under § 10 of the Federal Power Act requires adoption of a comprehensive plan that focuses on restoration and enhancement of fish passage and habitat, not construction of new dams. In any event, the Commission cannot adopt the recommendation and reasoning of the FERC staff in this DEIS, since it is plainly based upon fundamental errors in calculating the economic benefits of the Basin Mills project, in assessing the environmental impacts of that project, and in

CI-44 Opinion noted.

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evaluating the reasonableness of alternative forms of mitigation.

Respectfully submitted,

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CI-44
Cont'd

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February 17, 1995

Mr. Robert Dreher
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Dear Mr. Dreher:

CI-45 As you requested, I have reviewed the economic analysis in the DEIS for Bangor Hydro Electric's ("BHE") Basin Mills project. My review indicates that the analysis in the DEIS does not support the FERC Staff's conclusion that "the projects as proposed with staff mitigation would be best adapted to comprehensive plans for improving or developing the waterways of the lower Penobscot River Basin."[1] Deficiencies in the economic analysis in the DEIS preclude FERC or the public from making a reasonable judgment concerning the balance between economic and environmental costs and benefits of the proposed project and its alternatives.

CI-46 The DEIS is supposed to weigh the different environmental effects of the various alternatives against their different economic impacts. The cost of alternative power sources is a crucial piece of this comparison, because Basin Mills derives its economic value from being able to substitute for other power sources. Properly estimating the costs of those competing sources — the benefits of Basin Mills — is crucial to determining whether the project justifies its costs.

CI-47 Unfortunately, the DEIS overstates the economic benefits of the Basin Mills project for four reasons:

1. The DEIS does not establish the need for Basin Mills power on the BHE system.
2. The DEIS relies on BHE's estimate of replacement power costs. BHE's estimate does not represent the least-cost power alternative, even among fossil-fueled options. The DEIS overlooks *suitable* thermal technology (gas-

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[1] DEIS at xxvii.

CI-45 Opinion noted.

CI-46 The Commission's new approach to economic analysis is a current cost approach that focuses on today's energy spot prices in identifying the least-cost alternative. The Commission's economic analysis is, therefore, a highly limited analysis. It does not capture aspects of economic risk that a utility would be expected to consider in its decision-making, such as speculative forecasts of rising future fuel prices or intangible economic factors. Some of these risks are unique to hydropower, such as sourcing reliability, instantaneous load-following response to dampen voltage instability on the transmission system during highly dynamic peak-load periods, system-power-factor correction through condensing operations, and so on.

Moreover, the Commission does not use a traditional economic benefit-cost analysis per se as an essential criterion in its licensing decisions. The Commission would not necessarily deny a license on the basis of economics alone, particularly when the economic analysis is based on a limited current cost approach. Many public goods and services associated with hydropower projects, such as public recreation, incidental flood control, and environmental benefits are not captured in the Commission's economic analysis, but are considered in the Commission's balancing of developmental and nondevelopmental benefits as required by the FPA.

CI-47 Addressed in responses below.

CI-47 Cont'd

fossil-fueled options. The DEIS overlooks *suitable* thermal technology (gas-fired combined cycle plants), instead evaluating unsuitable straw-man resources such as peaking gas turbines.

3. The DEIS categorically and inappropriately excludes several of the most cost-effective alternative power sources (including conservation and wind) from consideration.

4. The DEIS understates the costs of Basin Mills itself by understating the costs of financing the unit and the resultant increase in taxes.

I discuss these effects in more depth below.

CI-48

THE DEIS DOES NOT ESTABLISH THE NEED FOR BASIN MILLS POWER

In Section 1.2 "Need for Power," projections of electricity demand resources in BHE's own service territory are conspicuously absent. Instead, the DEIS provides irrelevant data on historical and projected growth in statewide output. It also includes NEPOOL projections of pool-wide growth in demand (2.1-2.4% annually through 2002) and declines in NEPOOL planned capacity (0.3-0.6% annually). Without information on the current level of excess capacity, which the DEIS does not report, these figures tell us nothing about the need for power. The DEIS does include projections of NEPOOL's reserve margin falling to 3.4% in 2002, which does indicate that there could be a market for new capacity. Although it is likely that there will be a need for new generating capacity on the NEPOOL system in the next decade, FERC's conclusion that there is a "need for power in the area serviced by BHE" (DEIS at 5-4) is not supported by the record.

CI-49

The DEIS also suggests that one of the benefits of the project is that it could back out fossil generation, regardless of a need for new capacity:

> "...the usefulness of hydropower as a replacement for fossil fuels for baseload energy supply is as valid a criterion for hydropower development as is a need for megawatts of capacity" (DEIS, p. 1-4)

However, the DEIS never explicitly states whether or when the Basin Mills project would serve to back out existing resources. The benefits of avoiding generation from existing resources are different than the benefits of avoiding new capacity. If the project is expected to back out existing generation, then the avoided costs against which it is compared should reflect only the operating costs of the

CI-48 Electricity demand limited to BHE's service territory only is not the relevant scope of evaluation. Existing technology and market conditions make the NEPOOL area a viable competitive market for the project power. Increased marketing opportunities over a wider area are anticipated in conjunction with open access transmission. A larger-than-system-wide market makes purchased power competitive, as pointed out later in your analysis. NEPOOL projections forecast a need for new generating capacity.

See our revised economic analysis in Section 2 of the FEIS.

CI-49 We agree that if Basin Mills can be used to back out existing generation from fossil-fuel plants that are no longer cost-effective or environmentally acceptable, then the avoided costs against which it is compared should reflect only the operating costs of the avoidable plant. However, as pointed out above, the region shows a need for capacity as well. The operating costs of existing fossil fuel plants vary widely and a plant-specific analysis is not within the scope of this EIS. We have attempted to capture the relevant cost factors by using the cheaper of new fossil fuel plants or average purchased fossil fuel power in our economic analysis.

CI-49 Cont'd avoidable plant. Although existing marginal generation may have higher running costs than a new hydro plant, the capital costs of the new hydro plant, which must be considered when deciding whether to build it or not, may make it more expensive than the running costs of the existing plant.

SO-CALLED "NONEXCLUSIONARY" RESOURCES AND POWER PURCHASES SHOULD BE CONSIDERED AS ALTERNATIVE POWER SOURCES

CI-50 FERC Staff categorically rule out the most cost effective alternatives to new hydro power, precisely because they are low cost:

> Any source that does not burn fossil fuel is considered to be non-exclusionary. Nonexclusionary energy sources are sources that would be constructed or implemented in addition to hydropower, rather than replace hydropower, and vice versa, *because all such energy sources have low marginal costs* and would be used to displace higher cost fossil fueled generation rather than to displace each other in actual practice. Nonexclusionary resources, therefore, are not reasonable alternatives to each other, and we eliminate them from further analysis.
>
> Non-exclusionary energy sources include:
>
> - improvements in the efficiency of existing hydropower generation;
> - wind generation;
> - conservation; and
> - reduction of loss during transmission and distribution.[2]

The logic of eliminating these resources from full consideration rests on Staff's failure to distinguish planning decisions from dispatch decisions. The assertion that low-variable-cost options, such as energy conservation, will not displace hydro generation (or other low-variable-cost options), is only true for dispatch decisions: if hydro plants have already been built and are free to operate, additional energy efficiency will rarely reduce their operation, because other more expensive sources can usually be turned down instead. However, conservation (or

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[2] DEIS at 2-25; emphasis added.

CI-50 We have revised the discussion of alternative energy resources. Please see Sections 2.4.1 and 2.4.2 of the FEIS.

CI-50 Cont'd

other low-variable-cost resources) *can* displace hydro (or each other) in planning and regulatory decisions, including decisions to build or expand hydro facilities or limit their energy output.

Since the DEIS is intended to address whether the project should be constructed at all, the distinction between exclusionary and nonexclusionary resources is irrelevant and biases the analysis by eliminating the project's strongest competitors..

When comparing new resource options, all costs are effectively variable, so both capital costs and variable operating costs should be included in the economic comparison. This holds true whether the comparison is undertaken to determine which option to add to the system to meet load growth or to determine which planned additions to scale back in light of unanticipated declines in forecasted load growth. As such, nonexclusionary resources may not always be implemented, even though their variable operating costs are low. For example, recent testimony from the Central Vermont Public Service Company demonstrates how excess capacity in the NEPOOL market led the company to cut back on DSM acquisitions:

> The Northeast has experienced a long economic downturn resulting in electricity supplies including resources acquired for long term growth in excess of current needs. In order to balance the Company's own resources...the Company redesigned its DSM programs to slow the pace of acquisition from retrofit efficiency measures beginning in 1994.[3]

There is an abundance of so-called nonexclusionary resources. And — in addition to the DEIS's own recognition of their low variable costs — the data indicate that the *total* costs of these resources are competitive with cost of Basin Mills.

CI-51

Wind Power

For example, New England Electric System's recent Green RFP, which restricted entrants to renewable resources (including waste-to-energy plants), garnered a bid for a 28-year contract for 20 MW of an approximately 210 MW wind-farm planned in Maine. Due to poor documentation in the Basin Mills DEIS, it is

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[3] Rebuttal Testimony of Bruce W. Bentley in CVPS Docket 5724 before the Vermont Public Service Board, July 29, 1994. Page 4.

CI-51 We have included a discussion of wind power in Section 2.4.2 of the FEIS.

CI-51 Cont'd difficult to compare the costs of this plant with those of Basin Mills. As far as I could determine, the 74 mills/kWh estimate for Basin Mills in Table 2-1 is nominally levelized for the 50-year period beginning in 2002. When put in comparable terms, the wind bid price was 92 mills/kWh — more than Basin Mills, but less than the other alternatives in Table 2-1, and far less than the 132 mills/kWh alternative power cost shown in DEIS Tables B-2 and B-3.[4] Due to a lack of utility need, the developer, US Windpower, is still seeking to market most of the rest of this project's capacity.

Demand-Side Management

CI-52 The DEIS also excluded energy conservation from the alternative power sources under consideration. Over the past decade or more, conservation (also known as "demand-side management" or "DSM" for short) has been a growing part of many New England utilities' resource plans, because they recognized that it was often less expensive to reduce demand than it was meet demand with new generation, transmission and distribution investments. However, recently, rate concerns arising from slow demand growth and excess capacity have led many of these utilities to trim their DSM plans. These conservation resources are still available at relatively low cost on the NEPOOL system; they have only been deferred, because they are not currently needed. Some of this cost-effective conservation is likely to be available in Bangor Hydro-Electric's own system. In my testimony before the BEP, a copy of which I believe you filed with FERC, I estimated that BHE had sufficient untapped end-use efficiency resources to delay its own need for power for 3 to 7 years.[5] I have not seen any data to indicate that BHE has pursued this

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[4] This nominally levelized figure was calculated by extending the real-levelized bid price over the 50-year proposed license period (2002-51), escalating using FERC's 3% inflation assumption, and nominally levelizing over the same period using BHE's 8.7% discount rate. If, on the other hand, the estimates in Table 2-1 are in real-levelized 2002$, as they are labeled, then the comparable wind bid would be 64 mills/kWh, less than Basin Mills and the other alternatives considered in DEIS Table 2-1. This cost was calculated by escalating the real-levelized cost of 50.3 mills/kW (1994$) to 2002$.

[5] Testimony of Paul L Chernick on behalf of Conservation Intervenors before the Board of Environmental Protection in the Matter of the Basin Mills Hydroelectric Project Application, November 16, 1992.

CI-52 We have included a discussion of energy conservation in Section 2.4.1 of the FEIS.

CI-52 Cont'd resource more vigorously since then, so DSM should still be BHE's cheapest option for meeting growing demand.

Other Power Purchases

CI-53 The DEIS also excludes purchased power from full evaluation, "because it is included in the energy sources above" (DEIS at 2-25). Since purchases are *not* on the list of non-exclusionary resources, the rationale for this omission is not clear. Staff's statement might be referring to the list of "non-structural" alternatives (a term that apparently refers to anything but company-owned generating capacity), however, the DEIS never categorically excludes non-structural alternatives from evaluation (nor should it). On the other hand, Staff may be arguing that purchases include the same categories of generation being considered in general (e.g., gas-fired, biomass, etc.), and are therefore redundant. This argument would not be valid either, because a capacity glut may lead to market prices below the cost of replacement capacity. Hence, I see no reason to exclude purchases as a resource option, especially when they are as attractive as they are now. As BHE points out in its 1993 Annual report:

> [A competitive market] has worked (along with conservation and the recession, of course) to drive supply costs down to the point where it is definitely a "buyers' market," and will be for the foreseeable future (p. 10).

Moreover, purchases from new resources could also be competitive with Basin Mills. The wind project bid cited above was among the *highest-priced* of the Green RFP winners. Three other winning projects, totaling about 7 MW, came in with bids more than 20% lower.[6]

THE DEIS MISSTATES THE COSTS OF THE REPLACEMENT-POWER OPTIONS

CI-54 For those alternative power sources not eliminated from consideration in the DEIS, the analysis and presentation of costs is confusing, inadequately supported, and overstated. The DEIS expresses the costs in a confused way, using different levelized costs in different tables and calculations. For instance, many figures are labeled as being a particular year's dollars (e.g., 1995$ in Table 2-2); however, it

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[6] Northeast Power Report, January 6, 1995, pages 11-12.

CI-53 Our new economic analysis is based on a current cost approach reflecting today's spot fuel prices. Long-term projections are not amenable to predicting short-term market gluts and windfall energy purchase costs. Purchases are considered in the current cost economic analysis.

CI-54 See our revised economic analysis in Section 2 of the FEIS.

CI-54
Cont'd

appears that these are generally nominally-levelized values, which, by definition, refer to no particular year, but only the period to which they apply.

Natural Gas

The DEIS should have included an assessment of the costs of a natural-gas-fired combined cycle plant. This technology, which is often considered the benchmark for new intermediate and baseload generation in the northeast, is the obvious choice for comparison with Basin Mills. Falling prices for natural gas and combined cycle plants have resulted in non-utility gas plants being built for about 40-50 mills/kWh (real-levelized 1994$). Expressed in the nominally-levelized terms that I believe are found in Table 2-1, a new gas combined cycle plant would cost between 73 and 92 mills/kWh, a range beginning below BHE's understated estimate for Basin Mills. [7]

CI-54
Cont'd

In Section 5.1.2, Staff concludes that "as explained in Section 2, we identified gas turbine generators as the most likely means for making up the power deficit associated with each of the alternatives that offers less capacity than the combination of alternatives offering the greatest capacity (Applicant's proposals for all three projects and projects as proposed with staff modifications)" (DEIS at 5-4). However, I could find no such explanation in Section 2.[8] Although peaking turbines are identified on page 2-25 as the "most popular" *among natural gas turbine applications*, no mention is made of their applicability in substituting for Basin Mills. In fact, Table 2-1 on the same page, entitled "Comparison of levelized cost of energy alternatives for Basin Mills," indicates that the biomass, refuse and fuel cell alternatives that staff examined all have lower costs than peaking gas turbines.

While the inconsistencies between the analysis in Section 2 and Staff's conclusions are discomforting, Table 2-1 does not provide the basis for a good decision anyway. Table 2-1 (which the text attributes to Pacific Gas & Electric but

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[7] Again, if Table 2-1 is actually in levelized 2002$, as it is labeled, gas combined-cycle unit would be significantly less expensive than BHE's estimate for Basin Mills, between 51 and 63 mills/kWh (rather than 74 mills/kWh).

[8] On the other hand, the environmental analysis in Section 4 does appear to incorporate gas-fired combined cycle technology (e.g., DEIS at 4-165).

CI-54
Cont'd

which itself claims Staff as its source) compares the costs of several supply options. The differences in the duty cycles of some of the options is an immediate indication that they would not make good substitutes for one another. In particular, the gas turbine costs are inappropriate, because they are for a peaking plant, whereas the Basin Mills project has a capacity factor of 57%, more like intermediate (cycling) or baseload power.[9] Gas turbines that are built as peaking capacity have relatively low construction costs, but very high fuel costs because they run inefficiently. For a peaking plant, which is run only to meet peak loads (say, less than 10% of the time), these high operating costs are not important. However, for baseload or intermediate (cycling) generation, more capital-intensive, yet more efficient technologies would be much less expensive than peaking plant on a per kWh basis; a small increase in capital costs would be offset by operating-cost savings.

BHE's Alternative Power Value

More critical to the outcome of the DEIS analysis than the straw-man gas turbine costs are the actual replacement power costs used in calculating the net benefits of the alternatives. Appendix B of the DEIS identifies BHE as the source of a "composite value" for replacement power costs.[10] Unfortunately, the DEIS does not explicitly provide the costs or the basis for the cost estimates that BHE provided to the Commission.

It appears that the costs adopted in the DEIS are similar to BHE's IPPPROXY unit, which I believe to be a mix of biomass and oil, priced at $276/kWyr and

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[9] The Basin Mills portion alone has a 54% capacity factor.

[10] This analysis of alternative power sources is inconsistent with the analyses for the Stillwater and Milford Projects found in the same DEIS (DEIS B-4). Without explanation, the DEIS adopts BHE's assumptions about alternative power costs for Basin Mills, while using an unattributed set of assumptions for the Stillwater and Milford Projects. The Stillwater and Milford values are themselves a mismatched set of unsupported assumptions, reflecting a high capital cost (typical of a new coal plant), and a mix of fuels and a heat rate that suggest the hypothetical source is an existing rather than a new plant.

CI-54
Cont'd

CI-54 Cont'd

$36/MWh (1994$, escalating at 3% and 5% respectively).[11] These costs are overstated: they reflect projections of high oil prices and the inefficiency of out of date or inappropriate technology.[12] Table B-12 shows the (nominally) levelized alternative power cost for the Basin Mills development alone to be 132 mills/kWh, beginning in 2002.[13] This cost is 40% higher than either my high-end estimate (92 mills/kWh) for a reasonably priced gas-fired combined cycle plant or for wind power, and 80% above my low-end combined cycle estimate.

I have performed a rough calculation that indicates that adopting a more realistic estimate for the cost of replacement power, such as the 92 mills/kWh cost for wind or gas combined cycle, eliminates all of the benefits of developing Basin Mills or upgrading Veazie. By changing this one assumption, the net benefits of the No-Action Alternative exceed the net benefits of all other alternatives.

THE DEIS UNDERSTATES THE COST OF BASIN MILLS

CI-55

BHE has indicated that financing of the capital-intensive Basin Mills project will be particularly risky in an increasingly competitive environment, and as a result, that the plant might not be built by BHE (BHE President Briggs, quoted in Penobscot Times, 10/13/94; BHE Annual Report, p. 8). That risk would increase the cost of financing for Basin Mills, which should be reflected in the AFUDC rates used in computing construction costs and the annual carrying costs once the plant is in operation. Neither BHE's applications nor the DEIS discusses the financial stress and related costs to BHE's ratepayers of this undertaking.

CI-55 FERC has implemented a different approach to analyzing project economics (see Mead Corporation, Publishing Paper Division, 72 FERC Para. 61,027, July 13, 1995). Your comments on the cost of Basin Mills as presented in the DEIS are no longer applicable. See our revision of Section 2 of the FEIS.

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[11] Application Exhibit H, Appendix 1, page 17.

[12] For example, BHE assumes that its IPPPROXY unit operates at an 85% capacity factor. However, the DEIS apparently calculates the cost per kWh of the Basin Mills replacement by applying the Basin Mills 57% capacity factor to the costs of the IPPPROXY. This overstates the cost per kWh of the IPPPROXY in much the same way that I identified above for peaking plant: the high capital costs of the IPPPROXY will not be sufficiently offset by operating-cost savings if it is assumed to operate at only a 57% capacity factor.

[13] For the refurbished Orono and Veazie developments, the costs appear somewhat lower, between 104.1 and 128.0 mills/kWh, reflecting their earlier on-line dates.

CI-55 Cont'd

BHE has also suggested that, even if the risks of construction were tolerable, it could not recover the costs of the plant "in the customary manner as utility project" (BHE Annual Report, p. 8). In the BEP proceedings, BHE asserted that it might seek to defer recovery of a portion of the costs of the plant for some undetermined number of years early in its operating life. Such cost recovery requires additional financing, including equity financing, as well as associated taxes. The present value of the carrying charges rises as costs are deferred. Neither BHE's applications nor the DEIS discusses the increased costs to BHE's ratepayers from deferral or alternative cost-recovery schemes.

CI-56

CONCLUSION

The DEIS does not give full consideration to conservation, wind power, gas combined cycle and power purchase options, which are some of the lowest-cost alternatives to Basin Mills. Moreover, the DEIS conclusions are not based on a consistent, realistic, and replicable analysis of the Basin Mills alternatives. As such, the analysis in the DEIS does not credibly support FERC Staff's conclusions regarding the benefits of the Basin Mills project.

Sincerely,

Paul Chernick
President

CI-56 Opinion noted.

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254-9149

REPLY TO ATTENTION OF

February 15, 1995

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FEDERAL ENERGY REGULATORY COMMISSION

VERSAR, INC.
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ECOLOGICAL SCIENCES AND ANALYSIS

Regulatory Division
CENED-OD-R-51

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

Dear Ms. Cashell:

This is in response to your staff's request for comment on the Draft Environmental Impact Statement (DEIS) for the Lower Penobscot River Basin (FERC Nos. 10981 - Basin Mills, 2712 - Stillwater, and 2534 - Milford). -005 -006 -004

COE-1 In a letter dated August 13, 1993 the Corps requested cooperating agency status in FERC's NEPA analysis of the Basin Mills Project, a proposal by Bangor Hydro-Electric Company (BHE) to construct a new dam on the Penobscot River at Orono, Maine. It was also recommended that FERC work closely with the Corps in the development of the EIS so that ultimately, the EIS could contain sufficient information for the Corps to make both its Section 404(b)(1) Guidelines and its public interest review determinations in support of our permit decision.

We have completed our review of the DEIS and have prepared the attached comments. You will note that we have assessed the DEIS both in terms of NEPA compliance and in terms of Corps Regulatory requirements. Our comments must be incorporated into the final document in order for the Corps to accept the EIS.

If you have any questions concerning this matter, please contact Jay Clement of my staff at 207-623-8367/8124 at our Manchester, Maine Project Office.

Sincerely,

James C. Wong
James C. Wong
Acting District Engineer

Attachments
Enclosures

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-1 No response required.

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

CORPS OF ENGINEERS COMMENTS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE LOWER PENOBSCOT RIVER BASIN (FERC NOS. 10981 - BASIN MILLS; 2712 - STILLWATER; AND 2534 -MILFORD)

NEPA Compliance

COE-2

1. The DEIS is missing an index, as required in 40 CFR 1502.10(j) - Recommended Format. The index of an EIS, at the end of the document, should be designed for easy reference to items discussed in the main text of the EIS (33 CFR 325, Appendix B).

COE-3

2. The comments of National Marine Fisheries Service (NMFS) and draft comments from US Fish & Wildlife Service (USFWS) have been reviewed by Corps staff. These will undoubtedly be reviewed by FERC in detail as they are received. These comments and the general comments listed below need to be satisfactorily resolved prior to issuance of a Final EIS (FEIS). Because of the many issues that warrant further analyses, the Corps recommends that an additional draft or a supplemental EIS be produced for review and comment prior to the FEIS.

3. The Corps shall not adopt the DEIS document (40 CFR 1506.3) for purposes of exercising its regulatory authority (33 CFR 325) unless substantial changes are made, since the DEIS does not appear to meet the standards for an adequate statement under the existing regulations. If a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft of the appropriate portion(s) (40 CFR 1502.9). Alternatively, pursuant to 40 CFR 1502.9, the agency shall prepare a supplement to the draft EIS if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.

The latter clearly applies while the former will if FERC adequately responds to Corps and Federal resource agency concerns and comments.

General Comments

COE-4

1. In our August 13, 1993 letter, we recommended that the basic project purpose be clearly stated early in the document and that it be defined through coordination between the applicant, FERC, the Corps and the Federal resource agencies. The purpose and need as defined in Section 1.1 of the DEIS apparently states

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-2 The structure of the Lower Penobscot River Basin EIS is consistent with applicable NEPA requirements. We have, however, expanded the index of Appendix F to make it easier for the reader to locate specific information there. The detailed tables of contents for the main text and appendices, together with cross-references in the body of the text, obviate the need for a subject index.

COE-3 A supplemental EIS (SEIS) is not required in this proceeding. We agree that the Council on Environmental Quality (CEQ) regulations require a SEIS if an agency makes "substantial changes in the proposed action that are relevant to environmental concerns," or if there are "significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts".

As to the first basis for a SEIS, Commission staff reaffirms in the FEIS that the alternatives evaluated in the DEIS were sufficient to encompass all reasonable alternatives, as required by NEPA. Therefore, there are no "substantial changes in the proposed action relevant to environmental concerns" in the FEIS.

As to the second basis for a SEIS, none of the information obtained as a result of DEIS comments, nor any other information received by Commission staff subsequent to the DEIS, amounts to "significant new ... information" as defined by CEQ regulations. New data and analyses by Paul Rago in NMFS' DEIS comments are consistent with Commission staff's conclusions. Additional information received on eel studies, water quality and water temperature studies, and other information caused us to refine conclusions but did not constitute "significant" new data and information.

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-4 that "the project shall be best adapted to a comprehensive plan for improving or developing a waterway or waterways for the use or benefit of interstate or foreign commerce, for the improvement and utilization of water power development, for the adequate protection, mitigation, and enhancement of fish and wildlife, and for other beneficial public uses, including irrigation, flood control, water supply, and recreational and other purposes......". This is does not clearly state the project purpose and need as required by NEPA. FERC's clear statement of purpose and need along with the Corps' statement of the basic project purpose must be specifically identified.

The Corps generally defines the basic project purpose very broadly so that an array of alternatives may be applied to the project. Within the context of a Highway Methodology type process (discussed in earlier correspondence) it is generally defined after reaching consensus with the applicant, the lead Federal agency and the Federal resource agencies. For this project we could define the basic project purpose as generally as "to provide electrical generating capacity".

COE-5 2. Section 1.2 discusses the need for the project and specifically focuses on NEPOOL demands along with some discussion of supporting data from the Maine State Planning Office relating Maine's energy demands to economic growth. We believe better documentation is necessary to support this section. What are the present and projected demands in the State of Maine? This should be presented in terms of actual energy forecasts, not based on economics. Why is a planning period of only 10 years used to support need rather than the 50 year period associated with the life of the project? How do Maine's energy demands relate to those within NEPOOL? How can this project be justified in terms of demand when we are aware that other power companies in Maine (Central Maine Power Company) are reportedly taking producers completely off line and/or reducing power generation at existing sites? How do a particular State's needs relate to those of NEPOOL? Without better documentation, the Corps sees little support for the statement "NEPOOL and Maine State Planning Office forecasts support the long-term need for the capacity and energy that would be provided by the Basin Mills, Milford and Stillwater projects".

COE-6 3. In Section 1.3 you briefly discuss the history of the proceedings. On page 1-5 within that same section you incorrectly point out that a water quality certification is required for any project which results in a discharge into "navigable waters of the United States". A water quality certification is required for discharges into all waters of the United States, not just in navigable waters.

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-3 Cont'd Consequently, applying the "rule of reason" [1] that is applicable to this issue, no SEIS is required. See Allegheny Electric Cooperative, et al., 48 FERC ¶ 61,363 (1989) at 62,391.

We have not made any modifications in the FEIS which you feel are necessary for you to adopt it for purposes of exercising your regulatory authority under Section 404 of the Clean Water Act. The FEIS is designed to satisfy the Commission's NEPA compliance requirements. We note that you may use our documents to satisfy, in part, your NEPA obligations. These comments will also be addressed in the orders issued for these projects.

COE-4 The FEIS may not satisfy the Corps' NEPA obligations, although we note that you have stated that you may use document to satisfy, in part, your NEPA obligations. This comment will be addressed in the orders to be issued for these projects.

COE-5 We have modified the Need for Power portion of the EIS in order to respond to this and other comments received regarding that section of the DEIS.

COE-6 We have deleted the word "navigable" from the section you cite.

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[1] See Marsh v. Oregon Natural Resources Council, S. Ct., No. 87-1704, slip op at 11 (decided May 1, 1989).

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-7

4. Section 1.3.3 discusses cumulative impacts. Although the Corps has no objection to multiple NEPA documents for the various hydro projects within the Penobscot River Basin, we believe that the key issue of whether or not to construct the Basin Mills dam is somewhat clouded by the discussions of the Milford and Stillwater projects.

COE-8

5. Section 2.3 discusses alternatives to proposed project facilities or operation. In section 2.3.1, six alternatives to the Basin Mills project were originally considered but 5, including the proposed, were ultimately carried through the DEIS document. We recommend that the following additional alternatives be addressed since it appears likely they could meet our basic project purpose:

a. Constructing Basin Mills and removing the Veazie dam. This is discussed somewhat in Appendix D (Dam Removal Study) however, not as a combined project alternative. Could this alternative meet a redefined project purpose, providing both power and less environmental impact?

b. With and without constructing Basin Mills, increase generating capacity at the Milford and Stillwater Projects.

In addition, we believe this section should contain a discussion of alternative designs for the Basin Mills project which could minimize wetland and waterway impacts. If any other locations, alignments or designs for the Basin Mills dam were reviewed, they should be discussed in the DEIS. The only discussion of avoidance and minimization steps is very brief and contained in the sections discussing wetland impacts.

COE-9

Sections 2.3.2 and 2.3.3 discuss the Stillwater and Milford projects respectively. With the exception of possible fish passage facilities, any actions at these 2 projects are likely to not require the discharge of dredged or fill material into waterways or wetlands. As such they would be outside the jurisdiction of the Corps. However, since FERC has chosen to link these 2 projects to the Basin Mills project, we will have to review the effect of any actions at these projects. Since the primary issue at these projects appears to be fish passage and regulating flows for fish resources, we will rely greatly on the recommendations of the US Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) as the recognized Federal experts in this field.

COE-10

6. Section 2.4 discusses no action alternatives. We believe the no action alternative discussion should be specifically separated from the alternative energy sources section. Discussion of the no action or no build alternative is a NEPA requirement and the DEIS should contain a detailed

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-7 The Milford and Stillwater projects were combined with the Basin Mills proceedings at DOI's request in their comments on the scoping document for Basin Mills.

COE-8 Several agencies and other groups suggested that we consider a number of alternatives beyond those examined in the DEIS. Since many of these new proposed alternatives were exactly the same or very similar, we consolidated our analyses of these new proposed alternatives. The results are contained in Section 2.3.1.2.

Alternative project designs were addressed in BHE's license application, which reflects full pre-filing consultation with all agencies. See Appendix F of BHE's license application.

COE-9 No response required.

COE-10 This comment will be addressed in the orders to be issued for these projects.

Regarding this FEIS meeting Corps' requirements under the 404(b)(1) guidelines, see our response to COE-3 and COE-4, above.

description of what the implications of no action at the Milford and Stillwater Projects are and what not building Basin Mills means in terms of the basic project purpose. To satisfy the Section 404(b)(1) Guidelines, the applicant must demonstrate why these alternatives are not practicable or less environmentally damaging.

COE-10 cont'd

The term "practicable" is defined as "available and capable of being done after taking into consideration cost, logistics and available technology in light of overall project purpose" (40 CFR 230.3(q)). In order for the DEIS to satisfy the Corps' requirements under the 404(b)(1) Guidelines, alternatives must be discussed in terms of practicability as well as in terms of potential environmental impact. Only the least environmentally damaging practicable alternative (LEDPA) may be considered for final permit review. The DEIS only generally discusses alternatives' practicability and appears to focus on cost without ever providing sufficient detail to demonstrate why greater cost is necessarily not practicable. Assuming for the moment that several alternatives are practicable, the DEIS also does not provide sufficient detail to argue that the preferred alternatives are the LEDPA.

COE-11

7. Again, we believe the alternative energy sources should be presented in a separate section and discussed in detail sufficient to demonstrate whether they may be the LEDPA. Section 2.4.1 discusses a number of alternative energy sources which were eliminated, namely non-exclusionary energy sources. Due mostly to the general nature of the discussion, we are not convinced that the non-exclusionary sources shouldn't be considered, particularly after more appropriately redefining the basic project purpose. Without a detailed description of each alternative and an analysis of its practicability and environmental impact, we can only assume that each of these sources is both practicable and less environmentally damaging. The DEIS should present a consistent analysis for each alternative. We recommend both a narrative section and a comparative matrix of all the alternatives.

Section 2.4.2 does provide some comparison of alternative energy sources. Does the list presented in this section and in section 2.4 discuss all of the potential alternative energy sources in NEPOOL and BHE's service area? Are options such as solar power, tire derived fuel, nuclear power and coal fueled generation reasonable and practicable? This section also does not adequately discuss the practicability or environmental impact of the various alternatives. Too great an emphasis is placed on cost without clearly demonstrating why a more costly alternative is not practicable or more environmentally damaging. For this reason, Table 2-1 is not particularly valuable and cannot be used as the above mentioned matrix. Simply stating that hydropower is

COE-11 We address this comment in our revisions of the Need for Power section 1.2. This comment will be further addressed in the orders issued in these proceedings.

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-11 cont'd the least expensive does not necessarily make it the LEDPA.

COE-12 8. Section 2.6 discusses the actual construction alternatives to the project. Alternative 6 to the Basin Mills project is eliminated early due apparently to cost. Although this may be a legitimate decision, the DEIS contains insufficient detail as written to support the findings. We recommend that the DEIS specifically conclude that alternative 6 is either not practicable or more environmentally damaging or both and state the reasons why. Similarly, in Section 2.6.1.3, alternative 5 to the Basin Mills project is eliminated. The DEIS should describe why it was dismissed as noted above.

COE-13 9. Section 3.0 discusses the affected environment. The Corps will rely heavily on the expertise and comments of the Federal and State resource agencies in areas such as water quality/quantity, fisheries resources, terrestrial resources, threatened and endangered species, bio-diversity and air quality. Section 3.6 however, discusses wetlands to which we have the following comments:

COE-14 a. In Section 3.6.2 we believe the following sentence should replace the present one at the end of the first paragraph. "The Corps does not utilize the State's value based classification system. All wetlands within the area of Basin Mills, Stillwater, and Milford projects are regulated by the Corps".

COE-15 b. In the second paragraph of the same section the term "non-hydric" is used to describe the beaver flowage wetlands. The term is misleading but I believe it is the applicant's intent to state that the hydrologic parameter of the 3 parameters necessary for a wetland might not be present if beavers were not active in the area or if the railroad culvert were properly maintained. If this was the applicant's intent it should be so stated however, we do not concur. There is insufficient data to support this hypothesis so it is our recommendation that FERC remove this sentence from the paragraph.

COE-16 c. FERC should consider including a wetland cover type map of the project area in this section to clarify some of the discussions.

COE-17 d. In our previous correspondence to you and your consultant, we cautioned you against the use of WET2 as an assessment methodology for wetlands functions and values. We still maintain that although it provides general information on wetland functions and values it is generally inadequate in its assessment of wildlife habitat values. We believe it is appropriate to simply present the results of the WET2 analysis as FERC did in discussing the beaver flowage area but not to draw

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-12 We address DEIS Alternative 6 further in our responses regarding a number of new suggested project alternatives in section 2.5. In section 2.6.1.3, we did not eliminate DEIS Alternative 5 from further consideration; the DEIS and FEIS include a full analysis of that alternative.

COE-13 No response required.

COE-14 We have added this sentence to the FEIS (see section 3.6.2).

COE-15 We did not eliminate the sentence containing BHE's observations of this wetland area. It is worded to convey appropriate uncertainty. We added a sentence about the presence of wetlands in this area depicted on 1975 NWI maps. We include HEP and WET results in our assessment specifically to reduce subjective judgements based on professional competence.

COE-16 We have added wetland cover type maps to the FEIS, based on BHE's delineations, as Appendix H of the FEIS.

COE-17 This sentence has been rewritten (see section 3.6.2). Also, see response COE-15 above.

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-17 cont'd separate conclusions from the analysis as FERC did in discussing the borrow pit site. The sentence "These wetlands have low functional quality......" should be rewritten or eliminated.

COE-18 A HEP analysis was performed to augment the results of the WET2 analysis. As discussed in our October 21, 1993 letter, the HEP appears slanted toward waterfowl and aquatic furbearer species. Although the applicant's previous wetlands report indicates that the project could have a positive effect on these species, the Corps still maintains that the project is likely to have a negative impact to other avian, mammalian and amphibian species. We caution FERC on relying to heavily on these weighted assessments in the DEIS. In a Highway Methodology type approach, the Corps recommends an unweighted, "professional consensus" approach to assessing the wetlands' functions and values as outlined in the samples provided to you earlier. This approach may yield different results.

COE-19 e. In addition to wetlands are other special aquatic sites as defined in 40 CFR 230.3(q-1) (e.g. riffle/pool complexes) discussed and properly delineated? According to the US Fish & Wildlife Service these definitely exist in the project area. The Corps recommends that these be specifically discussed in the DEIS. There appears to be a brief mention of the term "riffle" in Section 3.8 (Bio-diversity) but not a specific discussion of special aquatic sites.

10. Section 4.0 discusses the environmental impacts of the projects.

COE-20 a. Subsection 4.1 discusses soil erosion and groundwater impacts. FERC or BHE should clarify whether erosion control measures or the proposed underdrain system will alter waters of the United States under Section 404. FERC should clarify that the underdrain system will only mitigate the impacts of the project and not, for example, drain wetlands not affected by the project.

COE-21 b. In subsection 4.3 FERC implies that any increase in generating capacity at Milford and Stillwater will not result in a discharge of dredged or fill material subject to Section 404 and that fish passage facilities will. This should be specified. What is FERC's and BHE's intention in terms of timing for these projects? Would work at these projects occur simultaneously with Basin Mills under the preferred alternative?

COE-22 c. The Corps will generally rely heavily on the expertise and comments of EPA and USFWS in the areas of water quality/quantity, fisheries, air quality, threatened and endangered species and bio-diversity. We do have the following

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-18 We modified the discussion of HEP results in the DEIS in response to your comment (see Section 4.4.2.1). However, as the DEIS stated, not conducting HEP analyses for certain species does not necessarily mean that the analyses are flawed. The species addressed in the HEP analyses were selected in consultation with state and federal wildlife agencies. The analyses showed negative impacts on several species due to loss of habitat, confirming that selection was not biased toward only those species that would be unaffected. In contentious proceedings, HEP and WET analyses provide decision support that is more objective than a "professional consensus".

COE-19 Information about riffle and pool habitats has been added to Sections 3.6 and 4.5 of the FEIS.

COE-20 A determination whether erosion control measures or the proposed underdrain system will alter waters of the United States under Section 404 is not a Commission responsibility. However, BHE quantified the area that would be disturbed by constructing erosion control measures and the underdrain system in its Wetlands Study (1993). The findings of the study are presented in the FEIS text. The maps provided in the study report indicate that although no wetlands would be affected by construction, waters of the United States would be temporarily affected.

If Alternative 3 were adopted by the Commission, we would recommend that the Commission require BHE's final groundwater control program to include measures to prevent decreases in groundwater levels below those at present, to avoid affecting any wetlands in the project area. The DEIS text has been modified to make this clear. However, staff recommends Alternative 4 as our preferred alternative in the FEIS, making this issue moot.

COE-21 The DEIS discussion of capacity increase at Milford and construction of fish passage facilities at Stillwater and Milford deals with anticipated environmental modifications that might result in impacts to aquatic resources. Whether these proposed actions may require a Section 404 permit and the

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

comments concerning the discussion of wetland impacts in Section 4.5:

COE-22 cont'd 1.) Subsection 4.5.2.1 discusses the Basin Mills development. FERC states that existing normal high water is 44' NGVD and that the proposed impoundment is 64'. Earlier in the DEIS there is a discussion of tree and other vegetation cutting to 66'. If the additional 2' of clearing will require mechanized land clearing of wetlands, these impacts must be addressed in the DEIS.

COE-23 2.) The narrative discussing wetland impact figures is still misleading. It states that 16.7 acres of wetland will be lost to excavation. Another 1.1 acres will be temporarily impacted by roads and cofferdams. Why isn't the 23.9 acres impacted by flooding (beaver flowage & borrow pit areas) presented as an impact? Table 4-11 presents it but confuses the facts by identifying it as mitigation. BHE cannot claim mitigation credit for flooding wetlands (with or without other alterations) without first acknowledging that they are being impacted by the project and discussing any loss of functions and values.

COE-24 3.) It is still not clear that BHE and FERC understand or have adequately presented wetland impacts from inundation. Any wetland which is effected by filling, excavation, draining or flooding must be discussed in terms of area of impact and type of alteration. Even wetlands which remain but are "wetter" or which will change character due to inundation must be considered in the overall project impact. In earlier correspondence, BHE defined inundation impact areas as those areas where loss of wetland functions and values would occur. This is incorrect. All areas of wetlands subjected to inundation from the Basin Mills project must be presented. If the applicant then wants to clarify whether or not there will be an impact in terms of change in character or a loss of functions and values within the inundated areas he may do so.

COE-25 4.) The DEIS indicates that greater than 50% of the Basin Mills project's impacts are to forested wetlands. Another 25% are to scrub-shrub wetlands (Table 4-11). The mitigation plan however, focusses virtually exclusively on emergent and scrub-shrub wetland enhancement/creation. In its present form, BHE's proposal for mitigation is unacceptable and in any case, contains insufficient detail to make any assessments. The sequential approach to mitigation planning mandated by the Corps/EPA Mitigation MOA (provided previously) must be followed before the Corps and the resource agencies could accept any proposal. It is therefore premature for FERC to conclude that the measures would provide sufficient in kind mitigation. It is also inappropriate for FERC to compare the

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RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-21 Cont'd timing of project construction are matters to be established by BHE and the Corps. They are not discussed further in the FEIS.

COE-22 BHE's Wetlands Study (1993) indicates that impacts (filling, excavation, bank stabilization, and fish passage and recreation facilities) due to the Basin Mills Project have been quantified. Consequently, impacts due to clearing vegetation to 66 feet along the proposed impoundment are encompassed in the analysis presented in the FEIS. (See Sections 4.4.2 and 4.5.2).

COE-23 All impacts (including flooding) are discussed in Section 4.5.2.1 and are presented in Table 4-10, which is entitled *Staff's estimate of federal wetlands permanently affected by the proposed Basin Mills development.* This section has been slightly modified to avoid confusion.

COE-24 BHE provided FERC with a copy of its draft Wetlands Report in September, 1993. FERC, in turn, provided the Corps with sections of this report for review and comment. Based on FERC's and the Corps' review, FERC requested additional information from BHE (letter dated November 19, 1993) about the amount of wetlands that would be affected by inundation (Item 20) and again on January 27, 1994 (Item 5). Although BHE has not altered their definition of "impacts" or "effects" to wetlands as being solely losses of wetland acreage, we have not adopted BHE's definition in our analysis. The discussion in Section 4.5.2.1 and acreages presented in Table 4-10 of the DEIS present staff's estimate of <u>all</u> project impacts, which include direct losses of wetland acreage (e.g., filling) <u>and</u> the effects of wetland type conversion (e.g., due to inundation). Our estimates of wetland type conversion due to inundation were in fact based on acreages discussed in BHE's final Wetlands Report (December 1993); 23.9 acres of the total area BHE identified for wetland mitigation measures are wetlands that will undergo a type conversion. These impacts are described in Section 4.5.2.1.

COE-25 We agree that mitigation for projected effects on forested wetlands is appropriate. If Alternative 3 were adopted, the

COMMENTS FROM THE CORPS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-25 cont'd Basin Mills project impacts to the 5 million acres of wetland in Maine and state that expected consequences are not of long-term consequences. This latter reference should be eliminated.

COE-26 5.) The DEIS indicates that 3.4 acres of emergent and scrub-shrub wetland will be created from existing uplands at the borrow pit site. The uplands are characterized as scrub-shrub and forested. The DEIS fails to discuss their habitat value or other functions and values they may have.

COE-27 6.) In the Terrestrial Impacts section (Section 4.4, subsection 4.4.2.2 - Regional Impacts), the DEIS mentions that 12 acres of shrub swamp and shallow marsh is being created as a result of the Basin Mills project. Are these figures included in the figures presented in the wetlands section?

COE-28 7.) In subsection 4.5.4 we do not feel it is appropriate or supportable to state that the permanent hydro-period offered by the Basin Mills project is an improvement to wetland functions and values.

COE-29 8.) In subsection 4.5.5 the DEIS states that removal of the Veazie dam may adversely affect 16.1 acres of wetlands from dewatering the existing impoundment however, no estimate is made of new wetlands which may be created in the new riparian zone. The DEIS should include this figure although it is likely that it will only be an estimate based on available resource data.

COE-30 9.) The first sentence of subsection 4.5.6 (referencing Maine's 5 million acres of wetlands) should be eliminated.

COE-31 11. Section 4.7 discusses bio-diversity impacts. As previously noted, the DEIS briefly mentions "natural run, riffle, and rapids riverine habitat" however, special aquatic sites as specifically defined by Federal regulation are not presented. In order for the DEIS to address the 404(b)(1) Guidelines they must be. Wetlands, which are a special aquatic site, are discussed again in this section however, FERC again concludes that the unavoidable loss of 40.6 acres of wetlands would be mitigated by BHE's proposal. We cannot concur.

COE-32 12. Section 5 discusses staff conclusions.

a. Subsection 5.1.2 reviews the fact that FERC has concluded that a need exists within the area serviced by BHE. How was that need defined however? Refer to our earlier comments on purpose and need. The DEIS further states that each of the alternatives meets the need with or without normalization with gas turbine generators and These are not a major factor in

RESPONSES TO CORPS COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

COE-25 Cont'd FEIS recommends that BHE be required to provide in kind mitigation for impacts on forested wetlands (see Section 4.5). We also agree with your comparison of affected wetlands with total wetlands in the watershed. This is why we contacted both the Corps (personal communication, Jay Clement, Corps, Manchester, Maine, December 10, 1993) and Maine Department of Inland Fisheries and Wildlife requesting information on the quantity of wetlands in the Penobscot River watershed. We were told that the information does not exist. In the absence of watershed data, we used the amount of wetlands in the state to place wetlands impacts in context, and indicated the basis for that context in the text.

COE-26 FEIS has been modified to clarify text relating to the quality of the upland habitat that would be inundated and the habitat BHE proposes to alter for wetlands creation. The affected upland area would be lost due to inundation by the impoundment; this is an unavoidable loss. The change in this habitat would occur in response to creation of the project impoundment, and its alteration was not specifically planned by BHE as a mitigation measure. BHE proposes to ensure that functionally valuable emergent and scrub/shrub wetlands are created by filling, grading, and planting the flooded area. This creation would help to mitigate for the effects on wetlands elsewhere in the project area. However, we acknowledge the uncertainty associated with the long-term ecosystem function of this created habitat.

COE-27 We state in Section 4.4 that the wetland-oriented cover types discussed in the terrestrial section do not represent jurisdictional wetlands; their categorization is based on aerial photography and ground-truthing. However, all cover types that are delineated wetlands are addressed in our wetlands discussion in Section 4.5.

COE-28 This sentence has been modified (see Section 4.5.4).

COE-32 cont'd

environmental considerations. If all of the alternatives meet the "defined" need, how then can FERC conclude that alternative 3, constructing Basin Mills, is the preferred? The Corps would have to be able to demonstrate that Basin Mills is the least environmentally damaging practicable alternative.

b. Subsection 5.2.1.3 discusses conclusions and recommendations. With the exception of the preferred, each of the alternatives is dismissed because they "do not result in economic or socioeconomic benefits to the local and regional economies.....". First of all, the DEIS fails to identify a clear purpose and need with which to compare alternatives. Second, although it has not been specifically identified, the overall/basic project purpose is not about economics, it is about producing power. Alternatives must be addressed in terms of meeting the project purpose, their practicability or their environmental impact. The conclusions in the DEIS do not appear supportable.

COE-29 We have no means by which to quantify the amount of wetlands that may be created since no data exist on river bottom topography and substrate. However, we have added a sentence in Section 4.5.5 that states that wetlands may form in previously inundated areas.

COE-30 See our response to COE-25.

COE-31 See our response to COE-2.

COE-32 Please see the revised Need for Power analysis in Section 1.2 of the FEIS and staff's Conclusions in Section 5 on the merits of the project alternatives. The Corps comment, in particular the purposes of licensing under the FPA, will be further addressed in the orders issued for these proceedings.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

United States Department of the Interior

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February 16, 1995

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ECOLOGICAL SCIENCES AND ANALYSIS

ER 94/881

Honorable Lois D. Cashell
Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Dear Ms. Cashell:

DOI-1 This document contains the United States Department of the Interior's (Department) comments on the November 1994 Draft Environmental Impact Statement (DEIS) for the Lower Penobscot River Basin, Maine, covering the following licensed and proposed hydroelectric projects: Basin Mills Project, FERC No. 10981 (including existing Veazie and Orono developments, and proposed new Basin Mills Dam); Milford, FERC No. 2534; and Stillwater, FERC No. 2712. The DEIS was prepared by the Federal Energy Regulatory Commission (Commission) pursuant to the National Environmental Policy Act (NEPA) based on the finding that the proposed licensing actions would have a significant impact on the quality of the human environment.

The Department's comments are provided in three parts. First, we give an overall assessment of the adequacy of the DEIS in addressing issues of concern to this Department; second, Enclosure A is a section-by-section analysis of the DEIS; and, third, Enclosure B contains updated and revised Prescriptions for Fishways and Fish and Wildlife Recommendations, which have been previously provided by the Department pursuant to Section 18 and Section 10(j) of the Federal Power Act and the Fish and Wildlife Coordination Act.

GENERAL COMMENTS

DOI-2 The DEIS does not provide an adequate statement of the need and purpose for the proposed Federal action. Consequently, it is not possible to understand if a full range of alternatives has been considered.

DOI-3 Of the alternatives reviewed, the DEIS fails to vigorously examine and, in fact, arbitrarily dismisses important reasonable alternatives to the proposed action. Some of these alternatives (e.g., conservation and demand-side management) could help achieve the

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-1 No response required.

DOI-2 We have revised the Purpose of Action (1.1) section of the FEIS. The purpose of the action will also be addressed in the orders issued for these projects.

DOI-3 See our revised Need for Power section (1.2) and alternative energy sources discussion in Sections 2.4.1 and 2.4.2 of the FEIS.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-3 Cont'd applicant's stated energy capacity needs, while at the same time avoid and reverse environmental harm to natural resources of local, regional, and national importance.

DOI-4 The DEIS fails to adequately analyze environmental issues surrounding the licensing of the hydroelectric projects in the lower Penobscot River Basin. As discussed in greater detail in Enclosure A, the DEIS fails to use accurate or current data in its analysis of impacts to natural, cultural and recreational resources for which this Department is responsible.

DOI-5 Fundamental conclusions are made in the DEIS based upon inappropriate judgements and false assumptions. For example, the DEIS makes inappropriate judgements about the likely success of congressionally sanctioned and authorized resource agency fish restoration programs. The DEIS misstates (or overlooks) relevant resource agency goals, ignores statutory obligations under the Federal Power Act, and gives undue deference to the Maine Department of Environmental Protection (DEP) with respect to recommendations for fish and wildlife mitigation and enhancement. The Maine DEP is not charged with management of fish and wildlife resources. In part, the selection of the proposed action is based on the unrealistic assumption that current resource agency management plans and objectives for anadromous fish will remain static over the next 30 to 50 years (i.e., the term of the license). Moreover, the DEIS does not fully address the U.S. Army Corps of Engineers' permitting requirements, including the Sec. 404(b)(1) Guidelines. Consequently, many conclusions in the DEIS regarding the licensing of the proposed projects are unfounded.

DOI-6 In the DEIS, the Commission fails to recognize and to properly account for its trust responsibility to the Penobscot Indian Nation (PIN), a Federally recognized Indian Tribe. In dealing with Indian Tribes, the Federal government is judged by the most exacting fiduciary standards. Seminole Nation v. United States, 316 U.S. 286, 297 (1942). As an agency of the Federal government, the Commission is charged with the United States' fiduciary responsibilities towards the Tribe. Covelo Indian Community v. FERC, 895 F.2d 581, 586 (9th Cir. 1990). Moreover, any Federal action is subject to this fiduciary responsibility. Nance v. Environmental Protection Agency, 645 F.2d 701, 711, cert. denied, 454 U.S. 1081 (1981). This duty must be fulfilled both procedurally and substantively.

While the DEIS mentions the PIN's interest in a "wild" salmon fishery and the cultural concerns the Tribe may have with the projects as proposed, the Commission fails to recognize and protect the PIN's rights and trust resources, including its property interest in the fishery resource of the Penobscot River. Nor does the Commission address the many impacts that the proposed projects, and particularly the Milford Project, will have on the Penobscot Reservation. The impoundment for the Milford Project surrounds at least 22 reservation islands.

The Department further points out that the Commission's treatment of tribal rights and interests in these proceedings is contrary to the provisions of the President's Memorandum dated April 29, 1994, entitled "Government-to-Government Relations With Native American Tribal Governments." Pursuant to this Memorandum, each executive department and

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-4 Opinion noted. We have corrected in the FEIS errors or omissions that respondents identified in the DEIS.

DOI-5 Sections 4(e) and 10(a) of the FPA require the Commission to evaluate and resolve conflicting resource objectives and to recommend a project alternative best adapted to the comprehensive use of the waterway. State and federal fishery program goals do not have mandatory status under the FPA. Rather, the FPA requires that state and federal fishery goals be evaluated by the Commission and balanced against other conflicting goals. Due deference is to be accorded to state and federal fish and wildlife recommendations submitted pursuant to Section 10(j). If these recommendations are inconsistent with the FPA or other applicable law, the Commission is required to attempt to resolve these inconsistencies with the agencies. The Commission is not exceeding its statutory authority by establishing fishery goals; it is attempting to resolve conflicts and to ensure that project impacts are appropriately mitigated, as the FPA requires.

Deference is accorded fish and wildlife conditions of the Water Quality Certificate issued by the Maine Department of Environmental Protection, consistent with our interpretation of the U.S. Supreme Court's decision in PUD No. 1 of Jefferson County v. Washington Dept. of Ecology (No. 92-1911, May 31, 1994). This issue will be further addressed in the orders for these projects.

The Corps is no longer a cooperating agency in the preparation of this FEIS. This FEIS does not intend to satisfy potential Corps NEPA compliance requirements associated with Section 404(b) of the Clean Water Act.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-6 Cont'd

agency "shall assess the impact of Federal Government plans, projects, programs, and activities on tribal trust resources and assure that tribal government rights and concerns are considered during the development of such plans, project, programs, and activities." The proposed issuance of Federal licenses for hydroelectric developments is certainly the type of activity for which such assessments and consideration of tribal interests are required. However, in this situation, the Commission has failed to do so.

DOI-7

In this DEIS, the Commission adopts Alternative 3, which requires, as mitigation for the construction of the new Basin Mills Dam, that the Maine fishery agencies trap and truck Atlantic salmon, American shad, and alewife from a point below Veazie Dam to an undetermined location above the Milford Dam. This alternative is contrary to the U.S. Fish and Wildlife Service's long-standing program to restore naturally self-sustaining runs of Atlantic salmon to the Penobscot River.

DOI-8

Additionally, in choosing Alternative 3, the Commission has selected an alternative which will detrimentally impact the PIN. The PIN has statutorily reserved fishing rights to take fish for sustenance purposes within the boundaries of its reservation, which consists of Indian Island and others in the Penobscot River above the Milford Project. These fishing rights were confirmed to the PIN by State and Federal legislation in the 1980 Maine Indian Claims Settlement (See Maine Implementing Act, 30 M.R.S.A. Section 6207(4); Maine Indian Claims Settlement Act, 25 U.S.C. Sections 1721-1735).

Alternative 3 results in Atlantic salmon and American shad bypassing Indian Island (which is the most densely settled reservation island and the center of PIN government and tribal life) as well as other reservation islands, while being trucked to the upstream release site. The Commission may not abrogate the PIN's fishing right by permitting a development which will result in fish being trucked around reservation fishing areas, and subjecting those fish which remain in the river to an additional barrier before reaching reservation waters.

DOI-9

In addition, the Commission has used the wrong baseline for assessment of impacts due to relicensing. Comparing the proposed relicensed condition to the existing condition grossly underestimates the impacts (including cumulative impacts) attributable to granting another long-term license. Proper impact assessment should compare each alternative to the without or no-project condition. In this regard, the Department is requesting that the baseline be changed from the existing to the no-project condition.

DOI-10

The inaccuracies and inadequacies in the DEIS are of such magnitude that, in the Department's view, a supplemental DEIS (SDEIS) must be produced. The new document should be prepared in full coordination and cooperation with State and Federal resource agencies having statutory management authority or other recognized expertise in issues dealing with environmental protection and enhancement. The SDEIS should also fully address the U.S. Army Corps of Engineers' permitting requirements, including the Section 404(b)(1) Guidelines. Enclosed comments discuss the Department's concerns in more detail.

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-6 This issue will be addressed in the license orders for these projects. We note that throughout the licensing process and the environmental compliance process, the Commission staff has incorporated, into our analyses, information from the Penobscot Indian Nation on its cultural heritage and perceived impacts of the projects on PIN resources.

DOI-7 See response DOI-5, above.

DOI-8 We note that the Act to Implement the Maine Indian Claims Settlement Act, 30 MRSA, 6201 et. seq. provides at 6207 para. 4, that "the members of...the Penobscot Nation may take fish, within the boundaries of their respective Indian Reservations, for their individual sustenance." The Commission staff does not dispute these rights.

Staff's analysis indicates that Alternative 3 would result in a partially wild run nearly double that which would exist under the No Action alternative, as well as significant increases in the alewife population. Also, only 50%, at most, of the salmon run would be trucked past Milford dam, thus providing for PIN exploitation of at least half the run. Alternative 3 thus provides benefits to PIN in several resource areas, including increasing runs of anadromous fish. However, staff's present preferred alternative, Alternative 4, eliminates the concerns you express.

DOI-9 This issue will be addressed in the orders to be issued for these projects.

DOI-10 We concluded that new data and information submitted by respondents with comments on the DEIS were insufficient to warrant preparation of a supplemental DEIS. The basis for our conclusion is evident in our responses to your detailed comments, below, and those of other respohdents. respondents. Also see our response to COE-2 and DOI-5.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-11 Because of the concerns described herein, Bureaus of the Department may, depending on your response to our comments, recommend that the Department refer this project to the Council on Environmental Quality under Section 1504 of the Council's Regulations for Implementing the Procedural Provisions of the NEPA.

Sincerely,

Andrew L. Raddant
Regional Environmental Officer

Enclosures

cc: FERC Service list w/ Encl.

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-10 Cont'd These license proceedings include consultation with state and federal resource agencies consistent with their statutory responsibilities, and if applicable, intervention status.

DOI-11 No response required.

ENCLOSURE A

DEPARTMENT OF THE INTERIOR'S
SECTION BY SECTION ANALYSIS OF THE
FEDERAL ENERGY REGULATORY COMMISSION'S
NOVEMBER 1994
DRAFT ENVIRONMENTAL IMPACT STATEMENT:
LOWER PENOBSCOT RIVER BASIN
MAINE

DOI-12

February 17, 1995

Provided in this appendix to the Department of the Interior's (Department) February 17, 1995, letter to the Federal Energy Regulatory Commission (Commission) are the Department's comments on the November 1994 Draft Environmental Impact Statement (DEIS) for the lower Penobscot River Basin in Maine. These comments follow the organization of the DEIS. They provide a section-by-section analysis of the DEIS and the Department's assessment of the adequacy of the DEIS in addressing issues of concern to this Department. Based on this review, and the issues raised herein, the Department is recommending that a supplemental DEIS be prepared by the Commission.

DOI-12 No response required.

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COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

1.0 PURPOSE AND NEED FOR ACTION

DOI-13

The Council on Environmental Quality's (CEQ) National Environmental Policy Act (NEPA) Regulations require that an Environmental Impact Statement (EIS) contain a statement on the underlying need and purpose to which the agency is responding in proposing the alternatives, including the proposed action (40 C.F.R. Sec. 1502.13). This portion of the document is crucial. It forms the foundation upon which the alternatives requirement of NEPA can be met. In the opinion of this Department, the DEIS does not describe the underlying need for the project or the purpose of the Federal action, as required by the CEQ Regulations.

A clear statement on underlying/basic project purpose is critical in the context of subsequent action by the U.S. Army Corps of Engineers (Corps) under Sec. 404 of the Clean Water Act (CWA). The Corps has already pointed out that the underlying/basic project purpose has yet to be defined in this proceeding. (See letter from Jay Clement to Sabina Joe, Commission staff, dated August 13, 1993).

The Department recommends that a Supplemental Draft Environmental Impact Statement (SDEIS) be prepared to address the issues raised in this letter. In regard to this section, the Department recommends that the SDEIS individually and separately identify the need and purpose to which the alternatives are responding in these licensing proceedings.

In the opinion of the Department, need is the lack of something requisite, desirable, or useful, or a condition requiring relief. Purpose is defined as an object or end to be achieved. Consequently, the two terms should be interpreted as complementary. The EIS discussion of purpose and need should demonstrate that the purpose of a proposed Federal action is to attain or achieve at least part of the underlying need for the proposed action in consideration of the beneficial public uses identified in the Federal Power Act (FPA) §10(a). The statements of purpose and need for the proposed action should each play a different role. The statement of need should be an objective description of the reason that the project (not necessarily the Federal action) is being pursued. The EIS must include alternative methods of satisfying the need. An adequate discussion of alternatives should respond fully to the statement of need. The statement of purpose should follow from the statement of need. It should be the tool for understanding why the Commission has selected the preferred alternative from among the alternative ways of meeting the need. Unlike the objective statement of need, the statement of purpose can be subjective, should refer to the Commission's mission, and should reflect the limits on the Commission's statutory authority. The statement of purpose further should explain how the proposed Federal action satisfies the need and should justify the decision to choose the preferred alternative. The statement of purpose should explain the nature of the Federal action and the relationship between the project and the Federal action. Need must be defined first, framing and delimiting the discussion of alternatives in the EIS.

This section states that the purpose of the proposed action is to decide whether the Commission should issue new licenses for the proposed projects. This purpose is incorrect

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-13 The Purpose of Action (1.1) has been revised and this issue will be further addressed in the license orders for these projects. The Need for Power section has been updated with the most recent NEPOOL forecast data. See COE-2 concerning an SDEIS.

Long-range planning for major capital investment focuses necessarily on long range load growth, and cannot capture short-term fluctuations in energy demand. Whereas there may be no increases in total capacity, systems in the NEPOOL area are likely to retire and substitute more efficient energy projects for existing projects which are, or will be, no longer cost-effective in the 30 year planning horizon contemplated in this FEIS. One of the expected effects of deregulation in the electric industry is that open access transmission will increase competition and enlarge the geographic market for system utilities. As such, the market for BHE electricity may expand beyond the New England area.

Licensees are required under Section 15(a)(2)(C) of the FPA to operate systems to provide efficient and reliable electric service. The details of how BHE's or generic utility facilities can be made more efficient or their lives prolonged is not relevant to the purpose of the FEIS. It is in the inherent self interest of each utility to maximize the efficiency and longevity of its performing assets consistent with financial cost-effectiveness.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-13 Cont'd

within the context of NEPA. An adequate statement on the purpose of the Federal action is not provided. These issues are further discussed below. Also, although section 1.0 states that a description is provided of whether or not there is a need in the region for the power the projects would produce, an adequate description of the need for the project is not provided. These issues are further discussed below.

1.1 PURPOSE OF ACTION. This section cites to the FPA Section 10(a) regarding the Commissions's requirement to license only projects that are best adapted to a comprehensive plan for improving or developing a waterway for various beneficial public uses -- such as interstate commerce (i.e., tourism); protection, mitigation and enhancement of fish and wildlife (including spawning grounds and habitat); and recreation; in addition to waterpower development. Section 10(a) establishes that a variety of needs specific to the Penobscot River Basin can be identified in the EIS, and that the purpose of the Federal action can be to satisfy those needs as much as possible in order to ensure that comprehensive river basin development is achieved. However, no "need" for beneficial public uses other than power development is identified in this section and the Commission's "purpose" does not satisfy the FPA Section 10(a) requirements for comprehensive planning.

1.2 NEED FOR POWER. This section reports (based on a dated June 1993 document) that relatively small increases in peak capacity demand, and decreases in planned capacity (due to planned retirement of existing facilities), are forecast by the New England Power Pool (NEPOOL) to occur during the 1993 to 2002 planning period in the NEPOOL service area -- which is much larger than the lower Penobscot River Basin. Also, based on a May 1992 document by the State of Maine, the annual growth in gross State product is reported as having been 5.6 percent for the 1979-1990 period and a 2 percent annual growth is forecast for the 1991-2000 period. The Commission is relying upon these wide-ranging forecasts as evidence in support of the long-term need for the capacity and energy that the Basin Mills, Milford, and Stillwater Projects would provide within the geographic scope of the EIS -- the lower Penobscot River Basin. The Commission has not squared the purported need for power with the fact that (1) utilities in the NEPOOL service area are planning no capacity increases for the foreseeable future; (2) an excess of power exists in the NEPOOL service area at this time, (3) deregulation is in progress that will likely change the electric industry, and (4) New England, including Maine, has been in the grip of a recession and forecasts of growth may not have been accurate. The need for power section at page 1-2 implies that many existing facilities will be retired, but there is no analysis of how those facilities could be made mor efficient or their lives prolonged.

DOI-14

In this regard, the Department notes that the discussion regarding Section 1.2 - Need for Power - relies upon the 1993 Electricity Supply and Demand report, which indicates that winter peak demand will grow by an average of 2.1 percent and summer peak demand will grow an average of 2.4 percent per year over the ten year forecast horizon (1993-2002). The need for the licensing of the projects at issue here is based on this forecasted increase in demand. The June 1994 forecast, however, indicates much lower growth rates. In this more recent forecast, the NEPOOL winter peak demand is only expected to grow by an average of

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DOI-14 The NEPOOL forecasts have been updated in the FEIS to reflect the 1996 data. See also DOI-13.

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DOI-14 Cont'd

1.3 percent and summer peak demand is also expected to have annual increases of 1.1 percent. The projected growth rate in annual net energy for load is also much lower in the 1994 forecast, reduced from 1.8 percent in 1993 to 1.4 percent in the 1994 forecast. Capacity margins were also projected at higher levels in the 1994 forecast.

Further, Table 1-1 on page 1-2 and the accompanying text only address existing and future hydroelectric capabilities for the three projects included in the DEIS. As presented in the table, proposed actions would increase the capacity of these three projects by 45.3 MW. However, the appropriate context for analysis would be to compare the proposed actions to the existing Bangor Hydro Electric (BHE) and NEPOOL systems in their entirety. Under such an analysis, one can discern the significance of the proposed actions to the respective systems. For instance, according to the 1994-2009 NEPOOL forecast, the existing generation capacity of the BHE system is 253.77 MW (Summer) and 267.04 MW (Winter), with the proposed actions resulting in an approximate 18 percent increase to the summer capacity. The existing total capacity of the NEPOOL system in the 1994-2009 NEPOOL forecast, is listed as 25,105 MW (August) and 25,595 MW (January). When viewed in this context, the proposed BHE actions add less than 0.2 percent to the NEPOOL August capacity.

DOI-15

The Commission seems to have weighted socioeconomic issues and benefits more heavily than environmental issues and benefits as criteria for selecting its preferred alternative. Although identified as major issues, no socioeconomic "needs" were identified in the purpose and need section. The socioeconomic issues that appear to be functioning as "needs" include increased

(1) construction spending in Maine,

(2) local short-term employment,[1]

(3) annual municipal tax revenue, and

(4) present value of net project benefit.

In the opinion of this Department, economic stimulation through issuance of Federal hydropower licenses is not a purpose of the FPA. If the Commission chooses to consider economic development as a "need" and a "purpose" for license issuance in these proceedings, then the Commission must briefly say so in the purpose and need statement.

The Department recommends that needs beyond increased generating capacity and economic growth be included in this portion of the SDEIS in order to satisfy the comprehensive development requirement (multiple beneficial public uses) of the FPA. As stated in the Department's comments during scoping for this DEIS, the need to protect, mitigate damages to, restore, and enhance fish and wildlife resources, and the need to protect Penobscot Indian

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[1] The proposed action would only create four (4) long-term jobs (see Table E-1, p. xxviii).

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DOI-15 The purpose of the proposed action will be addressed in the license orders for these projects. The FEIS includes updated NEPOOL forecasts. The FEIS and the license application provide a complete environmental record for Commission balancing and decision-making.

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Nation (PIN) rights must also be identified at the outset of the document. (See Department's August 25, 1993, letter to the Commission).

DOI-15 Cont'd

The Commission should base its forecast of need for power on the most current information contained in the 1994 NEPOOL forecast. The figures used in the tables and text in section 1-2 should be based upon this updated forecast. The Department notes, however, that the 1994 NEPOOL forecast only covers the 1994-2009 period.

The Commission should clarify the geographic and temporal scopes of the needs identified in the SDEIS. If the need for generating capacity and economic improvement is regional or extends beyond the Penobscot River Basin, an expanded geographical scope and additional alternatives should be included. Moreover, if the projections on the need for power extend only into the early part of the next decade, the consequences of a much longer term commitment of natural resources (i.e., a 50-year license term, and 100- to 150-year project life) must be more seriously evaluated than is presently done in the DEIS.

1.3 SCOPE OF THE EIS

DOI-16

The DEIS states that the Commission was requested to combine into one environmental document all licensing actions that are currently pending in the Penobscot River Basin. This includes applications for relicensing the Ripogenus and Penobscot Mills Hydroelectric Projects, located on the West Branch of the Penobscot. (A DEIS has also been prepared for these two projects, referred to as the Penobscot River Basin DEIS, dated November 1994).

As stated in the DEIS, the Commission has decided to use separate NEPA documents for the lower basin projects and those on the West Branch, due to their physical separation within the drainage, dissimilarity in affected resources, and potential for delay in reaching ultimate licensing decisions. On the contrary, the linkage and similarities may be greater than is presented in the DEIS. First, the upper basin projects regulate and augment water flows throughout the remainder of the river, such that the feasibility of continued operation of existing, as well as construction of any new, hydroelectric facilities downstream would likely be compromised if more natural river flows were to return. (This is a possible outcome, based on agency and the PIN recommendations for restored aquatic habitats at the West Branch Projects.) Second, the West Branch historically supported runs of anadromous Atlantic salmon, and, through its resources and flows, provided sustenance, both spiritual and physical, as well as a means of transportation and trade for native peoples inhabiting the basin. Both are important issues to the Department in the licensing proceedings in the lower river basin.

In the opinion of this Department, the Commission's charge under FPA Sec. 10(a) is in terms of a single comprehensive plan for the waterway(s) which in this case includes the entire Penobscot River Basin. Accordingly, decisions reached in each DEIS should not be made in a piecemeal fashion, but rather reflect a consideration of cumulative impacts, resource needs and balance throughout the basin.

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DOI-16 The Commission issued the FEIS and license orders for the Penobscot Mills and Ripogenus projects in October 1996. The reasons for not combining all of the projects in the Penobscot River basin into one EIS are given in Section 1.3.3.

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DOI-17

1.3.1 History of the Proceedings. The Department further brings to the Commission's attention several factors which relate to the text in History of the Proceedings. On pages 1-5 and 1-6, the DEIS discusses the water quality certifications issued by the State of Maine pursuant to Section 401 of the CWA for the proposed projects. Of relevance here is the pending appeal of the certificate issued for the Basin Mills Project. While the Maine Superior Court did uphold the Maine Water Quality Certification, the State's issuance of that certificate has been appealed by the Atlantic Salmon Federation and other conservation parties to Maine's Supreme Judicial Court, in this case sitting as the Law Court. The United States, which filed an amicus curiae brief before the Superior Court on behalf of the interests of the U.S. Fish and Wildlife Service (FWS) and the PIN, has again filed an amicus curiae brief before the Maine Law Court. In this brief, the United States advances the interests of the Department on behalf of the FWS and its longstanding interest in Atlantic salmon restoration on the Penobscot River. Further, the Commission should be aware that, in fulfillment of its trust responsibilities, the United States has taken a strong position on behalf of the PIN regarding the detrimental impact the proposed Basin Mills Project, with the mitigation as accepted by the State of Maine, will have on the PIN's statutorily confirmed fishing rights.

DOI-18

The Department also notes that the DEIS cites to the Commission decision in the Tunbridge Mill Corporation case (68 FERC ¶ 61,076) in support of the proposition that the Commission may disregard conditions in a Section 401 certificate that it finds unrelated to water quality, and thus, unlawful. (page 1-5). In Section 5 of the DEIS, the holding in Tunbridge is further addressed and purportedly applied to the water quality certification conditions imposed by Maine for these three projects. An examination of the Commission determinations on the 28 conditions imposed by Maine for the Basin Mills Project, however, reveals that the application of the Commission's Tunbridge principle in the DEIS is at best inconsistent. Conditions such as the funding and studying of the proposed trap and truck operation were found to be related to water quality, whereas the establishment of a restoration trust fund, which would fund activities "intended to improve the quality and quantity of the Penobscot River salmon run," (page 5-26) were not. Similarly, the removal of Bangor Dam was found to be within the scope of Section 401, while a study of the removal of Howland Dam was not, and thus, was not adopted. It is not clear how the study of the proposed trapping and trucking of fish is related to water quality, but a study of dam removal is not. Finally, while a study Maine required to assess water temperature effects on salmon was found to be within the scope of Section 401, the Commission has determined in the DEIS that it was not necessary, and thus, not adopted. This examination reveals that the Commission has gone beyond the limited authority it recognized for itself in reviewing water quality conditions, resulting in a piecemeal and inconsistent resolution of the conditions imposed by the State of Maine.

The Department notes that the Commission's position may not accord with the Supreme Court's holding in PUD No. 1 of Jefferson County v. Washington Department of Ecology, 114 S. Ct. 1900 (1994), in which it was recognized that States have broad authority under the CWA to impose terms and conditions on the operation of projects to ensure compliance

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DOI-17 The Maine Water Quality Certificate for the Basin Mills project was upheld in both the first and second appeal, as we note in the FEIS.

DOI-18 This issue will be addressed in the license order. The Commission staff will recommend that if the Commission were to issue a license for the Basin Mills project under Alternative 3, they should include the requirement for a water temperature study as a valid water quality condition. In the DEIS, staff indicated that its independent opinion would be to not recommend adoption (if it were not mandatory) because the expected environmental benefits from such a study would not outweigh the costs.

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DOI-18 Cont'd

with water quality standards or any other "appropriate requirement of State law; such conditions become a condition on any Federal license. To be consistent with its own precedent in Tunbridge, however, the Commission must review its conclusions concerning the water quality certificate conditions, and find that those conditions unrelated to water quality, including fishery management procedures such as studying or funding trapping and trucking fish, are not lawful, and thus, need not be adopted by the Commission. Such fishery management decisions are to be left to the fish resource agencies, such as the State, tribal, and Federal agencies charged with implementing and managing the Penobscot River's fish resources.

1.3.2 Major Issues - P. 1-6.

DOI-19

Native American Rights and Interests. Native American rights and interests must be a major issue in the SDEIS, particularly in regard to the effect that hydropower has on those rights and interests. Identification of the impacts of hydropower on the PIN must be targeted as a priority area for additional research.

DOI-20

American Shad. The FWS has recently signed a cooperative agreement with the Maine Department of Inland Fisheries and Wildlife (MDIF&W), Maine Department of Marine Resources (MDMR) and PIN to develop an active shad management program for the Penobscot. The DEIS assumes that there would never be any active shad management on the river and dismissed impacts to this species as a serious issue. The Department requests that American shad be a major issue in the SDEIS.

DOI-21

American Eel. American eels should have been included as a major issue in the DEIS (and the cumulative impacts of hydropower development on eels should have been assessed) as originally requested on page 8 of the Department's August 25, 1993, scoping letter to the Commission on the Basin Mills Project. The Department requests that American eels be included as a major issue and that the cumulative impacts on eels of the hydropower projects in the Penobscot River basin be assessed in the SDEIS.

The Department stated in its August 25, 1993, letter that (1) hydropower impacts to eels have been documented at the Lowell Tannery (Pumpkin Hill) Project (No. 4202) which is located on the Passadumkeag River upstream of the Basin Mills Project area; and, (2) testimony presented at the July 29, 1993, scoping session indicated that eel populations are in serious decline. The American eel was raised as an issue in correspondence to the applicant (comments on draft license application), dated May 25, 1990, from the MDIF&W. (This was likely the initial indication in this proceeding that upstream and downstream passage of eels might be a problem.) The Commission should be aware that recently the PIN and commercial eelers have expressed concern that American eel populations in the Penobscot River have declined over the last few years. (See also comments on Section 3.4.2.1 -- American eel, and Analysis of Alternatives: Applicant's Proposal).

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DOI-19 Native American rights and interests as affected by hydro power development have been considered in both the DEIS and FEIS. The primary factor affecting the PIN would be changes in the anadromous fishery, specifically Atlantic salmon, resulting from the various licensing alternatives. Our analyses includes the information in the record and that provided by the PIN. In recommending Alternative 4 as our preferred alternative, we conclude that the cultural concerns of PIN are a significant factor to consider along with the uncertain future of salmon abundance and the nature of the stock (wild vs. human assisted).

DOI-20 We address American shad in our detailed assessment of impacts in Section 4.3 and Appendix F of the FEIS. Also see response DOI-22 and CI-21.

DOI-21 We have revised our discussion of the American eel in the Section 3 (Affected Environment) and Section 4.3 (Environmental Impacts, Fisheries Resources), incorporating substantial new information on eels obtained from respondents and other sources.

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DOI-22 **1.3.3 Cumulative Impacts.** In consideration of Cumulative Impacts, the DEIS states that the "baseline for evaluating potential cumulative impacts is the existing and reasonably foreseeable expected environment, which is described in the No-action Alternative." (page 1-7). The text fails to define the "existing and reasonably foreseeable expected environment." The Department further notes that since significant impacts to fish and wildlife resources (which includes wetlands, plants, fish, shellfish, wildlife, and fish and wildlife habitat) most likely occurred because of the construction of the existing Milford, Gilman Falls, Stillwater, Veazie and Orono developments, a cumulative impact analysis cannot be complete without a consideration of the no-project (i.e., no-dam) conditions. Therefore, the DEIS fails in its attempt at identifying cumulative impacts by omitting consideration of no-project conditions. This is of particular concern given the Commission's authority at relicensing to decommission projects, including dam removal, at the Licensee's expense. (See Commission's December 1994 Policy Statement on Decommissioning). The only equitable way for the Commission to accurately measure and account for the impacts of relicensing is to compare the various with-project alternatives to the no-project alternative.

2.0 PROPOSED ACTION AND ALTERNATIVES

2.1 PROJECTS AS PROPOSED

DOI-23 The Department's review of Section 2.1 (Projects as Proposed) has raised the following concerns: On page 2-3, it is unclear whether the proposed sequencing of operations at the Veazie Development is entirely fish protection based. If so, there is no discussion of the resulting benefits or references in the record where those benefits are discussed. Similarly, regarding the Basin Mills Development on the same page, the Department notes that it is unclear whether BHE would regulate the impoundment elevation so that the backwater effect would never reach the tailwater of the upstream project. Further, "historic elevation" (page 2-3) is not defined. It is also unclear whether, if the impoundment created by the Basin Mills Dam is used to regulate the flood levels, this would violate the proposed run-of-river operation of this project.

DOI-24 **2.1.2 Proposed Environmental Measures.** In Section 2.1.2 (Proposed Environmental Measures-Basin Mills Project - Geology and Soils/Groundwater), the DEIS states that BHE developed an erosion and sedimentation control plan that specifies measures and procedures for limiting potential increased erosion and sedimentation during construction. BHE not only needs to implement such control measures during construction, but also needs to assess the long term cumulative impacts caused by the impoundment on the waterway and adjacent lands -- above and below the dams. These impacts include sediment accumulation behind the dams, potential scour of the channel bed downstream of the dams, and potential shoreline erosion due to water level fluctuations from the operation of the power plants and flashboards on the dams, as well as power boats.

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DOI-22 The No-action Alternative is the existing project without any change in environmental conditions except for those resulting from ongoing or planned activities in the basin that have a demonstrable and reasonable expectation of implementation. Typically, unfunded programs with unscheduled activities would not be incorporated in such a No-action scenario.

DOI-23 We have revised section 2.1 and our impact assessment discussions (section 4) to clarify the issues you raise in this comment.

DOI-24 We address erosion issues in section 4.1 of the FEIS; see also our response to DOI-80 and DOI-81, below.

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DOI-25 On page 2-9, the DEIS indicates that BHE "contends that any reduction in dissolved oxygen (DO) in the Basin Mills and Veazie impoundments would not produce levels below Maine Class B standards," but fails to cite data in support of this contention. DO reductions can have localized effects so that a projected increase in DO resulting from Bangor Dam removal may have no bearing on impacts associated with Basin Mills and other upstream operations. Fish passage in the river during certain times of migrations can cease or be delayed due to localized reductions in DO. Therefore, the issue of reduced DO needs to be fully evaluated. DO reductions are usually associated with elevated temperatures so a co-analysis is warranted.

DOI-26 The fish lift and truck and transport measure proposed by BHE for the Basin Mills Project would result in Atlantic salmon being trucked above the Milford Dam and released into the Penobscot River upstream from Indian Island, home of the PIN. As has been stated, this would reduce the ability of PIN to exercise its fishing rights within its reservation. Those fish remaining in the river will have to pass an additional barrier, further decreasing the likelihood that fish will reach reservation waters. Also, as is discussed in more detail elsewhere, the proposed measure would subject the fish to greater handling and may result in increased mortality (immediate and latent) due to stress.

DOI-27 The DEIS at page 2-10 discusses possible purchase by BHE of land along the river below Veazie to enhance access to the Eddington fishing area. The DEIS should have analyzed where fishing will increase if the project is built as proposed in order to determine if and where additional public access will be needed.

2.2 STATUTORY REQUIREMENTS

DOI-28 **2.2.2 Section 18 Prescriptions for Fishways and 4(e) Conditions.** The Department reiterates the positions it has taken previously with the Commission regarding statements made on pages 2-21 and 2-22 of the DEIS. On page 2-21, the Commission indicates that "Interior did not file a request to reserve Section 18 authority for the Milford Project with the Commission before the published deadline," and thus, the Commission will consider the Department's Fishway Prescriptions and Section 10(j) Recommendations as part of the Section 10(a) evaluation process.

The Department has consistently stated that the Commission's attempts to disregard the mandatory nature of the Department's Section 18 Fishway Prescriptions go beyond the Commission's statutory authority and impermissibly restricts the Department's exercise of its statutory authority and responsibilities pursuant to the FPA. (See the Department's August 3, 1993, response to the Commission's initial notification that the Department's comments, Section 18 Prescriptions, and Section 10(j) Recommendations were not timely filed, and thus, would not be considered in the licensing process other than as Section 10(a) Recommendations).

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DOI-25 We addressed water quality issues in Sections 3.3 and 4.2 of the FEIS; see also our response to DOI-88, below.

DOI-26 These issues are addressed in our impact assessment Section 4 of the FEIS. See also DOI-8.

DOI-27 There is high uncertainty associated with predictions of future demand for recreational fishing opportunities, and we are not aware of any methodology (other than a consumer preference survey) that could be used to reliably predict the local distribution of such predicted increased participation among currently undeveloped and unused potential local recreation sites. However, our recommendation of Alternative 4 as our preferred alternative would preclude the permanent elimination of potential salmon lies in the Basin Mills area, thus providing for possible future increases in recreational opportunity.

DOI-28 Commission staff reverses its DEIS recommendation on the issue of considering Section 18 prescriptions and Section 10(j) recommendations for the Milford Project under Section 10(a) of the FPA. As noted in Sections 2 and 5 of the FEIS, Commission staff, in this instance, recognizes the untimely Section 18 and Section 10(j) recommendations as if they were timely.

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DOI-29

The Department similarly objects to Commission attempts to restrict the Department's mandatory conditioning authority pursuant to Section 4(e) of the FPA, regarding the conditions which it will submit on behalf of the PIN, upon whose reservation the Milford Project impoundment lies. The Commission may not disregard those conditions even when submitted beyond the Commission's imposed 60-day deadline. Further, the Commission may not issue the license for the Milford Project without including the Department's Section 4(e) conditions. Again, the Commission has a trust responsibility to protect the PIN reservation, and it may not issue a license which fails to include the conditions deemed necessary to protect that reservation.

2.3 ALTERNATIVES TO PROPOSED PROJECT FACILITIES OR OPERATION.

DOI-30

CEQ's NEPA Regulations require an agency to examine all "reasonable alternatives", without reference to an agency's jurisdiction to implement an alternative. Pursuant to both CEQ directives and NEPA case law, the scope of alternatives in an EIS must reflect only technical, economic, and common sense practicability. The CEQ Memorandum: Questions and Answers About the NEPA Regulations (Forty Questions) states:

> "Reasonable alternatives include those that are practical and feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant."

Although the Commission staff considered several alternatives, the following modifications to those alternatives must be considered in the SDEIS. The following would mitigate (i.e., avoid, minimize, rectify) ongoing or expected impacts to fish in accordance with the Commission's NEPA Regulations which incorporated by reference those of CEQ.

1. Decommissioning of the existing generating facilities at the Veazie Project (Stations A and B), and replacement with intakes and turbines that are designed to minimize fish entrainment, injury and mortality. This amounts to replacing the two existing powerhouses with the applicant's proposed Station C on the east (Eddington) shore of the river, but should also be evaluated for implementation on the west (Veazie) shoreline. Project operation at Veazie for this alternative would continue to be run-of-river. Although this does not result in a significant change in power generation at the site, impacts to migrating fish would be avoided and minimized.

2. Decommissioning of the existing generating facilities at the Orono Project, and replacement with new turbine(s) at the dam, with operation continuing as run-of-river. (This assumes that Basin Mills Dam is not built below the confluence of the main stem and Stillwater Branch, as discussed below.) Generation may or may not be reduced; aquatic habitat below the dam would be restored and fish passage would be more effective.

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DOI-29 We now address 4(e) conditions in Section 5 of the FEIS. The issue of the validity of 4(e) conditions will be addressed in the order for the Milford Project.

DOI-30 While NEPA requires that an EIS include a consideration of alternatives, a discussion of the alternatives need not be exhaustive, and need only provide sufficient information to permit a reasoned choice among alternatives[1]. During scoping for this EIS, we considered input from all respondents, including DOI, in selecting the alternatives to be evaluated in detail in our impact analysis, as is explained in our Scoping Document 2 (issued October 29, 1993). However, to give full consideration to your new suggested alternatives, we conducted a preliminary economic and biological evaluation to determine whether they represented viable additions to the alternatives evaluated in the DEIS. The results of our evaluation of your alternatives, as well as of a number of other new alternatives proposed by other respondents, can be found in Section 2.3. Our analyses indicate that these alternatives were encompassed by the alternatives we evaluated in terms of power benefits and fisheries benefits. On this basis, we did not pursue these alternatives further.

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[1] See Richard Balagur, 57 FERC ¶ 61,315 at p. 62,018, citing State of North Carolina v. Federal Power Commission, 533 F.2d 702, 707 (D.C. Cir. 1976). See also the analysis in Marysville Hydro Partners, 63 FERC ¶ 61,271 pp. 62,74-44 (1993).

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DOI-30 Cont'd

3. Use of a horizontal generating unit in Station C at Veazie. (This would also apply for alternative number 1 above.) The proposed vertical unit for Station C is likely to cause excessive upwelling, and will likely impede attraction to the fish passage facilities.

4. Consideration of an alternate location for the Basin Mills Dam. (This option should be evaluated in combination with alternatives involving decommissioning/removal or continued operation of the Veazie and Orono Dams.) Location of the Basin Mills Dam upstream of Basin Mills Rips, and above the confluence of the Stillwater Branch with the main stem, would reduce loss of the important riffle habitat in the waterway that is currently used by Atlantic salmon and other aquatic life.

5. Alternate alignment of the Basin Mills Dam and/or location of the Basin Mills powerhouse. (This option should be evaluated in combination with alternatives involving decommissioning/removal and continued operation of the Veazie and Orono Dams.) The proposed alignment of the new dam and downstream location of the powerhouse (on the Bradley side of the river) will result in a dewatered or adversely affected river reach below the upstream end of the spillway. More effective fish passage and greater habitat protection would result if the upstream-downstream alignment of the dam were reversed, or if the powerhouse were constructed on the west (Orono) end of the spillway.

6. Decommissioning and removal of Veazie Dam in combination with construction of a new Basin Mills Dam. This alternative is implicit in numbers 4 and 5 above, but is restated to call attention to the fact that the Commission's Alternative 5 in the DEIS evaluates removal of Veazie Dam and <u>no</u> new Basin Mills Dam. The combined removal of Veazie and construction of Basin Mills would result in a significant increase in generating capacity, minimize habitat losses for Atlantic salmon and other aquatic life, and improve fish-passage effectiveness in the lower Penobscot River.

7. Install generating facilities at the Stillwater Dam. This could be done in concert with, or in place of, the existing powerhouse located downstream. The Department is prescribing a fishway at that dam (see Enclosure B), and the increased flow from generating facilities at the dam would improve attraction, and restore habitat for Atlantic salmon and other aquatic life. (A substantial portion of the river channel below the Milford Dam becomes dry when spillage stops, and all flows pass through the powerhouse at the east end of the dam).

NEPA and CEQ's implementing regulations require that an EIS contain a detailed description of possible mitigation measures. Implicit in NEPA's demand that an agency prepare a detailed statement on "any adverse environmental effects which cannot be avoided should the proposal be implemented," 42 U.S.C. §4332 (C)(ii), is an understanding that the EIS will discuss the extent to which adverse effects can be avoided. <u>U.S. Forest Service v. Methow Valley Citizens Council</u>, 29 ERC 1505.

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DOI-30 Cont'd

Although some of the aforementioned additional alternatives may simply appear to be design changes at individual sites, each would mitigate the impacts to fish and wildlife resources and habitats that would occur as a result of the actions proposed in the DEIS. Under NEPA and the CWA, mitigation of impacts involves a process, beginning with avoidance and minimization, and ending with compensation. (See 40 C.F.R. Sec. 1508 and 40 C.F.R. Sec. 230).

DOI-31

Little consideration has been given throughout the consultation process (beginning as early as 1980 for the Basin Mills Project) to changing the "footprint" of individual projects so as to avoid and minimize impacts to natural resource values. However, subsequent regulatory decisions, particularly those made under the CWA, will have to ensure that all steps have been taken to avoid and minimize impacts before endorsing any compensatory mitigative measures, such as those proposed in the DEIS. The Commission should give serious consideration to the entire mitigative process, including realignment and/or reduction of designs proposed by the applicant, before reaching conclusions in the SDEIS.

Other Issues Involving Alternatives.

DOI-32

Use of economic analyses in evaluating alternatives. The DEIS considers some alternatives involving the Basin Mills, Stillwater and Milford projects, while dismissing other alternatives based on unclear considerations and weighting based in part on economics. Equal consideration does not appear to have been given to those alternatives that would reduce generating capacity to restore fish populations and the natural web-of-life on this waterway. This situation must be rectified in the SDEIS.

When the FPA was amended in 1986, Congress anticipated that in some instances there would have to be a reduction in generating capacity in order to consider fish and wildlife equally in relicensing. Congress also anticipated that there would be some projects proposed that the resource agencies would oppose. Congress is on record indicating that both of these outcomes would be appropriate (i.e., environmentally harmful projects should not be licensed). Now, the FPA requires that the Commission give equal consideration to fish and wildlife resources in the licensing process, which includes this EIS.

Economic benefits flow from restoring the Nation's waterways -- that is common knowledge. The fact that the Penobscot River is the premier Atlantic salmon river in the Nation is not disputed.[1] Atlantic salmon, fishing, and tourism go hand-in-hand in Maine. The fact that tourism is a key stone in the Maine economy is also common knowledge. Tourism is a form of interstate commerce. Interstate commerce is stipulated as a purpose in

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Salmon anglers expend 30,000 to 40,000 angler days at Maine rivers. Most of the restoration effort, angler activity, and catch in Maine (60-80%) is on the Penobscot River near Bangor, Maine. (From: Morey, E.R., R.D. Rowe, and M. Watson. 1993. *Repeated Nested-Logit Model of Atlantic Salmon Fishing*. Amer. J. Agr. Econ. 75:578-592).

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DOI-31

Project layouts are, to a large extent, dependent on the geological and physical features of the locations proposed for project construction. They are also established during the earliest portion of project development, because they are required to establish engineering plans and constraints for the projects. BHE considered a substantial number of alternative project designs in arriving at their final proposed project, at least one of which you specify as number 5 in your comment (refer to BHE's license application, Appendix F, for discussion of the reasons for not adopting those alternative configurations). We do not consider alternative "footprints" for the project to be reasonable alternatives at this stage in the project review process.

DOI-32

The economic analyses of project alternatives has been revised using the Commission's new current cost approach as discussed in Mead Publishing Paper Division, 72 FERC ¶61,027 (July 13, 1995).

The need for power has been balanced with environmental needs in staff's recommended project alternative, Alternative 4. Under Alternative 3, we include a recommendation that the applicant implement measures for protection, mitigation, and enhancement of anadromous fish populations. The Commission attempts to resolve conflicts and to ensure that project impacts are adequately mitigated, as the FPA requires. Our recommended alternative represents the best comprehensive use of this river basin, as required in Sections 4(e) and 10(a) of the FPA. We have not prepared a SDEIS.

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DOI-32 Cont'd Section 10(a) of the FPA for decision-making by the Commission. The SDEIS must adequately explain how economics are being factored into alternatives selection and great weight must be given to the above facts and purposes in providing that explanation.

DOI-33 The Department recommends that the Commission further examine the economics literature on the benefits of recreational fisheries, including Atlantic salmon and other anadromous fisheries in the Northeast. However, while economic benefits will accrue from further development of recreational fisheries along the Penobscot River, the fish runs must first be restored to reasonable levels to ensure that sufficient quantities of fish reach reservation waters to be available for tribal sustenance fishing. The intentional development of salmon lies (ostensibly for angling stations), and flow regulation to maximize salmon angling below the Veazie Dam are inappropriate measures considering that run restoration is of paramount importance. These measures would further interfere with the quantity of fish reaching PIN reservation waters.

DOI-34 No Action Alternative. The CEQ NEPA Regulations require that the Commission include a No-action Alternative in its EIS for the lower Penobscot River. The CEQ Forty Questions give two distinct interpretations of No Action. One is where there is an ongoing program under existing legislation. In that case "no action" is "no change". The second interpretation of "no action" is illustrated in instances involving Federal decisions on proposals for projects, such as issuance of a new license. In these cases, "no action" means that the proposed activity would not take place.

The DEIS proposes a No-action Alternative for each of the existing projects and the new Basin Mills Dam. For the existing projects (Veazie, Orono, Milford, and Stillwater), this alternative involves the issuance of annual licenses for the next 30 to 50 years, with no change in current operations,and thus, no modifications to benefit fish and wildlife and other environmental values.

The issuance of annual licenses is not properly labelled the "No-action" Alternative. The issuance of an interim, annual license for the existing projects represents an "action" by the Commission. If the No-action Alternative was the preferred alternative, the Commission would none the less have to carry out additional actions in regard to these projects. These actions include, but are not limited to, periodic dam safety and license compliance inspections, license enforcement actions including issuance of regulatory compliance and rehearing related orders, collection of annual charges, and other administrative duties. If threats to public safety are discovered in the inspection process, including possible dam safety problems, or violations of the existing terms and conditions in the licenses become apparent, the Commission would not hesitate to take a variety of actions, including ordering major dam repairs or implementation of enforcement proceedings. These are Federal actions.

The No-action Alternative is clearer when the licensing action involves a proposed new dam or modification of an existing facility; that is, the application for an original license is

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DOI-33 We identify the sources we used in our recreational analysis in Section 4.8. We are not aware of any other relevant literature that we have overlooked, and you have not identified such literature. Regarding potential conflicts between PIN and recreational angler demands for Atlantic salmon, we regard that as a fisheries management issue appropriately addressed by the state and federal agencies with management authority over Atlantic salmon. Creation of salmon fishing lies below Veazie are intended as mitigation for the impacts of the Veazie Plant C construction on existing salmon fishing lies. However, the new Plant C fish lift is likely to enhance upstream passage efficiency such that the exposure of fishing below Veazie to angling pressure may be reduced, thus increasing their availability to PIN. These are issues that we leave to the appropriate fisheries management agencies.

DOI-34 This issue will be addressed in the orders to be issued for these projects.

DOI-34 Cont'd

denied, the proposed modification is denied, and the associated environmental impacts do not occur. (This is the case with the new Basin Mills Dam, and the proposed capacity changes at the other projects). When the Commission issues annual licenses for existing projects, however, the environmental impacts do occur. Impacts due to impeded fish passage, degraded or inundated spawning and other habitat, and impaired or unavailable public access continue, and are sanctioned through the annual licensing process. As a result, the project is effectively provided regulatory relief and shelter from the amended FPA while an improved environment and other benefits are denied the public.

The Commission must redefine the No-action Alternative when relicensing is involved. An analysis similar to that used for new projects must apply for applications for a new license for an existing project; i.e., the requested action, licensing, does not occur. The No-action Alternative means denying the license.

In the case of relicensing, the Commission could exercise its authority to decommission the project through the No-action Alternative. All hydroelectric operations would terminate. The Commission would remain involved to oversee site restoration until decommissioning is accomplished at the Licensee's expense.

Accordingly, the Department recommends that the Commission modify its description of the No-action Alternative in the SDEIS in accordance with, and as discussed above. Issuance of annual licenses (over the 30- to 50-year license term) is not a reasonable action for the Commission to consider under NEPA. Annual licenses may only be issued under Section 15 of the FPA only on an interim basis, until the Commission takes action on the application, either through issuance or denial of a new license, or the Federal government takes over the project. As the Commission stated as its NEPA Regulations were published, the Commission's choices are to license as proposed, license with modifications, or deny. The range of alternatives considered in all licensings must address each of those decision choices.

The DEIS also includes an additional category of No-action Alternatives (Sec. 2.4) that involves structural and non-structural alternatives to using hydropower to meet energy demands. Under this category, the Basin Mills Dam would not be built, but the existing Veazie and Orono Projects would continue to operate under annual licenses without modification. As stated above, issuance of annual licenses is not a reasonable NEPA alternative. It is equally inappropriate here. This needs to be revised in the SDEIS.

It is also inappropriate to consider all non-hydropower options under a No-action Alternative category. Use of other technology to satisfy future demand for energy, as considered under this alternative, could result in a variety of significant "actions" for the existing dams and project works, including decommissioning and removal.

DOI-35

Dismissal of "Nonexclusionary" Alternatives, Including Conservation. In the DEIS the Commission has not undertaken a sufficient analysis of alternative energy sources as a viable alternatives to construction of a new dam. The DEIS eliminates from

DOI-35 We have revised sections 2.4.1 and 2.4.2 of the FEIS to respond to your comments as well as similar comments made by other respondents.

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DOI-35 Cont'd

consideration a variety of alternatives, including conservation and improvements at other generating facilities, because such measures would be used "in addition to" rather than "in place of" hydropower. (Sec. 2.4.1). This reasoning appears to be somewhat arbitrary, given that all of the other alternatives in the DEIS (except for Alternative 5) involve measures that would be used "in addition to" the applicant's other hydropower facilities in Maine, and along with the hundreds of hydroelectric projects included in the NEPOOL service are. The major criterion that should be used in determining whether to include any alternative in the EIS is whether it addresses the stated need and purpose (e.g., to satisfy regional need for generating capacity).

The alternatives eliminated by the Commission because they are "nonexclusionary" are reasonable, and should be included in the SDEIS, because they could be used to produce, or reduce the demand for electricity. Including these alternatives in the SDEIS is required for the Commission to reach an informed decision on which project will be best adapted to a comprehensive plan for the waterway.

DOI-36

Failure to Consider Denial of License Applications for the Milford and Stillwater Projects. The DEIS states that no one has recommended license denial, decommissioning of facilities and removal of the dams at the Milford and Stillwater Projects, and therefore, these will not be considered as reasonable alternatives in the DEIS.

In the review of a license (or permit) application, the possibility for denial should always be considered. Relicensing is not to be taken as a given under the FPA; hydropower licenses are a privilege "justified only on the theory of resulting benefit to the public," and are thus revocable and not vested rights. Niagara Mohawk Power Corporation v. Federal Power Commission, 379 F.2d 153, 155 (D.C. Cir. 1967). Otherwise, the objectivity of the application process becomes questionable, as the Commission staff strives to determine under what terms a new license should be given, rather than first addressing the fundamental issue of whether it is acceptable to do so. The Commission, on December 14, 1994, issued a Policy Statement in which it concluded that it has the "legal authority to deny a new license at the time of relicensing" if no license can be fashioned that will comport with the statutory standards, particularly that of Section 10(a) of the FPA. (See, Policy Statement - Project Decommissioning at Relicensing, 69 FERC ¶61,336). While the Commission may not choose to implement a denial option, consideration of this option would allow for a cumulative impact review. In this way, a complete review of dam impacts on the Penobscot River, its associated wetlands, and plant and wildlife resources could be done.

DOI-37

Consideration of an Alternative which Describes Conditions Without the Existing Projects. For the Milford Project, three project alternatives are identified. In order for cumulative impacts to be considered, a fourth alternative must be included which describes conditions without the dams. Such a comparison would allow for the most accurate accounting of unavoidable impacts to wetlands, plants, fish, wildlife, and their habitats which would continue, or occur, as a result of relicensing.

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DOI-36 The DEIS erred in stating that we did not consider license denial, decommissioning of facilities, and removal of the dams at Milford and Stillwater Projects as reasonable alternatives. No one has recommended decommissioning and dam removal of Milford and Stillwater apart from mitigation issues associated with Basin Mills. Milford and Stillwater were included in our analysis of potential fishery benefits and power losses associated with dam removal, in the comprehensive dam removal survey discussed in Appendix D. See DOI-43 and DOI-61.

DOI-37 The issue of the No-action Alternative will be addressed in the orders to be issued for these projects; see also response DOI-36 above.

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DOI-37 Cont'd

On page 2-24 it is stated that the inclusion of a No-action Alternative was considered to "establish baseline environmental conditions with which to compare other environmental conditions". **The Department advocates that the Commission adopt the without- or no-project condition as the baseline paradigm most in keeping with customary impact assessment, the need to consider license denial, and its authority to decommission projects at relicensing.**

The PIN has used the Penobscot River since time immemorial and base the condition of the resource as it existed without the mainstem dams. The existing dams were contributory to the decline of the runs of Atlantic salmon, shad and alewife in the Penobscot River, and therefore, the only appropriate baseline for impact assessment and comparison of alternatives is consideration of the river without these mainstem obstructions. The Department, therefore, requests that the Commission redo its analysis of benefit:costs and resource tradeoffs between the different alternatives such that they are based in the SDEIS on the without-project condition.

DOI-38

Insufficient Information Regarding Alternative Energy Sources to the Basin Mills Project. The DEIS presents a very superficial analysis of alternative energy sources to the proposed Basin Mills hydroelectric plant. Insufficient information is provided for one to make judgments about the alternative power sources.

While the demand side analysis was presented in the State Section 401 hearings, it should not be necessary for the DEIS reader to obtain and read all previous testimony to piece together the information needed to make an informed judgment about the potential for conservation.

DOI-39

2.6.1.1 Basin Mills - Alternative 6 - Page 2-31. It is unclear why this alternative was eliminated from further consideration. It is stated that the "incremental analysis of the Orono expansion would be negative..."; however, review of Table 2-2 shows positive numbers. More explanation is required.

DOI-40

2.6.1.3 Basin Mills - Comparison of Alternatives - Page 2-36. It is stated that Alternative 5 has a net negative "economic" benefit because there are no generation costs to offset costs of dam decommissioning and removal. Mention is made of the "existence value" of Atlantic salmon but that no economic value was attached or factored into the analysis. This can and should be done. Otherwise, Alternative 5 is misrepresented in the overall analysis. The Commission should consider completing a contingent valuation of the Atlantic salmon and other fishery resources relative to project economic comparisons.

DOI-41

2.6.3.1 Alternative Project Designs, Milford Project, Alternative 2 - Page 2-44. The DEIS states:

> "we determined dependable capacities based on the amount of power that can be generated 80 percent of the time. Based on our review of application figure B-2

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DOI-38 We have revised the alternative energy sources discussions in Section 2.4 in response to your and similar comments from other respondents.

DOI-39 We address DEIS Alternative 6 further in our discussion of a number of new suggested project alternatives in Section 2.5 of the FEIS. We have deleted reference of this alternative in Section 2.6.

DOI-40 We acknowledge that the existence of an Atlantic Salmon run in the Penobscot unassisted by man would have intrinsic value to the PIN and others. We also recognize that various methods have been developed that attempt to express existence values in dollars. However, the efficacy of attempts to quantify such values, is a matter of continuing debate.

We are aware of only one existence value study directly pertinent to wild salmon: <u>The Economic Benefits of the Restoration of Atlantic Salmon to New England Rivers</u> by David L. Kay, Tommy I. Brown, and David H. Allee, Dept. of Natural Resources, Cornell University, prepared for the U.S.F.W.S., 1987.

That study places a one-time lump sum value of $20 million on salmon restoration. We neither endorse nor evaluate that study.

While we do not attempt to reduce the value of a restored wild Atlantic salmon run to dollars, we have considered in qualitative terms the potential existence values associated with restoration of a wild Atlantic Salmon population in the Penobscot River. Your comments and comments from other respondents on this issue resulted in our reconsideration of the value of potential numerical increases in salmon versus the value of an unassisted salmon run. This has been factored into our analysis and as a result, we have selected Alternative 4 as our recommended alternative.

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DOI-41 Cont'd

> showing the energy production curve for the existing project and the proposed expansion, the addition of another unit would increase the dependable capacity of the project because the unit allows for additional generation at higher flows. The 80 percent assumption, however, indicates that the existing dependable capacity is about 5.5 MW; the applicant identified 4.7 MW. ... Therefore, our review of the dependable capacity of the expansion indicated that a value of 0.6 MW is more realistic than the 1.4 MW value suggested by BHE."

The discrepancy stems from different assumptions on the percent of time exceedance used in defining the dependable capacity. BHE defined the dependable capacity as the amount of power,that can be generated 90 percent of time, which is commonly used in the hydropower industry, and the Commission used 80 percent of time assumption instead. In order to make any meaningful comparison, a unified definition should be used in the SDEIS.

DOI-42

2.6.3.2 Milford Project, Environmental Enhancements - P. 2-45 .

Proposed environmental enhancements do not include any mitigation for on-going impacts to wetlands, plants, fish, and wildlife.

3.0 AFFECTED ENVIRONMENT

3.1 GENERAL SETTING

DOI-43

The DEIS states that the region is home to the PIN, "much of whose cultural heritage is closely associated with the river and its resources." (page 3-1). PIN's rights and presence in the Penobscot River go far beyond this categorization, however, and the Commission must recognize and appropriately discharge its trust responsibility to this federally recognized Indian Tribe which exists in the Penobscot River. The Penobscot Indian Reservation consists of the islands in the Penobscot River, beginning at Indian Island and extending northward upriver. Twenty-two of those reservation islands are located in the Milford Impoundment. As noted above, the PIN has reserved fishing rights within the boundaries of its reservation. The Federal government, of which the Commission is a part, has a responsibility to protect those reservation lands and trust resources.

3.3 WATER QUALITY AND QUANTITY

3.3.1 Regional Resources

DOI-44

3.31.3 Toxics. The DEIS reports that dioxin levels in fish from the Penobscot River do not present a human health risk. This conclusion is not supported by the results of recent studies, showing that the levels of dioxin in all fish sampled in 1993 from the Penobscot (south Lincoln to Bangor) exceeded the concentrations recommended for human consumption. (See report by Barry Mower, Maine Department of Environmental Protection (MDEP), March 1994). A Maine Bureau of Health consumption advisory (instituted in 1992) remains in effect for fish taken below Lincoln. The DEIS neglects the existence of

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DOI-41 Your statement that BHE defines the dependable capacity as the amount of energy that can be generated 90% of the time is not supported by the information contained in Exhibit B of BHE's application for license. We will continue to use our method of computing the increase in dependable capacity for the Milford expansion.

DOI-42 Our analysis of impacts presented in Section 4 identified no impacts to wetlands, plants, and wildlife that require mitigation. Our fisheries enhancements are identified in the text you cite.

DOI-43 The Commission staff recognizes PIN's heritage in the Penobscot River and the presence of PIN lands within the Milford Impoundment. We have already discussed the treaty fishing rights of the PIN, stating that our licensing decision would increase the abundance and availability of anadromous fish to PIN. In recommending Alternative 4 as our preferred alternative, we conclude that PIN cultural values outweigh total potential fish abundance.

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DOI-44 Cont'd this consumption advisory, which cautions against the eating of fish by certain portions of the population. We remind the Commission again of its trust responsibility to the PIN, whose exercise of its statutorily confirmed right to take fish for sustenance is prevented by factors such as the presence of dioxin in fish tissue. Because dioxin continues to be present in the river, and has been found in fish, it is likely to be a threat to human consumers and predatory wildlife, including the endangered bald eagle. In some cases, the dam, which is part of the project works, entraps the sediments containing the dioxin. This would be a project impact.

3.3.2 Site-specific Resources

3.3.2.2 Water Quality

DOI-45 Labels in Figure 3-4, p. 3-15, are difficult to read. The reference to DO in the text as non-limiting and meeting Class B standards cites data which present ranges of DO values as measured by the BHE or MDEP. Because DO concentrations often exhibit wide diurnal swings (in response to alternating cycles of photosynthesis and respiration by algae and macrophytes), an assessment of potential DO impacts should include daily information, not just ranges. This is especially true when it is not stated whether the ranges include hourly or single daily measurements. The time of day samples were taken will affect measurements also. With water temperatures commonly exceeding 22-23° C during August and September (see Figure 3-6), DO concentrations could sag to much lower levels than those presented in the DEIS. It is encouraging that DO levels in the river have apparently increased dramatically over concentrations reported in the 1950's by Cutting (1959); measured DO concentrations in August 1957 were below 3 mg/l for about 30 miles below the confluence of the West and East Branches of the Penobscot River. However, because continued improvement in DO levels should be the management goal, every new development which could impair DO concentrations must be carefully evaluated and sampling protocols should be specified ahead of time. (See comments under Section 4).

DOI-46 The text indicates that Figure 3-5, p. 3-16, depicts the mean of the maximum temperatures for July and August, however the figure caption has no reference to July/August. The Department questions the format of Figure 3-5, as the data presented are not contiguous and even represent different locations; i.e., Enfield and Eddington. No explanation of their connection is provided. A better presentation would include comparisons at each station for the same years. The data presented do not allow a spatial/longitudinal comparison of temperatures for the above reasons (data are temporally and spatially separated).

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DOI-44 The FEIS (section 3.3.1.3) has been rewritten to include additional information on dioxin and related toxic compounds in the lower Penobscot River, as provided by various respondents including PIN and EPA. We have included information on the greater uncertainty with respect to the health risks of consuming fish from the lower river. However, we have found no evidence of contaminated sediment accumulation in impoundments on the lower Penobscot River or other evidence that construction of a new dam would change dioxin health risks, whatever they may be.

DOI-45 We have revised Figure 3-4 to make the labels more readable. We have presented the available dissolved oxygen information for the lower Penobscot River. We discuss impacts of the project on dissolved oxygen in section 4.2; see also our response to DOI-88.

DOI-46 Figure 3-5 has been revised to indicate that the data are from July and August of each year. The data are not contiguous and represent different locations because this is the only long-term temperature available for this section of the river. The text of this section has been revised to clarify this point.

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3.4 FISHERIES RESOURCES

3.4.1 Regional Resources

3.4.1.2 Anadromous Fish. The DEIS reports that the American shad population in the lower Penobscot River is residual and may number only in the hundreds-of-fish according to the MDMR. However, the Commission staff concludes that because no fish have been collected in the trap at the Veazie Dam, the MDMR's position that a remnant shad population is present in the lower river is suspect.

DOI-47 The Commission staff should not draw conclusions about the presence of shad in the Penobscot River based on a lack of collections in the trap at Veazie. The existing fishway has serious design flaws that limit its effectiveness for clupeids, including American shad. If shad are unable to negotiate the fishway, they will not reach the trap and be counted. There is at least anecdotal information from the fishery agencies that shad have attempted to use the fishway, based on observations when the facility was drained. It should also be noted that in the first year of operation of the fishway at the Cataract Hydroelectric Project, located on the Saco River in Maine, nearly 1,000 shad used the facility, even though there was little hard evidence on the status of the remnant population on that river.

DOI-48 The DEIS cites the work of Cutting (1959) and Baum (1983) in estimating total Atlantic salmon spawning and rearing habitat. Baum actually used Cutting's estimates as the basis for his projections. Cutting (1959) estimated a total of 9,156,580 sq. yds. (91,600 units) of spawning and rearing habitat combined (see page 23 of Cutting 1959), of which about 15 percent was spawning habitat. Thus, the actual number of nursery units using Cutting's data should be 77,910; spawning units would be 13,656. This differs from the 91,560 nursery units as stated in the DEIS.

DOI-49 It is surprising that more refined estimates of smolt production potential for the Penobscot River system have not been developed. Although Cutting's estimates were based on stream surveys, he provided no details regarding how the surveys were conducted, i.e. whether they were field or office (remote imaging/maps) based and the habitat classification scheme employed, and how the nursery and spawning habitats were identified and quantified. His projections of potential smolt production were based on the work of Canadian fishery scientists, and not on any historical survey work completed in the Penobscot River. The numbers of smolts per 100 square yard unit of stream cited by Cutting (1 to 3 per 100 sq. yds.) seems too conservative, and when used in developing smolt production estimates for the entire system (as was done by Baum 1983), result in surprisingly low estimates of total production (185,702) for a system the size of the Penobscot River (8,570 sq. mi.).

Compare, for example, estimated steelhead production in Panther Creek, Idaho, of 65,000 smolts for a drainage area of 530 square miles. The Northwest Power Planning Council (NWPPC), in working on enhancement and mitigation measures for salmon and steelhead

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DOI-47 We have incorporated into this section new information received from PIN, confirming reports of recreational angler harvest of shad below Veazie, and modified the text appropriately.

DOI-48 During preparation of the DEIS, we were informed by ASRSC that Dube (1987) presents the most current estimates of salmon spawning and rearing habitat in the river basin; we have thus used figures from that source in our analyses. We note that these are the production figures used by FWS and the ASAL Model Workgroup in their investigations of the impacts of Basin Mills project on the Penobscot River Atlantic salmon stock (see FWS 1988).

DOI-49 Your observations of smolt production for other species and river systems are not consistent with those that the state and federal fisheries agencies sponsoring and managing the Penobscot River salmon restoration effort have chosen to employ. We retain in our analyses the production estimates employed by these agencies (see Appendix D, Table D-6, and Appendix E).

DOI-49 Cont'd

stocks in the Columbia River Basin, rated steelhead smolt density estimates into categories of habitat quality as follows:

excellent habitat = 0.12 smolt/sq. yd. (12 smolts/100 sq. yds.);
good habitat = 0.08 smolt/sq. yd. (8 smolts/100 sq. yds.);
fair = 0.06 smolt/sq. yd. (6 smolts/100 sq. yds.);
poor = 0.04 smolt/sq. yd. (4 smolts/100 sq. yds.).

Thus, the estimates assigned as the best producers of smolts in the Penobscot River (3 smolts/100 sq. yds.) are still below what would be considered as poor production habitat in the Northwest. It is likely that the overall production potential of the Penobscot River has been grossly underestimated. Support for this is provided on page 3-31 where it is noted that 6 parr found in a 129 sq. yds. section of Blackman Stream equates to about 5 fish/100 sq. yds.

DOI-50

Notwithstanding the above, Cutting (1959) considered 10.3 miles of the lower Penobscot River as containing suitable spawning and rearing habitat (combined = 24,473 units; spawning area alone = 594 units). The DEIS states that the Basin Mills Project would affect about 8 percent of total nursery habitat (assumed as 91,600 units). A more valid comparison should be to compare the affected area (impacted by Basin Mills) to the total area available within that reach, i.e., total area = 24,473 units. The 8 percent value stated in the DEIS would translate into a total of 7,325 units of habitat, or about 30 percent of the total nursery and spawning habitat available in the mainstem Penobscot River (173 units of spawning habitat).

Resource management should focus on protecting areas that have already been reduced in extent due to previous hydroelectric developments. Thus, special attention should be given to preserving the remaining unregulated and free-flowing sections of the Penobscot River rather than dismissing them by comparison to the drainage-wide estimates of total habitat. Although Cutting (1959) acknowledges that "spawning areas are limited" in the mainstem, experience in the Northwest indicates that the stocks of fish which utilize mainstem habitats for spawning are typically the largest and heaviest, and are especially prized by anglers. Programs for the restoration of Atlantic salmon should not inadvertently eliminate the opportunity for stocks of mainstem spawning salmon to development by further reducing already limited spawning habitats through additional dam construction.

DOI-51

In the third paragraph, p. 3-23, the use of the term rubble is incorrect. Rubble is a term denoting size of substrates - rubble is typically defined as materials 3-10" in diameter. Its use here should be cover rubble between 0.5-2.5 inches; rubble larger than 2.5 inches.

DOI-52

Figure 3-9, p. 3-24, is cited on page 3-23 to show that a "minor run" (of Atlantic salmon) occurs in the river during September through October. However, a review of the tabular data presented in Baum (1983) (see Table 6) does not support this; the data suggests a

DOI-50 Northwest salmonids are different species with different life histories than Atlantic salmon, and you have submitted no new data into the record suggesting that a mainstem segment of the Penobscot River salmon stock has unique or special significance. Thus, we have no basis for modifying our approach for evaluating this habitat loss.

DOI-51 We have corrected the text in the manner you suggest.

DOI-52 In Figure 3-9, we sought to present a general characterization of the seasonal pattern of migration. Because run sizes have varied substantially over the years, the number of fish returning per month have also varied considerably. Thus, we do not see the merit of placing numbers of fish on a summary graph of this sort. However, to illustrate the type of variability that may occur in year to year, we have added the range of observed monthly percentages to each of the points on the graph to illustrate the consistency of the seasonal migration pattern.

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DOI-52 Cont'd general decline in numbers of fish over the period of August - November. To be meaningful, the figure should include total numbers, rather than just percentages.

3.4.1.2. American Eel - Pages 3-30. The Department has requested under Section 1.3.2., Major Issues, that American eels be included as a major issue and that the cumulative impacts on eels of the hydropower projects in the Penobscot River basin be assessed in the SDEIS.

Recently, concern has been expressed by the PIN and commercial eelers that eel populations in the Penobscot River have declined over the last few years. One of the major factors responsible for this decline has been continued operation of hydropower dams, and the resulting loss of eels due to turbine mortality. (See letter of F. Kircheis - MDIF&W, dated December 14, 1994). This mortality has never been (but should be) quantified on the Penobscot River. Basin Mills, and relicensing the existing projects as proposed, would be an added and continuing source of turbine mortality relative to eel populations. At this time, it is downstream, rather than upstream, migration problems that have been cited as being most problematic for eels due to hydropower projects. The Commission neglects this component in its analysis on page 3-30. However, there is insufficient evidence to support the conclusions that upstream passage is effective. The effectiveness of passage has not been evaluated.

DOI-53 Preliminary findings of studies conducted during the fall of 1994 in the Shenandoah River drainage of Virginia (involving FERC Project Nos. 2509, 2425, 2391) and in the Oswego, Raquette, and Hoosic River drainages of New York (involving FERC Project Nos. 2474, 2320 and 2330, 2616, respectively) provide substantial evidence that effective passage of American eels is likely not occurring at many hydroelectric projects in the Northeast.

This issue was raised in the "Chesapeake Bay American Eel Fishery Management Plan" (Plan), which was prepared by a multi-agency group in 1991. The Commission was provided a copy of that Plan in draft in proceedings for the above referenced Virginia projects. That Plan provides objectives which will affect passage at hydropower projects: (1) restore self-sustaining populations of American eels to their historical ranges; (2) implement appropriate monitoring programs necessary for collecting stock assessment data; (3) promote studies to improve the understanding of economic, social, and biological aspects of the fishery; and (4) continue to pursue and enforce standards of environmental quality and habitat protection necessary to protect the American eel population within the Bay and its tributaries. The Plan and the above referenced Virginia and New York studies are hereby incorporated into these proceedings by reference. (See also comments on Section 1.3.2 -- Major Issues; and Analysis of Alternatives -- Applicant's Proposal).

Based primarily on the above referenced evidence, the Department is including American eels in all of its Prescriptions for Fishways for the projects in this DEIS (See Enclosure B).

3.4.2. Site-specific Resources.

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DOI-53 We have requested and received most of the new data sources identified by you and PIN regarding the American eel. The FEIS text has been revised to incorporate this new information.

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DOI-54

Atlantic Salmon - Page 3-31. On page 3-31, the DEIS references that the 1983 Normandeau Associates, Inc. (NAI) study resulted in the collection of juvenile salmon only from Blackman Stream. In the same paragraph, reference is then made to a collection of 55 parr, of which about 22 percent (12) were found in the mainstem Penobscot, 33 percent (18) were found in the Stillwater River (essentially a branch of the mainstem Penobscot) and 45 percent (25) found in tributaries. This provides evidence that juvenile Atlantic salmon do utilize mainstem habitats for rearing, a fact which is downplayed by citing results of a 1989 survey in which only 11 salmon fry were found, with the majority (10) being found in Blackman Stream, and only 1 was found in the mainstem.

It is likely that densities of salmon have been too low over the past 25 years from which to accurately define habitat preferences. The mere absence of juvenile fish from mainstem habitats does not mean that those habitats are unsuitable for parr rearing. Rather, the lack of fish may be a function of difficulty in sampling mainstem habitats (gear efficiency is better in tributary systems) or that fish under existing low levels of seeding are more closely linked with tributary habitats where spawning has occurred, rather than mainstem areas which may be used as densities increase.

DOI-55

On page 3-33, Habitat Evaluation Procedures (HEP) analysis is described for smallmouth bass. Reference is then made to 5,951 square yards of spawning habitat and 478,461 square yards of nursery habitat. However, it is not clear whether these numbers relate to Atlantic salmon or smallmouth bass. The Commission needs to further define and explain the HEP that was completed, including a discussion as to why HEP habitat units are not quantitatively comparable or convertible to smolt production units. The DEIS should discuss how much shad habitat would be lost due to Basin Mills construction, expressed as total habitat and percentage of mainstem area.

DOI-56

Commission staff should be aware that cobble and rubble are typically synonymous. Therefore, separate reference to each is unwarranted and technically incorrect; e.g., "for spawning, and cobble, rubble, and bedrock that is..." (See page 3-34).

DOI-57

It is stated on pages 3-34-35 that "Nursery habitat is scarce and generally deeper than the 1-3 foot depth considered most desirable". This needs a source citation. Also, this is not (and should be) mentioned in the section discussing salmon nursery habitat on page 3-23, 3rd paragraph.

DOI-58

On page 3-35, in discussing the Milford fish community, no source citation is provided for the statement that the impoundment and riverine habitat support a "relatively unexploited resident warmwater fish community."

DOI-59

As noted above (see comment for Page 3-13), the smolt production projections for the Basin Mills reach are being erroneously compared to total basin wide production estimates (p. 3-36). The comparisons should be made to the total habitats available within the mainstem Penobscot River, since that habitat is the least plentiful in the basin. The limited data of

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DOI-54 Our intent in this section is to present all available data from existing studies. We have revised the text to identify factors, such as gear efficiency, that may affect the results of fish surveys.

DOI-55 We have clarified the text relating to salmon habitat. The amount of shad habitat that would be lost due to Basin Mills construction is discussed in our impact assessment (section 4.3.3.2).

DOI-56 We have corrected the text appropriately.

DOI-57 We concur with your comment and have revised the text accordingly.

DOI-58 We have added the citation.

DOI-59 The estimate of potential smolt production from the area affected by construction of the Basin Mills dam is from the Atlantic Sea Run Salmon Commission, as cited. ASRSC has not identified mainstem production areas as having any greater significance to the stock than any other production areas (Dube 1987). Our statement that "...this portion of the Penobscot is not presently contributing significantly to natural reproduction..." is a conclusion based on the field survey data presented and cited. We draw no inference in that statement about the potential production from this area in the future, either positively or negatively. Other attributes of that area relevant to other life history aspects of salmon are discussed in the preceding text.

DOI-59 Cont'd 1988 and 1989 (two years of data) are insufficient to draw any conclusions regarding mainstem usage, let alone suggesting that "this portion of the Penobscot is not presently contributing significantly to the natural ...." These types of statements do not represent good science, and therefore, have no place in this DEIS. Even if low catches of smolts were found, this does not mean the habitats within this reach are not important to Atlantic salmon production. Perhaps they represent some of the best adult holding, staging and/or overwintering habitats in the mainstem river.

3.4.3. Summary -- Page 3-37.

DOI-60 (First paragraph) It is noted that upstream adult migrations are forced to follow the mainstem Penobscot River; passage upstream into and through the Stillwater River is prevented due to lack of a fishway at the Orono Dam. Downstream migrating smolts apparently utilize both segments of the river at a 30 percent Stillwater and 70 percent Penobscot River split. The fact that some adult migrating salmon have been observed holding below the Orono tailrace indicates that some preference may be occurring for the Stillwater River, perhaps a function of smolt imprinting on Pushaw Stream bouquet below Gilman Falls. This supports further consideration of fish passage facilities at the Orono Dam, or decommissioning as suggested in Alternatives 2,3 and 4.

DOI-61 The DEIS's considerations of the impacts to the PIN's fisheries are inadequate. The amount of discussion dedicated to the topic is roughly three pages which is a minuscule amount if one considers that the document is 498 pages long. Moreover, discussions of the cultural value of the PIN's fisheries are not presented in any form which indicates where the fisheries should stand in order of importance to the DEIS reviewers. Instead, the DEIS focuses on guiding decisions using monetary benefits costs analysis as the basis. By minimizing the impacts to the PIN, a tribe whose history is so connected in the river and its fisheries, the DEIS analysis is deficient.

3.6 WETLANDS

DOI-62 The DEIS summarizes the amount of wetlands occurring in the area occupied by the Basin Mills, Milford and Stillwater Projects, referring to studies conducted by the applicant in 1993. However, the absence of a cover-type map in the DEIS makes it difficult to quickly refer to the locations of the 81.7 acres of wetlands that were identified in the applicant's studies. A cover type map should be provided in the SDEIS. Similarly, a tabular summary of the wetland functions that resulted from the applicant's use of Wetland Evaluation Techniques (WET 2.0) would be useful and should also be provided in the SDEIS.

DOI-63 Because the DEIS lacks summary information and maps on wetlands, it is unclear whether riffle-pool complexes were included in the applicant's studies. Riffle-pool complexes are considered "special aquatic sites" under the Sec. 404(b)(1) Guidelines (40 C.F.R. 230), and must be evaluated as part of the Corps' permitting process. Given the free-flowing nature and high gradient of the river segments, riffle-pool complexes exist in the project area.

DOI-60 Alternatives 3 and 4 include provisions for fish passage at Orono and Stillwater dams.

DOI-61 Staff's understanding of the cultural value of PIN's fisheries is based on the limited information provided on this topic by the PIN. The PIN has stated that their traditional and cultural values are closely tied to fishing rights on the Penobscot River. In recommending Alternative 4 as our preferred alternative, we conclude that PIN cultural values outweigh total potential numerical fish abundance.

DOI-62 The EIS has been modified (Section 3.6) to include a cover-type map and summary table of WET 2.0 results.

DOI-63 Information about riffle and pool habitats has been added; see Sections 3.6 and 4.5 of the FEIS.

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DOI-63 Cont'd

These complexes should be delineated and a map showing the locations of riffles and pools should be provided. A functional assessment of these special aquatic sites should also be completed. These "special aquatic sites" would be altered by the new Basin Mills impoundment (including the section immediately below the Orono Dam).

DOI-64

The Department disagrees with the conclusion in the DEIS that the series of wetlands associated with the borrow pit excavations along the east bank of the Penobscot River exhibit low functional quality. In fact, the DEIS states that a WET 2.0 analysis shows these wetlands to exhibit high value for four of the eleven rated functions (flood flow alteration, sediment and toxicant retention, nutrient removal and transportation, and wildlife diversity and abundance. Many of the reasons given for concluding that the wetlands are of low value (e.g., hydrologic isolation, lack of vegetational diversity, and small size) do not necessarily correspond to a wetland of low quality. For instance, small wetlands (less than one acre) provide extremely important habitat for reptiles and amphibians such as spotted turtle, spotted salamander, and wood frog. The Department recommends that the values of these wetlands be reassessed without relying solely on the "low," "moderate," and "high" rankings that are provided by the WET 2.0 analysis. An analysis in addition to the WET 2.0 study is particularly important for wildlife because WET emphasizes waterbirds, and ignores other types of wildlife such as mammals, reptiles, and amphibians.

DOI-65

Relative to the Milford Project, no vegetation cover type mapping has been presented. Hence, the extent and location of different vegetation types and wildlife habitats are not described. A description of specific wildlife habitat characteristics was not presented. These descriptions should describe conditions with and without the project. This will be necessary in order to evaluate cumulative impacts resulting from the dam, impoundment, and continuing project operations. In general, the two paragraph description in the DEIS is an inadequate attempt to distill the approximately twelve pages of material presented by BHE (1988. Milford Hydroelectric Project. New license application for major project - existing dam. FERC No. 2534-005) on the topic of wildlife and botanical resources. The BHE document itself falls short of providing adequate baseline information to evaluate impacts of interest to the PIN and this Department.

Similarly, and again relative to the Milford Project, no wetland maps are presented. Hence, the extent and location of different wetland types are not described. These descriptions should describe conditions with and without the project. This will be necessary in order to evaluate cumulative impacts resulting from the dam, impoundment, and continuing project operations. The description of wetland resources needs to be more informative. For example, on page 3-43 the DEIS states:

> "Orson Island has the greatest amount of wetlands (59 acres) within the study area. It is predominantly scrub-shrub habitat, although there are some sphagnum/larch bogs and softwood swamps."

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DOI-64 The statement referring to low functional quality has been removed.

DOI-65 As sections 4.4 and 4.5 of the FEIS state, the continued operation of Milford would not alter the existing environment and thus is not expected to have any appreciable effect on botanical or wildlife resources. Constructing the fifth turbine would not affect terrestrial or wetland resources because it would be located within the existing powerhouse. Thus, these resources do not merit extensive discussion in the EIS, particularly since that information is available elsewhere. We have modified the text in section 3.6 concerning wetlands on Orson Island.

DOI-65 Cont'd This description apparently draws from BHE 1988. However, upon reading the BHE document, it is not clear whether the 59 acres refers to all wetlands on Orson Island or just the shrub and ericaceous bogs. If the latter, than the 59 acres is an underestimate of the amount of wetlands. Indeed, no reference or explanation is provided which describes how the 59 acres was determined. Again, the DEIS attempts to distill approximately three and one half pages of material into one paragraph. The BHE document itself falls short of providing adequate baseline information to evaluate impacts.

3.7 THREATENED AND ENDANGERED SPECIES

DOI-66 BHE has identified 10 species which are either Federal or State-listed and which may occur in the Milford Project area. These are: Bald Eagle, Peregrine Falcon, Golden Eagle, Piping Plover, Least Tern, Roseate Tern, Sedge Wren, Grasshopper Sparrow, Tundra Peregrine Falcon, and Northern Bog Lemming. BHE states that only the Bald Eagle has been reported present. The DEIS identifies the Bald Eagle. In addition, the DEIS identifies two species of special concern (common tern and common loon) and two others on the watchlist (eastern bluebird and vesper sparrow). The DEIS fails to discuss nine of the species identified by BHE. The Department questions why the DEIS does not address all the species identified by BHE.

BHE lists 12 species of State-listed plants which may occur in the Milford Project area. Again, the DEIS does not list any records for the Milford Project area although two of the species (New England violet and Long-leaved Bluet) identified in the BHE report are also identified by the DEIS as present elsewhere in the lower Penobscot Basin. The Department again questions why the DEIS ignores those species identified by BHE. The Commission should note that all 12 plant species identified by BHE have been recorded in the Milford Project area, although only one (Long-leaved bluet) is listed as extant. The BHE report states:

> "Although suitable habitats for some of these species were found, no specimens were seen."

The combination of past records and the observation that suitable habitat exists justifies a field effort specifically designed to search for the species. No such search was identified in the DEIS, nor can one conclude from the BHE report that a carefully designed search effort was made.

3.7.1 Regional Resources - Page 3-44

DOI-67 **Bald eagle.** As reported in the DEIS, the endangered bald eagle (Haliaeetus leucocephalus) occupies the lower Penobscot River Basin throughout the year. Eagles nest both above and below the projects covered in the DEIS, the nearest active territory is approximately one mile south of the Veazie Dam. The MDIF&W has informed the FWS Office in Orono, Maine that another, non-nesting pair has established a territory in the

DOI-66 We have not included those species mentioned by BHE because, as section 4.6 of the EIS states, Interior in a letter dated January 19, 1993 (on the Milford Project) stated that "The FWS has reported that there are no known listed or proposed species in the project area, except for occasional transients. This includes the periodic use of the project area by bald eagles." In addition, because operating conditions of the Milford Project would not change and constructing the fifth turbine would not affect terrestrial or wetlands habitats, any listed or proposed species that may be present would also not be affected.

DOI-67 The EIS has been modified; additional information concerning winter distributions of bald eagles along the Penobscot River and nesting eagles in the Basin Mills project area is included in section 3.7 and a separate bald eagle Biological Assessment included as Appendix H of the FEIS.

DOI-67 Cont'd

immediate vicinity of the Basin Mills Dam site. During the nesting season in spring and early summer, these and other eagles can be expected to actively feed on migrating fish and other prey captured below dams and in other portions of the river.

The lower Penobscot River is also a significant wintering area for eagles, based on a comprehensive survey conducted in the late 1970's (cited as Todd 1979 in the DEIS). Since then, the number of eagles nesting in Maine has increased five-fold, and there are now 175 known pairs of bald eagles breeding in Maine. About one third of these eagles nest in the interior regions of the State. With this greater number of breeding pairs and the corresponding number of young produced (142 eaglets in 1994), an increase in the wintering bald eagle population in the lower Penobscot River, including the area covered by the DEIS, is a near certainty.

The DEIS acknowledges that bald eagles utilize free-flowing riverine segments in winter for feeding. According to anecdotal information from resource agency biologists working in the vicinity of the projects, at least one pair of eagles is observed utilizing the section of the Penobscot River that will be impounded by the Basin Mills Dam.

DOI-68

Shortnose sturgeon. Reference is made to the Regional Resources Section 3.7.1 (p. 3-44, fourth paragraph). The write-up on comparisons of habitat preference with habitats provided below Veazie is misleading and does not accurately reflect the analysis completed in the Biological Assessment (Appendix G). More detail should be provided (which can be excerpted directly from the appendix) to explain how the 230 cm/sec was calculated and the fact that the potential exists for shortnose sturgeon to find other microhabitat conditions below the Veazie Dam with velocities more suited to those published as optimum. As written, the reader is led to believe that since average water velocities at high flows (33,000 cfs) exceed velocities reported as optimum, ergo no shortnose spawning or rearing habitat exists. The write-up in the Biological Assessment indicates that only one transect was used (about 800 ft below the dam) to calculate velocities. A single transect is insufficient to characterize velocity profiles and distributions within an 800 ft. or longer river segment; 3-4 transects would be appropriate. The Biological Assessment should indicate whether the HSC curves developed by Crance (1986) are Category 1, 2 or 3.

DOI-69

Candidate Species. There are also a number of species that have been identified as candidates (Category 2) for listing under the Endangered Species Act (ESA), and that likely occur in the project area. Although candidate species are not formally protected under the ESA, the FWS encourages the Commission to consider them during project planning. Candidate species that might occur in the project area include the yellow lampmussel (Lampsilis cariosa), brook floater (Alasmidonta varicosa), extra striped snaketail dragonfly (Ophiogomphus anomalus (which was found in the project area in 1994), the Midget snaketail dragonfly (Ophiogomphus howeii), and the Orono Sedge (Carex oronensis). Federal status of the New England Violet (Viola novae-angliae) has been changed to Category 3C, meaning the plant is more numerous than previously thought. The State of Maine is proposing protected status for these candidates and other species, as discussed

DOI-68 As is stated in Section 3.7.1 of the FEIS, this section is a summary of the detailed information included in the Biological Assessment in Appendix G. We see no need to repeat text that appears in Appendix G. The BA presents estimated average velocities at 2 transects below Veazie, (see page G-5). In addition, NMFS, which has jurisdiction over the shortnose sturgeon through the Endangered Species Act, has concurred with the BA that the Basin Mills Project is not likely to adversely affect shortnose sturgeon (letter from J. Rittgers, NMFS, January 27, 1995). Regarding the HSC curves, the BA has been modified to include this information (the curves are category one).

DOI-69 The EIS has been modified to include this information on federal candidate or state listed species. It should be noted that although surveys to search for the mussels and dragonflies mentioned by Interior have not been conducted, aquatic macroinvertebrate colonization studies conducted in 1983 and 1993 in the project area did not find any of these species.

DOI-69
Cont'd

below. Accordingly, the Department recommends that they be included in the SDEIS, not only in the section dealing with Threatened and Endangered Species (3.7), but in the discussion on Biodiversity (3.8).

Additional information on the Federal and State candidate species follows:

Freshwater mussels. All five of the rarest freshwater mussel species in Maine could occur in the project area. These include:

1. **Yellow lampmussel** (Lampsilis cariosa) - Proposed State Threatened and Federal Candidate Species (C2). This mussel occurs principally in moderate to swift-flowing rivers, but is occasionally found in lakes and ponds. This species is known from the Penobscot watershed including the Orono area (late 1800's), shells have been found in the mainstem from Passadumkeag to Costigan (1985) and the Stillwater River (1993), but no surveys have been conducted in the project area.

2. **Brook floater** (Alasmidonta varicosa) - Proposed State Threatened and Federal Candidate Species (C2). It is restricted to flowing waters of rivers and streams, and has recently been found in Kenduskeag and Marsh Stream watersheds, below the project area. Shells have been found in the mainstem from Passadumkeag to Costigan, above the project area. No surveys have been conducted within the project area.

3. **Tidewater Mucket** (Leptodea ochracea) - Proposed State Endangered Species. This mussel occurs in quiet waters of ponds and slow moving sections of rivers in the immediate vicinity of the seacoast. It is known from only 8 to 10 locations in Maine including records from the Penobscot River in Orono (late 1800's) and Greenbush (1985). There has been no recent survey effort in the project area.

4. **Squawfoot** (Strophitus undulatus) - Proposed State Threatened Species. This mussel occurs principally in flowing waters of rivers and streams, but is occasionally found in lakes and ponds. Where it occurs it is rare and represents only a small proportion of the entire mussel fauna. There are about 8 historic records in Maine. Surveys of approximately 300 water bodies with potential habitat have yielded only six occurrences including, Marsh and Kenduskeag Stream watersheds, just downstream from the project site. No surveys have been conducted in the project area.

5. **Triangle Floater** (Alasmidonta undulata) - Proposed State Special Concern. This mussel is usually associated with flowing waters, but is occasionally found in lakes and ponds. It seems to be relatively secure in Maine, but is rapidly declining in southern New England and the mid-Atlantic States. Because of declines, many States

DOI-69 Cont'd

have listed or are considering listing this species. Shells have been found in the Penobscot near Argyle (1993). No surveys have been conducted in the project area.

Dragonflies. Gomphid dragonflies (Family *Gomphidae*) are usually considered stream or river species. (See for example, Hynes 1970, The Ecology of Running Waters.) Compared to other *Odonata* families, relatively little research has been conducted on the life history, distribution, and ecology of these species. Two species of snaketail dragonflies are briefly described below, which are Federal Candidate Species (C2) and are proposed for the Maine Endangered Species list. Both could occur in the project area, but have not been addressed in the DEIS. These are:

1. **Midget snaketail dragonfly** (Ophiogomphus howeii) - Proposed State Endangered and Federal Candidate Species (C2). This dragonfly inhabits medium to large unpolluted, free-flowing rivers. It was recently documented in the East (1993) and West (1994) Branches of the Penobscot River. There has been no survey effort in the lower Penobscot.

2. **Extra striped snaketail dragonfly.** (Ophiogomphus anomalus) -Proposed State Threatened and Federal Candidate Species (C2). This dragonfly inhabits medium to large unpolluted, free-flowing rivers. It was first discovered on the Penobscot River in Orono in the late 1800's and was not documented again in the State until the 1970's. A large population was discovered in the Lincoln area in the 1980's, and exuvia (exoskeletons shed during molting) have been found in the Passadumkeag area (1993). In 1994 O. anomalus exuvia were found throughout the project area, and an adult was observed in Orono.

Barrow's Goldeneye. The DEIS does not mention the seasonal occurrence of the Barrow's Goldeneye (Bucephala islandica), currently listed on the State of Maine's "Watch List", and proposed for designation as a species of "Special Concern". The Basin Mills segment of the Penobscot River is one of the few locations in Maine that is traditionally used by wintering Barrow's Goldeneyes.

3.8 Biodiversity

DOI-70

The DEIS reports that creation of the Basin Mills impoundment would increase to 32 percent the total amount of impounded water in the main stem of the Penobscot between Bangor and the confluence of the East and West branches (a distance of 74 river miles). Although a discussion on biodiversity must focus on the likely impacts in the lower Penobscot River, as discussed below, the Department requests that in the SDEIS the analysis of impounded waters include major tributaries, including the Piscataquis River and the West Branch of the Penobscot. Without considering these additional waters the Commission will have an incomplete and distorted view of comprehensive river basin development.

DOI-70 As explained in Section 1.3 of the DEIS, the scope of the EIS is limited to the lower Penobscot River basin in the vicinity of the 3 projects being evaluated for licensing and relicensing. Our cumulative impact assessment includes the geographic extent appropriate for the resources under consideration. For instance, we have summarized in the EIS hydrologic changes which might occur with enhancements at the Ripogenus and Penobscot Mills projects within the west branch of the Penobscot River. We have also included anadromous fish habitat contemplated for restoration throughout the watershed in our analysis of impacts to fisheries.

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DOI-71 The Department also recommends that the location of the proposed Basin Mills impoundment be considered within the linear context of other projects on the main stem of the river. As seen in Figure 3-1 in the DEIS, the clustering of four dams (including the breached Bangor Dam) within a relatively short river reach (roughly 12 miles) suggests a higher gradient than in the remaining 62 miles downstream from the West and East branches. With respect to the free-flowing river segments, the physical dissimilarity in the upper and lower portions of the mainstem probably means that differences in biological communities occur. Accordingly, it is not appropriate to consider the habitat losses in the Basin Mills area in the context of the entire mainstem. This masks the impacts. In the SDEIS, these losses should be considered relative to what remains in the lower 12 miles between Milford and Bangor. Stated in simpler terms, the new Basin Mills impoundment would virtually eliminate the last of the high gradient habitat in the lower Penobscot River. The Department notes that the subsequent discussion of impacts on biodiversity in the DEIS distinguishes between the lower segment of the river, and the rest of the basin.

DOI-72 The SDEIS should describe important natural physical processes that occur in the free-flowing segment of the river that would be inundated by the Basin Mills Project. This includes the seasonal flooding and nourishment of riparian areas, including vernal pool wetlands, and aeration and temperature moderation that take place in the existing riffle and pool complexes in this undammed portion of the river.

DOI-73 This section of the DEIS briefly identifies the nature of concerns relative to biodiversity. However, it fails to identify and quantify the existing conditions within the lower basin in context with most biodiversity issues. For instance, it fails to discuss how the location and extent of rare species, wetlands, plant communities, and wildlife habitat are altered by the presence of the projects; and, it fails to define their geographical and functional relationships. As an example, riverweed (Podostemum ceratophyllum) is specifically adapted to grow in riffle environments. Such habitat occurs in the Milford Project area and, indeed throughout the Penobscot River. Since the DEIS identifies the presence of riverweed in the bypass reach of the Stillwater Project, it is appropriate to ask if riverweed is found elsewhere in the project areas and what percentage of the existing riffle environments currently support riverweed? The Commission has failed to discuss the effect on biodiversity if the impounded area on the mainstem, from the breached Bangor Dam to the confluence of the East and West branches of the Penobscot River, is increased from 27 percent to 32 percent as identified in Section 3.8.

3.9 RECREATIONAL RESOURCES

3.9.2 Site-specific Resources

3.9.2.1 Basin Mills Project Area Recreation Resources.

DOI-74 At pages 3-47 to 3-48, the DEIS states that Atlantic Salmon angling is the primary recreational activity that attracts people to the area, and is considered to be the nation's largest recreational Atlantic salmon fishery. Of that activity, 90 percent occurs within the

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DOI-71 See response to comment EPA-24 and EPA-26. The FEIS has been modified to address the effect of converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in a existing mosaic of impounded and non-impounded reaches would not be significantly altered.

DOI-72 Changes in the physical processes of the local ecosystem are implicit in the discussion of effects from the conversion of 3.6 miles free-flowing river to an impoundment, but to ensure recognition of this point, text has been added to the FEIS.

DOI-73 We have no technical basis for modifying our assessment of the changes in biodiversity resulting from effects on species, communities, and ecosystems. No new information on the presence of rare species or assemblages has been provided since the DEIS was issued.

DOI-74 Regarding the methods used in obtaining whitewater boating use data, unobtrusive visual observations were made from 5 locations on the river bank. Observations were made for seven days a week from 7:00 a.m. to 8:00 p.m. for 13 weeks from June 4th to September 2nd 1990. Observations were made by trained personnel who recorded use data on gridded data sheets for each reach of the river from directly in back of the Bradley sand pit on State Route 178 to the southern tip of Ayer's Island. Data recorded included date, time of day, category of activity, category of user (adult male/female, youth male/female, and group/family), and weather conditions. Observers remained at a site for 2.5 hours for each observation period.

DOI-74 Cont'd

area from the Veazie Dam to four miles below that facility. Although data cited indicates that 90 percent of the money spent on this activity in the project area was spent by Maine residents, this still represents an important element of the Maine and the regional economy.

At page 3-53, 1990 data indicates that there were less than 50 user days annually by white water boaters in the project area. This is not an insignificant amount of use for a relatively urban location. The method for obtaining this data is not given, nor does this figure take into account the rapidly expanding sport of white water boating. Areas that experienced sporadic use a few years ago, now receive significant use. Further, the method used for determining consumer surplus value (page 3-53) fails to take into account increased user numbers, but merely escalates 1990 user days into 1994 dollars.

While removal of the breached Bangor Dam is desirable, this does not qualify as an appropriate mitigation component for the Basin Mills project impacts as the Bangor Dam in its present state has little impact on recreational opportunities and fisheries values.

3.10 LAND USE

DOI-75

The DEIS fails to mention that the PIN Reservation exists in the Penobscot River and, particularly, that the Milford Impoundment surrounds 22 Reservation Islands. Page 3-57 mentions only Indian Island, ignoring both the other impacted islands and the fact that those islands enjoy the protections of reservation status.

3.12 AESTHETIC RESOURCES

DOI-76

At page 3-58 to 3-59 the DEIS states that any hydroelectric project located at or near other such projects has an insignificant effect on existing aesthetic values due to the existing project or projects having already lowered the aggregate aesthetic value from a natural waterfront. This statement fails to take into account the cumulative impacts from additional development. Most important, the remaining undeveloped areas will be more significantly impacted by additional development. The last remaining segments of undeveloped shoreline in a highly developed basin have the greatest aesthetic value, and any infringement on those areas results in a significant adverse aesthetic impact.

3.13 CULTURAL RESOURCES

3.13.1 Regional Resources

3.13.1.3 Penobscot Indian Nation

DOI-77

Anadromous Fish - Page 3-63. On page 3-63, the DEIS cites to the Maine Indian Claims Settlement as authorizing the PIN to regulate fishing within its own territory. This neglects to mention the reserved sustenance fishing right confirmed to the PIN in 30 M.R.S.A. 6207(4) of the Maine Implementing Act, and ratified by Congress in the Maine

DOI-74 Cont'd

Regarding consumer surplus value, we acknowledge that white water boating is a rapidly expanding sport. However, user surveys from 1988 to 1990 did not show rapid growth in the Basin Mills area. Kayaking accounted for 10 of the 40 user days in 1990. The balance of the use was canoeing, 90% of which occurred on flat water. The 1993 ME SCORP reported statewide growth of white water boating of only 1-3% over the past 15 years. The 1990 Penobscot Valley Council of Government recreational user survey mailed to all the households in the towns affected by the proposed Basin Mills project received no response from residents indicating that they presently kayak in the affected reach (Risk 1991). However, we agree that it is not possible to predict whether demands for whitewater recreational opportunity will increase substantially in the future. Thus, in recommending Alternative 4 as our preferred alternative, we preclude the elimination of a free-running riverine section that could meet such demand in the future. Regarding Bangor dam removal, we did not consider there to be any benefits from removal of the dam remnants.

DOI-75

We have revised Section 3.10.2 of the FEIS to indicate the presence of additional PIN lands located in the Milford impoundment. Any order issued for the Milford project will include a discussion of reservation status under the FPA.

DOI-76

These statements have been removed from Section 3.12.2 of the FEIS to clarify our analysis of aesthetic impacts.

DOI-77

Staff is aware of the treaty reserved fishing rights confirmed to PIN in 30 M.R.S.A 6207(4) which states in part that "... the Penobscot Nation may take fish, within the boundaries of their respective Indian reservations, for their individual sustenance...." No action recommended by the Commission staff in this licensing proceeding would impinge on the rights of the PIN to take fish for individual sustenance.

DOI-77 Cont'd Indian Claims Settlement Act. This confirmed to the PIN a reserved right to take fish from the river within its reservation for individual sustenance. The Commission is referred to the United States' brief filed in the Atlantic Salmon Federation litigation pending before the Maine Law Court for a further discussion of this fishing right. By failing to recognize this right, and thus, to give it the protection merited, the Commission, through the findings and conclusions reached in this DEIS, has failed to fulfill its trust responsibility to protect the rights of the PIN. In the SDEIS, the Commission must recognize and properly discharge this trust responsibility to protect the PIN's rights and interests.

DOI-78 The PIN's fishing right is limited to its reservation waters, and thus, the opportunities noted in the DEIS for angler access below Milford will not assist in the fulfillment of this right. Nor, for that matter, will the trapping and trucking of fish to a location upstream of Indian Island or the licensing of an additional barrier to fish passage assist with the fulfillment of this right.

DOI-79 The restoration of salmon in the Penobscot River will take more than control and regulation of the more obvious anthropogenic impacts operating on the system, such as water quality and flow regulation. It is requiring serious regulation of fishing and harvest activities for Atlantic salmon. With such measures, the restoration of naturally reproducing/wild Atlantic salmon back to levels which exceed the Maine Atlantic Sea Run Salmon Commission's (ASRSC) goals can be achieved. However, this can only occur if other developments, such as the Basin Mills Dam Project are canceled. Restoration efforts need not face yet another barrier with which to contend with.

4.0 ENVIRONMENTAL IMPACTS

DOI-80 **4.1.1 Geology and Soils.** The DEIS states that no change in erosion and sedimentation would occur in any of the project areas under the No-action Alternative (p. 4-1). However, the DEIS fails to identify existing on-going erosion and stability issues present in those project areas.

DOI-81 **4.1.2.1 Alternative 2: Applicant's Proposal - Soil Erosion , Page 4-1.** In considering Alternative 2: Applicant's Proposal, the DEIS states:

> "[u]nprotected soils in the project areas are highly erodible, but dense vegetation and armored river banks protect soils in undisturbed areas. Disturbance of the shoreline and land areas during construction, however, could cause erosion and sedimentation." (p. 4-1).

The reader is left with the false impression that only those shorelines which are, or have recently been, disturbed by construction are at risk. In fact, significant lengths of shoreline within the Milford Project area are currently unstable based upon exposed nonvegetated undercut banks and trees which are falling into the river.

DOI-78 The issue of a PIN reservation will be discussed in any order issued for the Milford project. Alternatives 3 and 4 would increase all anadromous fish stocks in the Penobscot River. However, in recommending Alternative 4, we conclude that PIN cultural values outweigh total numerical fish abundance.

DOI-79 We concur that the construction of Basin Mills dam would increase the obstacles to be overcome in restoring wild salmon, which is, in part, why we now recommend Alternative 4 as our preferred alternative.

DOI-80 We have revised Section 4.1.1 to include the existence of erosion problems at the Milford Project. The issue of existing conditions representing our No-action Alternative will be addressed in the orders to these projects.

DOI-81 Suggestions that a "significant bank stability problem exists over extensive shoreline" at the Milford Project appear in a number of agreements relating to cultural resources. We note that the existence of erosion problems at the Milford Project are related to episodic flood events and the presence of the impoundment and are not due to project operation. During initial and second stage consultation in 1988 and 1989, both DIFW and PIN expressed concerns about impoundment fluctuations greater than one foot of normal pond elevation at times other than spring runoff or severe storms. FERC requested additional information (March 31, 1989, Item 6) concerning fluctuations. BHE provided 5 years of data showing that fluctuations in the Milford headpond elevation of greater than 1 foot other than due to the loss of flashboards because of high flows or ice flows occurred between 7 and 11 days a year (consecutively). These fluctuations were attributable to essential repairs or inspections. We conclude that this degree of frequency of impoundment fluctuations due to project operations is insufficient to result in significant bank instability. A FWS memorandum of June 20, 1989, stated that the Milford impoundment is maintained at a relatively stable level near the flashboards except when flashboards fail or maintenance is performed. It recommended that a new

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DOI-81 Cont'd

Section 4.1.6.1 states:

> "All alternatives except Alternative 1 (No-action) would cause minor soil erosion impacts from construction of either project works (Veazie, Basin Mills, Milford) or fishways (all projects). The greatest impacts would be associated with removing Veazie Dam (Alternative 5) and constructing the Basin Mills development (Alternatives 2 and 3). These impacts would, however, be minimized with proper erosion and sedimentation control plans." (p. 4-7).

In light of the extensive unstable banks documented in the Milford Project area, these conclusions appear unwarranted. Although arguments can be advanced that the undercut and unstable banks are a result of natural forces, the elevation at which erosion is occurring is in direct response to the elevation of the impoundment. Hence, the projects must accept responsibility for establishing conditions which have led to the present shoreline stability problems. In connection with the Milford Impoundment, the river appears to be encroaching upon the Sockalexis Arena Bingo Hall operated by the PIN on Indian Island.

DOI-82

In discussing site-specific impacts associated with the Basin Mills Project (Section 4.2.2.1), the DEIS states that the

> "HEC-2 model is used to determine backwater hydraulic and energy profiles in rivers.... BHE is continuing to obtain water elevations at additional flow levels. As additional water elevations are obtained, the computer model would be updated to refine the accuracy of the hydraulic modeling." (p. 4-9).

It appears that BHE has not completed hydraulic study of the rivers, and therefore, the impoundment elevations reported by BHE should be treated as tentative results. The impoundment elevations are critical to the flood mitigation measures and to the hydropower generation as well. The accuracy of the hydraulic model is determined by the parameters used in the model, and the hydraulic characteristics of channel and floodplain. Therefore, the hydraulic studies made by BHE should be subject to full engineering review and be made available to the public.

DOI-83

On page 4-10, the DEIS goes on to state:

> "[b]ased on the hydraulic capacity of the gated and ungated spillway sections under flood conditions, historic flood elevations at the upstream end of the impoundment in Old Town and Bradley would not increase as a result of the proposed project."

However, the design capacities of the gated and ungated spillway sections are not established. The Department notes that on page 2-3, the DEIS mentions that the design flow is up to about 40,000 cfs; however, on page 2-9, the DEIS mentions that BHE proposes to construct gated and ungated spillway sections of the Basin Mills Dam that would allow a

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DOI-81 Cont'd

license should require fluctuations to be kept to a minimum. The WQC requires that Milford be operated as a run-of-river project and that except for normal maintenance activities, inflows, or operating emergencies, maintain water levels in the impoundment within 1 foot of normal full pond elevation. We concur with these conditions and believe they will minimize potential erosion and bank problems, run-of-river project and, that except for normal maintenance activities, inflows, or operating emergencies, maintain water levels in the impoundment within 1 foot of normal full pond elevation. We will recommend that these conditions be included in license articles for this project. They will minimize potential erosion and bank problems.

DOI-82

The applicant has completed hydraulic studies of the Penobscot River in the vicinity of the proposed project sufficient for conceptual design purposes. Prior to final project design if the Commission were to license Basin Mills dam, any minor refinements in hydraulic modeling would be made at the time of FEMA mapping.

DOI-83

This section has been clarified to indicate that the combination of gated and ungated spillways can pass the 500-year flood. In Section 3.3.2.1, we now indicate that the discrepancies between flood flows you mention would be resolved prior to final project design at the time of FEMA mapping. Calculated water levels and historic flood data are presented in the project license application.

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DOI-83 Cont'd

500-year flood, which is between 177,000 and 211,000 cfs, to pass. This discrepancy should be clarified. Additionally, calculated water levels and historic flood data in the affected areas should be presented in the DEIS to support the above statement.

DOI-84

Further, the DEIS states:

> "the lower lying areas of Bradley between Otter Stream and the Penobscot River have flooded several times in recent years. The hydraulic capacity of the proposed Basin Mills development would enable it to pass flood flows without increasing the elevations in this section of the Penobscot River, ..." (p. 4-10).

While the hydraulic capacity of the proposed spillway may be able to pass flood flows, it should be noted that the water elevations would be increased due to the impoundment and the backwater effect. Thus, the DEIS should provide actual backwater calculations in this section of the Penobscot River and in Otter Stream, particularly for the 500-year flood flow, to support this statement.

DOI-85

In the DEIS, the conclusion is made based on analysis of the available data, that

> "BHE's proposed project would not increase the frequency or magnitude of flooding in areas adjacent to the proposed Basin Mills impoundment." (p. 4-10).

The presence of a new dam on the river and the impoundment created by the dam would change the distribution of streamflow and the water levels behind the dam. While the proposed project may not increase the magnitude of floods, the water levels would be significantly raised because of the impoundment. The DEIS does not present the changes in water levels and changes in flooding areas due to the proposed project as compared to the existing conditions. Without the support of further engineering information, the effectiveness of the mitigation measures proposed by BHE cannot be evaluated and the conclusions reached by the DEIS lack support and are thus disputable.

DOI-86

In discussing site-specific impacts related to the Orono Development (Section 4.2.2.1), the DEIS states that because all Stillwater flow would be diverted over the Orono Dam into the Orono bypass reach, water depth and velocity in the bypass reach would be enhanced due to increased spillage. (p. 4-10). This increased spillage over the Orono Dam has an erosive effect on downstream channel beds and banks due to the clear water discharged into the bypass and increased velocity. The SDEIS should address the scouring effect on the downstream channel as well as the sediment accumulation behind the Orono Dam.

4.2 WATER QUALITY AND QUANTITY

4.2.2.1 Site Specific Impacts - Water Quality

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DOI-84 The back water elevations developed by BHE using the Veazie Dam flow records represent the calculation of shore protection dike construction and serve as the basis for fill area determination; therefore, they must be representative of the Otter Stream backwater elevation. However, as indicated in Section 3.3.2.1, BHE would reconcile FEMA mapping for assessment of flood modeling and the backwater determination in Otter Stream reach.

DOI-85 See response to DOI-84 above.

DOI-86 As noted on page 4-10 of the DEIS, flows up to 1,740 cfs are currently discharged through the powerhouse at the Orono development. With the Orono development decommissioned, these flows would be passed over the spillway at Orono dam. Since average flow in the Stillwater River is 4,000 cfs, there is currently spillage at the dam during average flow conditions and we do not expect any additional erosion problems if the project is decommissioned. Under Alternative 3, the Basin Mills impoundment would back up to the Orono dam, further diminishing any erosion problems which would occur below the Orono dam.

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DOI-87 **Toxics.** As noted previously, recent data show elevated levels of dioxin in fish sampled from the lower Penobscot River. Accordingly, the Commission must review its finding that toxic contamination is not an issue at the projects covered in the DEIS.

DOI-88 **Dissolved Oxygen.** The discussion presented regarding effects of decreased spill on DO concentrations is insufficient to support the conclusions expressed in Section 4.2.2.1, page 4-11. Reference is made to MDEP modeling (Mitnick 1991) as representing "an accurate assessment of DO and assimilative capacity of the river..." (p. 4-11). However, no data are presented.

Of particular interest would be modeled results showing an hourly time-step so that diurnal changes in DO can be assessed, as predicted during a dry, wet and average water year condition during the low-flow warm period. The reference to a 0.3 mg/l decrease is meaningless as presented, as it could reflect a daily, weekly, or monthly average. Salmonids and other coldwater species are very sensitive to DO gradients and may cease or delay upstream migrations if DO levels are too low or gradient changes are too dramatic. The SDEIS should present and discuss data which lead to the conclusion reached in the DEIS.

DOI-89 Staff should insert the following into the first sentence, second paragraph of Section 4.2.2.2 on page 4-15 - "PIN collected additional data in summer (July - September) 1993 in two ...." The conclusion that "water temperature is not affected appreciably by the presence of impoundments in the lower Penobscot River" (p. 4-15) is unfounded.[3]

A review of Figure 3-6 (p. 3-17) indicates that for the periods monitored, water temperatures (minima, maxima, and means) were generally lower in the free-flowing section of river, than in two impounded sections. This suggests that at least some warming may be occurring in the impoundments, a condition which makes intuitive sense (and thermal dynamic sense) relative to increased heat absorption due to the greater surface areas and a general slowing of waters through the impounded areas.

The question of significance of these temperature differences on aquatic biota, and in particular Atlantic salmon ecology, remains unanswered due to the general absence of any reliable data from which to complete a technically sound analysis. The DEIS lacks necessary data concerning water temperature profiles in the river. Surely, the U.S. Geological Survey (USGS) and MDEP data sets are more complete, both in temporal and spatial coverage, than what was presented in the DEIS. More complete data, including both temporal and spatial coverage, must be presented in the SDEIS.

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DOI-87 See our response to DOI-44.

DOI-88 Available dissolved oxygen (DO) data were presented in Section 3.3.2.2 of the DEIS. DO modeling as presented in Mitnick (1991) predicted a maximum decrease of 0.3 mg/l in DO for a worst-case low flow period (the 7Q10 or 7-day low flow period with a 10-year recurrence interval). We conclude that there is no need to present data for other hydrologic conditions. The Maine DEP has found that the Basin Mills Project as proposed would meet all applicable water quality standards. Based on the discussion above we conclude that the additional modeling results you request are unnecessary.

DOI-89 We have added the months that PIN data was collected to the sentence as requested. We have re-evaluated the temperature data provided by PIN and the comments of several respondents on the statistical analysis performed on the data. Section 4.2.2.2 of the FEIS has been revised to include the new analyses, and our evaluation of possible temperature impacts on fish under Alternative 3.

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[3] The Department is aware that the Environmental Protection Agency (EPA) was not able to replicate the findings in the DEIS used to support the conclusion. Therefore, the Department will rely on the EPA to provide comments on their findings related to impacts of impoundments on water temperature.

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DOI-90

Flow regulation impacts on riverine thermal regimes can be dramatic. In the case of the Penobscot River, the temperature regime has already been altered due to the construction and operation of numerous mainstem and tributary dams; the degree of impact remains undefined since no quantitative studies have been conducted to address this condition. Such work must be done before any new construction is permitted on the river.

The Basin Mills Dam would inundate and convert yet another 3.5 mile reach of free-flowing river to an impounded condition. Given that substantial dollars, time, and energy have been spent toward Atlantic salmon restoration in the Penobscot River, a more detailed evaluation of the overall potential impacts (local and cumulative) of the Basin Mills Project on the existing temperature regime of the river is warranted. This should be done with special attention focused on impacts to all life history stages of Atlantic salmon.

The Department recommends development and use of a temperature model (1-2 dimensional model) for making this assessment, to include upstream impoundments. Consideration should be given to applying the FWS/Soil Conservation Service SNTEMP model for this, inasmuch as it has the capability of interfacing with species temperature Habitat Suitability Criteria (HSC) for evaluating thermal records in the context of their biological suitability for fish. The Commission analysis of temperature was rudimentary at best and should be redone as requested above; water temperature changes remain one of the major concerns relative to construction of the Basin Mills Project and its effects on fishery resources.

4.3 FISHERIES RESOURCES

4.3.2 Assessment Methodology

DOI-91

The Federal role in Atlantic salmon restoration has already been addressed under NEPA by the FWS in their EIS on Atlantic salmon restoration in New England. The Commission staff largely wasted their energies by addressing NEPA conclusions that have already been reached.

DOI-92

In this section, the Commission relied heavily on its own application of the ASAL model. The Commission evaluated the number of Atlantic salmon that would likely exist under the different alternatives in the DEIS, and reached conclusions about the likelihood for successful restoration (i.e., achievement of resource agency goals).

As discussed below, the approach was flawed. Not only was the application inconsistent with the original purpose of ASAL modeling, but also the inputs were modified that had been identified by the resource agencies as being the most appropriate, and scientifically defensible, for the Penobscot River.

DOI-93

The population model, ASAL, was developed by the FWS primarily as an impact assessment tool, i.e. to predict the effects of new hydroelectric development on future Atlantic salmon population levels. Its first application was in the mid-1980's in connection with the proposed

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DOI-90 Under Alternative 3, a post-construction water temperature study would be conducted for the project as required by condition 25 of the water quality certificate issued by Maine DEP. A water temperature model could be used as part of such a study; however, such a model is unlikely to show a significant impact on temperature due to one additional run-of-river impoundment within the inherent uncertainty of such a model and natural climatic variability. We discuss possible temperature impacts on salmon in Appendix F of the EIS.

DOI-91 No response required.

DOI-92 We note that Dr. Rago, author of the ASAL model, states (Attachment C to NMFS DEIS comment letter, pg. 1): "The applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent...." Parameters used in our ASAL modeling are consistent with al information submitted by all parties to these proceedings.

DOI-93 Your characterization of the purposes to which the ASAL model can be applied is incorrect. As Dr. Rago (co-author of the ASAL model) states (Attachment C to NMFS DEIS comment letter, pg. 4), "ASAL was designed as both a tactical and strategic planning tool...As a strategic model ASAL can be used to evaluate long term prospects for restoration with respect to variation in underlying rates e.g., upstream, downstream, marine survival etc. and to assess chances of viable population in the future...." This is the exact purpose to which we applied the ASAL model in our analysis.

DOI-93 Cont'd

Sewall's Falls Hydroelectric Project on the Merrimack River in New Hampshire. Since then the model has also been used in developing restoration plans, and was applied in the preparation of the FWS' EIS on Atlantic salmon restoration in New England. However, given the relative uncertainty of predicting future conditions, particularly the magnitude of various factors affecting the size of Atlantic salmon populations, the model's principal utility remains in comparing the differences in project alternatives; i.e., the impacts of a new hydroelectric project compared to those without the project.

DOI-94

The ASAL model was initially applied to the Basin Mills Project in 1987 by a multi-discipline group (referred to as the ASAL Working Group), consisting of the FWS, ASRSC, MDMR, University of Maine (Cooperative Fisheries Research Unit), PIN, and consultants for the applicant. This was a collaborative effort. The ASAL Working Group followed the team approach used elsewhere in the consultation process for Basin Mills to evaluate impacts to aquatic and terrestrial resources through the HEP, which involves stepwise decision-making by a team.

Although FWS staff led the Working Group, this was due only to their familiarity with the ASAL model based on earlier applications (e.g., Sewall's Falls). Information needed to run the model, particularly the inputs for the rates of survival at different points in the salmon's life cycle, were developed by the team using a consensus approach. As a result, the information used in the model represented the best collective scientific judgment among the resource agency and tribal experts who were most familiar with the Penobscot River and its Atlantic salmon resource.

An effort was made to use data from Maine (as opposed to that from the Merrimack or rivers in Canada), and in particular the Penobscot River, in order to ensure that the inputs were realistic and reasonable. In this regard, the group relied heavily on data on returns of hatchery fish in the Penobscot up until then, and on studies by ASRSC staff on wild fish in lower Penobscot River tributaries. Recognition was given to the likelihood that conditions in the river and in the ocean that affected salmon survival were continuing to improve. The group considered it reasonable to expect a more optimistic set of conditions within the second half of the 50-year modeling time frame. These expected adjustments in survival rates were agreed to by the entire group.

The Working Group's first report was produced in August 1988. The analysis showed that constructing the Basin Mills Dam would reduce the probability of successfully restoring Atlantic salmon by 60 percent (from 0.55 to 0.22). Although the report largely reflected consensus among all members, the applicant subsequently performed independent runs of the model, using alternate inputs for some of the variables, including marine survival rates based on data from the Merrimack River. These independent runs likewise showed that constructing the new dam would reduce restoration probability from 0.33 to 0.07, virtually the same level of impact that was determined by the Working Group.

DOI-94 All the information presented in your comment was presented in the DEIS. We also note that staff's ASAL model results show the same level of impact of Basin Mills dam construction as did the ASAL Working Group model results.

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DOI-94 Cont'd

The FWS subsequently revised the original report to address probable improvements in fishways at existing projects on the Penobscot. This factor was not addressed by the original Working Group. Consideration was given to the fact that upcoming relicensing of the existing projects would result in state-of-the-art fishways -- not the inefficient facilities that existed at the time of the original model runs. The updated model run showed that the new Basin Mills Dam would reduce the probability for successful restoration from 0.72 to 0.39. Again, the ASAL model predicted the same magnitude of impact that was previously found by both the Working Group and the applicant.

DOI-95

Contrary to the collaborative approach used by the ASAL Working Group, the Commission, through its staff, has made independent, unilateral decisions on the mortality factors it believes are most appropriate for the Penobscot River Atlantic salmon population. Discussion of the model inputs is not project-specific and could have been carried out without violating the Commission's ex parte rules. However, except for contacting the principle ASAL author, Dr. Paul Rago of the National Marine Fisheries Service (NMFS), apparently for assistance in compiling the source code, Commission staff decided to adapt ASAL for use in their Basin Mills process independent of the FWS or other resource agencies. In contrast, the Commission staff had telephone conversations with the applicant regarding the ASAL model, as mentioned in Appendix E of the DEIS. This seriously compromises the conclusions in the DEIS regarding future salmon populations in the Penobscot River under the different alternatives. As such, the results of the entire ASAL analysis by staff are suspect.

DOI-96

The lack of communication with the agencies regarding ASAL modeling is further evidenced by the staff's use of a 2.5 percent marine survival rate for "Merrimack River wild smolts". First, the current restoration program on the Merrimack has yet to produce naturally reproducing (i.e., wild) fish. All adult returns have resulted from stocked hatchery fish. Second, the highest documented rate of return in the Merrimack is roughly 1.4 adults per thousand stocked smolts. This is a marine survival rate of 0.14 percent (not 2.5 percent as shown in the DEIS), and roughly one-tenth of what has been reported for the Penobscot River, according to unpublished FWS data (maximum return of 14 adults per thousand stocked smolts or 1.4 percent).

DOI-97

It is widely recognized that wild salmon smolts have a higher marine survival than those of hatchery origin. As discussed in the ASRSC's management report for the Penobscot (cited at Baum 1983 in the DEIS), survival of wild salmon smolts can be as high as 31 percent. This far exceeds the 5 percent upper limit used by the Working Group for marine survival of Penobscot origin fish. Accordingly, neither the staff nor the Commission should view the values used by the Working Group as overly optimistic.

DOI-98

Equally disturbing is the staff's focus on the feasibility of restoration, while downplaying the ASAL model's primary role as an impact assessment tool. As discussed above, modifying certain input values changes only the ultimate level of restoration probability, a speculative output, based on the uncertainty of riverine and ocean conditions over the next 50 to 100

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DOI-95 In the DEIS, we provided as complete a description as possible of the manner in which we conducted ASAL modeling. Contacts with Dr. Rago and BHE staff were specifically for clarification of material submitted into the record, as is allowed under FERC's ex parte rules. These contacts were necessitated by typographical and other errors or problems that appeared in the model documentation provided by the various participants in these proceedings (see our discussion in Appendix E).

DOI-96 We have corrected our characterization of the 2.5% marine survival rate that we employed in some of our ASAL model runs. Our objective in conducting runs with that survival rate was to explore the consequences to potential restoration of a final marine survival value that we viewed as being somewhat more realistic than the 3.5% value employed by FWS and the ASAL Working Group. We note that the 0.14% marine survival rate for Merrimack stocked smolts that you cite in your comment is exactly the marine survival rate observed for Penobscot River stocked smolts in 1993, based on recent data provided to us by ASRSC and incorporated into our FEIS discussion.

DOI-97 We address this issue in our response to a similar NMFS comment; please refer to our response NMFS-26.

DOI-98 Our ASAL model assessments were made specifically for the purpose you state, "...to compare alternative project impacts and how mitigative measures could lessen that impact..."(see Appendices D and E). We did investigate the consequences of one of the proposed mitigation measures (trap and truck) for an alternative not including construction of the new Basin Mills dam (Alternative 4).

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DOI-98 Cont'd

years. The level of impact (reducing the probability by 0.33 on a 0 to 1.0 scale) remains the same.

Impact assessment is the purpose of any EIS. The staff's use of the ASAL model should have been expressly for the purpose of documenting impacts to the Atlantic salmon resource in the Penobscot River. The model should have been used to compare alternative project impacts and how mitigative measures could lessen that impact; i.e., address the difference in restoration probability instead of the absolute level expected under different alternatives. It is highly significant that neither the applicant -- nor the Commission -- has ever evaluated alternatives involving the proposed mitigation, i.e., stocking and trapping and trucking, for the with- and without-project scenarios. That is to say, how would the probability for restoration change if these mitigation measures were implemented by the resource agencies, and Basin Mills Dam was not built.

DOI-99

Surprisingly, staff repeatedly denounce some of the parameters (most notably marine survival rates, and downstream survival rates - see page 4-24) that were used by the FWS in their model runs as being overly optimistic. Staff have rejected FWS parameters ostensibly because such values have not occurred in recent times, and desptie the fact that FWS use of the values was based on projected future improvements in marine survivals, that appeared reasonable to the technical Work Group -- given the expected elimination of certain ocean fisheries. Commission staff apparently consider themselves to be more knowledgeable of reasonable improvements in marine survival than the resource trustees that have been directly involved in the development of the model and in monitoring population trends.

DOI-100

The Commission staff seem preoccupied with evaluating the agencies' Atlantic salmon restoration program rather than the applicant's proposed project. The central issue which permeates the entire staff analysis is whether a self-sustaining, fully-restored (to 8,000-11,000 adults) run of Atlantic salmon can occur under any of the alternatives under consideration. Based on its review of input parameters and assumptions, staff concluded (contrary to FWS and other resource trustees) that the attainment of such a goal is unlikely under all alternatives, including Alternative 5 (Veazie removal).

Having dismissed the restoration of a naturally-reproducing and self-sustaining run of salmon as a viable option, staff then focused exclusively on restoration goals and the most expeditious measures to attain such. This led staff to conclude that the mitigation measures proposed by BHE (Alternative 2) and supplemented with staff recommendations (Alternative 3)(i.e., stocking of smolts, 50:50 trap and truck operation, fishway improvements, etc.) are the best means to restore and continue managing Atlantic salmon in the Penobscot River.

Commission staff recognized that Alternative 5 provides the greatest potential for natural restoration, but when economics were factored in, that alternative was dismissed. The entire analysis is founded on the output from the ASAL model using parameter values which remain controversial, are not agreed to by any of the resources agencies, and which are not specific to the Penobscot River.

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DOI-99 Since the DEIS was issued, we have received more current data on marine survival rates that showed they have doubled from the lowest value recorded. While still very low, this increase illustrates the uncertainty associated with predictions of future survival rates. Based on comments submitted by Dr. Rago as attachment of NMFS DEIS comments, we conclude that significant increases in marine survival may occur in the future.

DOI-100 We have clarified the FEIS text to more clearly explain the logical sequence of our analyses. We agree that the ASAL model parameters are controversial, but we note that the FWS and ASAL Working Group modeling employed upstream passage efficiency values and marine survival values not specific to the Penobscot River.

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DOI-101 For these reasons, the Department requests that these staff modeling efforts be stricken from the record completely, and not used in any way in formulating any decisions regarding selection of alternatives. Furthermore, the Department requests that Commission staff complete an entirely new analysis of project impacts on the salmon restoration program in proper consultation with FWS and the other salmon resource agencies either using ASAL or not.

4.3.3 Analysis of Alternatives

DOI-102 **4.3.3.1 Alternative 1: No-action.** As discussed above, the DEIS evaluation of future conditions for anadromous fish under the No-action Alternative concludes that existing agency restoration plans for Atlantic salmon, American shad and alewife are unlikely to succeed (i.e., attain desired population targets). Support for this conclusion lies in purported higher than expected mortality rates in rivers and the ocean and because of the passive nature of current management efforts (particularly for shad and alewife). Great emphasis is given to this finding, particularly in light of the fact that the No-action Alternative is being used as the baseline against which all other alternatives are evaluated.

DOI-103 Undue emphasis has been placed on the numerical targets contained in agency management plans. Moreover, it is unreasonable to expect agency management objectives (e.g., numbers of fish, or locations where runs are to be restored) to remain static. Fisheries management is a dynamic process, responding to changing conditions and opportunities. For example, the ASRSC is currently revising its Strategic Plan for the State of Maine, which is the source of the numerical targets cited in the DEIS. As stated above (major issues - 1.3.2), the FWS has recently signed a cooperative agreement with the MDIF&W, MDMR and the PIN to develop an active shad management program for the Penobscot. The DEIS assumes that there would never be any active shad management on the river, and dismissed impacts to this species as a serious issue.

DOI-104 That the Commission staff found the agency expectations for anadromous fish to be unrealistically high constitutes recognition by the Commission of the magnitude of cumulative impacts attributable to existing hydropower development in the Penobscot drainage. Following the staff's reasoning leads to the inevitable, and indisputable conclusion that there is already too much hydropower development on the Penobscot River. Competing beneficial public uses of the waterway (i.e., anadromous fish restoration) will be denied, unless deliberate measures are used to reduce the number of hydroelectric projects in the river.

DOI-105 At considerable length, staff again attempts to explain why the FWS goals of restoration can not be met -- based on the use of ASAL model parameters, and in particular, marine survival estimates. (See pages 4-23 - 4-33). The logic of using an increased marine survival rate based on reduced ocean mortality (attributable to the "buy out" of Newfoundland and Faroe Island fishermen) seems reasonable and reflects sound modeling practices whereby adjustments are made to selected parameters which will likely change in the future. It seems completely unreasonable to utilize a constant marine survival rate (based on 1987-92 data), as

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DOI-101 Your comments on our ASAL modeling are not substantiated by any new data or information. Dr. Rago, the co-author of the ASAL model, confirms there were no technical errors in our application of the model (with the exception that the average marine survival rate for the period 1982 to 1987 should have been 0.79% rather than 0.76%; see our response NMFS-4). On this basis, we conclude our model results are technically accurate and provide a reasonable basis for comparing alternatives.

DOI-102 No response required.

DOI-103 Variability in a dynamic Atlantic salmon population is recognized in the ASAL model which is a Monte Carlo simulation model predicting probabilistic outcomes. We have presented the median values as the most likely expected values for each scenario considered. However, we have modified text in section 4 and 5 of the FEIS to emphasize the uncertainty associated with all model outcomes. Regarding the objectives of fishery management plans, we must rely on existing plan goals and objectives in our evaluation, since we have no basis for projecting changes in those plans.

Regarding the American shad Cooperative Agreement to which you refer, please see our response NMFS-31.

DOI-104 Opinion noted.

DOI-105 Cont'd

was done by the BHE and staff to make future predictions, when it is known such rates will change. It should be noted that the model does not have any specific water quality components which could include mortality equations related to dioxin, heavy metals, water temperature, and DO. The model also does not have a flow/hydrological component which would allow the adjustment of survivals (downstream/upstream mortality) based on flow conditions in the Penobscot River. The modeling that was completed relied on constant dam-specific mortality rates presented in Table D-7 (p. D-17) as determined by the FWS.

DOI-106

This raises further questions regarding the application of the ASAL model as a tool for comparing alternatives relative to Atlantic salmon restoration. The ASAL model, like other anadromous salmonid population models, predicts the number of returning adults via tracking mortality/survival through the entire life cycle of the fish. A schematic of the model presented in Appendix E illustrates this - the model is tracking hatchery production (egg-fry survival), wild/natural production, survival from fry to parr to smolts (hatchery and wild), ocean mortality (hatchery and wild), spawning mortality, post-spawning mortality (kelts), and other sources of mortality operating on the population (dam mortality - smolts and adults; natural mortality; hatchery mortality; sport fish harvest). Each of these parameters has a value which must be input into the model; Table E-1 (p. E-10) contains a list of input parameters used by Staff in the ASAL modeling.

Many of these input parameters have been estimated from existing data while others were derived through a consensus, "roundtable" discussion of experts. Thus, the actual values used can always be debated as to whether they represent the "most accurate" value for that parameter. Such is the case for the marine survival estimate, which staff have unfortunately elected to question as being overly optimistic. When adjusted using a much lower value, the ASAL model output suggests that the restoration goal of 8-11,000 adult fish would not be reached under a No-action Alternative. This opens the door to further comparisons of alternatives that demonstrate that attainment can be reached and maintained only with continued human intervention, i.e., stocking of fry and smolts. This is not shared by the Department, the PIN and other State and Federal agencies.

It should be noted that changing other model input parameters can likely have dramatic results on the numbers of adult fish predicted. Thus, increases in egg and fry survival rates (wild fish), realized through gravel restoration efforts, could substantially reduce both the time required to achieve restoration and the overall run size. Likewise, curtailment or reduction in sport fishery mortality rates (e.g., through a moratorium on fishing) would likely result in predictions that exceed restoration goals.

DOI-107

The point is that the ASAL model parameters can be "tweaked" in many different ways (e.g., sensitivity analysis) which result in many different predictions, none of which are necessarily right or wrong. As discussed above, in the Department's view, staff have acted irresponsibly in their use of the ASAL model and have exclusively relied on the model output for comparing alternatives relative to Atlantic salmon restoration. For these reasons, the Department's previous request concerning ASAL modeling by staff is reiterated here.

DOI-105 We concur that marine survival rates may change. The most recent data received from ASRSC shows that they have increased by a factor of two over the last two years (see our response NMFS-26). The magnitude and trend in marine survival rates of stocked smolts illustrates the potential for future increased survival. Regarding the inclusion of water quality as a variable in the ASAL model, we have applied the model as it was constructed for use by FWS and all other fisheries agencies. We assume that the absence of water quality parameters in their model construct represents a judgement on their part that, because of the relatively good status of water quality, such parameters do not play a significant role in the fate of Atlantic salmon in the Penobscot River, or are not tractable.

DOI-106 Opinion noted.

DOI-107 We used a rather large array of model parameters in our ASAL modeling (see Appendix E). We concur with your statement that the application of such a variety of parameters "...result(s) in many different predictions, none of which are necessarily right or wrong." We, thus, do not agree with your statement that "...staff have acted irresponsibly...." The ASAL model was the methodology employed by FWS and other agencies to support their arguments that construction of the Basin Mills dam would preclude salmon restoration in the Penobscot. We adopted the same methodology in our evaluations.

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DOI-108

4.3.3.2 Alternative 2: Applicant's Proposal. The DEIS finds that the Basin Mills Project would not appreciably alter American eel stocks in the Penobscot River, although it states that impacts to the species were not specifically assessed in any site-specific studies. The Commission is apprised that following construction of the Lowell Tannery (Pumpkin Hill) Project on the Passadumkeag River (a tributary to the Penobscot), commercial eel catches significantly dropped (in that tributary). This occurred despite the installation of downstream passage facilities (for salmon and alewives) at the project. Given the fact that a much larger percentage of the Penobscot River eel population would pass Basin Mills in their downstream migration than occurs in the Passadumkeag, we do not concur with the staff's conclusion in the DEIS that the eel stocks will be unaffected.

DOI-109

The Commission's evaluation of impacts due to the expansion of the Veazie Project fails to consider the potential for hydraulic turbulence below the new Station C powerhouse. Use of a vertical turbine (instead of the horizontal design proposed for the Basin Mills site) is likely to produce substantial upwelling in the Veazie C tailrace, and could interfere with attraction of fish to the fishway. Hydraulic modeling will need to be conducted to evaluate the severity of upwelling below Veazie.

DOI-110

Similarly, the DEIS does not consider how the angular alignment of the Basin Mills Dam will affect habitat at the upstream end of the spillway. Given the location of the powerhouse on the downstream end of the dam, it is likely that substrates on the other side of the river could be exposed or subject to insufficient flows, except when the spillway gates are being operated or when attraction water is being released from the fishway. As discussed previously, the SDEIS should consider the design alternative of locating the powerhouse on the upstream end of the dam. This should also be further evaluated using a hydraulic model.

DOI-111

The DEIS compares the loss of habitat for anadromous species that would result from the Basin Mills Project with what exists in the entire Penobscot River Basin (e.g., 4 percent loss in juvenile salmon production; 5 percent loss in shad spawning habitat). The staff's finding that attainment of agency numerical restoration goals is probably unrealistic, would lead one to conclude that less of the basin can be restored, due to the cumulative impact of existing hydropower projects. This places a higher premium on the remaining habitat. For example, if it is unlikely that shad will be restored above Milford, the third dam on the river above the estuary, the loss of spawning area at Basin Mills should be compared to what exists now in the lower drainage, not basin-wide. Viewed in this manner, the Basin Mills Project would eliminate close to 100 percent of the potentially available spawning area (considering the heavily impounded conditions between Bangor and Milford), not the five percent reported in the DEIS.

DOI-112

It is unclear whether the Commission staff considered whether reduced spillage over the Milford Dam would result in additional impacts, particularly to riverine habitats in the western half of the river channel. This area is presently characterized by exposed bedrock and boulders, some of which could provide additional habitat for resident and anadromous species if supplied with sufficient flows.

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DOI-108 Our discussion of potential impact to American eel has been revised to incorporate information in a number of data sources identified by PIN and other respondents.

DOI-109 We note in Appendix F that salmon upstream passage efficiencies of 98 to 100% have been documented at facilities with vertical turbines (e.g., West Enfield; Shepard and Hall, 1991). You have identified no studies or data to substantiate your contention that upwelling might affect upstream passage efficiency. Thus, we do not concur that hydraulic modeling is necessary to address this issue.

DOI-110 See response DOI-31, above.

DOI-111 Our assessment accounts for the accessibility of all existing shad habitat in the Penobscot River as has been delineated by the state of Maine. Maine's Division of Marine Resources has not distinguished any portion of that habitat as being any more critical than any other portion, and we adopt that view in our analyses.

DOI-112 We have revised our discussion to address this issue.

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DOI-113

The underpinning context in which the assessment of impacts regarding all of the alternatives on American shad is made relates to MDMR's passive restoration program. It is asserted that with the passive program, there is little chance for attaining restoration goals, and that the BHE proposal affords a "significant enhancement of the existing passive restoration program and would provide the opportunity for growth of the Penobscot River American shad stock." (p. 4-45). The Department suggests that the passive restoration program presently ongoing for American shad will become a more active program since the formal agreement that has been signed between the FWS, PIN, MDMR, and MDIF&W specifies that a plan for active restoration will be developed. Thus, it is inappropriate to compare alternatives which are presently operating under this passive restoration program with alternatives 2-3 which provide a more active approach. The impact assessment should be based on impacts to existing and potential habitat quantity and quality, not on management actions that may facilitate restoration. The same general comment applies to the discussions on alewife restoration.

DOI-114

On page 4-51, conclusions are made that Basin Mills would be beneficial for certain resident fishes, including smallmouth bass, pickerel, and white perch. However, no mention is made of potential impacts associated with expanding the range of habitats for these species relative to their potential for increased predation on salmon smolts, parr, and fry. The whole issue of predation impacts has been ignored in the DEIS, and yet may constitute one of the major biological concerns relative to construction of the Basin Mills Project and the relicensing of the other projects. Predation is one of the major causes of smolt mortality at Columbia River Dams and is a function of the types of habitats those dams create that are conducive to coolwater fish (e.g., walleye). Predation issues must be addressed further in the SDEIS, including an assessment of measures that could be used to control or regulate predation.

DOI-115

4.3.3.2 Alternative 3: Applicant's Proposal with Staff's Modifications. The Department concurs with several of the Commission's modifications of the applicant's proposal. This includes elimination of a pump at the Veazie Project as a means of transporting fish from the existing fishway to the new passage facility at the proposed Station C powerhouse. As stated in previous correspondence on this project, the pump would lead to delays and/or losses of upstream migrating anadromous fish. The Department also supports the staff recommendation for fishways at the Orono and Stillwater Projects. (See detailed Prescription for Fishways in Enclosure B).

DOI-116

In this section the Commission states that it may restrict the "recreational fishery harvest as a potential mitigation measure." The Department is of the view that this measure exceeds the authority of the Commission under the FPA as it constitutes management of of fish and wildlife and their use, a responsibility best left to appropriate State and Federal resource agencies.

Similarly, it is unlikely that the Commission could impose fish stocking and trap-and-truck handling procedures, unless such measures were fully consistent with and required by the

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DOI-113 The Cooperative Agreement between FWS, PIN, and the State of Maine to which you refer establishes that the signatories agree to coordinate their programs and activities for the benefit of the Penobscot River shad stock. This agreement presents intentions of the parties to develop a plan of action. In our recommended Alternative 4, we are recommending that BHE provide capability to trap shad at the new fish lift at Veazie and truck those fish to any location in the river to provide guaranteed support to shad restoration efforts not available by any other means, if the agencies choose to utilize this capability. We are also recommending construction of upstream and downstream passage facilities at all developments addressed in the FEIS which would substantially enhance potential passage for American shad relative to potential passage under existing conditions.

DOI-114 We have revised and expanded our discussion of predation impacts using new data and information identified by PIN. These data suggest that smallmouth bass are not significant smolt predators, but that pickerel are. We have revised the FEIS text to indicate that increases in pickerel abundance due to construction of the Basin Mills impoundment could result in increased smolt predation.

DOI-115 No response required.

DOI-116 In the text we suggest only that BHE consult with the appropriate fisheries management agencies concerning prohibition of fish harvest. Regarding trap and truck and stocking, we will recommend that BHE be required to provide to the appropriate state and federal fisheries agencies the resources necessary to implement these mitigation measures.

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DOI-116 Cont'd

fish and wildlife agency with relevant authority. As is clear from the consultation record on this project, the fishery agencies in Maine oppose the management proposals offered by the applicant, and proposed by the Commission staff under Alternative 3. In addition, the only sources of hatchery salmon that meet State stocking policy (which is based on international guidelines) are the two Federal hatcheries in Maine. Neither facility could provide fish for mitigation purposes. The DEIS fails to consider these and other impediments to the proposed mitigation. In Enclosure B, the Department is prescribing pursuant to Section 18 of the FPA that fish passage shall not be permanently accomplished via trap-and-truck.

DOI-117

Given the real difficulty in carrying out mitigation measures proposed by the applicant and the Commission in the DEIS, the only realistic outcome resulting from the construction of the Basin Mills Dam would be to significantly decrease any meaningful chance for restoration of anadromous fish stocks. Without appropriate <u>in-kind</u> compensation for impacts, as discussed below, the impacts of the new dam would go virtually unmitigated, further adding to the imbalance of hydropower development in the basin.

DOI-118

As discussed in the DEIS, the removal of dams in the Penobscot River Basin was evaluated as mitigation for the new Basin Mills Dam. Although the Department agrees with the concept of dam removal as mitigation for unavoidable adverse impacts associated with construction and operation of the new dam, it is dismayed by the approach taken that resulted in dismissal of numerous dams from consideration based on their perceived economic values. It is especially problematic that the calculation of a fair market value that uses original construction costs (some of the dams are over 150 years old), and an assessed tax value and power benefits that are based on an assumption that the projects at, or approaching the end of their current license term (e.g., Veazie, Great Works or Howland) would receive new 30- to 50-year licenses. At a minimum, the market value should have been calculated for scenarios in which the projects are, or are not relicensed, and the amortized values should be used. Also, current information should have been used for Great Works indicating that the dam soon must be entirely rebuilt by the Licensee if it is to continue to function safely.

The conclusion reached in the DEIS is that "removal of some dams to mitigate for the impacts of Basin Mills could be accomplished without creating a negative net worth for the project." This type of analysis is backwards. The Commission should determine what is an appropriate level of mitigation, and if that level is not economically feasible, then neither is the project. Instead, the Commission dismisses uneconomic mitigation measures for the sole reason that they are uneconomical.

The DEIS fails to consider <u>combinations</u> of dams that could be removed to offset losses to anadromous fish restoration, resulting from existing developments and the new Basin Mills Dam. Such combinations include Great Works and Howland, and Milford and Howland, removal scenarios that would achieve reduced cumulative impact <u>and</u> compensation for lost habitat.

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DOI-116 Cont'd

The agencies must decide whether they wish to utilize the resources to be made available. We indicate in the text that BHE has included in their project costs funding for construction of hatchery capacity, should there be no capacity available elsewhere. We also note that you have withdrawn your prescription prohibiting trap-and-truck.

DOI-117

We selected the fisheries enhancement and mitigation measures incorporated into Alternatives 3 and 4 based on two objectives: to provide for fisheries enhancement relative to current conditions for existing developments (Veazie, Orono, Stillwater, and Milford-Alternatives 3 and 4); and to completely compensate for any new unavoidable fisheries impacts attributable to the proposed new development (Basin Mills-Alternative 3). Upstream and downstream passage efficiencies and survival of migrating anadromous fish at all existing developments would be substantially improved as a result of fish passage construction and improvements at the four existing developments addressed in this EIS (see discussions of upstream and downstream passage in Appendix F of the FEIS). For the new Basin Mills development, fish passage facilities stipulated in DOI and NMFS Section 18 prescriptions and in the Maine Water Quality Certificate represent state-of-the art passage intended to achieve highest passage efficiencies possible. Mitigation measures required for the Basin Mills project (partial trap-and-truck and fry stocking) are intended to compensate only for the passage and habitat loss effects on fish stocks that remain and are, thus, unavoidable. See DOI-118. Under our preferred Alternative 4, we recommend that BHE provide trap-and-truck capability that could be used by the agencies, if they choose to do so, to further stock restoration efforts.

DOI-118

We have revised the presentation of our dam removal analysis in Appendix D to clarify our discussions of some of the issues you raise. Since we are now recommending Alternative 4 as our preferred alternative, these issues are moot.

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DOI-119

4.3.3.4 Alternative 4: Relicense Veazie, Decommission Orono, no Basin Mills. Although alternatives involving just Veazie and Orono would be less destructive than the proposed scenario involving a new Basin Mills Dam, further reductions in impacts may be possible by modifying the plan for Veazie. As discussed above, replacement of existing Stations A and B with a new Station C would retain or slightly improve energy capacity, and would lower impacts to downstream migrating fish, and would simplify upstream passage considerations. The present fishery on the east (Eddington) shoreline would also be protected if Station C were built as a replacement for the existing powerhouses on the opposite side of the river.

DOI-120

4.3.3.5 Alternative 5: No Basin Mills, Decommission/Remove Veazie, Relicense of Orono. The Department concurs with the assessment that this alternative would result in the greatest benefit to anadromous fish in the Penobscot River. However, as stated previously, this alternative should have been evaluated in conjunction with the new Basin Mills Dam. The combined action would result in significant energy benefits (net increase of roughly 30 MW), reduced fish passage costs ($766,000 for dam removal is far lower than what it will ultimately cost for fishways at Veazie), a slight increase in overall fish passage efficiency, and reduced cumulative impacts in the lower Penobscot River.

DOI-121

The conclusions drawn throughout section 4 are entirely slanted toward favoring the applicant's proposal and show a disregard of the State and Federal agencies' and PIN recommendations and concerns relative to fishery resources. The section has been clearly developed ex-post-facto to selection of Alternatives 2-3, with most sections written with a bent on justifying why the alternatives would have no or limited impact on the resources.

These conclusions are directed toward supporting and promoting a "with project" decision, rather than a rigorous NEPA evaluation of the project. They run directly counter to Federal and State resource agency conclusions: Construction of the Basin Mills dam will result in serious harm to Atlantic salmon, shad, and alewife restoration efforts; will effectively abrogate management directives focused on restoration of naturally reproducing/self-sustaining salmon populations; and will nullify Penobscot River restoration goals, i.e., that preservation of remaining free-flowing segments of river and the creation of additional free-flowing segments with productive habitat is critical to maintaining and promoting improvement of the waterway and the overall ecosystem.

DOI-122

This section and its related appendix (Appendix F) need to be completely rewritten following a more detailed analysis of impacts and with a greater emphasis on addressing and evaluating the concerns of the resource trustees in whose care rests the continued welfare of the Penobscot River.

DOI-123

Moreover, in the DEIS the Commission does not consider the values held by some members of the public, e.g., PIN, for preserving the Atlantic salmon in the most natural state possible. Instead, the DEIS, on pages 4-76 and 4-77, states that the assessment of existence values is extremely difficult and beyond the scope of the study. However, since the values of the

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DOI-119	See response DOI-30, above.
DOI-120	See response DOI-30, above.
DOI-121	Opinion noted.
DOI-122	See response DOI-10, above.
DOI-123	See response DOI-40, above.

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DOI-123 Cont'd

public are directly impacted by the project, these values should be estimated and weighed against the benefits projected in the DEIS. Furthermore, estimations of existence values are entirely possible.

4.4 TERRESTRIAL RESOURCES

DOI-124

As discussed in this section, impacts to wildlife resources were assessed by the applicant using HEP. However, the HEP application for the Basin Mills Project was not typical in many respects. During early stages of consultation, the applicant resisted any use of HEP, preferring instead to use qualitative survey data (presence/absence) to describe use of the area by wildlife populations. The applicant used these data in the HEP analysis, even though the standard procedure involves field work by an interdisciplinary team.

The selection of species used in the HEP analysis was based largely on availability of published habitat-preference models. There was no effort to create models for species more likely to be found in the project area, as has been done in other more recent licensing proceedings in Maine. (See for example, wildlife studies that were done at the Aroostook River Project, FERC No. 2367.) The gilding process described in the DEIS, normally used during the initial stages of a HEP study to select representative evaluation species, was not followed in this case until long after the analysis was done. The resource agencies never commented on the applicant's gilding results. According to the DEIS, the selected species are the best ecological representatives in the study area. The Department finds this surprising in light of the fact that one of the evaluation species, eastern meadowlark, is rare in Maine, and would not be expected to occur in the largely forested project area.

It is true that the resource agencies called for the HEP application at the Basin Mills Project and do not dispute the results, i.e., the quantification of suitability indexes and habitat units for selected evaluation species. However, the conclusion based on the HEP must not be interpreted as definitive for the wildlife community in the project area, or taken to be a complete evaluation of impacts. As discussed below, the outcome of the HEP purports that substantial benefits will accrue to wildlife if the project is built. According to the HEP, this would result primarily from increased water levels in an existing beaver-inhabited wetland. The HEP did not include any evaluation species that presently use that wetland, or any evaluation species that would not find favorable habitat conditions under a higher water level regime.

The Department also finds it surprising that the Commission accepted the results of the HEP analysis without question, while carefully scrutinizing (<u>and modifying</u>) the ASAL modeling that was done for Atlantic salmon. As discussed above, the Basin Mills HEP study was not conventional. This is documented by the early consultation record involving the applicant and resource agencies. An independent application of HEP by the Commission staff, assisted by resource agency biologists, would result in a vastly improved analysis of baseline and future conditions for terrestrial wildlife resources.

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DOI-124 The FEIS text that discusses the HEP analyses has been modified; however it should be noted that the DEIS did <u>not</u> state that "selected species are the best ecological representatives in the study area." The DEIS stated they were adequate. In addition, the Interior's comment that the "HEP did not include any evaluation species that presently use the existing beaver-inhabited wetland" is incorrect. Four of the six evaluation species (beaver, muskrat, mink, and wood duck) probably use this wetland area. The statement that "the Commission accepted the results of the HEP analysis without question" is also incorrect. Staff reviewed two years (1988-89) of meeting reports and letters among the HEP team members (BHE, FWS, DIFW). Based on these documents, at no time did FWS question the use of meadow lark as an evaluation species. During this time period FWS requested that BHE use guilding to demonstrate that selected evaluation species were ecologically representative. BHE developed a guilding matrix and based on these results, substituted gray squirrel for verio. FWS initially questioned this substitution, but based on a subsequent meeting report, did not maintain its objections.

DOI-125 The SDEIS must clarify use of the term "bottomland forest" throughout the document. This term is traditionally used to refer to forested wetlands. On p. 3-43, it states that large portions of the bottomland forest in the Milford and Orono study areas are probably forested wetland. In Table 4-8, however, bottomland forest appears to refer to upland forested habitat since Table 4-9 states that only 12.74 acres of forested wetlands would be impacted by Basin Mills in contrast to the 55 acres of impact to bottomland forest shown in Table 4-8.

DOI-126 On page 4-80, the DEIS states that "[t]he No-action Alternative would not affect terrestrial resources." This conclusion appears unwarranted in light of the shoreline stability issues documented in the Milford Project area. Many questions remain in reference to all three projects as to the rate of erosion, its effects on specific wetland, plant and wildlife resources, and on potential rare species habitat.

In discussing site-specific impacts for the Stillwater and Milford Projects on page 4-83, the DEIS states:

> "Continued operation of the Stillwater and Milford hydroelectric facilities is not expected to have any appreciable impact on botanical or wildlife resources within the project area. The flora and fauna community has adapted to the existing environment. There would be no effects on terrestrial resources from constructing and operating the fifth turbine at the Milford development because the new turbine would be located within the existing powerhouse."

This conclusion is based upon a comparison of proposed conditions with existing conditions, and not with or without dam conditions. Hence, it is a piece meal evaluation that does not identify all of the impacts. Based on the approach taken in the DEIS, a formulation of cumulative impacts is not possible. However, even with this approach, the conclusion is incorrect. Since a significant bank stability problem exists over extensive shoreline, the continued erosion of the bank will undoubtedly have a continuing impact on wetlands and terrestrial resources. One may argue that undercut banks and falling trees represent a normal circumstance of nature, however, the elevations at which banks are being undercut are in direct response to the Milford and Gilman Falls Dams. In addition, not all banks fall into the unstable category. The DEIS fails to identify conditions which may lead to stable banks in one location and unstable banks in another. Unstable banks provide certain benefits to fish and wildlife. The SDEIS should indicate the proportion of the shoreline which should be stabilized and what proportion should be left unstable to promote habitat diversity.

DOI-127 The analysis of regional impacts (Section 4.4.2.2., p. 4-84) does not evaluate cumulative impacts based upon no-dam conditions. For example, the loss of terrestrial habitat in the Milford Project area is listed as 1.4 acres, although the entire impoundment area was identified as 235 acres. Obviously, the cumulative impact in the Milford Project area must be much larger than 1.4 acres.

4.5 WETLANDS

DOI-125 The text has been modified to further clarify this topic; however, Interior should note that Section 3.5.2 (terrestrial) of the DEIS defined bottomland forest as typically occurring in a narrow band along the river bank and comprising mostly tree species adapted to seasonal flooding. We specifically stated in Sections 3.5.2 and 4.4.2 that BHE identified vegetation cover types discussed in this section by reviewing aerial photographs and ground-truthing and that wetland cover types do not constitute jurisdictional wetlands. Jurisdictional wetlands are discussed in Sections 3.6 and 4.5 - Wetlands. In reviewing the terrestrial vegetation cover types with wetlands delineations, we noted that the general distribution of the bottomland forest in the project area complemented that for forested wetlands (we have included these maps in the FEIS to aid understanding); however it was also obvious that the area of what is being labeled "bottomland forested" included both forested wetlands and forested uplands. Because BHE's application did not contain information on the quantity of forested wetlands in the Orono and Milford project areas, our intent was to convey the likelihood that forested wetlands occur in these areas by comparing the distribution of bottomland forest to that of forested wetlands that we had observed in the information provided for Basin Mills project area, nothing more.

DOI-126 See our response at DOI-81.

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DOI-127 Cont'd For the reasons discussed below, the Department cannot agree with the conclusion that the proposed wetland compensation plan would adequately mitigate for project impacts to wetland functions and values. Additional information is necessary to sufficiently evaluate the values of existing wetlands, the scope of impacts to these wetlands, and the adequacy of the proposed compensation plan.

DOI-128 The term "hydroperiod" is misused. Hydroperiod refers to the seasonal pattern of the water level of a wetland, not to the duration of soil saturation or inundation as indicated in the DEIS. Reference to a "permanent hydroperiod" should be changed to "permanent soil saturation or inundation."

DOI-129 The Department also disagrees with the inference in Section 4.5.1, and elsewhere, that increasing the duration of soil saturation or inundation in some wetlands, as a result of building Basin Mills, would result in an improvement in wetland functions and values. No scientific evidence has been provided to support this. An obvious illustration of this point comes from the evaluation of wildlife habitat functions. Some species require or prefer permanently flooded wetlands (e.g., muskrat) while other species prefer or require only seasonally-flooded or seasonally-saturated wetlands (e.g., spotted salamander, veery).

DOI-130 The DEIS states that the applicant used a WET analysis to conclude that the enhanced and restored wetlands will exhibit the same or higher degree of function and value as compared to the existing wetlands. As part of the Section 404 permit process, the applicant will need to provide an assessment of wetland functions and values that incorporates a "best professional judgment" approach rather than relying solely on the WET assessment. Because of many inherent problems with the use of WET (including its focus on functions and values related to waterbirds), it has been our experience that the Corps generally does not accept this assessment methodology, unless it is accompanied by a narrative section that interprets the results from a broader ecological perspective.

DOI-131 During the review of the Section 404 permit application, it will be necessary to clarify whether the amount of existing wetlands in the beaver flowage that would be inundated by the new Basin Mills impoundment has been counted as an impact. It is unclear whether the applicant did this in the wetland impact study, or if these consequences have been identified in the DEIS. The fate of the existing wetlands located in this area, which are periodically used by beaver, will have to be more thoroughly analyzed.

DOI-132 This analysis will need to be done for both the with- and without-project alternatives to more precisely determine what, if any, mitigation credit should be assigned to the work proposed by the applicant. It is not entirely clear whether the beaver maintained wetlands would necessarily become upland, or whether they might succeed to a drier scrub-shrub or forested wetland without the proposed dam (or without beaver), or how long that process might take. For purposes of calculating Habitat Units in the HEP, it was assumed that successional changes would occur in a 10-year timeframe. This must be viewed as simply an estimate, as no hard data were used to support this projection. Given that the HEP was done almost 10

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DOI-127 The issue of existing conditions representing our No-action Alternative will be addressed in the orders to be issued for these projects.

DOI-128 We have revised the text of the FEIS in Section 4.5 as you suggested and the word "hydroperiod" is no longer used.

DOI-129 We agree that using 10 years for the beaver flowage area to succeed to uplands is an overestimate. Section 4.4 of the FEIS has been modified.

DOI-130 Opinion noted. This EIS does not address the Section 404 permitting issues.

DOI-131 As is stated in section 4.5.2.1 of the FEIS, all impacts, including inundation of the beaver flowage are included in staff's estimate presented as Table 4-10.

DOI-132 We have modified the FEIS text in Sections 4.4 and 4.5 to clarify possible impacts to wetlands in the beaver flowage area with and without the Basin Mills development. However, this EIS does not address issues specific to be Section 404 permitting process and what might be required as part of that process.

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DOI-132 Cont'd years ago, and the so-called beaver area is still wet.[4] the estimates for successional changes should be revised. Wetland conversion projects (e.g., changing a forested wetland to an emergent marsh) generally are not looked upon favorably by the Corps and resource agencies as mitigation for destroying another functioning wetland.

DOI-133 It is not clear from the DEIS whether the inundation of the beaver flowage wetland and its subsequent conversion to a deep, open water habitat has been considered as a wetland impact in calculating affected wetland acreage. For Section 404 purposes, any wetland that is inundated by the impoundment will need to be considered as an impacted area, and any losses of wetland functions and values will need to be considered in mitigation planning. On p. 4-102, the DEIS refers to 40.6 acres of wetland being lost or disturbed by the Basin Mills Project, as opposed to the 16.7-acre impact figure stated on p. 4-87. It appears that the larger acreage figure, which accounts for inundation of the beaver flowage and borrow pit wetlands, may be the appropriate wetland impact acreage to use for Section 404 purposes.

DOI-134 The discussion in the DEIS regarding use of the borrow pit wetlands is also inadequate to evaluate the merits of this effort as a mitigation project. As with the applicant's proposed beaver flowage project, the FWS and other resource agencies will need to review plans of the area, showing existing conditions, and what will occur with the new dam, both with and without the proposed mitigation measures. The FWS will also need to review a functional assessment of the existing wetlands, so that they can thoroughly assess the trade-off in functions by converting forested and scrub-shrub wetlands to emergent and scrub-shrub wetlands.

DOI-135 For Section 404 purposes, it will also need to be clear that the wetlands in the borrow pit that would be inundated by the proposed dam have been included in the calculation of affected wetland acreage. It appears that the impoundment would increase the water level of the existing forested and scrub-shrub wetlands, but would not necessarily convert the area to deepwater habitat. This issue, however, needs to be clarified in the SDEIS.

DOI-136 The proposed creation of 3.4 acres of emergent and scrub-shrub wetland from scrub and forested upland within the borrow pit complex also needs considerably more detail. First, the wildlife habitat functions of the existing upland habitat need to be evaluated. If these areas are providing valuable upland wildlife habitat, then they should not be converted into wetlands. The FWS and other resource agencies generally recommend using disturbed upland areas (e.g., gravel pits which have not revegetated) for wetland creation.

DOI-137 The plans for land preservation that are mentioned in the DEIS will also need to be evaluated after the more detailed information on project impacts and mitigation, as discussed above, has been made available. For Section 404 purposes, preservation of wetlands is considered the lowest priority, after all practicable options for wetland restoration and creation have

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[4] Commission staff witnessed this during their August 1993 DEIS scoping trip.

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DOI-133 See response DOI-131, above.

DOI-134 As the DEIS states, BHE proposes to develop detailed mitigation plans in consultation with FWS and the Corps that will satisfy all state and federal permitting and licensing requirements.

DOI-135 As stated above, all inundation impacts have been identified by staff and reported in Table 4-10, including those wetlands associated with the borrow pits that would be inundated by the new Basin Mills impoundment. As the FEIS states, existing forested and scrub/shrub wetlands in the borrow pits would be converted to scrub/shrub and emergent wetlands and open water.

DOI-136 At this time, no information is available about the quality of the upland habitat that would be inundated and that BHE proposes for wetlands creation. Based on the nature of your comment, however, the FEIS has been modified to clarify apparently confusing text. This upland area would be lost due to inundation by the impoundment; this is an unavoidable loss. Regardless of the value of this upland, it would cease to exist once it is flooded, not because BHE chose it for wetlands mitigation. BHE proposes to ensure that functionally valuable emergent and scrub/shrub wetlands are created by filling, grading, and planting the flooded area. This creation would help to compensate for the effects on wetlands elsewhere in the project area. In this case, agencies' recommendations to use disturbed upland areas for wetlands creation is a moot point.

DOI-137 Opinion noted.

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DOI-137 Cont'd been exhausted. It is highly possible that the applicant would have to look for additional wetland restoration or creation projects to adequately compensate for wetland impacts.

DOI-138 The DEIS states that roughly 16 acres of wetlands might be adversely affected under Alternative 5 (removal of Veazie Dam). The Commission's comments that this may be an overestimate of impacts, given that the location and quantity of impacts was produced using only FWS National Wetland Inventory (NWI) maps and not as a result of more intensive surveys and analysis (e.g., on-site delineation). While it is appropriate to use NWI maps in the absence of more detailed information, caution should be exercised in comparing wetland impacts likely to occur with the removal of Veazie Dam with what would take place under the other alternatives. (See, for example, Sec. 5.2 in the DEIS.) A fair comparison would require using the same wetlands assessment methodology for all alternatives. Evaluation of the removal of Veazie (or any other dam) should also consider whether new wetlands would likely develop in the river channel or floodplain as a result of the modified water level.

DOI-139 In the SDEIS, care should be taken to avoid using the total amount of wetlands in Maine in determining the relative magnitude of impacts under the various alternatives. Consistent with the comprehensive planning mandate in Section 10(a) of the FPA, any reference to "regional impacts" should be confined to the Penobscot River Basin.

DOI-140 On page 4-86, the DEIS states that "[t]he No-action Alternative would have no adverse impacts on wetlands." This conclusion is unwarranted. Bank instability problems are currently affecting wetland conditions within the Milford Project area. An estimated 79 percent (23 kilometers) of island shoreline in the Penobscot Indian Reservation above Milford and Gilman Falls Dams is eroding. A significant portion of the shoreline occurs along wetlands.

In discussing site-specific impacts associated with Alternative 2 (p. 4-86), and, its staff findings (p. 4-94), the DEIS fails to identify the on-going bank stability problems and effects on wetland resources within the Milford Project area. It also fails to recognize the extent of cumulative impacts on wetland resources.

4.6 THREATENED AND ENDANGERED SPECIES

Bald eagle.

DOI-141 The FWS has reviewed the Commission's Biological Assessment (BA), prepared pursuant to Section 7 of the ESA, and incorporated into the DEIS, and does not concur that the proposed projects are "not likely to adversely affect" the endangered bald eagle. (See letter, dated December 15, 1994 to John Clements, Commission staff). Some of the shortcomings in the BA that were identified by the FWS include:

1. reliance upon extremely dated, bald eagle winter survey data;

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DOI-138 The DEIS did not state that the estimate of 16 acres of wetlands potentially affected by removing Veazie dam is an overestimate because NWI maps were used. In fact we stated "although the NWI maps probably underestimate the quantity of wetlands in the area, the assumption that all wetlands within the 50 foot contour would be affected may overestimate effects because most wetlands depicted on the NWI maps are in the upstream portion of the impoundment. Water level in this part of the impoundment is likely to drop only a few feet and consequently would not affect all wetlands with the 50 foot contour." As we stated, more rigorous information is not available. In addition, we have prefaced all uses of this 16-acre estimate with the words "may" or "might." We believe this is sufficient to convey reservations on this estimate. Although we have statements in Sections 4.4.5 and 5.2.1.1 that removing Veazie may allow riparian vegetation to colonize the previously submerged shoreline, we have added similar text to Section 4.5.5.

DOI-139 We agree with this comment and we contacted both the Corps and Maine Department of Inland Fisheries and Wildlife in 1993 requesting information on the quantity of wetlands in the Penobscot River watershed. We were told that the information does not exist. Without knowing the quantity of wetlands in the Penobscot River watershed, we are forced to use information that has been quantified -- the amount of wetlands in the state. However, we have expanded the text to indicate the limitations of placing the impacts in a statewide context.

DOI-140 See responses DOI-65 and 81, above.

DOI-141 Commission staff consulted with FWS and DIFW in December 1994 and February 1995 and requested that BHE conduct winter surveys of bald eagle distributions along the Penobscot River and a nesting survey of the Basin Mills project area.

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DOI-141 Cont'd

2. lack of discussion on the potential effect throughout the construction of Plant C (Veazie Project) on foraging behavior and activity patterns of a pair of bald eagles nesting one mile south of the dam (this issue would also apply to the Basin Mills site, should the territorial pair that is present there establish a nest);

3. lack of discussion on the cumulative effects of these projects on the quality and quantity (i.e., availability of ice-free water) of bald eagle foraging habitat; and

4. insufficient discussion of availability and quality of prey items for wintering bald eagles (e.g., benefits to wood duck nesting habitat, and resulting increased population levels, are not applicable to the eagles' winter diet; fish entrainment and mortality are also unlikely during the winter months, due to the absence of migrating anadromous fish).

The FWS has recommended additional Section 7 consultation with the Commission in order to gather further information, and perform needed analyses. The Commission should forego making any conclusions in the SDEIS regarding bald eagles until the requirements of Section 7 have been fully met.

Federal Candidates and State Designated Species.

DOI-142

As discussed above, the DEIS fails to consider a number of species that are candidates for Federal and/or State listing. Although candidate/State designated species are not formally protected under the Federal ESA (Maine has its own endangered species statute), the FWS encourages the Commission to consider them during project planning. Protecting species when they are designated as candidates may reduce the need for formal listing and protection in the future. Given the preference for free-flowing riverine habitats by a number of these species, either on a seasonal or year-round basis, construction of the Basin Mills Dam will likely have adverse impacts on current population levels, further reducing biodiversity in the drainage, and possibly leading to proposals for formal protection under State and/or Federal law.

4.7 BIODIVERSITY

DOI-143

The Department concurs with the Commission's conceptual framework for evaluating impacts to biodiversity as discussed in the DEIS. This involves a conservative approach that includes protecting communities and ecosystems, promoting native species, protecting rare and ecologically important species, as well as unique or sensitive environments, and maintaining the natural processes and structural diversity of ecosystems. However, the conclusions and recommendations are inconsistent with the biodiversity concepts espoused in the DEIS.

The Department concurs with the Commission's conclusion that the lower Penobscot River Basin constitutes a "distinct region" within the entire drainage. The fact that this portion of the river is more heavily developed by successive hydropower developments than elsewhere

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DOI-141 Cont'd The results of these studies are included in the FEIS in Sections 3.7 and 4.6, and in the Bald Eagle BA, attached as Appendix H.

DOI-142 Additional information on federal candidate species, provided by Interior in its comment letter, has been incorporated into the FEIS in Sections 3.7 and 4.6.

DOI-143 We have modified the EIS to address the effect of converting the remaining 12 miles of free-flowing habitat to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical process and structural diversity, but that the regional biodiversity in an existing mosaic of impounded and non-impounded reaches would be substantially unaffected. We have no basis for revising our assessment of the effects on biodiversity resulting from effects on species, communities, and ecosystems. No additional information on the presence of rare species or assemblages has been provided.

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DOI-143 Cont'd

in the main stem is evidence of the relatively higher gradient, implying a somewhat unique physical character. The Maine Rivers Study, cited in the DEIS, did not take the variations in gradient into account in designating specific resource values on the main stem of the Penobscot, nor did it have information on potential use by rare species, as discussed above.

DOI-144

Using the finding that the 12-mile reach between Veazie and Milford Dams (the project area addressed in the DEIS) is a distinct region in the drainage, the loss of an additional 3.5 miles due to the Basin Mills impoundment gives a more appropriate perspective of impacts. Instead of the 4.5 percent loss reported in the DEIS based on the drainage area of the entire basin, the new impoundment would eliminate virtually all of the remaining free-flowing habitat in this "distinct region". (The remaining 8.5 miles in this reach are already impounded). Creating an uninterrupted string of impoundments in this lower stretch of river would be contrary to the basic tenet expressed in the DEIS of maintaining natural processes and structural diversity of ecosystems.

DOI-145

The conclusions on impacts to fish and wildlife resources and recommendations for mitigation and enhancement are also contrary to the espoused principles of promoting or protecting native, rare, or ecologically important species and sensitive environments. For instance, protecting existing greenspace along the proposed Basin Mills impoundment would not compensate for the loss of terrestrial biodiversity from construction of the new dam and impoundment.

DOI-146

The analysis in the DEIS of impacts to native invertebrate species shows that a new Basin Mills impoundment would result in reduced diversity (and possibly density). However, the significance of this finding is dismissed in the DEIS because the population level of smallmouth bass (a non-native species) would not likely change.[5] Permanent stocking of non-native Atlantic salmon, as proposed by the applicant and in the DEIS, would also be contrary to one of the basic precepts on biodiversity identified in the DEIS. Similarly, the loss of invertebrate diversity is dismissed in the DEIS as not being significant. This is based on a statement that the remaining biological community would still be indicative of "good water quality". This variable is unrelated to biodiversity, according to the staff's own conceptual approach.

DOI-147

The Department does not agree with the statement that a discussion on biodiversity should be related to the status of top-predators such as smallmouth bass. Instead emphasis should be given to other members of the aquatic community that are riverine obligates, e.g., those that live in riggles, and those less likely to be found elsewhere in this region of the Penobscot River, e.g., freshwater mussels, dragonfly nymphs, wintering bald eagles and Barrow's Goldeneye, and Atlantic salmon and other anadromous fish species. Greater weight should

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[5] As was found during the HEP analysis on fishery impacts resulting from the new Basin Mills Dam, smallmouth bass are ubiquitous in the main stem of the Penobscot, occurring in equal numbers in impounded and free-flowing river segments.

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DOI-144 The FEIS has been revised to address the effects of converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in an existing mosaic of impounded and non-impounded reaches would not be affected.

DOI-145 The Commission staff has no basis for revising its assessment of the effects on biodiversity resulting from effects on species, communities, and ecosystems. No additional information on the presence of rare species or assemblages has been provided.

DOI-146 See response DOI-144, above. We note that the salmon proposed for stocking would be produced from Penobscot River brood stock and would, thus, be of the same genetic composition as the existing restored stock. Since mainstem salmon were extirpated, truly native mainstem salmon do not exist. However, we have revised our discussion of biodiversity to clarify your point, and we have considered your concerns in changing our recommendation to Alternative 4.

DOI-147 Changes in the physical processes of the local ecosystem are implicit in the discussion of effects from the conversion of 3.6 miles free-flowing river to an impoundment, but to ensure recognition of this point, text has been added to the FEIS.

DOI-147 Cont'd also be given in the analysis of biodiversity to natural riverine processes, including seasonal flooding and saturation of riparian wetlands (including vernal pools), and the aeration and temperature moderation afforded to water as it flows through riffle and pool complexes. These natural processes and structural diversity will be greatly diminished with the relatively uniform, unnatural hydraulic condition that would result from the Basin Mills Dam.

DOI-148 Biodiversity is evaluated in context with existing conditions. Again, a consideration of the cumulative impacts on biodiversity cannot be made without a consideration of the no-dam conditions. Currently the DEIS identifies that 27 percent of the river between Bangor and the confluence of the East and West branches of the Penobscot River is impounded. The development of the Basin Mills Project will increase this to 32 percent. These statistics indicate the magnitude of impacts imposed by dam construction. The total impacts on wetland and terrestrial habitats should be considered in a similar fashion, i.e., with and without the project.

4.8 RECREATION RESOURCES

DOI-149 Alternative 2 (and 3) would have significant adverse impacts on salmon angling opportunities below Veazie, currently one of the highest quality Atlantic salmon recreation resources in the country. The statements contained at page 4-109 as to allegedly moderate impacts from construction activity are simply not believable. Multi-year construction activity which will "block access to several popular fishing locations and cause increases in noise, dust and truck traffic downstream..." can hardly be considered moderate. In addition, siltation and "minor" flow changes will have major impacts. Even a minor flow change could have a significant impact on the availability of rods and lies, as well as on fish movement and habitat. Large areas may be rendered unfishable as a result of a minor flow redirection. These changes in flow must be accurately determined through modeling and their impacts analyzed prior to any construction activity, so that alternate locations for anglers can be provided during construction.

DOI-150 At page 4-109, the DEIS states that approximately 5 rods would be eliminated during construction. There is no guarantee that those rods would be recovered after construction. The DEIS also states at page 4-109 that three rods would be eliminated by the alteration of Plant B and construction of Plant C, and that none of the other rods would be "substantially" affected. The SDEIS should describe that which constitutes a substantial alteration, and whether or not some degree of alteration below that level represents an acceptable risk to anglers.

DOI-151 BHE's flow study is cited as indicating that two lies below Veazie would be affected by operation changes in Plant B. The next sentence refers to "eliminating" those lies, but states that reduced flows would reduce fishing opportunities, but not affect salmon in a biological context. Although no biological impact on resident species can be viewed as neutral, any adverse impacts on angling opportunities must be viewed as a negative impact. The DEIS also states that BHE would mitigate impacts from the Veazie developments by creating one

DOI-148 This comment will be addressed in the orders to be issued for these projects.

DOI-149 The characterization of the affect from construction on angling opportunity in Section 4.8.2.1 as "moderate" is accurate. Construction would take place from the east bank of the river and would directly affect approximately 5 of the maximum of 59 rods of fishing opportunity below Veazie. The construction period would be 3 to 3 1/2 years. Displacement of anglers from less than 10% of the available rods equaling 2,000 user-days over a three year period does not seem unreasonable in an area with an estimated 18,000 user-days in 1994.

With regard to the anticipated minor flow changes, it is noted that the 1989 CRA study states that the number and location of lies varies with flow. It was the consensus of the expert anglers who participated in the study that the assessment of lies below Veazie would best be made after viewing post-project conditions. Detailed flow modeling would not provide definitive predictions of how lies would be affected since minor flow changes, resulting from the installation of the coffer dam access, would be short term in nature and difficult to model at best.

DOI-150 We agree that there is no guarantee that these rods would be recovered after construction. See response DOI-149. An increase in water depth would constitute a substantial alteration. The 1989 CRA study used water depth as the determining factor to predict whether potential lies are likely to be lost above the proposed Basin Mills impoundment. Water depth would not increase below Veazie as a result of the project.

DOI-151 The text has been corrected in Section 4.8.2.1 to indicate that 3 lies would be created. In Section 2.1.1.1 ME DEP WQC #15 reserves the right to require additional angling mitigation actions if necessary at Veazie Plant C. This condition would be included in any license issued for Basin Mills. Further in Section 4.8.2.4 we have recommended the BHE develop a salmon angling monitoring plan.

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DOI-151 Cont'd or more new salmon lies through placing artificial structures in the river. While the goal of creating additional lies is appropriate, no specific number is proposed, the artificial means to be used have no track record for attracting salmon, and no appropriate studies have been performed or are proposed.

DOI-152 The DEIS goes on to state that creating new lies "probably" would create new rods. Any lost rods or lies must be fully mitigated for, preferably on a greater than one to one basis. The probability of mitigation is not adequate. In addition, between the Veazie impoundment and the Great Works tailrace, 71 of 81 rods would be lost, and even the most optimistic projections of new rods and fisherman access points resulting from Basin Mills construction would not come close to mitigating for this severe loss of angling opportunity, regardless of increased passage from the project.

DOI-153 At page 4-112, the DEIS states that improvements to fish passage at Veazie would cause the fish to move faster through the facility. However, the associated loss in angling opportunities would not be offset by providing other opportunities at different locations where the fish would be trucked due to the normal incidents of mortality that occur during such activity. There will be less angling opportunities at traditional locations, those locations will be severely impacted by construction activity, and the overall size of the run will be displaced by as much as 50 percent from Veazie to above Milford. This displacement does not offer an alternative or mitigation to the high number of anglers that are likely to be permanently displaced from fishing clubs reliant on current opportunities and access points. The entire dynamic of Atlantic salmon angling in the project area will be adversely affected under the preferred alternative.

DOI-154 Section 4.8.2.3. evaluates the loss of white water boating opportunities, and does not offer any statement as to the significance of losing this resource. The loss of 50 days of white water boating use is significant to those who do use the resource, particularly as white water opportunities become increasingly scarce due to access and flow limitations. Furthermore, the use pressures on available areas are increasing rapidly along with the sport's popularity; additional losses result in increased pressures on existing use locations on other rivers.

DOI-155 Section 4.8.2.4. describes a number of proposed recreation facilities and states that BHE will continue to meet with local representatives to discuss recreation needs and facilities, and will monitor use of recreational boat access facilities for three years to determine adequacy of the facilities. This type of monitoring should continue throughout the license term and BHE should be required to develop a plan for implementing specific solutions if and when these facilities become overcrowded.

DOI-156 Section 4.8.3.1 sets out FERC staff's recommended additions to the applicant's proposal. While the Department agrees that all those items are necessary, the FERC must include implementation dates and require BHE to explain, prior to licensing, how they will accomplish the additional facility requirements if certain actions are not possible, such as acquiring additional land or an easement at both Stillwater and Milford.

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DOI-152 See responses DOI-149 to 151, above, and response DOI-153, below.

DOI-153 The loss in angling opportunity from improved fish passage at Veazie would be due to individual fish spending less time in lies below Veazie. Under our recommended Alternative 4, salmon trucking would only occur if agencies choose to use that capability for management purposes. No lies in the Basin Mills area would be permanently lost. See also responses DOI-149 and 151.

DOI-154 See response DOI-74.

DOI-155 All licensed FERC projects are required to periodically assess and respond to recreation needs over the duration of the license term. Such a requirement will be included in any license issued for the projects evaluated in this FEIS.

DOI-156 We will recommend that any license for these projects include a requirement for a recreation plan which commits the licensee to recreation improvements under an approved schedule. If acquisition of real property interests are not possible to implement the staff-recommended boat launch and canoe portage at Stillwater and Milford, we will recommend that the Commission require the licensee to explore alternatives. In the case of Milford, an alternative is the applicant's offer to put a canoe portage around the west side of the dam where BHE already owns land. In the case of Stillwater, there exist two public boat launches, one owned by BHE, which might be expanded if a land acquisition for a third boat launch is unsuccessful.

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4.9 LAND USE

DOI-157

Section 4.9.6. states that clearing unimproved land would be mitigated by BHE's development of currently inaccessible areas. It is not clear whether these are the same lands. The DEIS should be revised to state clearly what lands that are currently inaccessible would be made accessible to the public and for what purposes. The DEIS states that new open space areas would be created by the removal of the Orono project facilities. However, there is no real likelihood that the public would use these areas, unless they are truly restored to pre-project conditions.

4.10 AESTHETIC RESOURCES

DOI-158

Section 4.10 describes the impacts to aesthetic resources in terms of possible and temporary impacts. The type of aesthetic impacts associated with a hydroelectric facility will be significant and permanent, yet are not adequately described, in clear terms, in the DEIS.

Construction impacts are claimed to be only temporary, but given the fact that BHE has not to date submitted any erosion control plan beyond heavy use of rip rap, and no replanting plan is proposed, these impacts will likely be permanent unless the Commission requires such mitigation. At page 4-145, the DEIS includes the statement that "FERC believes that BHE should investigate the use of alternative shore protection measures...." The Commission must make such measures mandatory license conditions if any real aesthetic mitigation is to be accomplished.

DOI-159

Section 4.10.2.2. is replete with statements to the effect that removal of significant rapids "would not be considered an improvement of the visual landscape," and that removing a small island at the mouth of the Stillwater River "also cannot be considered a visual improvement." The new Veazie powerhouse would allegedly not be detrimental to views on the opposite bank "if it is made to blend with existing and new vegetation by choosing neutral colors." It is highly unlikely that the visual impacts of a new powerhouse can be effectively mitigated by using neutral colors. Another typical statement reads: "To people who prefer a natural riverfront, the views that would include the dam and related structures and rip rap shore protection would not be an improvement over existing conditions."

The Commission's analysis should not attempt to lessen the fact that significant adverse aesthetic impacts will result from this project. Where there is an arguably positive impact, such as removal of the Orono powerhouse, the DEIS states that it will have a positive visual impact, but those aspects of the project which will clearly have the opposite effect are discussed using language that goes to great lengths to avoid qualifying the aesthetic impacts as negative.

4.11 CULTURAL RESOURCES

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DOI-157 Land use impacts would differ with the various alternatives. As already stated in Section 4.9.6, currently undeveloped lands adjacent to the Veazie dam would be altered to accommodate the new power and recreation facilities proposed under alternatives 2, 3, 4b, and 4d. All alternatives requiring the decommissioning of the Orono facility would create new waterfront open space. The improvements for these individual properties for public use are discussed in Section 4.8 (Recreation Resources) of the FEIS.

DOI-158 Section 4.10.3 has been modified to require the development of a plan for alternative shoreline protection measures. We will recommend that this condition become part of any license issued.

DOI-159 Staff's analyses of aesthetic resources classifies impacts as negative, positive, or no improvement over existing conditions. Your comment implies that changes resulting in no improvement should be classified as negative impacts. There are several instances (removal of the island and rapids at the mouth of the Stillwater Branch and development of the Veazie Plant C powerhouse on the east bank of the river) where the proposed activities would result in changes to the visual environment, but are not necessarily negative impacts. However, we have revised Section 4.10.2.2 of the FEIS to clarify our classification of impacts.

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DOI-160

As previously noted, the DEIS offers no quantification of Indian values, nor does it suggest how the authors have weighed PIN values relative to other environmental values. Some insight for the Commission is offered by a Bonneville Power Administration (BPA) study completed in 1986. The study Calculation of Environmental Costs and Benefits Associated with Hydropower Development in the Pacific Northwest was done to "develop economic values associated with resources in the BPA service area, and to relate these values to potential acquisition of representative hydroelectric resources in the Pacific Northwest."

Like the authors of the DEIS, the authors of the BPA study were unable to develop values for Native American resources. Unlike here, however, the authors of the BPA study admitted that this lack of values was a significant omission in the report. This "failure to develop values for environmental effects of hydroelectric acquisitions impacting Native Americans renders the data provided here incomplete as a full display of hydro-related environmental benefits and costs."

Further, it was found that "such evaluation should be pursued, for overview of ongoing legal and regulatory decisions in the BPA service area suggests that Native American values and concerns may be at least as important for future hydroelectric acquisition as any of the environmental products considered in this report." Identification of the impacts of hydropower on Native Americans was further targeted as the highest priority area for additional research.

DOI-161

Additional evidence of the progress made by other Federal agencies in estimating impacts to Native Americans can be found in the recently completed Columbia System Operation Review (SOR) Draft EIS prepared by BPA, the Corps, and the Bureau of Reclamation. This DEIS addresses a broad range of alternative operations of Federal dams and reservoirs on the Columbia River. In evaluating the impacts of these alternatives, a major concern was the impact of changing water levels and flows on cultural resources. To address these impacts, the Federal work group developed a site impact computer model based on monthly reservoir elevations and the elevations of 1,333 cultural/historic sites. The model calculates, for each alternative at each historic property, the percentage of site-days over a 50-year span on which wave erosions and site exposure would occur.

The work group also performed a geomorphic analysis which estimated the potential effects of reservoir operations on acceleration of erosion and landform changes. The results of the shoreline erosion model, the site exposure analysis, and the geomorphic analysis were used to rank alternatives with respect to their impact on cultural resources. This Columbia River analysis is offered as an example of the type of analysis required for proper identification of impacts of Native American resources.[4]

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DOI-160 See response DOI-40.

DOI-161 Your comments regarding the development of computer models to predict the impact on cultural resources are inappropriate to this case. Computerization for purposes of a broad, conceptual survey of "potential acquisition of representative hydroelectric resources in the Pacific Northwest" would not be a substitute for a more detailed, site-specific assessment by qualified archeological surveys documenting the location and significance of cultural resources potentially impacted by the proposed actions. Potential impacts to cultural resources and protection or mitigation methods will be addressed in a required cultural resource management plan for each project. Each cultural resource management plan must be approved by the Maine State Historic Preservation Officer and the national Advisory Council on Historic Preservation. The Programmatic Agreement on cultural and historic resource properties provides for development of the cultural resource management plans and other collaborative protection and conservation of cultural and historic properties, as agreed by the Commission, the Maine State Historic Preservation Officer, and the national Advisory Council on Historic Preservation. We will recommend that a Programmatic Agreement be included in any licenses issued for these projects.

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[4] U. S. Department of Energy, Bonneville Power Administration; U.S. Department of the Army, North Pacific Division; U.S. Department of the Interior, Bureau of Reclamation. Columbia River System Operation Review; Draft Environmental Impact Statement. July 1994.

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DOI-162 In conclusion to these comments regarding Cultural Resources, the Commission should be aware that the Department has requested inclusion in the Programmatic Agreement for the Basin Mills, Milford and Stillwater Projects, based upon its trust responsibility to protect the lands and resources, including cultural resources, of the PIN. (See, Department's December 1, 1994, letter commenting on the Draft Programmatic Agreement for Basin Mills, Milford, and Stillwater Hydroelectric Projects.)

DOI-163 Also, the discussion about anadromous fish on page 4-150 fails again to recognize the fishing rights confirmed to the PIN. Thus, it fails to consider the impacts of the proposed projects on those fishing rights. In particular, while the trapping and trucking proposal is mentioned, the impact to the PIN, which would result from release of the trucked fish at a location above the Milford Project, is not adequately discussed. Problems with fallback over the Milford Dam and other stress factors will require that the trucked fish be released at a location upstream of Indian Island. This would impair the PIN's ability to exercise its reserved fishing rights. This subject is completely ignored in the DEIS.

4.12 SOCIOECONOMICS

DOI-164 A picture of limited economic benefits from the project emerges in Section 4.12.2.1, which discusses Alternative 2. "Only minor benefits" are expected to accrue to the state and regional economy from limited short term economic gains. The secondary jobs would increase employment "only a fraction of one percent", and even those figures are acknowledged by FERC to be optimistic when the large majority of the work force will be local and thus will not add to established retail and service needs in the region.

DOI-165 The DEIS includes an acknowledment at page 4-160 only that construction traffic "could have adverse impacts on local traffic patterns." However, the next sentence states that worker traffic will increase volume by 70 percent, and yet no plans for traffic mitigation have been developed; only the suggestion is made that BHE do so. A full scale traffic study and associated mitigation plan should have been developed in order to provide the Commission with adequate information upon which to make a licensing decision. The type of plan outlined in Section 4.12.3 must be completed prior to any licensing decision.

DOI-166 Section 4.12.2.2. provides critical insight into the apparent local support base for the project. Although it is acknowledged that payroll and expenditure income associated with project operations will increase, only "minor long-term benefits" are expected. Only four full-time positions will be required during the life of the project, and the DEIS does not make it clear if this means four persons at all times during the project or a total of four persons during the operating life of the project.

DOI-167 The most significant elements of the analysis appear in the first and third paragraphs of page 4-161. Orono's property tax valuation would increase by 5 percent, Eddington's by 47 percent and Bradley's by 160 percent. The SDEIS should more clearly present where the

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DOI-162 We have recommended that the Department of the Interior be added as a concurring party to the final Programmatic Agreement for the projects.

DOI-163 The Commission respects the PIN's treaty reserved fishing rights and in no way has made decisions which would restrict these rights.

DOI-164 Note that historically manufacturing and construction trade jobs have a multiplier employment effect on retail and service employment, e.g., one new manufacturing job creates a need for more than 1 and often as many as 3 new service jobs.

DOI-165 Page 4-160 of the DEIS states that worker traffic would account for up to 70% of the increased construction traffic, as many as 1,500 trips per day during construction activity. We did not project an increase in total volume of 70%, as suggested in your comment. We have stated that alternatives involving construction of new facilities would result in traffic impacts and have revised Section 4.12 of the FEIS to indicate the need for traffic control plans prior to the start of any construction activities.

DOI-166 Operation of a new Basin Mills dam would require four full-time positions per year; we have clarified this point in the text. As is the case now, we expect most anglers to originate within the local economy so that there would be no net infusion to the local economy via local expenditures.

DOI-167 The greatest economic gain for the immediate communities under Alternative 3 would be from increased tax revenues. Need for power is not readily convertible to economic metrics comparable to other socioeconomic benefits.

DOI-167 Cont'd greatest economic gain to the communities will be derived: need for power, jobs, increased recreational facilities, or increases in property tax revenue.

4.15 UNAVOIDABLE ADVERSE IMPACTS

DOI-168 The impacts of building a new dam are avoidable if the Commission denies the license application for the proposed Basin Mills Project. The Department requests that the Commission not approve the applicant's or the staff's preferred alternatives.

As stated previously, it may be possible to significantly reduce unavoidable adverse impacts to fish and wildlife resources by modifying the applicant's existing and/or proposed generating facilities at the projects covered in the DEIS. The DEIS acknowledges that unavoidable adverse impacts to biological communities may extend beyond the Basin Mills Project site to the Veazie and Orono Dams, where substantial redevelopment (for power generation and/or recreation activity) is slated to occur. As discussed earlier, removal of two dams from the main stem of the Penobscot would greatly offset unavoidable adverse impacts.

4.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

DOI-169 The Department concurs with the conclusion in the DEIS that licensing of these projects would result in a (re)commitment of the area to energy production. However, this single occupation of the river for waterpower development is contrary to the comprehensive planning mandate in Section 10 of the FPA. With so much of the river developed to secure generating capacity, where is there opportunity to develop and improve the other beneficial public uses, such as fish and wildlife, which require a free-flowing waterway? Where is the equal consideration?

4.17 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

DOI-170 NEPA requires that an EIS consider the "relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 C.F.R. 1502). However, the DEIS appears to consider production of 64.4 MW of energy over the next 30 to 50 years to be a form of "long-term productivity", rather than a "short-term use of man's environment". In addition, the DEIS concludes that the proposed mitigation that would be implemented during the term of the licenses would prevent a loss in long-term productivity of aquatic life.

The Department views the 30- to 50-year license terms that would be in effect for the projects covered in the DEIS to be a relatively short-term phenomenon. Generation of hydropower is an old technology, and one that is likely to be outmoded by the end of the

DOI-168 Opinion noted. We have evaluated the effects of dam removal in Appendix D.

DOI-169 This issues will be addressed in the license orders to be issued for these projects.

DOI-170 Opinion noted.

DOI-170 Cont'd

proposed license terms, given the advances and breakthroughs that have occurred in other industrial sectors during the last 50 years.

In contrast, the placement of a new dam on the river is a long-term commitment, as previously acknowledged in the DEIS. The Veazie and Great Works Dams for example, have been in place for over 150 years. Basin Mills Dam would likely remain for at least that long.

DOI-171

The staff's proposed mitigation for losses in long-term productivity of aquatic life deals almost exclusively with Atlantic salmon, and consists primarily of stocking and transport of fish around dams (via fishways and trucking). This does little to ameliorate impacts to, and maintain and enhance long-term productivity of, other fish and wildlife that have historically used this portion of the Penobscot River. Any mitigation actively involving the applicant (e.g., stocking, trapping and trucking) would also terminate at the end of the 50-year license term, falling far short of the expected life of the project dams, and failing to offset long-term losses in aquatic productivity.

5.0 STAFF'S CONCLUSIONS

5.1 INTRODUCTION

DOI-172

An adequate statement of the basic and underlying need and purpose for the proposed Federal action has not been provided in the DEIS. Major issues regarding Native Americans, American shad, and American eels have yet to be adequately considered. The Commission's trust responsibility to protect the rights and trust resources of the PIN, a Federally-recognized Indian Tribe, has not been recognized or properly discharged. The baseline has been misplaced and environmental impacts have been consistently underestimated. The Corps' permitting requirements, including the Section 404(b)(1) Guidelines, have not been met. Many conclusions in the DEIS are based on flawed assumptions and modeling, and therefore, are unfounded. The full range of reasonable alternatives, including license denial, has not been considered and NEPA's alternatives requirement has not been met. Consequently, staff's conclusions cannot be upheld, particularly in regard to staff's preferred alternative. A supplemental DEIS has been requested.

The staff's conclusions are based largely on results of ASAL modeling done apparently in consultation with the applicant, and on the premise of passive restoration programs for shad and alewife under all but alternatives 2 and 3. Staff concludes that the "benefits of Alternative 3 would be achieved at the expense of a small change of free-flowing riverine environment to impounded river environment, ..." (p. 5-22). Staff's conclusion fails to note that this "small change" represents a large portion of the last remaining free-flowing river segments left in the lower Penobscot River.

DOI-171 Under Alternative 3, the trap-and-truck and stocking mitigation would continue for the term of the license (50 years). At the end of the term of a license issued under Alternative 3, the Commission would evaluate any proposal for relicensing with regard to consequences to anadromous fish and all other natural resources. If such an evaluation indicates that mitigation should continue under the new license, the Commission may decide that stocking and trap-and-truck would not stop and any necessary mitigation measures would be required in a new license issued for the project. Should the project be decommissioned at any time, the Commission would consider the need for dam removal as a decommissioning alternative. These same considerations would apply to a project licensed under Alternative 4.

DOI-172 See responses DOI-4 and DOI-10.

DOI-172 Cont'd

The staff has made inappropriate evaluations and conclusions about the future of the salmon restoration program -- at the expense of providing a rigorous examination of the alternatives, including the proposed action. That is, staff basically adopted the applicant's claim that restoration would not succeed. Based on its evaluation and conclusion about the Atlantic salmon restoration program, staff concluded that it could effectively cast aside relevant resource agency goals, ignore statutory obligations under the FPA, and gives undue deference to the MDEP with respect to recommendations for fish and wildlife mitigation and enhancement.

Staff's conclusion's overlook and/or disregard impacts of the proposed projects on tribal lands, fishing rights, and cultural resources. While placing some emphasis on the PIN's interest in "wild" salmon, staff has determined that since, in its view, restoration of a "wild" salmon population is impossible, it need not further address this PIN interest, much less the reserved right the PIN has to take fish within its reservation boundaries for sustenance. Also, staff's conclusions overlook the impact that trapping and trucking around Indian Island will have on the ability of the PIN to exercise those reserved rights.

In summary, many of staff's most important conclusions appear to be misguided, are without substantial basis, and are fatally and fundamentally flawed. The inaccuracies and inadequacies in the DEIS are of such magnitude that a supplemental DEIS must be prepared. This must be done in full coordination and cooperation with all the resource agencies having statutory management authority for effected fishery resources and the PIN. The new SDEIS must examine the impact of the proposed projects on the rights and trust resources of the PIN, as required of the Commission. To avoid the necessity for subsequent action under NEPA, the SDEIS must fully address the Corps' permitting requirements, including the Sec. 404(b)(1) Guidelines.

5.1.1 Project Alternatives

DOI-173

As discussed previously in more detail, the DEIS dismisses license denial, energy conservation and other alternatives. The energy conservation alternative could help meet the applicant's needs and satisfy the Commission's requirement for comprehensive river basin planning. The DEIS also fails to examine a number of design alternatives at the projects that could lessen impacts to aquatic habitat. The obvious alternative of combining the new Basin Mills Dam with the removal of Veazie (gains for anadromous fish, net increase in power) is also omitted in the DEIS. The Department has herein requested that these be included in the SDEIS.

DOI-174

The No-action Alternative needs to be redefined as it would result in license denial, and some form of subsequent action such as decommissioning. The continued operation of the Veazie and Orono Projects, without modifications, is not a No-action Alternative, due to the reality of continued involvement and oversight by Commission staff. This scenario is also inappropriate as an environmental baseline, as it represents a highly imbalanced state of hydropower development on the lower Penobscot River. The reasonable benchmark is the

DOI-173	See DOI-38 and DOI-39. We have conducted a preliminary evaluation of the alternative of combining the new Basin Mills Dam with the removal of Veazie and found it does not yield power and fisheries benefits beyond the range of those offered by the alternatives we evaluated in detail; see Appendix D.
DOI-174	This comment will be addressed in the license orders issued for these projects.

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DOI-174 Cont'd without projects condition. This is the only condition that allows for assessment and accounting of the impacts that must be mitigated.

5.1.2 Environmental Analysis Methodologies and Assumptions

DOI-175 As mentioned above, staff used inaccurate data in their application of the ASAL model, dismissing the information that had been developed by a team of resource agency and tribal experts who have far greater knowledge of Atlantic salmon. Staff also made the unrealistic assumption that resource agencies and tribal governments would not make any additional efforts over the next 30 to 50 years to increase restoration activities for American shad. Mention has been made that the FWS has signed a formal agreement with PIN and MDMR and MDIF&W to develop an active shad restoration program on the Penobscot River.

Staff also erroneously concluded that the basic objective in existing anadromous fish restoration plans is to achieve certain population numbers, while overlooking fundamental goal statements on the need to protect habitat and achieve self-sustaining runs. Once the staff concluded (using erroneous data) that the estimated numbers of fish were not likely to be achieved (under existing or unchanged conditions), agency goals were no longer relevant. This is an egregious misapplication of Section 10(a) of the FPA, which requires that the Commission make a determination of project consistency with agency prepared comprehensive plans.

5.2 COMPARISON OF ALTERNATIVES - RECOMMENDATION OF PROPOSED ACTION

5.2.1 Basin Mills.

DOI-176 At pages 5-11 to 5-12, the DEIS states that the Basin Mills Dam will eliminate as many as 71 out of 81 rods from Great Works to Milford and would "clearly preclude those potential fishing locations from being utilized in the future to satisfy increased demand...." Yet, the DEIS concludes that with an expected increase of only 11 percent, those losses are acceptable. The current angling opportunities are crowded at best, and there is a demonstrable need for maximizing the number of Atlantic Salmon in the project area. With a projected increase of 11 percent in the demand for angling locations, we can not support the elimination of almost 88 percent of the possible additional locations that would be made available without Basin Mills. The possible addition of angling opportunities above Milford as a result of trapping and trucking is speculative at best, and does not offer a viable alternative for many anglers who would have to travel a considerable distance to reach the new locations.

DOI-177 Alternative 5 (decommissioning and removal of Veazie Dam, no Basin Mills Dam, continued operation of Orono) is the Department's preferred alternative. Based on its analysis of the alternatives selected by DEIS staff, Alternative 5 would do the most to restore balance in the

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DOI-175	See responses DOI-92 to DOI-107, above.
DOI-176	See response DOI-27, above.
DOI-177	Opinion noted.

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DOI-177 Cont'd

Penobscot River system. As stated in the DEIS, 116 dams have been constructed in the Penobscot River Basin over time, virtually extinguishing historic runs of anadromous fish and adversely affecting various other fish and wildlife resources. The Department does not support the proposed construction of another dam which would add to the ongoing environmental impacts (i.e., the staff's recommendation of Alternative 3), unless serious steps (i.e., removal of dams) are taken to gain positive resource benefits, not just to offset losses and reduce cumulative impacts.

DOI-178

In the event that the Commission adopts the staff's recommendation to license Basin Mills, the Department is herein providing detailed Fish and Wildlife Recommendations and Prescriptions for Fishways pursuant to Sections 10(j) and 18 of the FPA, and Fish and Wildlife Coordination Act (FWCA), respectively. (See Enclosure B). These Recommendations and Prescriptions call for full fish passage, no trapping-and-trucking, removal of mainstem and tributary dams, and other measures designed to fully mitigate impacts to fish and wildlife resources.

DOI-179

Section 5.2.1.3. concludes that there will be virtually no benefits to the region in terms of employment or secondary economic impacts. The DEIS states that the benefits received by the project would be achieved "at the expense of a small [amount] of free flowing riverine environment to impounded environment." Any loss of free flowing riverine environment is a significant adverse impact when considered in the context of a basin already burdened by 116 dams.

5.2.2 Stillwater.

DOI-180

The Department does not object to the proposed continued operation of the Stillwater Project, provided adequate measures are incorporated to fully mitigate impacts to fish and wildlife resources based on the without-project condition. (See Enclosure B of these comments for detailed Recommendations and Fishway Prescriptions). However, the Department also would not object to a decision by the Commission to deny a license for the Stillwater Project, and subsequent order for the removal of the dam in an effort to reduce cumulative impacts from other hydropower developments in the Penobscot River Basin.

5.2.2 Milford.

DOI-181

The Department does not object to the proposed continued operation of the Milford Project, provided impacts are assessed and adequate measures are incorporated to fully mitigate impacts to fish and wildlife resources based on the without-project condition. (See Enclosure B of these comments for detailed Recommendations and Fishway Prescriptions). However, as with the Stillwater Project, the Department would not object to a decision by the Commission to deny a license for the Milford Project, and subsequent order for the removal of the two project dams (Milford and Gilman Falls) in an effort to reduce cumulative impacts from other hydropower developments in the Penobscot River Basin.

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DOI-178 Your 10(j) recommendations and Section 18 prescriptions are included in and addressed in Section 5 of the FEIS.

DOI-179 Opinion noted.

DOI-180 See Sections 2.4 and 2.5.3 of the EIS.

DOI-181 See Sections 2.4 and 2.5.3 of the EIS.

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DOI-182

The Commission is reminded that, pursuant to Section 4(e) of the FPA, a license may not be issued for the Milford Project without the Commission first finding that the project will not interfere, or be inconsistent, with the purpose for which the Penobscot Indian Reservation was created or acquired. As the Department has informed the Commission in filings, and as discussed herein, the Milford Impoundment surrounds 22 reservation islands. Any license issued for the Milford Project is also subject to the Department's mandatory conditioning authority, also pursuant to Section 4(e). As the Commission has been repeatedly informed, the Department intends to prescribe such mandatory conditions for this project, no license may be issued prior to the submission of those conditions. As the Commission has also been informed, development of the Department's Section 4(e) conditions is in progress.

DOI-183

5.2.1-3.4 Statutory Requirements Section 18 of the FPA. Section 18 of the FPA provides that the Commission shall order the construction, maintenance, and operation of such fishways as may be prescribed by the Department. The Commission also recognizes that it has no authority to reject or modify fishways that the Department prescribes. (See Lynchburg Hydro Associates, FERC No. 7163, at 39 FERC 61,079; 1987.) In other words the Commission does not have the discretion under Section 18 to conclude that a fishway is unnecessary when the Department has prescribed one, or that a different type of fishway from the one prescribed may be adequate. (See Bangor Hydro-Electric Company, FERC No. 2727, at 66 FERC 62,079; 1994.)

The DEIS for the most part acknowledges the Commission's obligation to require fishways prescribed by the Department, citing initial Prescriptions that were made during the responses to public notices on the pending applications. However, the Commission staff rejected the Section 18 Fishway Prescription that was made on January 19, 1993, for the Milford Project, purporting that it was received too late -- 15 days after the close of the comment period on the public notice. As discussed in the DEIS, the Commission has proposed instead to incorporate the fish passage plans of the applicant at the Milford Project, including use of an Alaska steeppass Denil fishway (a design that was strongly opposed by the Department).

The Department takes strong exception to the Commission's interference with the clear, unequivocal intent in Section 18 of the FPA. The Department's Fishway Prescription for Milford was proper, submitted well within the timeframe of the licensing process, and in many respects, far more detailed than what had been provided (and accepted without question) for the Basin Mills and Stillwater Projects. With respect to the Commission's imposed deadline for submission of Fishway Prescriptions (a Commission imposed restriction that is not in Section 18 of the FPA), the staff has overlooked the fact that the Department was already on record with an initial Fishway Prescription for the Milford Project, including a reservation of authority for subsequent related actions. (See Department's letter, dated August 11, 1989.) This earlier action predated the Commission's regulations containing time limits on Section 18 Fishway Prescriptions and 10(j) Recommendations. The Department is on record that such time restrictions are inconsistent with the FPA and thus beyond the Commission's authority. The comments that were submitted on January 19, 1993, explicitly

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DOI-182 This issue will be addressed in the license orders for these projects.

DOI-183 We have revised the text to state that Commission staff recognizes DOI's untimely Section 18 prescriptions as if they were timely; the Commission's final position on Section 18 prescriptions for the projects will be addressed in the license orders. Also see DOI-28.

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supplemented the earlier Prescriptions and Recommendations. The Commission has acted arbitrarily by ignoring the Prescription and Recommendations from the Department.

DOI-183 Cont'd

The Commission staff has also acted arbitrarily by substituting its preferred fishway plan (and that of the applicant) for the Prescription submitted by the Department. As the Commission found in the case of the Ellsworth Project (incidentally involving the same applicant as at Milford), the Commission lacks discretion to second guess the Department on Fishway Prescriptions. We also note the staff's inconsistent action at the Stillwater Project, where they rejected an Alaska steeppass fishway proposed by the applicant as being inadequate (presumably independent of the similar position taken by the Department in its Section 18 Prescription for the project). The Stillwater Branch is a fraction of the size of the mainstem of the Penobscot at Milford. If a steeppass fishway is insufficient at Stillwater, it certainly would not be adequate at the larger Milford facility.

5.2.1-3.5 Section 10(j) of the FPA. The FPA requires that licenses issued by the Commission contain conditions to protect, mitigate damages to, and enhance fish and wildlife (including related spawning grounds and habitat) affected by the development, operation and management of the project. Section 10(j) of the FPA further requires that these conditions be based on Fish and Wildlife Recommendations received pursuant to the FWCA, 16 U.S.C 661 et seq., from the NMFS, the FWS, and State fish and wildlife agencies, unless the Commission determines that the agency recommendations are inconsistent with the purposes and requirements of Part I of the FPA or other applicable law.

DOI-184

The FWS has provided initial Fish and Wildlife Recommendations in its comments on the license applications for the Basin Mills, Stillwater, and Milford Projects. The Commission staff has rejected a number of these Fish and Wildlife Recommendations, finding that they are inconsistent with the purposes and requirements of the FPA. Specifically, the staff concluded that the FWS' recommended provisions would be inconsistent with Sections 4(e) and/or 10(a) of the FPA due to economic implications and/or standards for making a "public interest" finding (which is similarly based largely on economics and socioeconomics, according to the DEIS). We disagree. Staff may be reading more into Sections 4(e) and 10(a) than actually exists. Moreover, both sections of the FPA do make explicit reference to preservation of environmental quality, including the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat). The Fish and Wildlife Recommendations by the FWS for the three projects that were subsequently rejected by the Commission staff were entirely within the letter of the FPA. The conditions proposed by the staff are not equivalent in their effect.

DOI-185

Staff has given undue deference to the MDEP under Section 10(j) of the FPA. The MDEP is not a State fish and wildlife agency, nor do they have any legislative authority to act on behalf of Maine's three, independent fish and wildlife agencies in carrying out obligations under the FWCA. Although the Commission must adhere to the MDEP's conditions in the

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DOI-184 See response DOI-5. The FPA requires the Commission to balance conflicting uses of a waterway. The Commission's licensed projects are most often multiple purpose projects and the "balance" struck is singular to the particular waterway. The FEIS documents our scientific findings and our recommendations with respect to enhancing anadromous fish runs in the Penobscot River basin. Our procedure and rationale in attempting to resolve Section 10(j) inconsistencies, and the outcome of that effort, are documented in Section 5.

DOI-185 Maine DEP reiterates in their November 19, 1993, letter to the Commission that "...by Executive Order of the Governor of the State of Maine, the terms and conditions contained in the Department's water quality certification represent the State's official recommendations regarding the subject application, superseding all preliminary recommendations by individual State agencies." Maine submitted no 10(j) recommendations.

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DOI-185 Cont'd

State water quality certification (under Section 401 of the CWA),[7] the Commission should not consider Section 401 requirements as fish and wildlife agency recommendations.

The Department also notes that the MDEP performs a balancing function in its certification process, similar to what is done by the Commission in the Federal licensing process. This is because hydropower is considered to be a "designated use" in Maine's water quality standards. The MDEP believes that to fully maintain the hydropower designated use at a project, it often must adjust the recommendations from the State fish and wildlife agencies, resulting in less than full protection and enhancement for fish and wildlife and associated public uses. Accordingly, the recommendations from the agencies, formulated in accordance with the FWCA to "prevent loss of, or damage to" fish and wildlife resources, are typically compromised by the MDEP before they are passed on to the Commission.

Agencies in Maine currently operate under an Executive Order that allows for the MDEP's water quality certification and conditions to supersede previous recommendations from those charged with protecting and managing fish and wildlife. However, the Commission has an obligation to consult with and consider the recommendations of the State fish and wildlife agencies, and to look beyond the MDEP's certification to the individual comments from the State fish and wildlife agencies.

The FWCA requires that agencies, including the Commission, consult with other Federal and State fish and wildlife agencies prior to taking final action on a land and water development project. The Commission's regulations under Part I of the FPA indirectly delegate much of the responsibility for consultation under the FWCA to the applicant, resulting in an extensive record of comments from the State fish and wildlife agencies prior to final action by the MDEP. (See for example Section 4.38 in 18 C.F.R. Subchapter B Part 4). The Commission is ignoring its responsibility under the FWCA and Section 10(j) of the FPA by not addressing in this DEIS, and giving equal consideration to, the specific comments from Maine's fish and wildlife agencies that are contained in the consultation record.

5.3 Consistency with Comprehensive and Other Resource Plans.

DOI-186

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which the proposed projects are consistent with any comprehensive plans that have been filed by State and Federal agencies regarding waterway development and use. The DEIS mentions several fishery-related comprehensive plans, including the ASRSC's <u>Strategic Plan for Management</u>

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[7] The Commission has held in <u>Tunbridge Mill Corporation</u> that it need not adopt Section 401 conditions which are unrelated to water quality. In this DEIS, however, and contrary to its own directive in <u>Tunbridge</u>, the Commission has adopted conditions under Section 401 which relate to fish management, not water quality. This is an inconsistent application of its own precedent. See further discussion of this issue in comments to the History of the Proceedings section above.

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-186 See responses DOI-5, DOI-100, and DOI-103, above. Many comprehensive plans, such as those developed by fish and wildlife agencies, are single-purpose resource plans. While the Commission attempts to license projects consistent with such plans, the Commission must carry out its mandated responsibilities to resolve conflicting uses of a waterway. Hence, consistency with comprehensive plans is not mandatory. However, our preferred Alternative 4 would be in compliance with all comprehensive plans.

As discussed in Sections 4 and 5, Commission staff finds that restoration of a self-sustaining run of Atlantic salmon is not likely to occur under any evaluated scenario. This finding is consistent with Dr. Rago's analysis for NMFS. See response NMFS-3, -9, -22, -24, -26, and -30.

DOI-186
Cont'd

of Atlantic Salmon in the State of Maine, prepared in 1984. Although reference is made to the FWS' EIS on Atlantic Salmon Restoration in New England, issued in 1989, the staff does not acknowledge this as a "comprehensive plan". The FWS' EIS was accepted by the Commission staff as a comprehensive plan on January 18, 1991. (See letter from Dean Shumway, Office of Hydropower Licensing, to Ronald Lambertson, FWS' Northeast Regional Director). Accordingly, the FWS' EIS on Atlantic Salmon Restoration in New England must be included and considered as a comprehensive plan in the SDEIS.

As discussed in the DEIS, licensing of the Basin Mills Project under the proposed action (Alternative 3) would not be consistent with the goals in the comprehensive plans related to anadromous fish management, because the runs would not be self-sustaining. This finding is based on the fact that 1) cumulative impacts from existing and proposed hydropower developments, as analyzed in the DEIS, greatly reduce the number of upstream and migrating fish, and 2) the applicant's mitigation requires permanent trapping-and-trucking and hatchery stocking (i.e., the runs would not be self-perpetuating with minimal human intervention).

Commission staff has dismissed the significance of these evident conflicts with the comprehensive plans, because they concluded that the estimated future runs of anadromous fish can not be attained in the Penobscot River under any of the alternatives considered in the DEIS. Furthermore, they have substituted their judgment that maximizing the numbers of migrating fish (via stocking and trucking) will somehow offset the goals for self-sustaining runs.

Commission staff has seriously erred by focusing almost exclusively in the DEIS on agency projections for future anadromous fish runs, while downplaying the importance of the fundamental goals of restoration contained in the comprehensive plans and stressed repeatedly by all State and Federal resource agencies and PIN throughout the consultation process. For example, the ASRSC's 1984 Strategic Plan and FWS' EIS on salmon restoration in New England speak first and foremost about restoring self-sustaining runs in historic habitat. The documents do contain projections for runs in individual rivers, but these represent a range of possible population levels. A multitude of factors in any given year will determine actual numbers of returning fish.

The revised ASRSC Strategic Plan (currently in preparation and intended to supersede the 1984 version) emphasizes the importance of focusing on the fundamental precepts of restoration without becoming dependent on numerical estimates of future runs. The goal of the revised Strategic Plan is:

> "To protect, conserve, restore and enhance Atlantic salmon habitat and naturally-reproducing populations within historical habitat in Maine."

Although the Commission staff would not have had the opportunity to review the yet unpublished revised Strategic Plan, the clear message embodied in its goal statement has been echoed by the resource agencies in comments on the application and in the State's water

DOI-186
Cont'd

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-186 Cont'd quality certification proceeding. The Commission staff's selection of an alternative that will destroy habitat and continuously introduce artificially reproduced and genetically dissimilar salmon in perpetuity into the Penobscot River is entirely out of line with the long-term goal for anadromous fish. The staff's preferred action, if adopted by the Commission and incorporated into project licenses, will ensure that restoration will never succeed under any terms.

DOI-187 The Department would be interested in considering additional engineering alternatives which would meet the stated goals and objectives of Atlantic salmon restoration, shad restoration, and alewife restoration. The Department recommends that the Commission require that alternatives be developed that are consistent with meeting the goal of restoring the "self-sustaining run" of salmon -- before further considering the licensing of a new Basin Mills Dam and the relicensing of the other projects. The intent here is for fish to be an integral criteria for formulation of the alternatives. In simple terms, such new alternatives must adopt, as their own, the goals and objectives of the Department. Rather than compromising them, the alternatives must meet and help advance those goals and objectives. The PIN and the Department through FWS should be involved in the formulation of such alternatives. In addition, the alternatives should involve reductions in certain sources of mortality that are presently operating on the populations, as well as potential creation and enhancement of habitats which would likewise improve survival potential and production. As has been partially recommended in the letter, this could and should also logically involve:

1. Modifications to project operations and physical structures including fishways at existing sites (including Milford);
2. Development of a trust fund for use in improving conditions in the waterway and involving such things as off-site mitigation and enhancement in which BHE would fund stream improvement projects (e.g. habitat enhancement, spawning gravel restoration, etc.) which could increase upstream production potential;
3. Conversion of trap-truck passage designs at Basin Mills to fishway construction;
4. Development of programs to reduce predation of smolts by resident fish;
5. Further evaluations of dam removal as a means to increase access, survival, and anadromous fish habitat availability.

APPENDIX B - Page B-4.

DOI-188 Throughout the economic analysis, a discount rate of 8.7 percent is used to compute the present value of costs and benefits. According to Appendix B, this rate was provided to the Commission by BHE. It is never stated what this 8.7 percent represents - although, presumably, it is some kind of nominal interest rate. During the Section 401 hearings, BHE's consultants (RCG Hagler) indicated that they had changed the analysis from the 8.7

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-187 See responses DOI-15, -31, -117, and -118 above.

DOI-188 We use a nominal discount rate because we use nominal cashflows in our analysis. To the extent that the Commission's economic analysis is, for the most part, a current cost analysis which assumes no inflation in fuel prices, our use of a nominal discount rate may overstate alternative power benefits and penalize the Basin Mills alternative (Alternatives 2 and 3).

DOI-188 Cont'd percent figure to a 4.0 percent real rate for two reasons - 1) real rates are easier to interpret and 2) real rates provide a more valid comparison for projects with different start-up dates. (BEP hearing documents, Appendix A, pages 327-8).

APPENDIX C

TABLE C-1, PAGES C-3 -- C-11.

DOI-189 Table C-1 lists plant species that have been recorded in the Veazie, Basin Mills, Orono, Stillwater, and Milford Project areas (according to cited references). The information provided is limited to scientific and corresponding common names of recorded plant species. No information is provided, however, with respect to the locations of the recorded species in the project areas, the particular terrestrial and wetland resources associated with these species, or the relative abundance or status of these species in the plant communities which could be affected by the projects. Such information is needed to assess the existing importance of these species to the various Penobscot River terrestrial communities.

TABLE C-2, PAGES C-12 - C-18.

DOI-190 Table C-2 is a list of bird species whose known breeding or winter ranges overlap the Basin Mills or Milford Project areas and those species actually observed in these project areas (according to cited references). Although this table does indicate residency status, Federal or "blue" listing, and whether the bird species was observed in the Basin Mills or Milford Project area, no information is provided with respect to particular terrestrial or wetland resources associated with these species. As with the evaluation of Table C-1, this information is important in understanding potential impacts to these bird species.

DOI-191 In addition, Table C-2 indicates 53 bird species which were observed in the Basin Mills Project area, yet only 8 bird species which were observed in the Milford Project area. Although one may expect some variation in the presence of local wildlife due to differences in habitat availability and quality, the birds not observed in the Milford Project area included such ubiquitous species as the Black-capped chickadee (Parus atricapillus), the House sparrow (Passer domesticus), the Northern junco (Junco hyemalis), the American crow (Corvus brachyrhynchos), and the American robin (Turdus migratorius). Each of these species was observed in the Basin Mills area. Based upon the failure to note such common species in the Milford Project area, one may question the sufficiency of the wildlife evaluation conducted for this project area -- particularly with respect to endangered or blue-listed local species, such as the Bald eagle (Heliaetus leucocephalus), the Hairy woodpecker (Picoides villorus), and the Yellow warbler (Dendroica petechia).

TABLE C-3, PAGES C-19 - C-20.

DOI-192 Table C-3 is a list of mammalian species whose known ranges overlap the Basin Mills or Milford Project areas and those species actually observed in these project areas (according to

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DOI-189 We have included a map in Section 3.5 depicting vegetation cover types and land uses in the Basin Mills and Veazie project areas. Section 3.5 describes these botanical associations and lists dominant species. The intent of an EIS is to synthesize, summarize, and interpret data, not to repeat all data provided in the license application. The results of systematic sampling within each association in the Basin Mills Project area is presented in BHE's license application, Volume VI of XIV. This document also includes a complete species list organized by vegetation association and a notation of relative abundance.

DOI-190 We have included a table in Appendix C that lists birds observed in the Basin Mills project area by major habitat.

DOI-191 As is stated in Section 3.5, BHE conducted only reconnaissance wildlife observations for the Stillwater, Orono, and Milford developments. Because proposed actions for these developments would have small impacts on terrestrial resources (from recreation facilities), we conclude that information provided on wildlife resources is adequate to assess impacts.

DOI-192 A table in Appendix C has been modified to list mammals observed in the Basin Mills project area by major habitat.

COMMENTS FROM U.S. DEPARTMENT OF THE INTERIOR ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-192 Cont'd

cited references). This table does indicate whether the species were observed in the Basin Mills or Milford Project area. However, no information is provided with respect to particular terrestrial or wetland resources associated with these species. Such information is needed to assess the existing importance of these species to the various Penobscot River terrestrial communities. Two errors in the Table were noted:

DOI-193

1) The title of the table cites the reference Milford 1990; however, this reference is not provided in any of the Literature Cited sections (Pages 6-1 - 6-13, G-13 - G-15).

2) The "Status" of the mammals is described as C or U (presumably for Common or Uncommon); however, the key to the table only defines codes W, S, P, End, and Bl

TABLE C-4, PAGES C-21 - C-22.

DOI-194

Table C-4 is a list of amphibian and reptile species whose known ranges overlap the proposed project area and those species actually observed in the Basin Mills Project area (according to cited references). This table does not provide any information with respect to observations of these species in the Milford Project area. These animals, most of which are wetland-dependent, are likely to be affected by any impacts to local resources associated with the Penobscot River. Such information is needed to assess the existing importance of these species to the various Penobscot River communities.

APPENDIX F - Development - Specific Fisheries Impacts.

DOI-195

Staff repeatedly cites results of HEP analysis and Instream Flow Incremental Methodology (IFIM) analysis for evaluating effects of flow modifications on fish habitats at selected locations. The HEP analysis was completed for smallmouth bass and IFIM for Atlantic salmon below Gilman Falls and for Orono bypass channel. Staff need to provide more detail regarding how these studies were completed, including locations of transects, flow conditions, hydraulic model results, HSC curves used, timing of field measurements, and general methods employed. From the information presented, it appears that staff may be confusing HEP and IFIM analysis.

Staff incorrectly refer to an IFIM study (conducted on the Stillwater River below Gilman Falls) and the computation of weighted usable area (WUA). Based on the approach presented, the type of study completed would not be classified as an IFIM study in the traditional sense as developed by the FWS instream flow group in Fort Collins, Colorado (K.Bovee and C. Stalnaker, B. Milhous). How were WUA calculated as presented in Figures F-24, F-25 and F - 26? More details of this analysis are required before the interpretations afforded by Staff can be technically evaluated.

End of Enclosure A

RESPONSES TO U.S. DEPARTMENT OF THE INTERIOR COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

DOI-193 Errors in Appendix C concerning citations and keys have been corrected.

DOI-194 A table in Appendix C has been modified to list amphibian and reptile species observed in the Basin Mills project area by habitat. Considering the proximity of the Milford development to the proposed Basin Mills development, these species are likely to occur near Milford in similar habitats. Because proposed actions for Milford would have small impacts on terrestrial resources (from recreation facilities) we conclude that information provided on wildlife resources is adequate to assess impacts.

DOI-195 We have clarified the text you cite. Details of the studies can be found in the documents we cite in the text.

COMMENTS FROM ENVIRONMENTAL PROTECTION AGENCY ON LOWER PENOBSCOT RIVER BASIN DEIS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-221

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FEDERAL ENERGY REGULATORY COMMISSION

CC-1-1

February 15, 1995

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C.

re: Draft Environmental Impact Statement for the Lower Penobscot River Basin, Maine; Basin Mills, Stillwater and Milford Hydroelectric Projects (FERC Projects #10981, #2712, ~004 and #2534) ~005

Dear Secretary Cashell:

EPA-1 The Environmental Protection Agency-New England, in accordance with our responsibilities under the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and Section 404 of the Clean Water Act[1] has reviewed the draft Environmental Impact Statement (dEIS) prepared by the Federal Energy Regulatory Commission (FERC) for the above referenced hydroelectric projects on the Lower Penobscot River Basin in Maine.

The dEIS addresses impacts from three projects: 1) construction of the new Basin Mills dam (which would produce 38 megawatts [MW] of power), expansion of the existing Veazie development (an increase of 8.4 MW to 16.4 MW), and decommissioning of the existing 2.3 MW Orono dam;[2] 2) relicensing of the Stillwater facility; and 3) an increase in capacity at the Milford dam (from 6.4 MW to 8 MW).

EPA-2 EPA has significant concerns regarding compliance of the proposed action with the requirements of NEPA and Section 404(b)(1) Guidelines (40 CFR Part 230) of the Clean Water Act. Based on the information available currently, we believe the Basin Mills component of the proposed action would: (1) cause or contribute to violations of Maine's water quality standards and antidegradation statute, in particular with regards to anadromous aquatic life, habitat, and recreation uses [§230.10(b)]; (2) permanently and adversely affect wetlands and other special aquatic sites while other less damaging practicable alternatives are available

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[1] Although no Clean Water Act Section 404 permit application has been filed with the U.S. Army Corps of Engineers for the Basin Mills development, the dEIS states that the Corps was a cooperating agency in the preparation of the dEIS and that the Corps will use the dEIS to assist in making its permitting decisions.

[2] The Orono dam would be decommissioned but not breached.

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-1 The FERC's NEPA documents for the Lower Penobscot River Basin projects are not intended to meet all NEPA compliance requirements associated with the U.S. Army Corps of Engineers (Corps) decision-making in issuing a Section 404 permit under the Clean Water Act for the Basin Mills Project. While the Corps is identified as a cooperating agency in preparation of the DEIS, they are not identified as such in the FEIS. To the extent they deem it appropriate, the Corps can use the DEIS to fulfill part of their compliance responsibilities in association with an anticipated BHE application for a section 404 permit (Official Transcript of Proceedings, Volume 1, FERC public meeting in Bangor, Maine, December 13, 1994, pp. 3 and 4.)

EPA-2 Under the authority of section 401 of the Clean Water Act, State of Maine issued a Water Quality Certificate for the Basin Mills Project on November 10, 1993. By this action, "the [Maine] Board [of Environmental Protection] has certified that the construction and operation of the Basin Mills Project will not violate applicable water quality standards," subject to the conditions set forth in the certificate (Letter from Dean C. Marriott, Commissioner, Maine Department of Environmental Protection, to Lois Cashell, Secretary, FERC, November 19, 1993).

EPA-2 Cont/d

[§230.10(a)]; and (3) have a significant adverse impact on fish, wildlife, special aquatic sites and recreational uses without ensuring that all reasonable steps to avoid, minimize and offset potential adverse impacts have been taken [§230.10(c) and (d)].

EPA-3

The primary focus of EPA's concerns involve the proposed Basin Mills construction; EPA believes this proposed facility will result in substantial environmental impacts. Our environmental protection concerns for the Lower Penobscot River are further compounded by the failure of FERC's EIS to provide an adequate definition of the purpose and need for the project, or sufficient consideration of a suitable range of reasonable and practicable alternatives to the proposed action. These inadequacies result in the EIS failing to demonstrate compliance with the requirements of NEPA and Section 404 of the Clean Water Act. The technical attachment to this letter provides a detailed statement of our concerns about the proposed action and our recommendations for modifications necessary to reduce environmental impacts and achieve compliance with NEPA and the Clean Water Act.

EPA-4

In EPA's view, FERC's proposed action, as reflected in the dEIS, also raises serious questions bearing on the U.S. trust responsibilities to the Penobscot Indian Nation. We understand that the Department of the Interior (DOI) will be addressing this issue in its comments on the dEIS. EPA concurs with the position DOI has taken regarding FERC's failure to properly exercise trust responsibility; we do not intend to submit separate comments on this issue.

EPA-5

The identified adverse environmental impacts from the proposed Basin Mills project are of sufficient magnitude that EPA believes the project must not proceed as proposed. We believe the Basin Mills project would prevent attainment of Maine's water quality standards on the Lower Penobscot River and would significantly degrade waters of the United States. Specifically, these adverse impacts, which would be of a persistent nature as the proposed Basin Mills facility has the potential for long-term operations, include:

- at least 41 acres of wetlands and their existing functions and values permanently altered by excavation, filling, inundation, and mitigation;
- loss of riffle and pool complexes in 3.6 miles of free-flowing river inundated by construction of the Basin Mills dam;
- disruption of anadromous fish restoration efforts by construction of another obstacle to passage by migrating Atlantic salmon, alewife and shad;
- reduced regional biodiversity which would adversely affect existing aquatic communities as well as state and federal threatened and endangered species;

EPA-3 We have revised our Purpose of Action (1.1) and Need for Power (1.2) sections of the DEIS in response to this and other comments from respondents. The purpose of action will also be addressed in the orders to be issued for these projects. With respect to compliance with the Clean Water Act, see our response EPA-2, above.

EPA-4 We address this issue in our responses to DOI and PIN comments. Please refer to response DOI-8.

EPA-5 Your conclusions regarding adverse impacts of Alternative 3 are not supported by existing data and the analyses we conducted in preparing this EIS. Thus, we disagree with your conclusion that "...the Basin Mills project would prevent attainment of Maine's water quality standards...." As we note in response EPA-2, above, the State of Maine has demonstrated their concurrence with our conclusions through their issuance of a 401 WQC for the Basin Mills project, a decision subsequently upheld in two court challenges (Atlantic Salmon Federation, et al. v. Board of Environmental Protection, Decision No. 7327, Law Docket No. Ken-94-779).

COMMENTS FROM ENVIRONMENTAL PROTECTION AGENCY ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-5 Cont/d

- substantial loss of sport fishing opportunities for Atlantic salmon, resulting in adverse effects on existing and potential recreational opportunities on the Penobscot River;
- downstream temperature increases resulting in increased Atlantic salmon mortality; and
- adverse impact to heritage values of the Penobscot Indian Nation from diminished wild Atlantic salmon runs.

EPA-6

Currently, between 80 and 85% of all Atlantic salmon returning to U.S. waters come back to the Penobscot River to spawn, making this the premier Atlantic salmon river in the U.S. Additionally, the U.S. Fish and Wildlife Service has made the Penobscot River the focal point of its Atlantic salmon fishery restoration effort.[3] Despite these remarkable qualities, and in contradiction to the judgement of the responsible resources agencies, FERC has independently determined that the federal government's Atlantic salmon management plan goal of a self-sustaining fishery in the Penobscot River is infeasible under existing conditions or any of the Basin Mills alternatives considered in the dEIS. EPA believes FERC's proposed action is inconsistent with the long established federal government comprehensive management fishery plan for the Penobscot River as well as being in conflict with the substantial federal and state investment in these restoration efforts.

EPA-7

In accordance with EPA's national rating system, EPA has rated the dEIS for the Basin Mills project Environmentally Unsatisfactory - Inadequate (EU-3). If the concerns that form the basis of this rating are not resolved adequately, EPA will consider the EIS a candidate for referral to the Council on Environmental Quality pursuant to Section 309 of the Clean Air Act. For the purposes of the Stillwater and Milford projects, EPA rates the dEIS Environmental Concerns - Insufficient Information (EC-2) pending adoption of mitigation measures recommended by the federal resource agencies. Please see the attached rating sheet for a full description of these ratings.

EPA-8

EPA believes the substance and extent of the deficiencies of FERC's Lower Penobscot River draft EIS are such as to warrant preparation of a supplemental draft EIS. Furthermore, EPA believes it is essential for the supplemental document to address the permitting requirements of the Army Corps of Engineers under Section 404 of the Clean Water Act and compliance with EPA's Section 404(b)(1) Guidelines. EPA encourages FERC and the applicant to work with the Corps to merge the Section 404 permitting process with the NEPA

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[3] Between 1967 and 1988 USFWS spent $44 million dollars in New England on Atlantic salmon restoration; approximately $17 million dollars of which was spent in Maine, mostly on the Penobscot River. For 1993 and 1994, USFWS spent $1 million each year in Maine for Atlantic Salmon restoration, again, mostly on the Penobscot River.

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-6 State and federal fishery goals are not mandatory under Section 10(j) of the FPA. Because our analysis of the impacts of Alternative 3 indicates that state and federal fisheries management goals conflict with requirements of Section 10(a)(1) of the FPA, Section 10(j) requires FERC to attempt to resolve the conflict, and failing resolution, to make findings that its license conditions would adequately protect the resource involved. Under Alternatives 3 and 4, we include a requirement that the applicant implement measures for protection, mitigation, and enhancement of anadromous fish populations. Thus, the Commission is not exceeding its statutory authority by establishing fishery goals; it is attempting to resolve conflicts and to ensure that project impacts are adequately mitigated under all alternatives, as the FPA requires.

EPA-7 No response required.

EPA-8 See response EPA-2, above.

COMMENTS FROM ENVIRONMENTAL PROTECTION AGENCY ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-8 Cont/d

process, under the Corps' "highway methodology," to ensure the EIS contains sufficient information for the Corps to make its Section 404(b)(1) Guidelines determination. Failure to adequately address these compliance issues may result in the need for subsequent action under NEPA, resulting in significant time delays to complete consideration of this proposed action.

EPA-9

Thank you for the opportunity to comment on this dEIS. EPA is committed to working with FERC, the applicant and the other federal and state resources and regulatory agencies to resolve our concerns about the proposed Basin Mills project. EPA believes that through a collaborative effort by all the involved parties an opportunity to provide for environmentally sound development of hydropower resources on the Penobscot River can be identified and licensed.

Please contact me directly or Steven John (617/565-3426) of my Environmental Review team if you have any questions about our comments on the dEIS.

Sincerely,

John P. DeVillars
Regional Administrator

cc: Service List

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-9 No response required.

EPA-10

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes that draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

EPA-10 No response required.

COMMENTS FROM ENVIRONMENTAL PROTECTION AGENCY ON LOWER PENOBSCOT RIVER BASIN DEIS

ATTACHMENT

Technical Comments

Lower Penobscot River Draft Environmental Impact Statement

EPA-11

I. Regional Environmental Values

The Penobscot River is the largest river basin in Maine and is renowned for its salmon fishery. As FERC's dEIS states, historically the Penobscot River supported a large number of Atlantic salmon and other species of anadromous fish as well as sustaining a commercial fishing industry (dEIS page 3-18). The numbers of fish returning to the Penboscot River dramatically declined as the river basin developed; the chief factor in the demise of the Penobscot's salmon population was likely inadequate fish passage over dams (dEIS page 3-19). Since 1967, the Penobscot River has been the focal point of U.S. Fish and Wildlife Service's Atlantic salmon restoration effort. Currently, an estimated 80% to 85% of all Atlantic salmon in the U.S. return to the Penobscot River to spawn.

The Penobscot River basin is primarily forested, with some industrial, commercial and residential developments scattered along the river banks. The vicinity of the Basin Mills project area consists of rolling fields and forested areas; several small towns abut the lower reach of the Penobscot River.

There are approximately 82 acres of primarily forested wetlands in the Basin Mills project area, interspersed with scrub-shrub and emergent wetlands. The river and associated wetlands provide valuable habitat to an array of wildlife, including raptors (hawks and the northern harrier), waterfowl (geese, ducks, mergansers and loons), owls, neotropical migrants (warblers, veerys, and thrushes), mammals (shrews, beaver, fox, deer, and moose), and reptiles and amphibians (frogs, salamanders, turtles, and snakes). In addition, the area above the proposed Basin Mills dam is a 3.6 mile stretch of free-flowing river currently providing valuable habitat for the Atlantic salmon, shad, alewife, and a wide variety of aquatic macroinvertebrates such as caddisflies, stoneflies, dragonflies, midges, and mayflies.

EPA-12 The stretch of the Penboscot River from the breached Bangor dam upstream to the Milford dam also provides important habitat for the federally endangered bald eagle. Two other species, the federally endangered shortnose sturgeon and the New England violet (a candidate species for federal listing), occur in the project area. Finally, a variety of state listed species and several freshwater mussel species proposed for federal listing may also be present in the project area.

EPA-13 In the EIS project area, 8.4 miles of the 12 mile stretch of river between the Veazie dam and the Milford dam are presently

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-11 No response required.

EPA-12 We have evaluated the potential effects of each alternative on the bald eagle and shortnose sturgeon in the EIS and Appendices G and H. We conclude that none of the alternatives would result in any adverse impacts to threatened or endangered fish, wildlife, or plant species within the project area or adjacent areas. Additionally, there is no scientific documentation to support a statement that the endangered shortnose sturgeon occurs in the project area (see Appendix G, Shortnose Sturgeon Biological Assessment). NMFS' Biological Opinion issued after review of our BA concurred with our finding that the proposed project under Alternative 3 would have no impact on shortnose sturgeon even if they were present. This same finding applies to Alternative 4.

EPA-13 No response required.

EPA-13 Cont/d impounded.[1] The 3.6 mile stretch of free-flowing river remaining today contains important riffle and pool complexes which provide habitat for fish and other aquatic species and help aerate the water. The project area is one of the last remnants of a valuable mosaic in the Penobscot River basin of riverine, forested, and scrub-shrub wetland habitat.

II. Project Impacts

EPA-14 The Basin Mills project would profoundly alter one of the last vestiges of the Penobscot River basin. The proposed project would have effects both upstream and downstream of the dam and have both short and long term effects on wildlife habitats. Construction of the dam and associated facilities would permanently affect at least 41 acres of wetlands, 54 acres of primarily forested uplands and 3.6 miles of free flowing river. It would transform a diverse complex of wetlands and upland habitats which support a broad array of aquatic, semi-aquatic and terrestrial wildlife communities into a lake favored by only a few species. Several species which are uncommon in the area would suffer disproportionately high impacts if the project is built as proposed.

EPA-15 As currently proposed the project would jeopardize the existing salmon fishery present at the site and imperil the success of the federally funded salmon restoration program in the Penobscot basin. Moreover, the Basin Mills dam would have substantial adverse impacts to the recreational values of the site with the loss of approximately 88% of the existing Atlantic salmon fishing sites.

EPA-16 In addition to complying with the requirements of the National Environmental Policy Act, this proposal requires a Clean Water Act (CWA) Section 404 permit. In order for a Section 404 permit to be issued for this proposed action, it must comply with the requirements of the EPA Section 404(b)(1) Guidelines (Guidelines). A series of key requirements at 40 CFR 230.10 prohibits issuance of a permit if it would result in an avoidable or significant adverse impact to the aquatic environment. The Guidelines specifically prohibit discharges which would either cause or contribute to either violations of state water quality standards or significant degradation of waters of the aquatic environment (see generally Section 230.12). Based on the record currently available to us, EPA concludes that the Basin Mills project would violate state water quality standards and would cause or contribute to significant degradation of the aquatic environment. The basis for this conclusion is set forth below.

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[1] The proposed project would impound the last 3.6 mile stretch of river between Veazie and Milford.

EPA-14 We have addressed project impacts on wetlands, uplands, and riverine habitat in Section 4 of the FEIS. You do not provide any data or detailed evidence to support your statements made here (e.g., "...a broad array..", "....few species") Thus, you provide no basis for modifying our analyses or conclusions.

EPA-15 As we state in Appendix F (pg. F-30), the Atlantic salmon fishing sites to which you refer are not "existing" but only potential fishing sites. However, under our preferred Alternative 4, these salmon lies would not be affected.

EPA-16 See response EPA-5, above.

A. Impacts to the Aquatic Environment

EPA-17

The Guidelines strongly protect "special aquatic sites."[2] The Basin Mills project would damage two types of special aquatic sites, wetlands and riffle and pool complexes. In disrupting these fragile habitats, the project would adversely affect fisheries, wildlife and recreational values.

According to the dEIS (page 4-88) and Bangor Hydro-Electric Company's (BHE) Wetlands Study (December 1993), the proposed Basin Mills project will permanently impact 16.7 acres of wetlands (3.6 acres of fill, 9.3 acres of excavation, and 3.8 acres of inundation). These documents state that a total of 81.7 acres of wetlands within federal jurisdiction are present in the Basin Mills project area and that 53 acres of "bottomland forest" would be lost.

EPA continues to question BHE's estimates of impacts to aquatic habitats associated with the Basin Mills dam; it appears BHE has not included all the adverse effects of inundation in calculating wetland impacts. In fact, FERC's staff found that approximately 41 acres of wetlands would be "permanently affected by the proposed Basin Mills Project" due to excavation, filling, inundation, and mitigation (dEIS page 4-89).[3] Specifically, 21.2 acres of forested wetlands, 11 acres of scrub-shrub wetlands, 7.1 acres of emergent wetlands, 0.2 acres of aquatic bed and 1.1 acres of unconsolidated shore would be affected by the proposed project. EPA recommends the EIS display the acreage of wetlands filled and altered by the proposed project; converting forested and scrub-shrub wetlands into

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[2] Section 230.10(a)(3) sets up two rebuttable presumptions when an applicant proposes to fill special aquatic sites in order to carry out a non-water dependent activity. An activity is non-water dependent if it does not require access or proximity to or siting within a special aquatic site to fulfill its basic project purpose. The project purpose of generating electrical capacity can be achieved in a variety of ways that are not water dependent (i.e., other than hydro power). Therefore, in this case, the basic purpose of the proposed activity is not water dependent. The two presumptions contained in the guidelines are as follows: first, the guidelines presume that practicable alternatives that do not involve special aquatic sites are available, unless clearly demonstrated otherwise. Second, the guidelines presume that alternatives that do not involve special aquatic sites are less environmentally damaging to the aquatic ecosystem, unless clearly demonstrated otherwise.

[3] BHE considers conversion of existing wetlands into wetlands with a more "permanent hydroperiod" (e.g., inundation) as wetland enhancement, and counts this conversion as mitigation.

EPA-17 Opinion noted. The Commission's interpretation of Section 230.10(a) of the Clean Water Act will be addressed in the order for the project.

EPA-18 open water and emergent marsh is an impact that must be assessed and which normally requires compensatory mitigation under Section 404 of the Clean Water Act.

EPA-19 The dEIS states that there will be a net loss of 53 acres of bottomland forest; this use of the term "bottomland forest" is unclear. Bottomland forest typically refers to forested wetlands in riparian areas; if the bottomland forest referred to in the dEIS consist in whole or in part of forested wetlands, then the wetland impact is higher than FERC's estimates. Subsequent NEPA documents should clarify use of this term and if, in fact, the areas termed "bottomland forests" are upland, the EIS should refer to them as upland forests.

EPA-20 As EPA has stated in previous letters to FERC, the Habitat Evaluation Procedure (HEP) analysis included in the dEIS does not provide a completely accurate portrayal due to the specific wildlife species which were chosen for the analysis. In particular, it appears as though BHE restricted its guild species to those for which there are existing habitat models. The species chosen for the HEP analysis (beaver, mink, muskrat, gray squirrel, eastern meadowlark, and wood duck) do not appear to adequately represent the species in the project area.[4] BHE should have chosen species appropriate for the habitat in the project area, and if no models existed for these species, models should have been developed.[5] In fact, despite the conclusion in the dEIS that the proposed project would result in a net increase in 54 average annual habitat units (AAHUs), FERC concedes that "[w]ildlife that prefer a riverine habitat or bottomland forest would have less available habitat" (dEIS page 4-83). Given the fact that the species chosen for the HEP analysis resulted in a net increase of AAHUs, despite the definite loss of habitat for forested and riverine species, it is clear that the species used in the HEP did

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[4] For example, the eastern meadowlark is uncommon throughout New England, and prefers grasslands and open farmfields. One would not expect to find the meadowlark in the primarily forested riparian habitat found in the project area. In addition, EPA disagrees that the three furbearers chosen by BHE (mink, muskrat, and beaver) adequately represent species found in the project area. Since all three of the mammals chosen by BHE for the HEP breed in riparian subsurface areas, and forage most of the year in the water, they do not represent the spectrum of species utilizing the diverse forested, scrub-shrub, emergent, and riparian resources in the Basin Mills project area.

[5] Appropriate species for this HEP might include a migratory songbird (such as a warbler), an amphibian (such as a spotted salamander or wood frog), a raptor (such as Cooper's or sharp-shinned hawk), and a small mammal that uses forested areas (such as the red-backed vole).

EPA-18 As is stated in Section 4.5.2.1, all impacts of the Basin Mills development, including inundation, are included in staff's estimate presented as Table 4-10. We have modified the text slightly to provide further clarification. We have also included as Appendix I, maps depicting delineated jurisdictional wetlands presented by BHE in its Wetlands Study (BHE 1993). We refer EPA and other respondents to BHE's Wetlands Study Figures 13-23 for maps depicting impacts on wetlands and Figures 25-28 (Mitigation Areas 1 and 2) depicting areas (uplands and wetlands) that will be inundated by the impoundment and for which BHE proposes measures to create or improve wetland functions and values. As the FEIS states, staff has included the acreage in these two mitigation areas in our estimate of project impacts on wetlands because they would experience inundation and wetlands type conversion.

EPA-19 The FEIS has been modified to further clarify this topic; however, EPA should note that Section 3.5.2 (Terrestrial Resources) of the DEIS defined bottomland forest as typically occurring in a narrow band along the river bank and comprising mostly tree species adapted to seasonal flooding. We specifically stated in Sections 3.5.2 and 4.4.2 that BHE identified vegetation cover types discussed in this section by reviewing aerial photographs and ground-truthing, and that wetland cover types do not constitute jurisdictional wetlands. Jurisdictional wetlands are discussed in Section 3.6 and 4.5. Based on BHE's Wetlands Study, all forested wetlands in the Basin Mills Project area have been delineated. Forested wetlands within the "bottomland forest" cover type do not represent unquantified or additional wetlands.

EPA-20 The FEIS text (Section 4.4.2.1) that discusses the HEP analyses has been modified. It should be noted, however, that the HEP analyses were performed by BHE, in cooperation with FWS and DIFW, over a two-year period. At no time did the HEP team question the use of meadow lark as an evaluation species. In addition, in 1990, FWS concurred with the HEP results for the selected evaluation species (letter to F. Ayer, BHE from G. Beckett, FWS, June 1, 1990).

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EPA-20 Cont/d not adequately represent the species in the project area (e.g., those utilizing forested and free-flowing river habitats). EPA recommends a new HEP analysis using appropriate wildlife species be prepared for the Basin Mills project and be included in subsequent NEPA documents.

EPA-21 Furthermore, FERC should not rely on the Wetland Evaluation Technique (WET) functional assessment as an adequate representation of wetland functions and values. Although useful to a degree, WET places higher value on waterfowl and emergent wetlands as opposed to forested wetlands and associated wildlife. WET inaccurately skews the functional assessment analysis in the dEIS; subsequent NEPA documents should supplement the WET analysis with a more complete assessment. In most cases, the U.S. Army Corps of Engineers (Corps) and the resource agencies accept a complete narrative description of the wetlands together with a WET analysis.

EPA-22 The 3.6 miles of free flowing river to be inundated by the Basin Mills project would also destroy riffle and pool complexes. The Guidelines characterize riffles as rapid movement of water over a coarse substrate, resulting in turbulent water and a high dissolved oxygen content; pools exhibit slower moving water and finer substrate. The Guidelines state that riffle and pool complexes are particularly valuable for fish and wildlife, and that modification to these complexes can reduce riverine habitat diversity. The dEIS fails to quantify the impacts to these complexes, or to demonstrate how the lost functions and values of the complexes would be offset. To qualify for a section 404 permit BHE must quantify the impacts to these special aquatic sites, examine alternatives to their destruction, and, if there are unavoidable impacts to these sites, must offer mitigation to offset the lost functions and values.[6] These impacts should be displayed in the EIS.

- Fish and Wildlife Habitat

EPA-23 In addition to the aquatic impacts discussed above the proposed project would: construct another obstacle to migrating salmon, alewife, and shad;[7] reduce biodiversity among aquatic

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[6] However, BHE's and FERC's plans to stocking, trap and truck anadromous fish, even if successful, would not fully mitigate for the loss of riffle and pool complexes. In addition to being extremely valuable for anadromous fish, these complexes also provide habitat for other aquatic species as well as improve water quality. BHE and FERC must develop mitigation for any unavoidable impacts to these riffle and pool complexes that will compensate for lost functions and values.

[7] Average upstream passage efficiency for Atlantic salmon at each dam equals 92% (for an average loss of 8% of passing salmon at each facility) (dEIS page 4-27); for shad, which are less efficient

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EPA-21 The DEIS did not rely solely on the results of WET. BHE's Wetlands Study (1993) provides narrative descriptions of wetlands and expected impacts, and we included this type of information in our assessment. If regulatory agencies find the assessment information in BHE's 404 permit application deficient, they can require BHE to provide additional descriptions or analyses.

EPA-22 Information about riffle and pool habitats has been added; see Sections 3.6 and 4.5.

EPA-23 We have assessed the effects of the proposed project on fish, wildlife, plants, wetlands, biodiversity, and threatened and endangered species in Section 4 of the FEIS. We conclude that BHE's proposed mitigation would compensate for the expected unavoidable impacts under Alternative 3, but acknowledge that there is uncertainty regarding the ecological function and value of the habitats created as mitigation.

EPA-23 Cont'd

macroinvertebrates, native fish species, and possibly other taxa such as birds, reptiles, amphibians, and mammals; and, likely result in an adverse impact to several state and federally listed species.[8] The loss of 41 acres of primarily forested and scrub-shrub wetlands in a riverine habitat is of particular concern to EPA. Based on our examination of the dEIS species list and a field visit to the project site, EPA believes the affected wetlands support a valuable and diverse array of wildlife.[9] The wetland impacts, taken in concert with the impacts to fisheries and water quality, would result in significant adverse effects on the productivity and ecological stability of the lower Penobscot River basin. Moreover, the mitigation proposed by the applicant would not adequately compensate for these expected impacts.

EPA-24

The dEIS recognizes the detrimental effect on fisheries from construction of another dam on the Penobscot River, stating "... Basin Mills construction reduces nursery habitat and introduces an additional incremental increase in upstream and downstream mortality" (dEIS page 4-74), and "[b]ecause the dam would be in the lower river, Basin Mills-related mortality would affect virtually the entire basin-wide stock of adult and juveniles of each species [salmon, alewife and shad]" (dEIS page 4-18). Impacts that affect fisheries include, among others, modification of the physical habitat by inundation, and blockage of upstream migration and downstream passage. However, rather than evaluating how mitigative measures could lessen these impacts, FERC concludes in the dEIS that a successful "wild" salmon restoration effort was not

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in their use of passageways, losses range from 20% to 40% of adults per dam (dEIS page 4-32).

EPA-25

[8] Bald eagles would be adversely affected by the project in two ways: (1) bald eagles utilize this free-flowing segment of the Penobscot River for winter feeding (the free-flowing segments are less likely to freeze than impounded areas); (2) bald eagles prey on migrating fish in the spring and early summer (bald eagle nesting season). Although no nesting pairs currently inhabit the areas that would be inundated by the Basin Mills project, a pair of eagles has recently set up a territory in the area. USFWS expects this pair will nest directly in the Basin Mills project area in the spring of 1995 (personal communication, W. Mulhaney, USFWS, January, 1995).

EPA-26

[9] Although the species lists provided by the applicant indicate that a wide array of wildlife utilize the project area, there are omissions, some of which are notable. For example, wintering bald eagles frequent the Milford dam site, but are not included on the list. The EIS should clarify how the species lists were developed; if they were based on incidental observations only, the EIS should indicate that the lists are incomplete.

EPA-24 See response EPA-6, above. In our fisheries impact assessment using the ASAL model (see Section 4 and Appendix E), we considered five different measures of potential impact, including: year in which a fully restored run size would be reached; probability of a fully restored run size existing 50 years after licensing; numbers of smolts and adults lost; and, expected run size 50 years after licensing. We did not rely on a single measure in our assessment, although we chose one (median run size 50 years after licensing) to focus our comparison of alternatives. However, we have added text to explain the uncertainty associated with the model outputs, to emphasize that they are only of value in comparing alternatives and not in making specific predictions of fish population size.

EPA-25 Regarding Footnote 8, FERC consulted with FWS and DIFW in December 1994 and February 1995 and requested that BHE conduct winter surveys of bald eagle distributions along the Penobscot River and a nesting survey of the Basin Mills project area. The results of these studies are included in the FEIS in Sections 3.7 and 4.6 and in a bald eagle Biological assessment included as FEIS Appendix H.

EPA-26 Section 3.5.2 clearly states that BHE only conducted reconnaissance-level surveys of wildlife for the Stillwater, Orono, and Milford developments.

EPA-24 Cont'd

attainable under any of the alternatives evaluated.[10] EPA believes FERC, in making this determination, has inappropriately focused on numerical projections for future anadromous fish runs rather than the fundamental goal of the comprehensive plans for restoring self-sustaining fish runs and historic habitat. The proposed Basin Mills project is in direct conflict with the goals of the pending revision to the Atlantic Sea Run Salmon Commission (ASRSC) Strategic Plan (updating current 1984 Plan) which focuses on restoration and enhancement of Atlantic salmon habitat and naturally-reproducing populations within historic habitat in Maine.

- Biodiversity

EPA-27

EPA agrees with FERC that aquatic biodiversity[11] would be adversely affected by the proposed project; however, we do not agree that this impact is restricted to lower trophic levels.[12] Moreover, we believe that the project area would suffer a loss of biodiversity due to the conversion of forested and scrub-shrub wetlands into emergent and open water areas.

The dEIS states that the project area "does not contain any unique or sensitive environments that are not present elsewhere in the basin" (dEIS page 4-101). EPA does not believe that this is the threshold question to be examined when assessing impacts to biodiversity. Rather, as FERC itself states in the dEIS, one of the objectives of preserving biodiversity is to ensure that rare or unique species or assemblages, together with their habitat, are not significantly altered. FERC also correctly states that biodiversity conservation involves, among other things, promoting native species and maintaining the natural processes and structural diversity of ecosystems. In this case, several federally listed, state listed, and candidate threatened and endangered species live, or have the potential to live, in the project area.[13] Therefore,

EPA-27 We agree that invertebrate species contribute to biodiversity and revised the FEIS text to clarify this. The FEIS concludes that the loss of benthic communities characteristic of riffle habitats does not significantly affect regional biodiversity because the composition of benthos in the Basin Mills rips is the same as in non-impacted riffle sites elsewhere in the basin. However, local biodiversity would be altered.

We agree that the conversion of natural wetlands types to other wetlands types results in the loss of biodiversity and have modified the FEIS text to clarify this. For those wetlands of concern that have already been modified, we conclude that conversion does not result in a loss of regional biodiversity.

We stand by our use of unique or sensitive environments as valuable measures of biodiversity, especially as surrogates for species that are not considered individually.

We have revised the FEIS to include an assessment of the effects on additional listed and rare species (i.e., Barrow's goldeneye, 5 mussels, and 2 dragonflies). We conclude that the project would not have significant adverse effects on these species or on biodiversity.

We have revised the FEIS text to address the effect of converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in an existing mosaic of impounded and non-impounded reaches would not be affected.

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[10] This conclusion is based on FERC's use of U.S. Fish and Wildlife Service's ASAL model. As noted in USFWS comments on the dEIS, USFWS found significant flaws in FERC's run of the model.

[11] In simple terms, biodiversity can be defined as the abundance (numbers of individuals) and richness (number of species) of living organisms, together with the ecological complexes in which they live.

[12] Even if this reduction in biodiversity were restricted to invertebrates, EPA-New England considers this an impact of concern.

[13] The United States Fish and Wildlife Service (USFWS) states that the bald eagle (a federally endangered species) exists in the project area and may be adversely affected by the proposed project (from both bioaccumulation of dioxin and loss of habitat - see USFWS dEIS comment letter). In addition, USFWS believes that five

EPA-27 Cont/d

given the magnitude of impact proposed (i.e., impoundment of 3.6 miles of free-flowing river, destruction or substantial alteration of 41 acres of wetlands), EPA believes that rare species may indeed be affected adversely by the proposed project. In light of this information, the EIS should reassess project related impacts to these species and to biodiversity as a whole.

The conversion of the last free-flowing segment of the Penobscot River in the 12 mile reach between Milford and Bangor into an impoundment will deplete regional biodiversity; in particular, it will alter the structural diversity of the ecosystem.[14] As FERC states in the dEIS, exotic fish species will benefit to the detriment of native species such as Atlantic salmon. This type of conversion unquestionably contributes to a loss of biodiversity.

EPA-28

Furthermore, EPA considers the conclusions drawn from the dEIS cluster analysis and the Hilsenhoff Biotic Index to be faulty. The analyses examine aquatic macroinvertebrates in the project area and compare the taxa present in impoundments to riverine reaches of the Penobscot River. The dEIS concludes that there is a significant difference in invertebrate communities between the impounded and riverine habitats,[15] but that the invertebrate communities found in both the riverine and impounded areas are "indicative of good water quality." EPA is concerned about the validity of this conclusion as the Hilsenhoff Biotic Index is designed for running water, not impoundments. Unless FERC modified the Hilsenhoff test to work appropriately on lentic habitats (i.e., impoundments), the conclusion about water quality impacts in the impounded areas is

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of the rarest freshwater mussel species in Maine may occur in the project area. All five are proposed for state listing; two are candidate federal species. Two species of dragonfly (both candidate species for federal listing and proposed state threatened or endangered species) could also occur in the project area. Barrow's Goldeneye (proposed for designation as a species of Special Concern at the state level) also utilizes the project area. Two state listed plant species would be impacted by the proposed project.

[14] Specifically, the proposed project would convert 3.6 miles of free-flowing river into an impoundment and alter 41 acres of primarily forested wetlands. The structural diversity is therefore diminished; a full 12 miles of river between the Veazie and Milford facilities will be impounded, the last free-flowing stretch of river in this reach will be lost, and forested wetlands will be replaced by open water and emergent marsh.

[15] In fact, the data show benthic macroinvertebrate abundances are 10 - 50% lower in impoundments than in riverine habitats.

EPA-28 FERC agrees that the HBI has limited utility for biodiversity analyses and it has been eliminated from the FEIS. However, the impoundments on the lower mainstem of the Penobscot River exhibit low residence time and high flushing rates, and are more similar to large river pools than totally impounded waterways. The characteristics of the benthic communities are consistent with this characterization. We have revised our analysis to base our FEIS conclusions solely on the community composition data. These data reveal differences in the benthic invertebrate communities and suggests a reduction in aquatic biodiversity would occur at the site. At the same time, there is no evidence of the loss of rare benthic species or unique assemblages that significantly contribute to regional biodiversity. Regarding footnote 16, by issuing a 401 WQC for the project, the State of Maine disagrees with your interpretation of Maine's water quality standards and statutes.

EPA-28 Cont/d potentially incorrect.[16]

EPA-29 Finally, the dEIS states that because fish prey on all species found in both the impoundments and the riverine segments, the loss of biodiversity would not "propagate to higher trophic levels." The EIS should take into account the fact that other wildlife species also prey on aquatic invertebrates (and may be adversely affected by the shift in species composition), and that the loss of biodiversity among the invertebrates themselves is an issue of significant concern.[17]

B. **Water Quality Impacts**

EPA-30 EPA believes the impacts associated with the proposed Basin Mills project would adversely affect existing and designated uses mandated by Maine's water quality standards for the Penobscot River and also are inconsistent with the state's antidegradation policy.

The Penobscot River is protected as a Class B water under Maine's water quality standards. Designated uses specified under the Class B water quality standards include, among other things: fishing; recreation in and on the water; unimpaired habitat for fish and other aquatic life; and hydropower generation. Additionally, discharges to Class B waters cannot cause "adverse impacts to aquatic life in that the receiving waters must be of sufficient quality to support all aquatic species indigenous to the receiving water without detrimental changes in the resident biological community" (38 M.R.S.A. Section 465(3)(C)).

Maine's water quality standards require protection of the entire spectrum of indigenous aquatic life existing or known to have existed in the Penobscot River. Atlantic salmon, shad and alewife are indigenous to the Penobscot River and are part of the resident biological community expected to exist in this reach of the river.[18] Furthermore, the dEIS recognizes the historic

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[16] Maine's water quality standards and antidegradation statute protect existing conditions; the loss of the existing condition by converting riverine habitat to impounded waters would be inconsistent with the standards and the statute regardless of whether the new impoundment supported "good water quality."

[17] Neither the Section 404(b)(1) Guidelines or the CEQ memorandum on biodiversity distinguish among species at different levels on the phylogenetic scale. Not only are invertebrates a critical component of the aquatic food chain, but they are afforded the same protection as higher trophic level species.

[18] Indigenous means "supported in a reach of water or known to have been supported according to historical records compiled by State and Federal agencies or published scientific literature."

EPA-29 We have been unable to identify any other major wildlife species, beside fish, that are present in the Basin Mills area and that rely on in-river freshwater macroinvertebrates as their primary prey. You have provided no data or information to substantiate your comment, and we thus retained our existing discussion. Also, see response EPA-28, above.

EPA-30 The State of Maine, through its issuance of a 401 WQC for the Basin Mills project, has confirmed that the proposed project meets Maine's water quality requirements and statutes (FERC may only proceed with consideration of a license for a proposed project after a valid 401 WQC is issued). Maine's action in issuing a WQC has been upheld in two court proceedings to date (see response EPA-5, above). On this basis, we disagree with your interpretation of compliance of the project with water quality standards.

**EPA-30
Cont/d**

significance of these fisheries (dEIS page 3-18 to 3-30). Hence, Maine's Class B water quality standards clearly protect these species.

To meet the requirement that these species be supported in the resident community without detrimental changes, the habitat necessary to maintain self-sustaining populations of Atlantic salmon, shad and alewife must be unimpaired and accessible. Therefore, the Class B designated use of fishery habitat for the Penobscot River requires restoration of self-sustaining fisheries for salmon, shad and alewife. Moreover, in various planning documents, Maine has identified restoration of self-sustaining populations of salmon, shad and alewife as a goal for the Penobscot River. (e.g., Strategic Plan for Management of Atlantic Salmon in the State of Maine, Atlantic Sea Run Salmon Commission, 1984; Penobscot River Shad and Alewife Potential, Maine Department of Marine Resources, 1984). Additionally, the USFWS has had an ongoing Atlantic Salmon program on the Penobscot River which has expended millions of dollars since the 1960s.

Maine's federally approved antidegradation statute provides special protection of existing instream water uses and the level of water quality necessary to assure that these uses are maintained and protected (38 M.R.S.A. Section 464(4)(F)). Existing uses to be protected include recreation in and on the water, fishing, aquatic life, plant life, and wildlife utilizing the water and habitat, including significant wetlands within a waterbody which support wildlife or aquatic life, and plant life maintained by the waterbody. Compliance with the antidegradation statute requires a demonstration that the proposed activity will not have a significant adverse impact on existing uses. "Significant adverse impact" is defined as "impairing the viability of the existing population, including significant impairment to growth and reproduction or an alteration of the habitat which impairs viability of the existing population." The antidegradation policy applies to all new or increased discharges and activities having the potential to lower water quality, such as the proposed project.

Information from the Atlantic Sea Run Salmon Commission and the Maine Department of Marine Resources indicates that the river currently supports small self-sustaining populations of salmon, shad and alewife, as well as other riverine aquatic communities. These aquatic communities are existing uses that must be protected to meet the state's antidegradation requirements. Maine's Section 4 water quality certificate acknowledges that existing uses at the proposed Basin Mills site includes "nursery habitat for Atlantic salmon" and "migratory pathway for anadromous fish" (State Water Quality Certificate pages 53 and 55).

EPA-30
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38 M.R.S.A. §466(8).

EPA-30 Cont/d In order to ensure that the designated and existing uses of the Penobscot River are met, any FERC hydropower license must include appropriate conditions. Based on our review of the dEIS, EPA remains concerned that, despite conditions proposed by FERC and imposed the State, the project would fail to comply with applicable water quality standards.[19] EPA's concerns regarding the proposed project's impacts are detailed in this letter and are part of the public record in EPA comments and recommendations to FERC and to the State of Maine regarding its draft water quality certification (e.g., March 26, 1993 letter from Ronald Manfredonia to Lois Cashell; February 3, 1993 letter from Ronald Manfredonia to Dana Murch). Our comments in those previous letters are hereby incorporated by reference into this review.

- Toxics - Dioxin

EPA-31 According to Maine's 1994 Water Quality Assessment, a biannual report submitted to Congress pursuant to §305(b) of the Clean Water Act, the lower Penobscot River is not attaining its designated use for fishing due to dioxin contamination.[20] Moreover, since February 1992, a State of Maine fish consumption advisory for dioxin has been in place for the Penobscot River, in direct contradiction to the conclusions in the dEIS that fish tissue levels of dioxin do not pose a human health risk (dEIS page 3-12). EPA believes the role played by dams on the lower Penobscot River

EPA-31 FEIS Section 3.3.1.3 has been rewritten to include additional information on dioxin in the lower Penobscot River, as provided by various respondents. We have included information on the greater uncertainty with respect to the health risks of consuming fish from the lower river. However, neither you nor other respondents have provided any new evidence to suggest that proceeding with the project as proposed would change these alleged health risks. We thus have not altered our discussion of potential project impacts relating to toxics.

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[19] Our concerns that the Basin Mills project will violate Maine's water quality standards remain despite the Maine Department of Environmental Protection issuance of water quality certification for the project on November 10, 1993. EPA believes Maine's water quality certification is fundamentally incompatible with, among other things, the goal of the state water quality standards of restoring self-sustaining anadromous fisheries to the Penobscot River. Fish trapping and trucking, without incorporating other measures to foster restoration of self-sustaining fisheries, such as removal of an existing mainstem dam, does not adequately offset adverse project impacts.

[20] EPA is currently evaluating the issue of dioxin in the Penobscot River in the context of reissuing a federal wastewater discharge permit to a bleach kraft pulp and paper mill in Lincoln, ME. The discharge permit for the Lincoln Pulp and Paper Mill is currently being drafted to ensure that the wastewater discharge will, among other things, protect human health and aquatic life, taking into account the Penobscot Indian Nation's fishing rights (reserved under the Maine Land Claims Settlement Act of 1980), and will not jeopardize the continued existence of the bald eagle. EPA's efforts, however, do not eliminate FERC's responsibility during the hydropower licensing process of ensuring that the construction and operation of hydropower facilities will not worsen the existing dioxin contamination problem in the river.

EPA-31 Cont/d with regard to the fate and transport of toxins such as dioxin has not been adequately examined. EPA recommends the EIS reflect the uncertainty about this relationship and the need for continuing investigations on this issue.

- Toxics - Mercury

EPA-32 Despite acknowledging research showing elevated levels of mercury in fish in recently formed reservoirs,[21] FERC's dEIS does not consider the impact that creation of a new impoundment at Basin Mills may have on mercury concentrations in fish and wildlife tissue. Maine issued a health advisory on May 18, 1994, regarding mercury contamination of freshwater fish. The advisory recommends pregnant women, nursing women, and women of childbearing age refrain from eating any fish from the state's lakes and ponds; all others are recommended to eat no more than six large fish to twenty-two small fish meals per year. As mercury is already a matter of concern in this river basin, EPA believes the EIS should evaluate the fish mercury contamination potential as a result of the construction of the Basin Mills dam. Additionally, the EIS should include appropriate measures to mitigate any adverse impacts.

- Temperature

EPA-33 EPA believes the unpaired t-test used in the dEIS to compare the temperature data for impounded versus riverine habitats is inappropriate for the collected data.

EPA conducted a statistical analysis on the 1993 temperature data for Freese Island (a free-flowing site upstream of the Milford impoundment), the Milford impoundment, and the area immediately upstream of the Great Works Dam, using appropriate methodologies.[22] This analysis demonstrated that water temperatures at Freese Island were significantly cooler than water temperatures at Milford, which were in turn significantly cooler than those at Great Works. The mean temperature difference between the Freese Island site and Great Works in 1993 was 0.33°C (although daily temperature differences could be much higher than this). This analysis indicates that the particular free-flowing site examined is significantly cooler than impounded areas downstream, and that the cumulative impact of numerous impoundments may lead to even higher temperatures farther downstream.

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[21] Penobscot River Basin DEIS for Ripogenus Hydroelectric Project (FERC No. 2572) and Penobscot Mills Hydroelectric Project (FERC No. 2458), November 1994.

[22] A non-parametric Kruskal-Wallis test was run as the data were not normally distributed.

EPA-32 Section 3.3.1.3 has been revised to include information on mercury in Maine's aquatic environment. However, we have no evidence that mercury contamination problems, if presently existing in the area, would be worsened by construction of the Basin Mills impoundment. The Basin Mills impoundment would be a very small reservoir as compared with some of those in the Ripogenus and Penobscot Mills projects referred to by EPA. Thus, we have not altered our discussion of potential project impacts relating to mercury.

EPA-33 We have re-evaluated the temperature data provided by PIN and the comments from EPA, PIN, and others on the statistical analysis performed on the data. Section 4.2.2.2 has been revised to include the new analyses and our evaluation of possible temperature impacts on fish.

EPA-33 Cont/d

EPA is concerned that temperature increases may lead to increased mortality in salmon during migration through impoundments (see EPA's March 23, 1993 comment letter and PIN's pre-filed direct testimony to the Maine Board of Environmental Protection, November 16, 1992). We believe the dEIS does not adequately address these concerns. According to the U.S. Fish and Wildlife Service, temperatures in excess of 73°F can retard or entirely halt upstream migration of salmon (U.S. Fish and Wildlife Service, Atlantic Salmon Restoration in New England, Final Environmental Impact Statement 1989-2021, 1989). According to data provided to FERC by the PIN, the maximum temperature for almost the entire month of August, 1993 exceeded 73°F (Attachment 4 of letter from Paul Bisulca, Penobscot Indian Nation (PIN), to Lois Cashell, December 20, 1993). The additional temperature increases that would result from creation of another impoundment on the Penboscot River as a result of constructing the Basin Mills dam, would worsen this problem. If the Basin Mills dam is constructed, salmon will be forced to migrate through 12 continuous miles of impoundments, without any free-flowing, cooler river segments. The National Marine Fisheries Service (NMFS) believes that the increased temperature associated with another Penobscot River impoundment, in waters already marginal for temperature, could have adverse impacts on salmon and shad during migration (personal communication, M. Colligan, NMFS, 1/9/95).

EPA believes the increase in water temperature associated with dams on the Penobscot River have not been adequately analyzed and that FERC must reconsider the cumulative impacts of the existing impoundments and the impact of an additional dam on water temperature. To the extent that the proposed Basin Mills dam will intensify these impacts, the FERC hydropower license must contain appropriate mitigation measures to ensure that there is no increase in cumulative temperature impacts on the Penobscot River. Maine's water quality certificate requires that a post licensing study be conducted to confirm that this is not a problem following dam construction; we believe that this issue must be addressed and mitigation developed prior to licensing of the Basin Mills project and before construction of any new dams on the Penobscot River.

EPA-34

For the reasons set forth above, EPA believes that the adverse impacts resulting from the construction of the Basin Mills project as currently proposed are inconsistent with Maine's water quality standards. In order for the designated uses to be met, the EIS must evaluate project alternatives and/or mitigation that allow and promote the restoration of the fishery community consistent with Maine's water quality standards. At a minimum, this mitigation must include replacement of the habitat inundated by the Basin Mills impoundment to compensate for the cumulative impacts to migrating fish from an additional dam; removal of one or more existing mainstem and tributary dams may offset these impacts.

EPA-34 See response EPA-30, above.

C. Recreation

EPA-35

EPA believes the project-related loss of 71 of the currently existing 81 rods for Atlantic salmon fishing between the existing Veazie impoundment and the Great Works tailrace (dEIS page 4-128) represents a significant adverse impact to recreation opportunities on the Penobscot River.

EPA believes the dEIS discussion of the loss in angling opportunity on the Lower Penobscot River from construction of the Basin Mills facility, with regard to the State water quality standards' designated and existing uses of recreation, is inadequate. In particular, the dEIS fails to consider the loss of rods in the reach between the Veazie impoundment and Great Works dam as a loss in existing use, insofar as they are currently utilized, or as an impediment to future enhanced attainment of the designated use of fishing in this reach as the salmon restoration effort progresses. Additionally, EPA does not believe that this impact to recreational fishing would be adequately mitigated by increasing access to existing fishing rods. Rather, loss of these rods could only be mitigated by creation of additional rods.[23] The EIS should address more thoroughly the impact of the proposed project with regard to the anticipated increase in demand for Atlantic salmon fishing opportunity, discuss appropriate mitigation measures to offset the loss of fishing opportunities associated with the proposed development, and discuss compliance of the proposed project with Maine's designated use of fishing.[24]

EPA-36

EPA is also concerned about the impact to salmon fishing downstream of the Veazie facility from construction of the proposed Veazie Plant C. The dEIS does not address the need for more accurate hydrological modeling of changes to fishing opportunities below Veazie nor does the dEIS explain the basis for the assertion of minimal impacts to recreational fishing opportunity from the proposed Veazie construction (dEIS page 4-129). EPA believes that the EIS must contain a thorough examination of the projected impacts to the existing Atlantic salmon fishing opportunities from this component of the proposed action.

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[23] Additional rods may be created through the breaching of an existing mainstem dam, thus returning currently impounded areas to a free-flowing state.

[24] FERC concludes (dEIS page 4-54 and 4-55) that the impacts from construction of the Basin Mills facility to Atlantic salmon would be minimized by eliminating sport harvesting of salmon; FERC recommends BHE cooperate with the fisheries agencies in efforts to limit salmon harvest. Such an effort, however, would result in further impacts to recreation uses on the Penobscot River.

EPA-35 See response EPA-15, above.

EPA-36 These issues are addressed in detail in Appendix F, pgs. F-8 to F-11.

III. Project Alternatives

FERC advances five Basin Mills alternatives for consideration in the dEIS: 1) the no-action alternative; 2) construction of the Basin Mills project as proposed by Bangor Hydro-Electric Company (BHE); 3) construction of the Basin Mills project as proposed by BHE but with additional FERC staff modifications; 4) not constructing the new Basin Mills dam, relicensing Veazie (with or without increased power), and decommissioning or refurbishing the Orono facility; and 5) not constructing Basin Mills, refurbishing and relicensing Orono, and decommissioning and removing the Veazie dam. All five alternatives include the relicensing of Stillwater and increasing power generation capacity at Milford.

A. Purpose and Need

EPA-37

The Council on Environmental Quality (CEQ) NEPA regulations require that the EIS contain a statement of the underlying purpose and need to which the lead federal agency is responding by its consideration of the proposed action and the alternatives to that action (40 CFR §1502.13). The identification and evaluation of an appropriate set of project alternatives, which is the substance of the EIS, is based on the purpose and need statement.

Similarly, under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (Corps), in consultation with EPA, develops a basic project purpose for each proposed project. The Corps typically defines the project purpose in a broad sense in order to allow consideration of a reasonable range of alternatives pursuant to Section 230.10(a) of the EPA 404(b)(1) guidelines. A project purpose drawn too narrowly may preclude consideration of less environmentally damaging practicable alternatives.[25]

In the dEIS, FERC states that BHE's proposal would increase generating capacity from 19.1 MW to 64.4 MW of "nonpolluting, low-cost hydropower." This increased capacity would be used to help offset the predicted increase in New England peak capacity demand through the year 2002 of 2.4 percent (557 MW) in the summer months and 2.1 percent (445 MW) in the winter months. Additionally, the dEIS states that the three projects proposed by BHE are in the New England Power Pool (NEPOOL) area; the energy derived from these proposed projects would presumably be sold to NEPOOL. NEPOOL has expressed a "long-term need" for energy, and BHE proposed the Basin Mills project in response to this need.

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[25] Although no application has been filed for an Army Corps of Engineers Clean Water Act Section 404 permit, the proposed project must eventually satisfy the requirements of Section 404. Therefore, EPA recommends that the purpose and need statement and the alternatives analysis address the requirements of both NEPA and Section 404.

EPA-37 The Purpose of Action (1.1) and Need for Power (1.2) sections of the EIS have been revised to reflect these and other comments received from respondents. The purpose of the action will also be addressed in the orders to be issued for these projects.

EPA-37 Cont/d

EPA believes that the dEIS discussion of basic project purpose and need for power in New England, and the minimum amount of power that would be sufficient to meet actual needs, is inadequate for purposes of NEPA and the Section 404 analysis.[26] Specifically, the dEIS does not present any data to support the contention that existing power sources in the region are inadequate to meet future demands. Moreover, FERC should clarify why the need for power is expressed only through the year 2002 when the proposed term of the dam license is 50 years. If power demand through the year 2002 can be satisfied with shorter term projects which cause less environmental damage (e.g., conservation, increased efficiency of existing powerhouses, etc.) than the Basin Mills proposal, the feasibility and practicability of these alternatives must be evaluated and documented in FERC's EIS.

For purposes of the NEPA evaluation as well as for the Section 404 analysis, EPA believes that the project purpose should be "to provide electrical generating capacity to assist in meeting NEPOOL's projected demands."[27] This purpose would require BHE and FERC examine a suitable range of alternatives which could contribute towards meeting future power needs of the region.

B. Range of Alternatives

EPA-38

CEQ's regulations implementing NEPA require consideration of a reasonable range of alternatives; reasonable alternatives are practicable and feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant. Given the basic project purpose stated above, EPA considers the range of alternatives considered in the dEIS too limited for purposes of NEPA and Section 404 of the Clean Water Act.

In its consideration of alternatives, FERC rejected all

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[26] The EIS should, for the purposes of compliance with NEPA and Section 404, disclose BHE's anticipated distribution of the newly generated power. Specifically, BHE should state whether the 64 MW of power generated by the Basin Mills facility and the refurbishing of existing dams would be sold to NEPOOL, or if it would be used to decrease the amount of power currently purchased from NEPOOL (for use by customers within the BHE service area).

[27] BHE currently provides power to a portion of six counties in eastern Maine, covering approximately 4,850 square miles. The total population of this service area is approximately 190,000. BHE sells 39% of its kilowatt hours to industry, 31% to residences, and 29% to commercial entities. BHE generates 20% of its power from hydro, 19% from nuclear, 19% from bio-mass refuse, and 7% from oil. The remaining 35% of BHE's power comes from NEPOOL.

EPA-38 We have addressed the issues you raise in our revisions to the Need for Power section (1.2) of the EIS. See also our response to Conservation Intervenors comments, CI-7.

**EPA-38
Cont/d**

"nonexclusionary" energy sources[28] as not being "reasonable alternatives to each other" (dEIS page 2-25). Examples of these nonexclusionary energy sources include improvements in efficiency of existing hydropower generation, energy conservation, purchasing power, and wind generation. If the basic project purpose is to provide adequate electrical generating capacity to assist in meeting NEPOOL's projected demands, and these nonexclusionary sources have the potential to provide generating capacity in the NEPOOL area and are otherwise reasonable, then they should be considered as possible alternatives. Moreover, it is likely that some of these nonexclusionary sources are far less environmentally damaging than hydropower (e.g., conservation and improvements in efficiency of existing hydro sources). At a minimum, the EIS must demonstrate that the forecast on which the need for additional power has fully considered implementation of energy conservation measures and adoption of other nonexclusionary power sources. Such a demonstration would be necessary to document that the proposed action on the Lower Penobscot River is balanced against the universe of other reasonable and practicable power generating alternatives being considered in the BHE and NEPOOL service areas.

Similarly, FERC's dEIS summarily dismisses other alternative power sources. For example, the dEIS mentions natural gas, biomass energy, refuse as fuel, and fuel cells as possible alternatives to the proposed project. However, the dEIS rejects these alternatives as unreasonable due to air quality impacts, questions regarding the sustainability of the resource, cost, and other environmental issues. The dEIS fails, however, to document fully that these impacts are in fact sufficient to eliminate them from a more comprehensive consideration in compliance with the requirements of NEPA. For the proposed project to comply with Section 230.10(a) of the 404(b)(1) Guidelines and qualify for a Clean Water Act Section 404 permit the Corps may only permit the practicable alternative that would cause the least damage to the aquatic environment, unless that alternative would result in other "significant adverse environmental consequences." While EPA does not dispute that there are environmental concerns associated with these other options, without further analysis it is not clear that construction of a new dam on the Penobscot River is less environmentally damaging than other alternative power sources.[29]

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[28] FERC defines nonexclusionary energy sources as those that would be implemented in addition to hydropower rather than to replace hydropower. FERC explains that nonexclusionary energy sources all have low marginal costs, and are used to replace energy sources with high marginal costs (such as fossil fuels) rather than being used to replace each other.

[29] The dEIS does present a table displaying the comparative costs of the Basin Mills development, natural gas, biomass, refuse, and fuel cell alternatives. However, FERC concludes that

EPA-38
Cont'd

EPA-39

Finally, FERC does not consider other hydropower alternatives that may be less environmentally damaging than the proposed project. First, the dEIS should analyze constructing the Basin Mills dam and breaching other dams on the River; it is likely that the fisheries, recreational and water quality impacts associated with construction of the Basin Mills dam could be adequately offset by removal of at least one mainstem dam (e.g., Veazie) and one tributary dam (e.g., Howland), or by the removal of two mainstem dams (e.g., Veazie and Great Works). Second, the dEIS should evaluate constructing the proposed Basin Mills dam in a less environmentally sensitive location of the Penobscot River (e.g., relocation of the proposed dam upstream of the Basin Mills rips and the confluence of the Stillwater Branch and the mainstem of the Penobscot would preserve valuable riffle and pool complex).[30] Third, in light of the substantial environmental impacts associated with the proposed Basin Mills project, the dEIS should examine the reasonableness and practicability of smaller projects; specifically, would a lower level of increased power production than currently proposed by BHE be sufficient to assist in meeting NEPOOL's projected demands. If these smaller scale projects (e.g., energy conservation, enhanced facility efficiency) are otherwise practicable, then they should be evaluated in the EIS. EPA believes the alternatives and modifications described above fall within the range of reasonable alternatives to the proposed action and believe they must be carefully evaluated to comply with the requirements of both NEPA and the Clean Water Act.

IV. Mitigation

EPA-40

EPA believes the proposed mitigation discussed in the dEIS would not adequately offset the adverse impacts of the Basin Mills dam. First, all appropriate and practicable steps have not been taken to

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hydropower is the "least expensive" of the alternatives, as well as "nonpolluting" due to the lack of emissions. Under NEPA and Section 404, an increase in cost does not necessarily render an alternative impracticable; rather, an alternative is impracticable from the standpoint of cost when the costs are so high that the project is not economically viable. Moreover, although hydropower does not result in air emissions, it can cause other significant environmental impacts such as loss of wetlands, adverse effects to fisheries, and water quality degradation.

[30] By itself, relocation of the proposed Basin Mills dam will likely not render this project environmentally acceptable as relocation would not address the cumulative impacts from construction of an additional dam on the Penobscot River. However, relocating the Basin Mills facility may substantially decrease potential aquatic impacts and increase the prospects for developing satisfactory mitigation.

EPA-39 While NEPA requires that an EIS include a consideration of alternatives, a discussion of the alternatives need not be exhaustive and need only provide sufficient information to permit a reasoned choice among alternatives[1]. The results of our evaluation of all new suggested alternatives can be found in Section 2.3.1.2. Our analyses indicate that these alternatives offered power and fisheries benefits within the range encompassed by our DEIS alternatives. On this basis, we did not pursue any of these alternatives further.

Regarding your suggestion that a number of small generating stations throughout the basin be considered as an additional alternative, a recommendation of such far reaching consequences (e.g., where would these plants be located, what would be their environmental impacts, what are the foregone benefits of each) requires reasoned support that is commensurate with the magnitude of the recommendation. Your recommendation does not include such support. Therefore, we could not address your suggestion because of the absence of substantive evidence to support it.

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[1] See Richard Balagur, 57 FERC ¶ 61,315 at p. 62,018, citing State of North Carolina v. Federal Power Commission, 533 F.2d 702, 707 (D.C. Cir. 1976). See also the analysis in Marysville Hydro Partners, 63 FERC ¶ 61,271 pp. 62,74-44 (1993).

EPA-40 Cont/d minimize the impacts to the aquatic ecosystem, as required by Section 230.10(d) of the 404(b)(1) Guidelines. Second, even if the proposed mitigation were adequate under Section 230.10(d), it would not suffice under Section 230.10(c) to bring the impacts below the threshold of significance.[31] Specifically, the mitigation offered by BHE does not compensate for the loss of 3.6 miles of free flowing river, including the loss of spawning and nursery habitat, nor does it compensate for the alteration of 41 acres of valuable wetland habitat.

Even if the BHE proposed project, incorporating FERC staff modifications, were the least environmentally damaging practicable alternative, BHE would have to mitigate for any unavoidable impacts to waters, wetlands, and other special aquatic sites. EPA believes the conceptual mitigation presented in the dEIS is wholly inadequate to compensate for lost aquatic functions and values. EPA's concerns regarding the proposed mitigation are: 1) the proposed anadromous fish mitigation is not consistent with state water quality standards or state and federal restoration plans; 2) the wetlands estimated to be affected adversely by the project appear to be incorrectly assessed; and 3) conversion of one wetland type to another generally does not qualify as mitigation. These concerns are addressed below.

A. Anadromous Fish Mitigation

EPA-41 EPA continues to be concerned that fish stocking and proposals for trapping and trucking do not adequately mitigate for the project related loss of Atlantic salmon habitat, the conversion of 3.6 miles of free flowing river into an impoundment, and the cumulative impact to migrating fish from construction of another dam on the Penobscot River. In the dEIS, FERC has determined that the greatest benefit would be gained from utilizing any means possible to maximize the number of salmon returning to the Penobscot River; therefore, FERC supports trap and truck measures. EPA maintains that these measures are unacceptable on a permanent basis as they fail to meet the designated use goal of an unimpaired self-sustaining fishery population mandated by the Maine's water quality standards. EPA also disagrees with FERC's conclusion that BHE's proposal to trap and truck 30,000 shad and 150,000 alewife would provide adequate compensation for project related impacts to these fisheries; trap and truck measures are fundamentally inconsistent with Maine Department of Marine Resources restoration goals for large self-sustaining populations of these species in their historic habitat.

EPA-42 EPA's March 26, 1993 comment letter to FERC, raised a number of biological and logistical concerns regarding the practicability and viability of the proposed trap and truck mitigation. Our

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[31] See discussion on Section 404 Compliance (page 22).

EPA-40 We have responded to the details contained within this comment in prior and following responses; see EPA-1, EPA-2, EPA-17, EPA-30, EPA-51, and EPA-52.

EPA-41 NMFS and DOI Section 18 prescriptions for upstream and downstream fish passage facilities incorporated into our Alternatives 3 and 4 constitute significant steps toward reducing past and present impacts of the three hydroelectric projects evaluated in the Lower Penobscot River Basin DEIS on anadromous fish. These measures include: new downstream passage facilities at all developments that would reduce current downstream mortality rates; new upstream passage facilities at Orono and Stillwater dams, where passage has not been possible to date; and, improved passage facilities at Veazie and Milford that would increase upstream passage efficiency for all species. The additional mitigation measures we have incorporated into Alternative 3 (trap-and-truck from Veazie and stocking of salmon fry) would completely mitigate for the new potential impacts to Atlantic salmon attributable to the new Basin Mills dam. Trap-and-truck capability, also included in Alternative 4, would also provide for more rapid growth of alewife and shad populations than would be possible in its absence if the agencies choose to avail themselves of this potential enhancement. Taken together, these measures would result in a reduction of existing and potential impacts to and actual enhancements of anadromous fish stocks in the Penobscot River, under either Alternative 3 or 4.

EPA-42 We discuss trap-and-truck feasibility and stocking in Section 4.3. Your comments reiterate your concerns without presenting any new data or information refuting or contradicting our information source (BHE's explanation of their trucking plan, BHE 1991e). However, we have expanded the text in sections 4 and 5 to acknowledge that there remains considerable uncertainty regarding the actual efficacy of the proposed mitigation measures.

EPA-42 Cont/d biological concerns include the potential transport impacts on t fish from fluctuations in temperature and oxygen, overcrowding a stress in the transport trucks; and residual impacts, includi delayed mortality and the disorientation of released fis. Logistical concerns include the potential for truck breakdowns and labor disputes, the willingness and ability of BHE to truck sufficient numbers of fish quickly enough to avoid delaying fish movement up into spawning habitat and the potential that the applicant may not be able to provide this service for as long as the proposed dam exists. EPA is concerned that FERC's projections regarding the effectiveness of trapping and trucking fail to take these concerns sufficiently into consideration. **EPA-43** Additionally, by accepting trap and truck mitigation measures, FERC fails to adequately take into consideration its trust responsibilities; this mitigation would result in fish bypassing Penobscot Indian reservation fishing areas.

EPA-44 FERC proposes to incorporate Maine Department of Environmental Protection's water quality certification condition for a study of the trap and truck effort after the dam is built (dEIS page 4-53). EPA believes FERC is obligated to address these concerns prior to licensing the proposed dam as its recommendation presumes the successful implementation of trap and truck. Hence, EPA recommends that FERC consult with the USFWS to determine appropriate means to estimate the impacts of these biological and logistical obstacles to trapping and trucking anadromous fish prior to approving this proposed mitigation and licensing of the Basin Mills facility.

B. Wetland Mitigation

EPA-45 BHE considers wetlands inundated by the proposed dam -- and therefore converted from one wetland type into another type of aquatic system -- to be creditable as wetland mitigation. In contrast, EPA considers this type of aquatic habitat conversion as an impact that must in itself be assessed and, possibly, mitigated (see discussion below). In order to clarify the acreage and types of wetlands associated with the various alternatives, EPA suggests that the EIS include maps showing existing wetlands, and detailing the presence and types of wetlands expected as a result of each project alternative. Additionally, a table should be developed for the EIS which quantifies acreage and the types of wetlands existing under each alternative.

Conversion of Wetland Type

EPA-46 Existing wetlands altered or inundated by the proposed project cannot be counted as mitigation and, in fact, is more properly viewed as an adverse impact. Conversion of wetland systems from one type to another (e.g., forested wetlands converted to emergent marsh or open water) diminishes the functions and values of the forested wetlands. Although functions and values associated with the emergent or open water system are gained, these functions and

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EPA-43 We have addressed this issue in our responses to comments from the Penobscot Indian Nation (see our response PIN-3).

EPA-44 Our evaluation of the proposed trap-and-truck program leads us to conclude that it is feasible, but we acknowledge the uncertainty associated with its actual efficacy. Our experience has shown, however, that any trap and truck effort can benefit from study in order to reduce uncertainties, to ensure that predictions of consequences were correct and to help identify improvements that may reduce trucking-related problems. This is the basis for recommending the trap-and-truck study as specified in the Maine WQC, if the Commission were to license Alternative 3.

EPA-45 As stated above, we have included in the FEIS, as Appendix I, maps depicting wetlands (based on delineations) in the Basin Mills project area. We have also revised our presentation of wetlands impacts to clarify a number of issues (see our response to COE comments, specifically COE-23). Section 4.5.6 - Staff's Findings itemizes the effects on wetlands due to each of the alternatives.

EPA-46 We agree that inundating and converting existing wetlands should be considered an impact and we included these impacts in Table 4-11 of the DEIS and Table 4-10 of the FEIS.

COMMENTS FROM ENVIRONMENTAL PROTECTION AGENCY ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-46 Cont/d

values differ substantially from those destroyed, resulting in a net loss of forested wetland habitat. The proposed Basin Mills project would result in the loss of at least 21 acres of forested wetlands. That these forested wetlands would be converted into emergent wetlands or open water does not obviate the need to mitigate for their loss, and cannot, in and of itself, be considered mitigation.

EPA-47

The dEIS claims that because shallow marshes abutting the Penobscot River are scarce, creation of additional shallow marshes would provide needed habitat for waterfowl and other wetlands-oriented mammals. However, a variety of wetland dependent mammals, birds, reptiles, and amphibians currently utilize the forested wetlands that would be inundated by the proposed Basin Mills dam; this habitat would be lost to these species if the project were constructed as proposed. To offset this impact adequately, BHE should first examine the practicability of in-kind mitigation; that is, if forested wetlands are lost, forested wetlands should be restored or created.

EPA-48

The dEIS also states that as there are 5 million acres of wetlands in Maine, the changes to wetlands within the project area are not of "long-term consequence" (dEIS page 4-92). EPA rejects this characterization, and believes that the state of Maine is not the proper scale at which to examine the potential wetland losses. Rather, FERC should examine the particular wetland and riffle and pool complex value that would be lost, and adjust the scale accordingly; for Atlantic salmon, the appropriate scale would be available salmon habitat in the lower Penobscot River basin.

EPA-49

Furthermore, EPA has some concerns about BHE's plans to "enhance" the existing borrow pit wetlands by filling some areas and inundating others, thereby converting existing forested and scrub-shrub wetlands into emergent wetlands. Again, this type of wetland conversion would not qualify as mitigation if functional wetlands would be lost in the name of enhancement.

- Wetland Creation and Preservation

EPA-50

The dEIS states that some wetland mitigation will be accomplished through creation. However, it appears that BHE plans to convert existing forested and scrub uplands into wetlands. EPA typically discourages the use of valuable uplands for conversion into wetlands. Rather, BHE should evaluate opportunities to convert disturbed, low habitat value upland sites to wetlands.

EPA-51

BHE also proposes to preserve approximately 26 acres of wetlands as part of its mitigation package. While EPA supports preservation as part of a larger mitigation package, preservation in and of itself does not compensate for wetland losses. To date, BHE has not yet proposed mitigation sufficient to offset the losses of the wetlands adversely affected by the proposed project. Before preservation is

RESPONSES TO ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

EPA-47 We agree with this comment and have modified the FEIS to include recommendations that BHE provide in kind mitigation for impacts on forested wetlands (see Section 4.5). We also acknowledge that the habitat created as mitigation may not provide the same ecological value and function as the habitat lost.

EPA-48 We agree with this comment and we sought information on the quantity of wetlands in the Penobscot River watershed. Watershed wetlands data has not been quantified. Without knowing the quantity of wetlands in the Penobscot River watershed, we are forced to use information that has been quantified -- the amount of wetlands in the state. However, we have expanded the text to emphasize the limitations of comparisons made in a state-wide context.

EPA-49 No response required.

EPA-50 At this time, no information is available suggesting that the upland habitat that would be inundated and that the replaced area BHE proposes for wetlands creation has particularly high value. Based on the nature of your comment, however, the FEIS has been modified to clarify apparently confusing text. This upland area would be lost due to inundation by the impoundment; this is an unavoidable loss. Regardless of the value of this upland, it would cease to exist once it is flooded. BHE proposes to ensure that functionally valuable emergent and scrub/shrub wetlands are created by filling, grading, and planting the flooded area. This creation would help to compensate for the effects on wetlands elsewhere in the project area. In this case, recommendations to use disturbed upland areas for wetlands creation is a moot point.

EPA-51 We agree that BHE's current wetlands mitigation plan fails to adequately compensate for effects on functions and values of forested wetlands. Unless the Corps decides that the proposed preservation plans are adequate, we would recommend that the Commission require BHE to restore or create forested wetlands under Alternative 3 (see Section 4.5).

EPA-51 Cont'd

considered, BHE must first attempt to restore or create wetlands in order to offset the functions and values of wetlands lost due to filling, excavation, and inundation.

EPA-52

V. Section 404 Compliance

The importance of the Penobscot River basin for fish and wildlife and recreation is well documented. We base this conclusion on information supplied in the dEIS, the views of the U.S. Fish and Wildlife Service and data supplied by the public. The Basin Mills project would damage these environmental values substantially. The mitigation plan as currently proposed would fall well short of compensating adequately for the impacts to wetlands, fisheries and recreation. In addition, these adverse impacts may be avoidable in whole or in part through selection of a less environmentally damaging approach to achieve the basic project purpose.

Based on the information currently available, the proposed action violates each of the four key requirements of the EPA 404(b)(1) guidelines. First, the alternatives evaluated in the dEIS are too limited in scope -- FERC should consider a variety of other alternatives, including conservation, alternate locations for the Basin Mills dam, and construction of Basin Mills in conjunction with the breaching of another mainstem dam. Also, the dEIS does not demonstrate that a smaller, less environmentally damaging project is not practicable. Failure to examine alternatives such as these means that the evaluation is not adequate to satisfy Section 230.10(a) of the Section 404(b)(1) Guidelines.

Second, as explained above, the proposed project would result in violations of Maine's federally approved water quality standards. As currently formulated, the project would disrupt existing uses, interfere with realizing designating uses and be inconsistent with Maine's antidegradation policy. Section 230.10(b) of the guidelines prohibit issuance of a section 404 permit if it would "cause or contribute" to violations of state water quality standards.

Third, the impacts of the Basin Mills project as currently proposed would be significant.[32] We reach this conclusion after examining the environmental values of the project area, its sensitivity to

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[32] Section 230.10(c) of the 404(b)(1) guidelines prohibits issuance of a Section 404 permit for a discharge that causes or contributes to significant degradation of waters of the United States. Significant degradation includes among other things, loss of ecological diversity, productivity, and stability; significant adverse impacts to fish and wildlife habitat; or significant adverse effects on recreation.

EPA-52 The FERC's NEPA documents for the Lower Penobscot River Basin projects are not intended to meet all NEPA compliance requirements associated with the Corp's issuance of a Section 404 permit under the Clean Water Act for the Basin Mills Project. Thus, your comments are relevant but not appropriate for this document.

EPA-52 Cont'd

disruption and the persistence of the impacts a new dam would cause. Specifically, the project would result in the loss of 3.6 miles of free-flowing aquatic habitat for fish, aquatic macroinvertebrates, and other aquatic wildlife, and would result in the destruction and/or conversion of 41 acres of primarily forested and scrub-shrub wetland habitat. This loss of habitat would result in decreased biodiversity, stability and productivity within the lower Penobscot River basin. By harming anadromous fish, including the Atlantic salmon, the project runs counter to the federal government's commitment to the ongoing restoration program in the Penobscot River basin. In addition, to these biological impacts, the proposal would have a significant adverse effect on the recreational values at the project site by decreasing the quantity and quality of angling opportunities.

Finally, the mitigation currently proposed by the applicant falls short of replacing the outstanding values lost to the project let alone be sufficient to prevent significant impacts from occurring. Moreover, the impacts may exceed what is portrayed in the dEIS because the impacts to wetlands and other special aquatic sites appear not to have been fully assessed. The project violates Section 230.10(d) of the guidelines because it does not include all practicable and appropriate steps to minimize impacts to the aquatic ecosystem as described in Section IV above.

Based on these concerns, we recommend FERC and BHE pursue less environmentally damaging approaches to achieve the basic project purpose. If the current location and design of the Basin Mills project were proven to be the least environmentally damaging practicable alternative, then a mitigation plan which would prevent significant impacts from occurring would be necessary in order to comply with Section 404 requirements.

VI. Environmental Justice

EPA-53

On February 11, 1994, the President signed Executive Order 3195-01 on Environmental Justice. This order requires "[t]o the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States... ."

EPA believes FERC's dEIS fails to meet the requirements of this Executive Order, either in spirit or substance. The dEIS disregards the cultural value of a completely wild salmon stock in the Penobscot River to the Penobscot Indian Nation (PIN), stating that assessment of "existence value" is extremely difficult and

EPA-53 We acknowledge that the existence of an Atlantic Salmon run in the Penobscot unassisted by man would have intrinsic value to the PIN and others. We also recognize that various methods have been developed that attempt to express existence values in dollars. However, the efficacy of attempts to quantify such values, is a matter of continuing debate.

We are aware of only one existence value study directly pertinent to wild salmon: The Economic Benefits of the Restoration of Atlantic Salmon to New England Rivers by David L. Kay, Tommy I. Brown, and David H. Allee, Dept. of Natural Resources, Cornell University, prepared for the U.S.F.W.S., 1987.

That study places a one-time lump sum value of $20 million on salmon restoration. We neither endorse nor evaluate that study.

While we do not attempt to reduce the value of a restored wild Atlantic salmon run to dollars, we have considered in qualitative terms the potential existence values associated with restoration of a wild Atlantic Salmon population in the Penobscot River. Your comments and comments from other respondents on this issue resulted in our reconsideration of the value of potential numerical increases in salmon versus the value of an unassisted salmon run. As a result, we have selected Alternative 4 as our recommended alternative.

EPA-53
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outside the scope of the EIS (dEIS page 4-76). To the contrary, and notwithstanding FERC's claim of difficulty in making this assessment, FERC is clearly charged by NEPA[33] and the Environmental Justice Executive Order to consider this issue. EPA strongly encourages FERC to conduct the necessary analysis to assess the intrinsic value of a wild Atlantic salmon fishery to the PIN.

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[33] NEPA sets an obligation to "[p]reserve important historic, cultural, and natural aspects of our national heritage, and maintain, wherever possible, an environment which supports diversity, and variety of individual choice." 42 U.S.C. 4321-4347 as amended, Title I §101(b)(4).

EPA-53
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COMMENTS FROM US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
22 Bridge Street, Unit #1
Concord, New Hampshire 03301-4986

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MAR 18 1996
ECOLOGICAL SCIENCES AND ANALYSIS

REF: FERC #10981, 2534, 2712 - ME
/005/004

March 12, 1996

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Dear Ms. Cashell:

FWS-1 The U.S. Fish and Wildlife Service has reviewed the Draft Environmental Assessment and the Biological Assessment for the proposed Basin Mills Hydroelectric Project located on the Penobscot River in Maine. Your agency's request for formal consultation was received on October 17, 1995. We acknowledged receipt of the request to initiate formal consultation in our November 14, 1995 letter. Due to the partial government shutdown the formal consultation period was extended until February 9, 1996. This document represents the Service's biological opinion on the effects of that action on threatened bald eagles (*Haliaeetus leucocephalus*) in accordance with section 7 of the Endangered Species Act of 1973, as amended, (16 U.S.C. 1531 et seq.). A complete administrative record of this consultation is on file in the Service's Maine Field Office, 1033 South Main St, Old Town, Maine.

Consultation History

Information on the proposed Basin Mills Project and its potential effect on the threatened bald eagle was exchanged during informal consultation between our agencies, and is summarized as follows:

November 20, 1992 - Letter from D. Shumway to G. Beckett, U.S. Fish and Wildlife Service, requesting information on listed species within the Basin Mills project area.

December 30, 1992 - Letter from G. Beckett, USFWS, to D. Shumway, FERC, providing information on listed and candidate species within the Basin Mills project area.

March 24, 1993 - Letter from W. Patterson, DOI, to L. Cashell, FERC, responding to the public notice regarding Basin Mills license application.

November 15, 1994 - USFWS receives Draft Environmental Impact Statement for the Lower Penobscot River Basin, which includes the Basin Mills, Stillwater, and Milford Projects.

RESPONSES TO US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-1 No response required.

FWS-1
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December 15, 1994 - Letter from G. Beckett, USFWS, to J. Clements, FERC, stating USFWS nonconcurrence with FERC's conclusion that the project is "not likely to adversely affect" bald eagles.

December 27, 1994 - Letter from J. Clements, FERC, to D. Morrell, Bangor Hydroelectric, requesting additional information be collected on the use of the project area by wintering eagles.

January 4, 1995 - Letter from S. Hall, BHE, to L. Welch, USFWS, and C. Todd, MDIFW, requesting comments on BHE's proposed study of wintering bald eagles.

January 10, 1995 - Letter from K. Carr, USFWS, to S. Hall, Bangor Hydroelectric (BHE), providing comments on BHE's proposed study of wintering bald eagles.

January 16, 1995 - Letter from S. Hall, BHE, to L. Cashell, FERC, providing final study plan for bald eagle survey of the Penobscot River, winter 1995.

January 19, 1995 - Letter from S. Hall, BHE, to L. Welch, USFWS, and C. Todd, MDIFW, regarding winter surveys for bald eagles.

February 16, 1995 - Letter from A. Raddant, DOI, to L. Cashell, FERC, providing Department of the Interior's Comments on draft EIS.

March 9, 1995 - Letter from S. Hall, BHE, to L. Welch, USFWS, and C. Todd, MDIFW, providing study plan for bald eagle nesting survey.

May 4, 1995 - Letter from S. Hall, BHE, to L. Cashell, FERC, summarizing results of bald eagle winter survey.

September 12, 1995 - USFWS receives revised Biological Assessment on the potential effects of the Basin Mills project on bald eagles.

October 12, 1995 - Letter from K. Carr, USFWS, to L. Cashell, FERC, stating USFWS nonconcurrence with conclusion in BHE's Biological Assessment that project will not adversely affect bald eagles. USFWS requests that FERC initiate formal consultation with the Service.

October 17, 1995 - Letter from J. Clements, FERC, to K. Carr, USFWS, requesting formal consultation.

November 14, 1995 - Letter from M. Bartlett, USFWS, to J. Clements, FERC, acknowledging receipt of FERC's request to initiate formal consultation.

January 18. 1996 - Letter from K. Carr. USFWS to L. Cashell, FERC, requesting extension

FWS-1
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FWS-1 Cont'd

of formal consultation period because of recent government furloughs.

January 22, 1996 - Letter from J. Clements, FERC, to K. Carr, USFWS, granting extension of formal consultation.

February 7, 1996 - Phone conversation between L. Welch, USFWS, and A. Mitchnick, FERC, regarding section 7 consultation process and possible conservation recommendations.

Biological Opinion:

The Service has separated the bald eagle geographically within the 48 coterminous states into recovery populations termed Recovery Regions. Maine is within the 24-state, Northern States Recovery Region for bald eagles. In developing biological opinions pursuant to Section 7 of the Endangered Species Act, Service policy provides for the evaluation of jeopardy to a species such as the bald eagle, within its specific recovery region, rather than across the species' entire range within the coterminous 48 states.

It is the Service's biological opinion that the construction and operation of the Basin Mills hydroelectric facility will not jeopardize the continued existence of the bald eagle. The action will not jeopardize the bald eagle because the scope of the permit action, which is limited to a portion of the Penobscot River, will not preclude recovery or appreciably reduce the survival of the bald eagle population in the Northern States Recovery Region. Critical Habitat has not been designated or proposed for this species; therefore, none will be destroyed or adversely modified by the proposed action.

Description of the Proposed Action:

The proposed action consists of the Federal Energy Regulatory Commission's issuance of a license to Bangor Hydroelectric Company for construction of a new Basin Mills development, expanding the existing Veazie development, and decommissioning the Orono development. Basin Mills and the Veazie developments are located on the mainstem of the Penobscot River, and the Orono dam is located on the Stillwater River branch of the Penobscot River. These three projects occur between the towns of Old Town and Veazie, Maine. Collectively the three developments constitute the Basin Mills Project (FERC #10981), and would generate 271.8 million kilowatt-hours (kWh) of electrical energy per year.

The Orono dam, located 1,200 feet upstream of the proposed Basin Mills development, would be decommissioned and the existing penstocks and powerhouse would be removed. Construction of the Basin Mills facility would create a 292 acre reservoir, resulting from the impoundment of a 3.5 mile section of free-flowing river. The Veazie development, located 3.75 miles downstream of the proposed Basin Mills development, involves the construction of a third powerhouse on the east side of the Penobscot River. A complete description of project facilities and operations can be found in the Draft Environmental Impact Statement for the Lower Penobscot River Basin (FERC 1994).

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Species Account/Environmental Baseline:

In 1978, the bald eagle was listed as an endangered species in Maine and 42 of the other contiguous states, and as a threatened species in the remaining five states (USFWS 1979). At that time, environmental contaminants, human disturbance at nest sites, habitat loss, and shooting all contributed to the eagle's decline (Palmer 1988, Wiemeyer et al. 1972). In 1988, the State of Maine passed legislation (12 MSRA and Chapter 8.05) that allows eagle nests to be designated as essential habitat. Although this legislation provides for the protection of nesting eagles from human disturbance and destruction of breeding habitat, it does not regulate exposure to contaminants and other indirect causes that may lead to reproductive failure. Due to the significant increase in the number of bald eagles breeding in the United States, the Service reclassified the bald eagle from an endangered to a threatened species on August 11, 1995 (USFWS 1995^).

Bald eagles are present in the lower Penobscot River basin throughout the year, and currently nest both upstream and downstream of the proposed Basin Mills project. The active nest nearest to the project is approximately 1 mile downstream of the Veazie facility. During the nesting season in spring and early summer, these and other eagles are expected to actively feed on migrating fish and other prey captured below dams and in other portions of the river.

Limited information currently exists on the distribution of Maine's wintering bald eagle population. The last comprehensive surveys were conducted in 1977 and 1978, when only 50-60 pairs of eagles were nesting within the State (Todd 1979). Despite the fact that only three pairs of eagles nested in the entire Penobscot River system during that time period, the area regularly supported wintering eagles. In fact, the lower section of the Penobscot River was considered one of the four major wintering areas in the State.

During the winter of 1995, BHE conducted aerial surveys of the lower Penobscot River. BHE's study and personal observations by Service biologists indicate that limited numbers of eagles were using the project area in 1995. In fact, BHE reported a similar number of eagles as that reported to be using the area during 1977-1978. As stated in the Biological Assessment, the wintering bald eagle population in Maine is highly dispersed. No large aggregations of eagles, as reported in the literature for other regions, are known to occur in Maine.

The Service anticipates that the use of traditional wintering areas like the Penobscot River in Maine will increase in proportion to State and regional nesting population increases. Since the last comprehensive wintering surveys were conducted in 1978-79, the number of eagles nesting in Maine has increased over threefold to 192 active nesting territories in 1995. Unfortunately for the purposes of this study, the winter of 1995 was unusually mild, resulting in more open water habitat being available throughout the Penobscot River basin than would likely occur under more typical, colder winter conditions. The Service cautions using the survey information collected by BHE in 1995 as an indicator of the size of the wintering population of eagles on the Penobscot River. Nonetheless, the survey results reported by

FWS-1
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COMMENTS FROM US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

BHE confirm that eagles are utilizing the area of the river that will be impounded.

FWS-1 Cont'd

Availability of forage items is the most important factor affecting the selection of wintering areas by bald eagles (Stalmaster 1987). The quality of the wintering areas may vary with the quantity, quality, and vulnerability of the prey, amount of ice cover limiting access to prey, suitable shoreland habitat, and human disturbance (Stalmaster 1987). Although wintering eagles are known to congregate in large numbers in selected areas elsewhere in the United States and Canada, the population remains generally dispersed within Maine. Many coastal nesting pairs remain year round in the general vicinity of their breeding territories. Eagles nesting within interior Maine are believed to migrate short distances to areas of open water, or to the coast (C. Todd, MDIFW, pers comm.). Severity of the winter, and subsequent ice conditions on Maine's lakes and rivers, are thought to limit the number of eagles that may over winter within interior Maine. Free flowing, undammed river segments, areas receiving thermal discharges, or located below hydroelectric facilities consistently remain ice-free throughout the winter, providing eagles with foraging habitat.

The 3.5 mile section of the Penobscot River proposed to be impounded by the Basin Mills project consists of a series of several riffle-pool complexes, varying in depth, water velocity and substrate. The area consistently remains ice-free throughout the winter, providing foraging habitat for wintering eagles. If the Basin Mills dam is constructed, the area is expected to freeze during the winter, a condition that presently occurs at the existing Veazie, Orono, and Milford projects. Therefore, construction of the dam will result in changing a free-flowing river segment into a seasonally ice covered impoundment, thereby displacing wintering eagles from this habitat.

It is well documented that eagles utilize wintering habitat in the vicinity of hydroelectric facilities. Eagles use the open water created by spillways, feed on fish killed by passage through turbines, and forage on waterfowl attracted to the open water (Stalmaster 1987, Stalmaster & Plettner 1992). However, the proposed tailrace for the Basin Mills project is likely to extend less than 500 feet downstream before merging with the upstream limit of the existing Veazie dam impoundment. Therefore, there is likely to be only limited open water downstream of the proposed Basin Mills dam during winter.

FWS-2

In addition, the Service believes that construction of Plant C at Veazie will alter foraging behavior and activity patterns of eagles nesting approximately 1 mile downstream of the Veazie dam. Surveys conducted by MDIFW in 1995 indicate that this nesting territory was occupied by one adult eagle, and although the nest structure was tipped, it remains intact and usable. Eagles frequently exhibit a high degree of fidelity to nesting territories (Stalmaster 1987), and the Service anticipates that eagles will rebuild their nest within this nesting area. Piscivorous birds, such as eagles, are frequently attracted to the variety of fish, including alewife (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*), Atlantic salmon (*Salmo salar*), and striped bass (*Morone saxatilis*), that can be expected to congregate near the base of the dam. Construction activities will likely affect the distribution and abundance of fish below the dam, and consequently, will affect the foraging patterns of eagles.

RESPONSES TO US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-2 Site specific bald eagle surveys and our other project specific analyses do not support your conclusion that the proposed project would affect foraging patterns of bald eagles. Additionally, your Biological Opinion, enclosed herein, concludes that the proposed project would not affect bald eagles. The Commission staff is recommending that BHE conduct bald eagle monitoring surveys if the Commission were to license the project under Alternative 3, and if these surveys indicate eagles are adversely affected by the project, the staff would recommend further protection measures under that alternative.

COMMENTS FROM US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-3 The construction of the Basin Mills project will contribute to factors that cumulatively may be limiting the suitability of the Penobscot River for eagles. Currently, bald eagles nesting and wintering along the river are exposed to multiple environmental contaminants, including dioxin, that are believed to be affecting reproductive and survival rates of eagles. The mainstem of the Penobscot is one of the few regions in Maine where eagle nest establishment and breeding productivity have not increased at rates consistent with advancing recovery trends statewide (Todd 1996). Productivity rates for eagles within the Penobscot River system are approximately 20% lower than the statewide average for the period 1975-1995. In addition, construction of the Basin Mills project will increase to 32% the proportion of the Penobscot River (West Enfield - Bangor) that is impounded (FERC 1994) - thereby reducing its suitability as bald eagle wintering habitat.

Species of Concern:

FWS-4 In addition to the bald eagle, several species of concern (former Category 2 Candidate Species) are known to or may occur within the project area. These include the Atlantic salmon (*Salmo salar*), yellow lampmussel (*Lampsilis cariosa*), brook floater mussel (*Alasmidonta varicosa*), extra-striped snaketail dragonfly (*Ophiogomphus anomalus*), midget snaketail dragonfly (*Ophiogompus howeii*), and Orono sedge (*Carex oronensis*).

The construction of hydroelectric dams with either inefficient or non-existent fishways was a major cause in the decline of Atlantic salmon (USFWS & NMFS 1995). Multiple conditions associated with dams have been identified as threatening salmon populations, including: passage over spillways, through turbines and through impoundments; exposure to pollutants, predators and disease organisms; and vulnerability to angling (Ruggles 1980). The 1995 Status Review for Atlantic Salmon reports that 1)smolts are vulnerable to the impacts of dams and may become impinged or entrained on their downstream migration, and 2) dams can alter flow pattern of rivers, create impoundments, increase water temperature and concentrate pollutants, all of which can adversely affect resident parr and migrating smolts. The Service and the National Marine Fisheries Service recently classified Atlantic salmon in the Penobscot River, and three other Maine rivers, as species of concern (USFWS 1995^{B}). An extensive consultation history exists regarding the proposed construction of the Basin Mills project and the Service's concerns for the restoration of salmon in the Penobscot River.

The two freshwater mussel species, brook floater and yellow lamp mussel, are predominantly found in free flowing stretches of rivers and streams. Construction of dams, and the subsequent impoundment of rivers, has been identified as one of the major threats to mussels (Williams et al. 1992^{A}). From 30-60% of mussel fauna have been extirpated from selected U.S. rivers due to the physical, chemical, and biological changes associated with the construction of dams (Layzer et al. 1993, Williams et al. 1992^{B}). In addition, these effects have been observed both upstream and downstream of dam structures. In 1994, the Maine Department of Inland Fisheries and Wildlife proposed to list both mussel species as threatened under Maine's Endangered Species Act.

RESPONSES TO US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-3 No responses required.

FWS-4 A generic and conceptual discussion of aquatic and terrestrial species in relation to dams is not an adequate or accurate basis for assessing project specific information to indicate that there would be any significant affects on the species of concern that you have listed.

FWS-4 Cont'd

The striped snaketail dragonfly, and the midget snaketail dragonfly inhabit medium to large, unpolluted, free flowing rivers. The extra-striped snaketail dragonfly has been observed in the Penobscot River in Orono, and the midget snaketail dragonfly has been observed in both the East and West Branches of the Penobscot River (D. Boland, UMaine, pers.comm.). The construction of dams and the associated deterioration of water quality is also considered the primary factor threatening the dragonflies (Schweitzer 1989). Elsewhere in the species historic range, the construction of dams has lead to local extirpation (Schweitzer 1989). In 1994, the Maine Department of Inland Fisheries and Wildlife proposed to list the midget snaketail dragonfly as an endangered species, and the extra-striped snaketail dragonfly as a threatened species.

The Maine Natural Heritage Program has four records for the Orono Sedge within the proposed project area. The effects of the project on this species are not clearly understood at this time.

While these six species of concern do not have formal protection under the ESA, the Service encourages their consideration during project planning in order to help minimize the possible need to list these species under the ESA in the future. Unfortunately, unlike more vagile organisms, several of the species do not have the ability to relocate to other areas once their current habitat becomes unsuitable due to the construction of the Basin Mills dam. The Service believes that this project could lead to the extirpation of these rare species from the project area.

__Cumulative Effects:__

FWS-5

Cumulative effects include the effects of future State, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

The draft EIS proposes extensive recreational facility development within the proposed Basin Mills project area that includes development of shoreline paths, improved boat access, and parking facilities. Although these project features will have human benefits, in combination, they will result in increased human disturbance to wildlife utilizing the area throughout the year. The increased human presence will further reduce the suitability of the area as potential nesting and roosting habitat for bald eagles.

__Conclusion:__

After reviewing the current status of bald eagles, the environmental baseline for the project area, the effects of the proposed Basin Mills project and cumulative effects, it is the Service's biological opinion that the Basin Mills project, as proposed, is not likely to jeopardize the continued existence of the bald eagle. No critical habitat has been designated for this species, therefore, none will be affected.

FWS-5 The Commission staff concurs with FWS's biological opinion that the proposed project would not likely adversely affect the bald eagle or its critical habitat.

FWS-5 Cont'd

Incidental Take Statement:

Sections 4(d) and 9 of ESA, as amended, prohibit taking (harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without a special exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Harass is defined as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is any take of listed animal species that results from, but is not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or the applicant. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The Service does not anticipate that construction of the proposed Basin Mills project will incidentally take any bald eagles. Although the Service believes that eagles currently wintering within the project area will be displaced from an area that has consistently provided open water foraging habitat, it cannot be demonstrated that individual eagles are likely to be injured or killed as a result. Therefore, no incidental take of bald eagles is authorized.

Conservation Recommendations:

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

The Service proposes the following conservation measures as a means to minimize the effects of the Basin Mills project on bald eagles.

FWS-6

1. The Service recommends the preservation of a forested buffer strip along the shoreline of the project area. We understand that portions of the project area already have residential development, therefore every effort should be made to protect remaining stands of trees. Buehler (1990) reported that eagles along Chesapeake Bay avoided areas with human disturbance within 100m, and tended to prefer areas with no development within 500m. Undeveloped, forested areas will provide valuable perching habitat for eagles that may utilize the project area. In addition to shoreland protection, BHE has proposed to preserve two wetland areas below the proposed project site. The Service does not recommend selective cutting within the remaining stands or girdling trees to create snags as a means of enhancing the project area for eagles. The availability of dead trees that can be used for perching is not considered a limiting factor for eagles within the project area.

FWS-6 BHE has agreed to purchase and protect a 56-acre parcel adjacent to the Basin Mills impoundment in Orono if Basin Mills dam were constructed. The land provides a wildlife corridor between the University of Maine's Forest and the Penobscot River. In addition, BHE proposes to restore 1.1 acres of wetlands disturbed by construction, restore and enhance 23.9 acres of wetlands, create 3.4 acres of wetlands, and to preserve 25.6 acres of wetlands, all adjacent to the project. In addition to the measures proposed by BHE, we recommend that any license issued under Alternative 3 require the licensee to maintain a forested buffer along the shoreline of the Basin Mills impoundment. Such a buffer would further benefit bald eagles and forest-dwelling wildlife, and should include all forested areas that would not be disturbed by BHE for construction of the project. Under our recommended Alternative 4, these measures would not be required.

The availability of perching sites may be equally important as availability of food resources for wintering bald eagles (Cline 1985). Research by Steenhof (1976) and Ives et al. (1981) indicated that the most frequently used bald eagle perches are large mature live trees and snags that are no more than 15 meters from the shoreline. We have seen nothing in the record indicating that there is an over-abundance of such large trees and snags in the vicinity of the Basin Mills shoreline. We view such enhancements as appropriate, given the fact that the availability of perching sites are critical to wintering eagles, that such habitats would be relatively easy and quick to create, and that BHE would only create such sites in consultation with Interior and MDIFW. We will recommend that any license issued under Alternative 3 require BHE to consult with Interior and MDIFW on the appropriateness of such measures, and to prepare and implement a 5-year program approved by the Commission for monitoring these enhancement sites. The findings of the program would be reported annually to the Commission.

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FWS-7 2. The Service concurs with BHE's proposal to conduct a 5-year monitoring program to examine eagle use of the project area. Although BHE suggested the monitoring program as a means of evaluating the tree girdling project, the Service believes that it is important to evaluate the effects of the Basin Mills project on eagles. This program would help the Service evaluate the effects of the combined hydroelectric projects on Penobscot River eagles.

FWS-8 3. The Service recommends that no in-water construction activities take place between May 15 - June 15, in order to minimize the affects of construction and sedimentation of the river on migratory fish and nesting eagles foraging in the area.

FWS-9 4. The Service recommends that the Basin Mills dam be relocated above the confluence of the Penobscot and Stillwater Rivers, resulting in an increase in open water habitat during the winter, compared to the current proposed location. The river would remain open below both the Basin Mills and Orono dams until the water reached the upstream limit of the Veazie impoundment (an area just below Basin Mills rips).

FWS-10 5. The Service recommends the removal of other mainstem dams as mitigation for the construction of Basin Mills. Although previously recommended as a benefit to fish, dam removal would result in restoration of open water habitat for wintering eagles, and help offset habitat losses attributable to the project.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

FWS-11 **Reinitiation:**

This concludes formal consultation on the actions outlined in the description of the proposed action section of this biological opinion. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1)incidental take occurs; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat

RESPONSES TO US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-7 We are unsure what effects Interior is referring to in its recommendation. The purpose of BHE's proposed 5-year monitoring program is to document eagle use of the perch enhancement sites as a potential benefit to the species. We will recommend that any license issued under Alternative 3 stipulate that BHE consult with Interior and MDIFW on the appropriateness of perch enhancement measures, and to prepare and implement a 5-year program approved by the Commission for monitoring these enhancement sites. The findings of the program would be reported annually to the Commission. The requirements would not be applicable to our recommended Alternative 4.

FWS-8 The small amount of sedimentation that would occur in the river as a result of construction activities under Alternative 3 would be temporary at any time of the year, and would not affect migratory fish. At present, there are no bald eagles that nest in the close vicinity of the Basin Mills project. The closest eagle nests to the Basin Mills project are approximately 16 miles to the north and 4.5 miles to the south. The nest 4.5 miles to the south (which is partially tipped) is not presently occupied by a pair of eagles. Although eagles may have a considerable foraging range, it is unlikely that birds from either of these distant nests would frequent the Basin Mills project construction area, considering habitats of at least equal quality exist closer to the nest locations. Consequently, under Alternative 3 we are not recommending that the Commission require BHE to restrict in-water construction during the May 15 to June 15 time period.

COMMENTS FROM US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

RESPONSES TO US DEPT OF INTERIOR FISH AND WILDLIFE SERVICE ON LOWER PENOBSCOT RIVER BASIN DEIS

FWS-9 This concept was originally presented during scoping and we evaluated it in Section 2.3.1.2 of the EIS (see Table 2-1).

FWS-10 Additional dam removal was originally presented during the Basin Mills scoping process. Through our analysis in Appendix D, we determined that it would be impractical. It is not clear what eagle habitat losses attributable to the Basin Mills project that Interior is referring to. We refer to Interior's biological opinion that "critical habitat has not been designated or proposed for this species; therefore none will be destroyed or adversely modified by the proposed action." The Commission will not include this recommendation concerning additional dam removal under any of the project alternatives. Interior will be notified, however, of any conservation recommendations relating to any listed species at the project.

FWS-11 No response required.

FWS-11 Cont'd

designated that may be affected by the action. In the instance that incidental take occurs due to the Basin Mills project, any operations causing such take must cease pending reinitiation.

Sincerely yours,

William J. Neidermyer

William J. Neidermyer
Acting Supervisor
New England Field Office

FWS-11
Cont'd

FWS-11
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es: LWelch/MAmaral:3-8-96:603-225-1411
filename:basin.bo
cc: Service List
C. Todd, MEDIFW, Bangor
P. Nickerson, RO/SE

FWS-11
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FWS-11 Cont'd

LITERATURE CITED

Buehler DA (1990) Bald eagle distribution, abundance, roost use and response to human activity on the northern Chesapeake Bay, Maryland. Dissertation, Virginia Poly. Institute and State University. 131pp.

FERC (1994) Draft Environmental Impact Statement: Lower Penobscot River Basin. FERC/DEIS-0082.

Layzer JB, Gordon ME, and Anderson RM (1993) Mussels: the forgotten fauna of regulated rivers. A case study of the Caney Fork River. Regul. Rivers Res. & Manage. 8:63-71.

Palmer RS (1988) Handbook of North American birds. Vol 4, Diurnal raptors part 1. Vail Ballou Press, Binghamton, N.Y.

Ruggles CP (1980) A review of downstream migration of Atlantic salmon. Canadian Technical Report of the Fish and Aquatic Sciences 9852.

Schweitzer DF (1989) A review of Category 2 Insecta in USFWS regions 3, 4, and 5. Unpub. report prepared for USFWS. Newton Corners, MA 143pp.

Stalmaster MV (1987) The Bald Eagle. Universe Books, New York, 227pp.

Stalmaster MV, and Plettner RG (1992) Diets and foraging effectiveness of bald eagles during extreme winter weather in Nebraska. J. Wildl. Manage. 56(2):355-367

Todd CS (1979) The ecology of the bald eagle in Maine. M.S. Thesis, Univ. of Maine, Orono. 90pp.

Todd CS (1996) Bald Eagle Nesting, Productivity, and Contaminant Samples from the main stem of the Penobscot River, Maine -- 1995. Report to USFWS office in Concord, NH. 16pp.

U.S. Fish and Wildlife Service (1979) List of endangered and threatened wildlife and plants. Federal Register 44:3644.

U.S. Fish and Wildlife Service (1995^A) 50 CFR Part 17 Endangered and Threatened Wildlife and Plants; Final Rule to Reclassify the Bald Eagle from Endangered to Threatened in All of the Lower 48 States. 60(133):36000-36010.

U.S. Fish and Wildlife Service (1995^B) 50 CFR Part 17 Endangered and Threatened Wildlife and Plants; 12 Month Finding for a Petition to List Anadromous Atlantic

FWS-11
Cont'd

FWS-11 Cont'd

Salmon (*Salmo salar*) Populations in the United States as Endangered or Threatened. Federal Register 60(52):14410-14412.

U.S. Fish and Wildlife Service and National Marine Fisheries Service (1995) Status Review for Anadromous Atlantic Salmon in the United States. 131pp.

Wiemeyer SN, Mulhern BM, Ligas FJ, Hensel RJ, Mathisen JE, Robards FC, Postupalsky S (1972) Residues of organochlorine pesticides, polychlorinated biphenyls, and mercury in bald eagle eggs and changes in shell thickness - 1969 and 1970. Pestic. Monit. J. 6:50-55.

Williams JD, Warren ML, Cummings KS, Harris JL, Neves RJ (1992^A) Conservation status of freshwater mussels of United States and Canada. Fisheries. Vol 18, 9:6-22.

Williams JD, Fuller SLH, and Grace R (1992^B) Effects of impoundment on freshwater mussels in the main channel of the Black Warrior and Tombigbee rivers in western Alabama. Bull.of the Alabama Mus. of Nat. History. 13:1-10.

FWS-11
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COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

T. Lewitt Review Copy ASF-1

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ECOLOGICAL SCIENCES AND ANALYSIS

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January 10, 1995

Ms. Lois Cashell
Secretary
Federal Energy Regulatory Commission
825 North Capitol Street NE
Washington, DC 20426

RE: **Basin Mills Hydroelectric Project, Maine, Project No. 10981**

ASF-1

Dear Ms. Cashell:

Enclosed please find comments on the Draft Environmental Impact Statement with respect to the above Project.

Sincerely,

Perkins, Townsend, Shay & Brown, P.A.

By: Clinton B. Townsend
Clinton B. Townsend

CBT:dfc
Enc.

Copy

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-1 No response required.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

RE: Basin Mills Hydroelectric Project
Project No. 10981

Comments of Clinton B. Townsend on behalf of the Maine Council of the Atlantic Salmon Federation on the Draft Environmental Impact Statement for the Basin Mills Hydroelectric Project dated November, 1994

INTRODUCTION

ASF-1 Cont'd

My name is Clinton B. Townsend. I am the vice president for conservation and legislation of the Maine Council of the Atlantic Salmon Federation. These comments on the Draft Environmental Impact Statement (DEIS) are submitted on behalf of the Maine Council. They are complementary to the more detailed comments to be submitted by the Sierra Club Legal Defense Fund on behalf of the Conservation Intervenors.

The Atlantic Salmon Federation is an international non-profit organization which promotes the conservation and wise management of the Atlantic salmon and its environment.

The Maine Council of the Atlantic Salmon Federation opposes the application by Bangor Hydroelectric Company (BHE) for the Basin Mills Hydroelectric Project, including the Veazie Project. This opposition is because of the project's impact on the joint effort by the United States Government, through the U.S. Fish and Wildlife Service (USFWS), and the State of Maine, through the Atlantic Sea-Run Salmon Commission (ASRSC), to restore self sustaining runs of naturally reproducing Atlantic salmon to the Penobscot River drainage under the Anadromous Fish Restoration Act (AFRA). The restoration effort has been going on for more than a quarter century, at taxpayer expense and with public support. The project as proposed by BHE would undermine that effort.

The Draft Environmental Impact Statement as presented is flawed in two respects. First, it is poorly constructed, so that it is difficult for the reader, even one familiar with the history of the project, to extract the information necessary to evaluate the several alternatives discussed; secondly, it fails to deal with many of the substantive issues in a proper fashion. The Draft Environmental Impact Statement should be withdrawn and rewritten to meet these objections, and a new Draft Environmental Impact Statement should be issued for public comment after these deficiencies are remedied.

HISTORY OF RESTORATION

ASF-2

Restoration of Atlantic salmon and other anadromous fish became possible when implementation of the Clean Water Act brought about dramatic improvements in water quality in the Penobscot River as the result of the

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-2 No response required.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-2 Cont'd

removal of industrial wastes and municipal sewage discharges from the waters of the river, which had been an open sewer.

At the same time, restoration has been hampered because of inadequate upstream and downstream fish passage at the complex of hydroelectric dams on the river, and because of the impact of commercial interception fisheries in the ocean off Greenland and Newfoundland.

The current dam relicensing proceedings before the Federal Energy Regulatory Commission (FERC) give an opportunity to remedy fish passage deficiencies. The marine interceptory fisheries have been brought under control because of the ability of the North Atlantic Salmon Conservation Organization (NASCO) to establish scientifically based quotas for the Greenland fishery; the purchase of the Greenland quota by a consortium of public and private participants including the United States Government and the Atlantic Salmon Federation; and the moratorium on Atlantic salmon fishing off Newfoundland and the purchase of commercial fishing licenses by the Canadian Government.

We are therefore at a critical moment in the restoration effort, poised to move forward because the past impediments to restoration are in the process of being brought under control.

IMPACT OF BASIN MILLS

ASF-3

The Basin Mills Project threatens that position. The restoration effort was undertaken on the Penobscot River in the full knowledge that there were four hydroelectric dams (Veazie, Great Works, Milford and West Enfield) on the main stem of the river below the junction of the Piscataquis and Mattawamkeag tributaries, as well as three (Orono, Stillwater and Gilman Falls) on the Stillwater branch. The Basin Mills Project adds a fifth main stem dam, and this additional obstruction to upstream and downstream migration means the difference between probable success of restoration and probable failure.

ASF-4

The ASAL computer modelling studies developed by USFWS, and to which all parties in these proceedings subscribe, show that construction of the Basin Mills Project will have a profoundly negative effect on the probability of successful restoration of Atlantic salmon, reducing the probability of success from over 70% to less than 40%. This is unacceptable

ASF-5

The importance of the ASAL model is not as an absolute predictor of success, which it does not pretend to be. Rather, it is the basis for comparing the probability of success or failure of the Atlantic salmon restoration program with and without the construction of the Basin Mills Dam. It is vital to look at the doughnut of comparable probability rather than the hole of absolute predictability when ASAL is being considered.

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-3 The results of our analyses of the Penobscot River Atlantic salmon restoration program and its success to date leads us to disagree with your conclusion that "...this additional obstruction (Basin Mills dam)...means the difference between probable success of restoration and probable failure." The basis for our conclusion is explained in Section 4.3 of the FEIS. However, based on new information provided by NMFS in their DEIS comments, we do agree that construction of the Basin Mills dam would reduce the equilibrium stock size and increase the likelihood of extirpation of a number of tributary populations. See also our response to a similar comment by NMFS (NMFS-29).

ASF-4 The ASAL computer modeling studies to which you refer are subscribed to by only those parties opposing construction of the Basin Mills dam. BHE, the applicant, does not subscribe to those findings. In the DEIS and FEIS, we have explored in detail the definitions and analytical bases for the conclusions drawn by FWS and others concerning probability of salmon restoration. However, we have expanded the text in sections 4 and 5 to acknowledge the uncertainty associated with ASAL model and outputs.

ASF-5 NMFS' Dr. Rago (see pg. 4 of Attachment C to NMFS comments on the DEIS) states that "ASAL was designed as both a tactical and strategic planning tool...As a strategic model ASAL can be used to evaluate long term prospects for restoration with respect to variation in underlying rates e.g., upstream, downstream, marine survival etc. and to assess chances of viable population in the future...." This is the exact purpose to which we applied the ASAL model in our analysis.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

THE NEED FOR BALANCE

ASF-6

Reduction of the probability of successful restoration of Atlantic salmon and other anadromous fish as the result of construction of the Basin Mills Project will throw the uses of the Penobscot River even further out of balance than they now are.

Less than 200 years ago the Penobscot River supported huge runs of Atlantic salmon and other anadromous fish. These were a resource of great value to the aboriginal inhabitants of the watershed, and to the European settlers who arrived in the region in the 17th and 18th centuries. As the result of the erection of dams and introduction of industrial and municipal pollution, those runs diminished greatly throughout the 19th and early 20th centuries, and by about 1950 had totally disappeared.

The joint USFWS and ASRSC restoration effort is an attempt to bring back some small part of those historic runs, perhaps about 10% of the original numbers, while still permitting the use of the river's waters for hydroelectric power production, industrial process water, water based recreation, and other economic and social purposes.

PURPOSES OF RESTORATION

ASF-7

While there will be significant positive economic benefits from restoration of Atlantic salmon, restoration is not based on economics alone. It is also a profoundly moral action. Restoration is designed to undo some of the environmental destruction of the last two centuries, and to confer the environmental, economic and social benefits of the existence of the runs upon the present day descendants of the aboriginal inhabitants and the European settlers who use the resources of the Penobscot River watershed.

THE NEED TO EXAMINE ALTERNATIVES

ASF-8

It therefore becomes necessary, in the context of the Federal Power Act (FPA) as amended by the Electric Consumers Protection Act (ECPA), which governs the proceedings for licensing of the Basin Mills Project, and the National Environmental Policy Act (NEPA), the basis for preparation of an Environmental Impact Statement (EIS), to consider all of the alternatives which may be available to the applicant in its quest for sufficient electric power to meet the present and future needs of its service area.

Electricity is a fungible product. It can be generated in many different manners, and electricity generated by any one source is indistinguishable from that from any other source. Further, existing supplies of electricity can be

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-6 No response required.

ASF-7 No response required.

ASF-8 We have revised section 2.4.2, Comparison of Alternative Energy Sources, in response to your and similar comments from other respondents.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-8 Cont'd

stretched to do more work by efficiency, and existing consumption of electricity can be reduced by conservation.

As a result, there are an enormous range of options available to human beings when it comes time to choose how or whether to generate or use electricity.

ASF-9

By contrast, rivers and the biological entities which depend on rivers are unique. Each river is the only one of its kind, and in every river and watershed there have evolved creatures such as the Atlantic salmon, which are suited to take advantage of the particular characteristics of that river in order to reproduce themselves.

These creatures have no options whatsoever. If they cannot use the river as nature designed them to do, they perish. And that is just what happened when the Penobscot and other rivers in Maine and throughout New England were altered by human agency. And that is why there is an effort to restore Atlantic salmon, as a small recompense for the destruction of the past.

Every source of electrical energy has one or more environmental impacts. In the case of hydroelectric energy, the impacts are both localized and far reaching. The local impact is the change from a free flowing river to a lake. This affects water quality, local fish and wildlife populations, and human use.

The far reaching impact is on migratory creatures, particularly anadromous fish. The presence or absence of anadromous fish in the ecological community reverberates throughout it, because both human beings and other wildlife populations depend upon anadromous fish as a food source.

In considering the environmental impact of adding the Basin Mills Project to the existing dams on the river, and in determining a proper balance between the use of the Penobscot River for restoration of Atlantic salmon and for generation of hydroelectric power, the FERC cannot limit itself to comparison of the river in its present state, with multiple dams from tidewater to headwaters, with the river as it would be with the Basin Mills Project added.

Rather, the balancing test must be between the river as it was without dams and the river fully dammed. It immediately becomes apparent that in its presently heavily dammed condition, the Penobscot River has suffered from the cumulative impact of all the dams on the river and in the watershed. The balance is skewed heavily toward hydroelectric development, and far away from the historic abundance of anadromous fish.

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-9 We appreciate the eloquence of your statement. The issue of why FERC chooses to use existing conditions as the No Action alternative baseline for comparison to all other alternatives will be addressed in the orders to be issued for these projects. However, on the basis of comments and new information received after issuance of the Deis, we are now recommending Alternative 4 as our preferred alternative.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-10

This brings the discussion back to the issue of options available to the applicant, Bangor Hydroelectric Company. It must be remembered that in this process under NEPA, the environmental impact of the project must be found and alternatives to minimize or even eliminate that impact must be examined.

Section 2.4.1 of the DEIS rejects consideration of any alternative energy source which does not burn fossil fuels, including windpower, conservation and efficiency. The rationale is that such sources would not replace hydroelectric power, but would merely displace higher cost fossil fuels.

This rationale ignores the purposes of the restoration program under AFRA, as well as the requirements of ECPA, and the objectives of NEPA.

Under the Federal Power Act as modified by ECPA, protection of anadromous fish is of equal importance with generation of electrical energy.

However, this is ignored in the DEIS, which assumes that the need for more electrical generating capacity is a foregone conclusion. From this flawed assumption the DEIS proceeds to the conclusion that the alternatives to be considered only include looking for the cheapest way to get additional capacity.

The rationale of Section 2.4.1 does not consider whether there are alternatives which do not conflict with the existing AFRA objective of restoration of Atlantic salmon while still meeting the electrical energy needs of the applicant's service area.

Those needs may be met by the addition of capacity from other generating sources than a hydroelectric dam, or may be met in ways other than the addition of more capacity, such as efficiency or conservation, and the EIS must consider all such other ways, not just a select few.

It is not enough to focus merely on the economics of alternative sources of electrical generation. It is necessary also to examine all alternative options which will help to effectuate the purposes of the restoration program in both its economic and moral context. Only by doing so will it be possible to ensure that the several goals of all of the relevant statutes and programs are met.

Failure to examine all such alternatives when the need and reason to do so are apparent, as the foregoing discussion establishes, is arbitrary and capricious. The final EIS must take the factors discussed in these comments into account if it is to escape challenge on this ground.

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-10 We have revised the Purpose of Action (1.1), Need for Power (1.2), and Comparison of Alternative Energy Sources (2.4.2) in response to your and similar comments from other respondents.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

OTHER ISSUES

ASF-11

There are several other issues which are overlooked in the DEIS. These include impacts on Atlantic salmon in particular and other wildlife impacts in general which are not addressed, as well as the possible removal of other dams.

While the DEIS discusses in a general way the loss of spawning and rearing habitat in the lower segment of the Penobscot River, it does not address the needs of Atlantic salmon during migration and the impact of impoundments both on adults migrating upstream and juveniles migrating downstream.

1. Resting and Holding Areas. Atlantic salmon are creatures of moving water. They need running water in which to rest while migrating upriver. Their hydrodynamic design is such that they are well suited to "holding" in a current adjacent to rocks and other bottom features with a minimum of effort and a maximum of oxygen being brought to their gills. This ability, shared by all salmonids, is the result of thousands of years of evolution, and it is what makes salmonids the premier riverine fish.

As a result of this biological adaptation, running water is less stressful to Atlantic salmon than impounded water, because in still water the fish must swim in order to pass oxygenated water through the gills, whereas in moving water the fish can "hold" while it lets the current do the work of bringing oxygen to it.

Atlantic salmon migrate upstream in sporadic movements, an arduous swim up a rapid, for example, being followed by a period, often protracted, of rest before essaying the next movement upstream. The effect is similar to a human climbing stairs, and resting at the landings before proceeding up the next flight. Thus, any given stretch of fast water provides an opportunity both for movement and for rest, with plenty of oxygen available at all times.

Impoundments, by contrast, are not of benefit to migrating salmon; they are simply an area to get through on the way to the next stretch of running water. Therefore, the loss of holding and resting habitat and the increase in impounded area is a "double whammy" for migrating fish, because of loss of a benefit and addition of a burden.

Construction of the Basin Mills Project will therefore not only eliminate an important segment of spawning and rearing habitat, it will also eliminate an important area for migrating fish to stage through on their upstream journey.

ASF-12

2. Predation on Smolts. In addition to the impact of an additional impoundment on Atlantic salmon migrating upstream, the DEIS overlooks the impact of an additional impoundment on juvenile fish migrating downstream. These fish, known as "smolts", migrate during high water in the spring. They use

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-11 We investigated the potential value to salmon of the 3.6 mile river reach that would be inundated by the Basin Mills impoundment and describe our findings in Appendix F. Radio tracking studies of adult salmon show that most move rapidly through the existing riverine environment, suggesting that the area does not contain significant resting and holding habitat. ASRSC habitat survey data (Dube 1987) documented no resting or holding habitat in the area, and rated the nursery habitat as being in the lowest quality classification category. Thus, the existing data and information do not support the point you make with regard to the river segment that would be impacted by Basin Mills.

ASF-12 Since issuing the DEIS, we have identified and acquired a number of new studies of predation on Atlantic salmon smolts. One comprehensive study we obtained presented stomach contents data from 142 smallmouth bass captured in the Penobscot River during the salmon smolt migration period. None contained salmon smolts. However, the same study did report smolts in the stomachs of pickerel. We have incorporated that information into our discussion of this topic in the FEIS.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-12 Cont'd

the river's currents to aid their own swimming. Each impoundment reduces the current available to them, thus slowing their progress to the sea. Just as adult salmon are adapted to use moving water on their upstream migrations, juvenile salmon are adapted to use moving water to migrate downstream.

The presence of an impoundment increases the impact of predators on migrating juvenile Atlantic salmon. The DEIS mentions black bass as an inhabitant of the Penobscot River. What it does not mention is the negative impact of these fish on Atlantic salmon restoration. Black bass are not native to the Penobscot River drainage. They were introduced into New England from their original range west of the Appalachian Mountains. Black bass are much more adapted to live in the still waters of an impoundment than are salmonid fishes such as Atlantic salmon.

Black bass are voracious fish eaters. Their effect on Atlantic salmon is that in every impoundment, some proportion of the migrating smolts will be eaten by black bass. Thus, an additional impoundment created by the Basin Mills Dam will have both a direct and a cumulative impact on migrating juvenile Atlantic salmon. This impact needs to be studied, and the study results quantified and addressed in the DEIS.

ASF-13

3. Barrow's Goldeneye. The proposed Basin Mills site is at the location of a well known wintering population of Barrow's Goldeneye ducks, which may be the only site in Maine, possibly in New England, where these birds winter in inland waters. These birds are known to feed on molluscs and crustaceans by diving to the river bottom. It is quite possible that they use this area because it is home to several species of rare fresh water mussels. The impact of the dam on these species needs to be studied, and the study results quantified and addressed in the DEIS.

ASF-14

4. Removal of Other Dams. In the context of the current version of the DEIS, the Maine Council of the Atlantic Salmon Federation supports adoption of Alternative 5, set forth at Section 4.8.5. Leaving the Basin Mills site unobstructed, removal of the Veazie Dam and upgrading the Orono Dam, including state of the art upstream and downstream fish passage on the Stillwater River as part of the Stillwater and Milford Hydroelectric Projects (Nos. 2712 and 2534) would have the greatest benefits for Atlantic salmon restoration.

In addition, the record of proceedings before the Maine Board of Environmental Protection includes discussion of the possible removal of the dam at Howland at the mouth of the Piscataquis River, and possible removal of the dam at Great Works on the main stem of the Penobscot River. The DEIS does not give adequate consideration to these possible sources of mitigation for construction of the Basin Mills Dam.

RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-13 We discuss potential project impacts on Barrow's Goldeneye in the FEIS.

ASF-14 NEPA does not require maximization of mitigation benefits, only mitigation adequate to compensate for any unavoidable adverse impacts incurred. In our dam removal analysis in Appendix D, there is no upper limit on mitigation cost. However, since it is the Commission's responsibility to balance public interests, we seek fishery mitigation measures that at least fully compensate for the projected adverse impacts and that impose the least cost on other public interests. We have revised the presentation of our dam removal analysis in Appendix D to clarify our discussions of some of the issues you raise. Alternative 3 in the FEIS does not require BHE to undertake dam removal studies. However, under our recommended Alternative 4, Basin Mills dam would not be built.

COMMENTS FROM THE MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-14
Cont'd

In the light of the recent determination by the FERC that it has authority to require decommissioning and removal of existing projects, and to order studies of removal at the expense of the owner, we recommend that the FERC order the applicant to undertake removal studies for the Veazie, Howland and Great Works projects, and that the study results be quantified and addressed in the next version of the DEIS.

January 5 ,1995

Respectfully submitted,

Clinton B. Townsend

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RESPONSES TO MAINE COUNCIL OF THE ATLANTIC SALMON FEDERATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

ASF-14
Cont'd

STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ANGUS S. KING, JR.
GOVERNOR

COMMENTS

February 15, 1995

Lois Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

RE: LOWER PENOBSCOT RIVER BASIN DEIS
BASIN MILLS PROJECT, FERC No. 10981
STILLWATER PROJECT, FERC No. 2712
MILFORD PROJECT, FERC No. 2534

Dear Secretary Cashell:

DEP-1

The Maine Department of Environmental Protection (DEP) has reviewed the Draft Environmental Impact Statement (DEIS) prepared by the FERC staff in conjunction with the proposed licensing/relicensing of three hydroelectric projects on the Lower Penobscot River Basin in Maine (FERC/DEIS--0082, dated November 1994). The projects considered in the DEIS, all of which are owned and operated by Bangor Hydro-Electric Company (BHE), are as follows:

- Basin Mills Project (FERC No. 10981), including: the construction and licensing of the new 38 MW Basin Mills development (formerly FERC No. 10550); the expansion (from 8.4 to 16.4 MW) and relicensing of the existing Veazie development (currently FERC No.2403); and the decommissioning of the existing 2.3 MW Orono development (currently FERC No. 2710).
- Stillwater Project (FERC No. 2712), consisting of the relicensing of the existing 1.95 MW development.
- Milford Project (FERC No. 2534), consisting of the expansion (from 6.4 to 8.0 MW) and relicensing of the existing development.

Our summary and comments on the DEIS for each of the three projects follow.

Serving Maine People & Protecting Their Environment

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BASIN MILLS PROJECT

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I. Evaluation of Alternatives

The DEIS evaluates five alternatives for the Basin Mills Project, summarized as follows:

Alternative 1: No action alternative (Basin Mills not built, Orono and Veazie continue existing operation).

Alternative 2: Project as proposed by BHE, including all conditions of the Water Quality Certification (WQC) issued for the project by the Maine DEP.

Alternative 3: Project as proposed by BHE with modifications (involving several additions to, deletions from, and changes in the project mitigation measures contained in Alternative 2) as proposed by FERC staff.

Alternative 4: Alternative in which Basin Mills is not built, Orono is either decommissioned or refurbished and relicensed, and Veazie is relicensed, either with or without redevelopment.

Alternative 5: Alternative in which Basin Mills is not built, Orono is refurbished and relicensed, and Veazie is decommissioned and removed.

In addition, the DEIS includes an analysis of the economic and environmental feasibility of removing one or more of 116 candidate dams in the Penobscot River Basin as mitigation for adverse impacts on fisheries from the construction of Basin Mills.

II. Staff Modifications

As noted above, Alternative 3 includes modifications by FERC staff to the project as proposed by BHE and conditioned by the Maine DEP. These modifications, which relate to project impacts on fisheries resources, threatened and endangered species, recreational resources, aesthetic resources and socioeconomics, are as follows:

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Fisheries Resources

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- Elimination of trapping and handling of salmon, and installation of electronic monitoring, at the existing Veazie Plant A fishway after the proposed Plant C fishlift becomes operational (replacing BHE's proposal to use a fish pump to move salmon from the exit of the Plant A fishway to the proposed Plant C fish handling and sorting facilities).

- A requirement that BHE cooperate with fisheries agencies in efforts to limit the salmon harvest throughout the Penobscot River basin in order to assist salmon restoration efforts.

- A determination that dam removal should not be adopted as a mitigation measure for the Basin Mills development (Condition 27 of the Maine DEP's WQC requires that BHE conduct and submit the results of studies evaluating the costs and benefits of removing the Howland Dam, and that BHE pursue all necessary approvals and remove the dam if removal is found by DEP to be in the public interest).

- Implementation of phased construction of upstream fish passage facilities at the Orono Dam (BHE proposes no fishway at the Orono Dam: Condition 7 of the Maine DEP's WQC requires that BHE study the need for a fishway at the Orono Dam after the Basin Mills Dam is constructed and on-line).

- A determination that BHE should not be required to fund salmon restoration efforts as a mitigation measure for the Basin Mills development (Condition 12 of the Maine DEP's WQC requires that BHE establish a trust fund for salmon management activities on the Penobscot River).

Threatened and Endangered Species

- A requirement that BHE confer with state and federal wildlife agencies to investigate the appropriateness of enhancing the shorelines of the river downstream from the proposed Basin Mills Dam as potential pearching areas for the endangered bald eagle (BHE makes no proposals relative to eagles).

- A requirement that BHE prepare and implement a 5-year plan to monitor and report on the use of any perch-enhancement sites created for the endangered bald eagle.

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Recreational Resources

- A requirement that BHE upgrade and maintain the existing canoe portage facilities around the west end of the Veazie Dam (BHE makes no proposals to provide canoe portage at the Veazie Dam; Condition 13 of the DEP's WQC already requires that BHE construct and maintain a canoe portage trail, including take-out and put-in sites, around the Veazie Dam).

- A requirement that BHE construct, operate and maintain parking, rest rooms, and waste disposal facilities in conjunction with the preservation of a 7,000-foot-long section of river shoreline below the Veazie Dam for future public access for shore angling (Condition 13 of the Maine DEP's WQC requires that BHE preserve and provide appropriate facilities for public access to this shoreline area).

- Revision of BHE's proposed recreation plan to incorporate greater recreational access to the project area for the disabled in compliance with the Americans with Disabilities Act.

Aesthetic (Visual) Resources

- A requirement that BHE investigate and develop a plan for the use of alternative shoreline protection measures in place of riprap, as proposed by BHE, in the areas upstream of the proposed Basin Mills Dam.

Socioeconomics: Traffic

- A requirement that BHE develop and implement a detailed traffic management plan to minimize traffic congestion in the affected communities during project construction (Condition 4 of the Maine DEP's WQC already requires that BHE develop and implement an Advance Transportation Route Plan as well as all temporary traffic control measures recommended by the Maine Department of Transportation in order to alleviate congestion during construction).

- A requirement that BHE develop and implement a "Park and Ride" or mass transit system to reduce increased traffic due to construction workers (Condition 4 of the Maine DEP's WQC already requires that BHE develop, implement and promote a Park and Ride or mass transit system to minimize the additional traffic caused by construction workers).

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III. Staff Findings and Conclusions

The primary issue addressed in the DEIS is whether or not constructing the proposed Basin Mills Dam would be consistent with an appropriate balance among the principal resources values of the Lower Penbscot River basin. The key issue addressed in this balancing is whether or not constructing a new dam at the Basin Mills site would impede or preclude restoration of anadromous fish to the Penobscot River. On this key issue, the FERC staff reaches the following conclusions and makes the following findings in the DEIS:

Atlantic salmon:

- "We conclude that establishment of a fully-restored, self-sustaining salmon run is unlikely to occur under existing conditions (i.e., even without Basin Mills dam being constructed)."(Emphasis in original.) DEIS, page 4-30.
- "Our key finding...is that attainment of the goal of a fully-restored, completely self-sustaining salmon stock in the Penobscot River which persists into the future without human intervention is unlikely under all [project] alternatives." DEIS, page 4-74.
- "[BHE's proposal] would include trapping and trucking 50 percent of the salmon run and stocking 30,000 smolts per year. We examined the logistical difficulties associated with the proposed intervention measures and conclude that they are feasible." DEIS, page 4-74.

American shad:

- "We conclude that, under the [existing] passive restoration program, significant growth in the Penobscot River American shad stock would not occur in the foreseeable future." DEIS, page 4-32.
- "Those [project] alternatives that provide for trapping and trucking of shad from Veazie dam to primary spawning habitat located upstream of Milford dam...offer the greatest chance for significant shad population growth..." DEIS, page 4-78.

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Alewife:

- "...[W]e conclude that the growth rate of the existing alewife population would be slow and that the [agency] restoration goal... would never be approached under its existing passive restoration program." DEIS, page 4-33.
- "Trapping of alewife and their release in tributary ponds and lakes that are the primary production waters in this river basin would provide for the most rapid increase in existing alewife stocks." DEIS, page 4-78.

These conclusions and findings compare favorably to those made by the Maine DEP in its WQC for the project, as noted below:

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- "The Board finds that today's Penobscot River salmon run is currently completely dependent on human intervention...[T]he Board is persuaded by the evidence that restoration of a completely self-sustaining salmon run is highly unlikely with or without the Basin Mills Dam." WQC, pages 25-26.
- "...[T]he Board finds that the stocking of hatchery-reared salmon is an often-used mitigation measure for the impacts of hydro dams that is both technically feasible and biologically viable." WQC, page 24.
- "The Board finds that trapping and trucking is a viable management technique that has been used on the Penobscot and other rivers in Maine and other states to aid in the restoration of anadromous fish." WQC, page 26.
- "The Board is persuaded by the evidence in the record that, by decreasing delays and inefficiencies in upstream fish passage, [BHE's] trap and truck proposal will result in more salmon reaching prime spawning areas, which will lead--all other things being equal--to larger returns of adult salmon. The [salmon restoration] model shows an increase in the probability of successful restoration when comparing the future with the Basin Mills Dam and trap and truck against the future without the dam." WQC, page 26.
- "The Board finds that the applicant's proposal for trapping and trucking of shad and alewife will increase the numbers of these fish in the river in the short-term and will improve the chances of successful restoration of these species in the long-term. This is especially true in view of [the fishery agency's] current passive restoration effort and lack of financial resources." WQC, page 26.

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Finally, on the basis of its independent analysis, the FERC staff concludes in the DEIS that Alternative 3 -- the project as proposed by BHE with staff modifications -- would be best adapted to comprehensive plans for improving or developing the waterways of the lower Penobscot River Basin. Therefore, the FERC staff recommendation is to construct Basin Mills, expand Veazie and decommission Orono with staff-recommended mitigation measures.

DEP-2

IV. Water Quality Certification Conditions

On November 10, 1993, the Maine DEP issued a state hydropower project permit and Water Quality Certification for the proposed Basin Mills Project. Our certification that the construction and operation of the project will not violate applicable water quality standards is subject to twenty-eight conditions; these conditions are summarized on pages 2-14 through 2-17 of the DEIS.

By letter dated November 19, 1993, the Maine DEP commented on the pending application for license for the Basin Mills Project and transmitted our WQC decision to FERC. In these comments, we recommended that all the conditions of the WQC be included as appropriate in the Articles of any license issued for the project, in compliance with Sections 401 (a) and (d) of the Clean Water Act.

In the DEIS, the FERC staff takes the position, in accordance with a recent Commission licensing decision [Tunbridge Mill Corporation, 68 FERC ¶ 61,078 (issued July 15, 1994)], that FERC has the authority to review the validity of water quality certification conditions, that only "water quality related" conditions are lawful and are thus subject to inclusion as mandatory conditions in a license, and that conditions unrelated to water quality are unlawful and are thus not subject to inclusion as mandatory conditions in a license. See DEIS, pages 1-5 and 5-24.

After examining the Maine DEP's WQC for the Basin Mills Project in accordance with the Tunbridge decision, the FERC staff concludes that thirteen of the twenty-eight WQC conditions are not water quality related and are thus not mandatory licensing conditions. These thirteen conditions are summarized in the DEIS as follows (see page 5-25) (the conditions are numbered as they appear in the Maine DEP's WQC):

2. Evidence of availability of funds
3. Certificate of public convenience and necessity
4. Traffic control measures
12. Establish (salmon) restoration trust fund
13. Recreational enhancements

DEP-2 The Commission's final determination on the legal status of the State of Maine's section 401 WQC conditions will be made in the order for the project.

DEP-2
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14. Evaluation of recreational access
15. Create artificial salmon lies
17. Wetlands mitigation
18. Groundwater mitigation
19. Archaeological mitigation
20. Flood control
24. Striar Mill water intake
27. Study of removal of Howland Dam.

DEP-2
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However, based on the independent analysis conducted in the DEIS, the FERC staff further concludes that adoption of ten of the conditions deemed to be "outside the scope" of WQC is in fact warranted under the Federal Power Act in any license for the project. This leaves three WQC conditions (Conditions 3, 12, and 27) which the FERC staff concludes should not be included as license conditions. Finally, the FERC staff concludes that all of the remaining fifteen conditions are "water quality related" and must become conditions of any license, even though the staff concludes that one condition (Condition 25: Study of water temperature effects on salmon) is unnecessary. See DEIS, pages 5-25 through 5-27.

We strongly disagree with FERC's position on its authority to review the validity of water quality certification conditions, as discussed in the DEIS. The Tunbridge decision effectively changes FERC's long-standing practice of leaving any review of the appropriateness of WQC conditions to the State courts. We believe that this practice was in fact in keeping with the express language of the Clean Water Act and controlling case law and should be continued. We believe that FERC has no authority to review and either accept or reject state-imposed WQC conditions, and that these conditions are subject to review only by Maine's courts and, ultimately, the U. S. Supreme Court. See generally, PUD No. 1 v. Washington Dept. of Ecology, ___ U.S. ___, 114 S.Ct. 1900, 1907-08; Roosevelt Campobello International Park v. U.S.E.P.A., 684 F.2d 1041, 1056.

The Maine DEP contends that all of the conditions attached to the WQC for the Basin Mills Project set forth limitations and monitoring requirements necessary to assure that the project will comply with State water quality standards and other appropriate requirements of State law (including the Maine Waterway Development and Conservation Act, which is the State's hydropower permitting statute), and that all such limitations and monitoring requirements "shall become a condition on any Federal license" for the project, in accordance with Section 401(d) of the Clean Water Act.

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The State of Maine is authorized to impose conditions necessary to insure that the construction and operation of the Basin Mills Project will comply with all aspects of Maine's water quality standards, including designated uses, numeric and narrative criteria, and the State's antidegradation policy. See PUD No. 1 v. Washington Dept. of Ecology, ___ U.S. ___, 114 S. Ct. 1900. FERC staff has ignored this holding, as seven of the thirteen conditions determined by the FERC staff to be "outside the scope" of WQC are in fact necessary (a) to meet the State's designated uses of the Penobscot River for fishing, recreation in and on the water, industrial process water supply, and as habitat for fish and other aquatic life, and (b) to satisfy the provision of the State's antidegradation policy that existing in-stream water uses and the level of water quality necessary to protect those existing uses must be maintained and protected. These conditions include: Condition 12 (requiring a trust fund for salmon management activities); Condition 13 (requiring construction of recreational access facilities); Condition 14 (requiring evaluation of recreational access needs); Condition 15 (requiring creation and monitoring of artificial salmon lies); Condition 17 (requiring mitigation for loss of wetland functions and values); Condition 18 (requiring mitigation for groundwater impacts); Condition 24 (requiring mitigation for construction impacts on Striar Mill process water intake); and Condition 27 (requiring study of costs and benefits of Howland Dam removal).

Furthermore, the three conditions which the FERC staff concludes should not be included as license conditions are in fact appropriate conditions for inclusion in any license for the Basin Mills Project. Condition 3 requires that, prior to commencement of construction, BHE obtain a certificate of public convenience and necessity from the Maine Public Utilities Commission (PUC) for the Veazie and Basin Mills developments. FERC staff concludes that Condition 3 "would give the state the ability to control the timing of activities under [a] federal license," and asserts that "the state has no authority to halt or order the construction of the projects." DEIS, page 5-26. However, Maine law requires that, in order to obtain a permit to construct a hydropower project, an applicant must demonstrate, among other things, that the project will result in significant economic benefit to the public (38 MRSA § 636). Additionally, Maine law requires that a regulated public utility must obtain such a certificate from the Maine PUC to authorize construction of any new electric generating facility of more than 1,000 kilowatts of installed capacity (35 MRSA § 13-A). In issuing a certificate, the Maine PUC must determine that there is a need for electric power and that the proposed facility is a cost-effective way to meet this need. BHE is a regulated public utility, and must therefore obtain this certificate of public convenience and necessity for the Veazie and Basin Mills developments as long as BHE proposes to own and operate the developments. So, as a practical matter, BHE cannot build the proposed Veazie and Basin Mills developments without the approval of the Maine PUC, even if a license has been issued for the project by

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FERC. Thus, while states cannot in general control the construction of projects duly approved by FERC (including state water quality certification approval), the State of Maine can determine whether this applicant can undertake this project, and Condition 3 merely ensures that BHE receives the required Maine PUC approval and that the project will be in the public interest. Furthermore, the requirement that BHE be held responsible for compliance with the State's utility commission's requirements is in full accordance with the Federal Power Act.

Condition 12 requires that BHE establish a trust fund to be administered by the Atlantic Sea Run Salmon Commission for salmon management activities on the Penobscot River. The condition further requires that BHE contribute $100,000 per year, adjusted for inflation, to this fund for the term of the FERC license. FERC staff concludes that, under Condition 12, "BHE could be required to fund activities for salmon-run management that do not involve the impacts of the [proposed] projects, but rather would subsidize activities to ameliorate the impacts of other projects..." DEIS, page 5-26. However, a condition designed to support salmon management activities is appropriate to assure that the construction and operation of the proposed Basin Mills project will not cause the Penobscot River to violate its assigned water quality standards for designated uses (fishing and as fish and wildlife habitat) and will not violate the State's antidegradation policy (existing in-stream uses and the level of water quality necessary to protect those in-stream uses shall be maintained and protected). Therefore, Condition 12 is an appropriate condition for inclusion in a license, and FERC has no authority to decide not to include the condition in a license as a mandatory WQC requirement.

Condition 27 requires that BHE conduct all necessary studies to evaluate the economic, environmental and social costs and benefits of removing the Howland Dam; submit the results of the studies, along with an application to remove the dam, by September 30, 1998; and, if the Maine DEP determines that removal of the dam is in the public interest and satisfies all applicable statutory criteria, prepare applications and pursue approvals for dam removal and expeditiously remove the dam. FERC staff concludes simply that this condition "is outside the scope of the State's authority under Section 401 of the Clean Water Act to ensure that BHE's projects involved in this proceeding comply with state water quality standards." DEIS, page 5-27. However, the Maine DEP found that removal of the Howland Dam would provide "in-kind mitigation for the loss of salmon habitat due to the construction of the Basin Mills Dam" and would provide mitigation for impacts on fish passage created by the new dam by "improv[ing] fish passage into and out of the Piscataquis River." WQC, pages 19, 27. On this basis, Condition 27 is clearly "water quality related" and should be included in any license as a mandatory WQC requirement. Furthermore, BHE acknowledged in testimony before the Maine DEP that the license for the Howland

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Project is set to expire on September 30, 2000; that an application for new license for the project must be filed no later than September 30, 1998; and that future studies may determine that the project cannot be economically relicensed. Therefore, Condition 27 merely requires that BHE perform the studies that will be necessary to support the licensee's upcoming application either to relicense or to decommission the Howland Project.

Furthermore, under applicable agency enabling statute and processing regulations, the terms and conditions of our WQC for the Basin Mills Project were subject to appeal by BHE during the 30 days following the November 10, 1993 decision date. BHE did not appeal the conditions of the WQC within this jurisdictional time period, and thus has effectively agreed to comply with the twenty-eight conditions attached to the WQC. Compliance with these conditions is now enforceable by the Maine DEP under State law. We expect, and will enforce, BHE's compliance with all WQC conditions, whether or not they are included in any FERC license for the Basin Mills Project. We note that BHE always has the option of filing an application to amend or delete any condition of the WQC for the project which BHE may decide in the future should be amended or deleted.

Finally, the FERC staff has misinterpreted Condition 25, which requires that BHE conduct and submit the results of a study to determine the effects of ambient water temperatures in the lower Penobscot River on migrating Atlantic salmon. FERC staff interprets this condition "as being directed toward a determination of whether any changes in water temperature which are attributable to construction of the Basin Mills Project would adversely affect salmon." DEIS, pages 5-27. However, the condition actually requires a study with "provisions to monitor water temperatures and salmon behavior in the river from the West Enfield Dam to the Bangor Dam site," and further reserves the Maine DEP's authority "to require such changes in project facilities and operation and/or such other mitigation measures as are deemed appropriate and necessary to reduce the effects of ambient water temperatures on migrating salmon." WQC, page 70. This condition is based on the Maine DEP's finding that "current summer water temperatures in the lower Penobscot River"--even without the proposed Basin Mills Dam and impoundment--"sometimes exceed preferred temperatures for salmon, and that such temperatures can lead to stress, migratory delays, and death in the fish." WQC, page 51. We believe that the study required by Condition 25 is necessary and appropriate to establish a statistically-valid picture of water temperatures and any resultant effects on salmon migration throughout the lower river. In particular, this study is necessary to establish whether there is any statistically significant increase in water temperature due to the presence of multiple BHE-owned dams and impoundments on the lower river. We note the concern expressed by the FERC staff that "unless very specific methodologies and

DEP-2 cont'd

decision criteria are established before initiation of the study, study findings would serve as a basis for future argument and contention among the parties with interest in this project." DEIS, page F-35. We agree, and will consider the specific recommendations offered by the FERC staff for the temperature study plan at the appropriate time (see DEIS, pages F-35 and 36).

DEP-3

V. Section 10(j) Recommendations

In the DEIS, the FERC staff takes the position that the terms and conditions of the Maine DEP's WQC, by virtue of being the State's official recommendations on the Basin Mills Project, also represent the recommendations of the State's fish and wildlife agencies, under Section 10(j) of the Federal Power Act, regarding conditions for the protection, mitigation, and enhancement of fish and wildlife resources. See DEIS, page 5-27. After examining the Maine DEP's WQC, the FERC staff concludes that fourteen of the twenty-eight WQC conditions fall within the scope of Section 10(j). See DEIS, page 5-25. Finally, the FERC staff concludes that eleven of the Section 10(j) recommendations should be adopted, and that three WQC conditions (Conditions 12, 25, and 27) should not be adopted as Section 10(j) recommendations. See DEIS, pages 5-27 through 5-29.

The Maine DEP contends that, as noted in our November 19, 1993 comment letter, "[b]y Executive Order of the Governor of the State of Maine, the terms and conditions contained in the Department's water quality certification represent the State's official recommendations regarding the subject application, superceding all preliminary recommendations by individual State agencies." We therefore agree, in keeping with this Executive Order, that all appropriate WQC conditions should be considered as the State's Section 10 (j) recommendations.

The Maine DEP also contends that Condition 12 (requiring a trust fund for salmon management activities), Condition 25 (requiring a water temperature study) and Condition 27 (requiring a study of costs and benefits of Howland Dam removal) are appropriate conditions for inclusion in any license for the Basin Mills Project, as discussed in the previous section of these comments, and should be adopted as Section 10 (j) recommendations for the protection, mitigation, and enhancement of fish and wildlife resources.

DEP-3 No response required.

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DEP-4

STILLWATER PROJECT

I. Evaluation of Alternatives

The DEIS evaluates three alternatives for the Stillwater Project, summarized as follows:

Alternative 1: No action alternative (continued operation of existing project).

Alternative 2: Project as proposed by BHE, including all conditions of the WQC issued for the project by the Maine DEP.

Alternative 3. Project as proposed by BHE with modifications (involving several additions to and changes in the project mitigation measures contained in Alternative 2) as proposed by FERC staff.

II. Staff Modifications

As noted above, Alternative 3 includes modifications by FERC staff to the project as proposed by BHE and conditioned by the Maine DEP. These modifications, which relate to project impacts on fisheries and recreational resources, are as follows:

Fisheries Resources

- Implementation of phased construction of upstream fish passage facilities at the Stillwater Project, with the first phase consisting of a standard Denil or vertical slot fishway or a fish lift (BHE proposes installation of a steeppass Denil fishway at the Stillwater powerhouse).

Recreational Resources

- A requirement that BHE attempt to acquire property or an easement and provide formal boat launching facilities if the existing informal access at the Old Town Water District property is restricted in the future.

III. Staff Findings and Conclusions

On the basis of its independent analysis, the FERC staff concludes in the DEIS that Alternative 3--the project as proposed by BHE with staff modifications--would be

DEP-4 No response required.

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DEP-4 cont'd best adapted to comprehensive plans for improving or developing the waterways of the lower Penobscot River Basin. Therefore, the FERC staff recommendation is to relicense the Stillwater Project with staff-recommended mitigation measures.

IV. Water Quality Certification Conditions

DEP-5 On December 29, 1992, the Maine DEP issued a Water Quality Certification for the Stillwater Project. Our certification that the operation of the project will not violate applicable water quality standards is subject to six special conditions; these conditions are summarized on page 2-18 of the DEIS.

By letter dated December 29, 1992, the Maine DEP commented on the pending application for license for the Stillwater Project and transmitted our WQC decision to FERC. In these comments, we recommended that all the conditions of the WQC be included as appropriate in the Articles of any license issued for the project, in compliance with Sections 401 (a) and (d) of the Clean Water Act.

As discussed above, the FERC staff takes the position, in accordance with the Commission's recent Tunbridge decision, that FERC has the authority to review the validity of water quality certification conditions, that only "water quality related" conditions are lawful and are thus subject to inclusion as mandatory conditions in a license, and that conditions unrelated to water quality are unlawful and are thus not subject to inclusion as mandatory conditions in a license. See DEIS, pages 1-5 and 5-24.

After examining the Maine DEP's WQC for the Stillwater Project in accordance with the Tunbridge decision, the FERC staff concludes that one of the six special WQC conditions is not water quality related and is thus not a mandatory licensing condition. This condition (#6) deals with recreational facilities and access. However, based on the independent analysis conducted in the DEIS, the FERC staff further concludes that adoption of the condition deemed to be "outside the scope" of WQC is in fact warranted under the Federal Power Act in any license for the project. See DEIS, page 5-34.

As discussed above, we strongly disagree with FERC's position on its authority to review the validity of water quality certification conditions, as discussed in the DEIS. The Tunbridge decision effectively changes FERC's long-standing practice of leaving any review of the appropriateness of WQC conditions to the State courts. We believe that this practice was in fact in keeping with the express language of the Clean Water Act and controlling case law and should be continued. We believe that FERC has no authority to review and either accept or reject state-imposed WQC conditions.

DEP-5 The Commission's final determination on the legal status of the State of Maine's section 401 WQC conditions will be made in the license order for the project.

DEP-5
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DEP-5
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and that these conditions are subject to review only by Maine's courts and, ultimately, the U. S. Supreme Court.

The Maine DEP contends that all of the conditions attached to the WQC for the Stillwater Project set forth limitations and monitoring requirements necessary to assure that the project will comply with State water quality standards, and that all such limitations and monitoring requirements "shall become a condition on any Federal license" for the project, in accordance with Section 401(d) of the Clean Water Act.

As discussed above, the State of Maine is authorized to impose conditions necessary to insure that the operation of the Stillwater Project will comply with all aspects of Maine's water quality standards, including designated uses, numeric and narrative criteria, and the State's antidegradation policy. See PUD No. 1 v. Washington Dept. of Ecology, ___U.S. ___, 114 S.Ct. 1900. The condition in question (requiring construction and maintenance of recreational access facilities) is in fact necessary (a) to meet the State's designated uses of the Penobscot River for recreation in and on the water and (b) to satisfy the provision of the State's antidegradation policy that existing in-stream water uses and the level of water quality necessary to protect those existing uses must be maintained and protected.

Furthermore, under applicable agency enabling statute and processing regulations, the terms and conditions of our WQC for the Stillwater Project were subject to appeal by BHE during the 30 days following the December 29, 1992 decision date. BHE did not appeal the conditions of the WQC within this jurisdictional time period, and thus has effectively agreed to comply with the six conditions attached to the WQC. Compliance with these conditions is now enforceable by the Maine DEP under State law. We expect, and will enforce, BHE's compliance with all WQC conditions, whether or not they are included in any FERC license for the Stillwater Project. We note that BHE always has the option of filing an application to amend or delete any condition of the WQC for the project which BHE may decide in the future should be amended or deleted.

We note that our WQC for the Stillwater Project includes special conditions requiring that BHE provide a total interim minimum flow of 70 cfs (50 cfs and 20 cfs in the East and West bypass channels, respectively), and that BHE make channel modifications (physically modifying an existing gravel/cobble berm) and conduct a study to establish a permanent minimum flow release in the project bypass reach. Based on the independent analysis conducted in the DEIS, the FERC staff concluded that the proposed flows "would significantly enhance existing juvenile salmon habitat in the bypass reach and would create new salmon lies," and that channel modifications

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"could increase [weighted usable area] for juvenile salmon and the number of salmon lies without requiring a total minimum flow greater than 70 cfs." DEIS, page F-26 (emphasis added). However, in our WQC for the Stillwater Project, we have specifically reserved the authority, after reviewing the results of the minimum flow study, to order "such continuation or modification of the interim minimum flow as is deemed necessary to maintain adequate fish habitat" in the bypass reach. WQC, page 15 (emphasis added). Our condition, therefore, leaves open the possibility that the permanent minimum flow release will be greater than 70 cfs. We believe that this condition is fully warranted based on the available information, and that compliance with this condition, and any resulting higher minimum flow release, is enforceable by the Maine DEP under State law.

DEP-6

V. Section 10(j) Recommendations

In the DEIS, the FERC staff takes the position that the terms and conditions of the Maine DEP's WQC, by virtue of being the State's official recommendations on the Stillwater Project, also represent the recommendations of the State's fish and wildlife agencies, under Section 10(j) of the Federal Power Act, regarding conditions for the protection, mitigation, and enhancement of fish and wildlife resources. See DEIS, page 5-27. After examining the Maine DEP's WQC for the Stillwater Project, the FERC staff concludes that five of the six special WQC conditions fall within the scope of Section 10(j). Finally, the FERC staff concludes that all five of the Section 10(j) recommendations should be adopted. See DEIS, page 5-34.

The Maine DEP contends that, as noted in our December 29, 1992 comment letter, "[b]y Executive Order of the State of Maine, the terms and conditions contained in the enclosed [certification] represent the State's official recommendations regarding the subject Application for New License, superceding all preliminary recommendations by individual State agencies." We therefore agree, in keeping with this Executive Order, that all appropriate WQC conditions should be considered as the State's Section 10 (j) recommendations.

DEP-7

MILFORD PROJECT

I. Evaluation of Alternatives

The DEIS evaluates three alternatives for the Miford Project, summarized as follows:

Alternative 1: No action alternative (continued operation of existing project).

DEP-6 No response required.

DEP-7 No response required.

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DEP-7 Cont'd

Alternative 2: Project as proposed by BHE, including all conditions of the WQC issued for the project by the Maine DEP.

Alternative 3. Project as proposed by BHE with modifications (involving several additions to and changes in the project mitigation measures contained in Alternative 2) as proposed by FERC staff.

II. Staff Modifications

As noted above, Alternative 3 includes modifications by FERC staff to the project as proposed by BHE and conditioned by the Maine DEP. These modifications, which relate to project impacts on recreational resources, are as follows:

- A requirement that BHE attempt to gain an easement and to construct a canoe portage around the east side of the Gilman Falls Dam.
- A requirement that BHE finance and maintain recreational access facilities at the North Fourth Street site, the Birch Street site, and the Costigan Stream/Burr's Store site.

III. Staff Findings and Conclusions

On the basis of its independent analysis, the FERC staff concludes in the DEIS that Alternative 3--the project as proposed by BHE with staff modifications--would be best adapted to comprehensive plans for improving or developing the waterways of the lower Penobscot River Basin. Therefore, the FERC staff recommendation is to expand and relicense the Milford Project with staff-recommended mitigation measures.

DEP-8

IV. Water Quality Certification Conditions

On October 23, 1992, the Maine DEP issued a Water Quality Certification for the Milford Project. Our certification that the operation of the project will not violate applicable water quality standards is subject to eight special conditions; these conditions are summarized on page 2-19 of the DEIS.

By letter dated October 23, 1992, the Maine DEP commented on the pending application for license for the Milford Project and transmitted our WQC decision to FERC. In these comments, we recommended that all the conditions of the WQC be

DEP-8 The Commission's final determination on the legal status of the State of Maine's section 401 WQC conditions will be made in the order for the project.

DEP-8
cont'd

included as appropriate in the Articles of any license issued for the project, in compliance with Sections 401 (a) and (d) of the Clean Water Act.

As discussed above, the FERC staff takes the position, in accordance with the Commission's recent Tunbridge decision, that FERC has the authority to review the validity of water quality certification conditions, that only "water quality related" conditions are lawful and are thus subject to inclusion as mandatory conditions in a license, and that conditions unrelated to water quality are unlawful and are thus not subject to inclusion as mandatory conditions in a license. See DEIS, pages 1-5 and 5-24.

After examining the Maine DEP's WQC for the Milford Project in accordance with the Tunbridge decision, the FERC staff concludes that one of the eight special WQC conditions is not water quality related and is thus not a mandatory licensing condition. This condition (#8) deals with recreational facilities and access. However, based on the independent analysis conducted in the DEIS, the FERC staff further concludes that adoption of the condition deemed to be "outside the scope" of WQC is in fact warranted under the Federal Power Act in any license for the project. See DEIS, page 5-38.

As discussed above, we strongly disagree with FERC's position on its authority to review the validity of water quality certification conditions, as discussed in the DEIS. The Tunbridge decision effectively changes FERC's long-standing practice of leaving any review of the appropriateness of WQC conditions to the State courts. We believe that this practice was in fact in keeping with the express language of the Clean Water Act and controlling case law and should be continued. We believe that FERC has no authority to review and either accept or reject state-imposed WQC conditions, and that these conditions are subject to review only by Maine's courts and, ultimately, the U. S. Supreme Court.

The Maine DEP contends that all of the conditions attached to the WQC for the Milford Project set forth limitations and monitoring requirements necessary to assure that the project will comply with State water quality standards, and that all such limitations and monitoring requirements "shall become a condition on any Federal license" for the project, in accordance with Section 401(d) of the Clean Water Act.

As discussed above, the State of Maine is authorized to impose conditions necessary to insure that the operation of the Milford Project will comply with all aspects of Maine's water quality standards, including designated uses, numeric and narrative criteria, and the State's antidegradation policy. See PUD No. 1 v.

DEP-8
Cont'd

DEP-8 cont'd

Washington Dept. of Ecology, ___U.S. ___, 114 S.Ct. 1900. The condition in question (requiring construction and maintenance of recreational access facilities and periodic removal of semi-buoyant logs from the project impoundment) is in fact necessary (a) to meet the State's designated uses of the Penobscot River for recreation in and on the water and (b) to satisfy the provision of the State's antidegradation policy that existing in-stream water uses and the level of water quality necessary to protect those existing uses must be maintained and protected.

Furthermore, under applicable agency enabling statute and processing regulations, the terms and conditions of our WQC for the Milford Project were subject to appeal by BHE during the 30 days following the October 23, 1992 decision date. BHE filed but subsequently withdrew an appeal of the WQC within this jurisdictional time period, and thus has effectively agreed to comply with the eight conditions attached to the WQC. Compliance with these conditions is now enforceable by the Maine DEP under State law. We expect, and will enforce, BHE's compliance with all WQC conditions, whether or not they are included in any FERC license for the Milford Project. We note that BHE always has the option of filing an application to amend or delete any condition of the WQC for the project which BHE may decide in the future should be amended or deleted.

V. Section 10(j) Recommendations

DEP-9

In the DEIS, the FERC staff takes the position that the terms and conditions of the Maine DEP's WQC, by virtue of being the State's official recommendations on the Milford Project, also represent the recommendations of the State's fish and wildlife agencies, under Section 10(j) of the Federal Power Act, regarding conditions for the protection, mitigation, and enhancement of fish and wildlife resources. See DEIS, page 5-27. After examining the Maine DEP's WQC for the Milford Project, the FERC staff concludes that seven of the eight special WQC conditions, including the condition dealing with recreational facilities and access, fall within the scope of Section 10(j). Finally, the FERC staff concludes that all seven of the Section 10(j) recommendations should be adopted. See DEIS, page 5-38.

The Maine DEP contends that, as noted in our October 23, 1992 comment letter, "[b]y Executive Order of the Governor of the State of Maine, the terms and conditions contained in the enclosed [certification] represent the State's official recommendations regarding the subject Application for New License, superceding all preliminary recommendations by individual State agencies." We therefore agree, in keeping with this Executive Order, that all appropriate WQC conditions should be considered as the State's Section 10 (j) recommendations.

DEP-9 No response required.

COMMENTS: DEIS--0082
February 15, 1995
Page 20

DEP-9 cont'd

Thank you for this opportunity to comment of this Draft Environmental Impact Statement. Please direct any questions regarding these comments to Dana Murch of the DEP's staff at 207-287-3901.

Sincerely,

Martha Kirkpatrick

Martha Kirkpatrick, Director
Bureau of Land & Water Quality
Department of Environmental Protection

a\deis0082

cc: Sabina Joe, FERC, OHL
Doug Morrell, BHE
David Turin, EPA New England
John Kurland, NMFS
Gordon Russell, USF&WS
DEP Service List
FERC Review Coordinating Committee

DEP-9
Cont'd

COMMENTS FROM NATIONAL GEODETIC SURVEY ON LOWER PENOBSCOT RIVER BASIN DEIS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Coast and Geodetic Survey
Silver Spring, Maryland 20910

DEC 2 1994

MEMORANDUM FOR: Donna Wieting
Ecology and Environmental Conservation Office
Office of the Chief Scientist

FROM: Captain Lewis A. Lapine, NOAA
Director, National Geodetic Survey

SUBJECT: DEIS 9411.05 - Lower Penobscot River Basin
Penobscot County, Maine

NGS-1

The subject statement has been reviewed within the areas of the National Geodetic Survey's (NGS) responsibility and expertise and in terms of the impact of the proposed actions on NGS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in Penobscot County is provided on the diskettes accompanying this memorandum. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project include the cost of any relocation(s) required.

For further information about these monuments, please contact John Spencer, NOAA, NGS, N/CG17, 1315 East-West Highway, Silver Spring, Maryland 20910-3282, telephone 301-713-3236.

Attachments

RESPONSES TO NATIONAL GEODETIC SURVEY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NGS-1 The project applicant would be responsible for preventing disturbance to geodetic control monuments during project construction.

COMMENTS FROM NATIONAL GEODETIC SURVEY ON LOWER PENOBSCOT RIVER BASIN DEIS

Washington, D.C. 20230

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ECOLOGICAL SCIENCES AND ANALYSIS

P-2534-005
2712-004
10981

January 19, 1995

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street
Washington, DC 20426

NGS-2 Dear Ms. Cashell:

Enclosed are comments on the Draft Environmental Impact Statement for Lower Penobscot River Basin Penobscot County, Maine. We hope our comments will assist you. Thank you for giving us an opportunity to review the document.

Sincerely,

Donna Wieting

Donna S. Wieting
Acting Director
Ecology and Conservation Office

Enclosures

+ Disks Rec'd / OHL

RESPONSES TO NATIONAL GEODETIC SURVEY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NGS-2 No response required.

NGS-2
Cont'd

The enclosed disk contains programs DSX, DSPLOT, and DSSELECT (in separate directories) which facilitate the use of the National Geodetic Survey's (NGS) data sheet file (DSDATA).

DSX.EXE extracts individual or groups of data sheets from a DSDATA file. It provides options to extract by station identifier, station name, area, and more. Various utilities are included for manipulating the data.
Print files 'DSX.DOC' and 'D_README' from directory 'DSX' on the diskette for documentation on setting up and using the program!

DSPLOT.EXE is used to plot DSX created index files (or any file in the same format) on the terminal screen.
Print file 'DSPLOT.DOC' from directory 'DSPLOT' on the diskette for documentation on using the program!

DSSELECT.EXE allows for extraction of various data items from a DSDATA file into a separate file. Ouptut format is one record per station with data items separated by a delimiter for easy database loading.
Print file 'DSSELECT.ASC' from directory 'DSSELECT' on the diskette for documentation on using the program!

NGS welcomes your suggestions and comments on the usefulness of the program. Please send your comments to:

U.S. Department of Commerce, NOAA
National Geodetic Survey, N/CG174
SSMC-3, Station 9202
1315 East-West Highway
Silver Spring, MD 20910

NGS-2
Cont'd

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930

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ECOLOGICAL SCIENCES AND ANALYSIS

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FEB 16 199

DRAFT

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

RE: DEIS Lower Penobscot River Basin (FERC #10981, #2712, #2534) -005
000 004

Dear Ms. Cashell:

NMFS-1 These comments are submitted by the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), United States Department of Commerce, in response to the Federal Energy Regulatory Commission's (FERC) Draft Environmental Impact Statement (DEIS) for the Lower Penobscot River Basin, Maine. The Attachment A contains specific comments on each section of the DEIS; Attachment B contains revised fishway prescriptions and Attachment C contains detailed comments on the ASAL modeling included in the DEIS. The action under analysis is the issuance of a new hydroelectric development as part of the Basin Mills Project (FERC No. 10981) and relicensing the existing Stillwater (FERC No. 2712), and Milford (FERC No. 2534) hydroelectric projects.

General Comments

NMFS-2 The executive summary of the DEIS contains the statement that the **key issue** addressed in the DEIS is whether or not constructing a new dam would impede or preclude restoration of populations of anadromous fish in the Penobscot River. The staff findings in the document (4.3.3.6) state that the **key finding** is that attainment of the goal of a fully-restored, completely self-sustaining salmon stock in the Penobscot River is unlikely under all alternatives and the staff subsequently concludes that project impacts cannot be evaluated against an unattainable goal. The methodology FERC used to reach their conclusions are not consistent with its obligations under Sections 4(e), 10(a) or 10(j) of the Federal Power Act (FPA).

The key issue is more appropriately defined as whether FERC can meet its own statutory obligation, under Section 4 (e) of the FPA, to identify an alternative which gives **equal consideration** to the purposes of power generation and the protection,

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-1. No response required.

NMFS-2 This comment will be addressed in the order issued for this project.

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-2 Cont'd mitigation of damages to, and enhancement of fish and wildlife. Impacts from the various project alternatives to the current and projected future populations of all fish and wildlife in the Penobscot River should be identified. The alternatives should then be assessed for their relative ability to protect, mitigate impacts to, and enhance fish and wildlife resources and generate power. The evaluations presented in the DEIS are meaningless by virtue of the fact that imposed upon each of the alternatives is FERC's finding that resource agency goals are unattainable. Proceeding with this assumption, FERC is then able to essentially disregard additional impacts to fish and wildlife resources in the Penobscot. Clearly, FERC has not considered the purposes of power generation and the protection, mitigation of damage to, and enhancement of fish and wildlife equally and consequently has not met its obligation under Section 4(e) of the FPA.

NMFS-3 Section 10(a) of the FPA obligates FERC to ensure that projects are adapted to comprehensive plans for waterpower development and for the adequate protection, mitigation, and enhancement of fish and wildlife resources. This section of the FPA, again, obligates FERC to strive to achieve a balance between power generation and fish and wildlife resources. The DEIS for the lower Penobscot River does not seek such a balance. In fact, it appears from the cumulative analysis presented, especially in regard to fish passage efficiencies, that FERC has concluded that the extensive hydropower development on the Penobscot River precludes the continued existence of anadromous fish. Clearly a balance has not been achieved by conditions included in past licenses issued by FERC.

NMFS-4 FERC further ignores its obligation under Section 10(j) to accept recommendations of the NMFS and USFWS to adequately protect, mitigate damages to, and enhance fish and wildlife. FERC relies on ASAL model projections to support its conclusion that resource agency goals will not be met. The inputs FERC used were not those recommended by the resource agencies with expertise in anadromous fish but rather their own numbers which seem to be arrived at arbitrarily. For reasons discussed in greater detail in Attachment C, NMFS disagrees with the model inputs used by FERC but more substantively disagrees with FERC's decision to disregard the recommendations of NMFS and USFWS and to ignore its legal obligation under Section 10 (j) of the FPA.

NMFS-5 **Purpose and Need**
The alternatives presented in the DEIS are difficult to analyze given that a purpose and need for the proposed action is not clearly defined. The purpose and need section of the DEIS references Section 4 (e) of the Federal Power Act (FPA) which requires FERC to ensure that projects it licenses are best adapted to a comprehensive plan for waterway use including both water power development and for the adequate protection, mitigation, and enhancement of fish and wildlife (including

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-3 In the FEIS, we recommend Alternative 4 as our preferred alternative. We conclude that this alternative is best adapted to the comprehensive use of this river basin, as required in Section 10(a) of the FPA.

NMFS-4 In Section 4 (and in Appendices D and E) we present the results of ASAL model runs using all of the model parameters specified by NMFS and FWS. We also present the outputs of model runs we made using alternative parameter values. Our model runs employ more than 90% of the model parameters specified by the USFWS. Dr. Rago, in Attachment C, correctly pointed out that our use of the current 0.76% marine survival value did not account for in-river loss of smolts before they reached the sea. We corrected that value for in-river loss, and used the corrected value of 0.79% in rerunning specific ASAL model scenario. We have taken Dr. Roga's analyses into account in our decision to recommend Alternative 4 as our preferred alternative.

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-5 Cont'd

related spawning grounds and habitat). The purpose and need could be described as two-fold: the applicant's purpose and need is to generate power; the Commission's purpose and need is to decide whether a license for these projects can be crafted so as to give equal consideration to the power and development purpose and 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. The purpose and need section of the DEIS should be the focal point of the document and needs to be clearly and explicitly defined by FERC.

NMFS-6

No Action Alternative
FERC has defined the no-action alternative as continual operation of the Veazie and Orono projects under annual licenses for another 30-50 years. NMFS does not agree with this definition. Without the construction of the Basin Mills dam, the resource agencies would pursue improved fish passage efficiency thus reducing threats to anadromous fish passage. At the time of relicensing FERC must decide whether to deny or issue a license; it is not a foregone conclusion that the relicensing request will be granted. Therefore, NMFS believes that the more appropriate no-action alternative would be that Basin Mills dam does not get built and Veazie and Orono do not get relicensed. No-action means, literally, that the action agency takes no-action. Issuance of an annual license clearly requires action by FERC. The fact that FERC incorrectly defined the "no-action" alternative mean that the comparisons between it and the action alternatives are misleading.

NMFS-7

Preferred Alternative
NEPA obligates the action agency to identify the alternative it believes would fulfill its statutory mission and responsibilities. FERC has identified Alternative 3 as its preferred alternative. By this action, FERC is claiming that alternative 3 balances the need for hydropower with the need to protect fish and wildlife resources in the basin. The analyses presented by FERC in the DEIS illustrates that the balance has shifted in the Penobscot basin to favor hydropower development over fish and wildlife resources. Alternative 3 further shifts the scale in favor of hydropower. Accordingly, the "preferred alternative" presented in the DEIS does not achieve a balance between the purposes of power generation and protection, mitigation, and enhancement of fish. Activities authorized by this license would negatively impact habitat for anadromous fish without in-kind mitigation and would add another obstacle to fish migrations in the Penobscot River. Adding new unmitigated threats to a restoration effort already facing numerous obstacles is not consistent with resource agency goals.

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-4 Cont'd — The Commission is legally obligated to consider the recommendations made by state and federal fish and wildlife agencies pursuant to Section 10(j) of the FPA. State and federal fishery goals are not mandatory under Section 10(j). However, our recommended Alternative 4 is consistent with fishery goals of all comprehensive plans.

NMFS-5 — This comment will be addressed in the orders issued for these proceedings.

NMFS-6 — The baseline for evaluation is the scenario of existing and expected environmental conditions with the existing project. Therefore, the no-action condition includes the existing project in a relicense situation. Commission action would be required to remove an existing dam, therefore, it cannot be "No-action." This comment will be further addressed in the orders issued for these proceedings.

NMFS-7 — See response NMFS-4, above.

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-8

Cumulative Impact Analysis
The Commission acknowledges in the DEIS that to make sound licensing decisions it must analyze the additive or interactive impacts of multiple developments within a river basin. As stated in the DEIS, minor impacts of past, present, and reasonable foreseeable future actions of several agencies or persons, when added together, may result in combined or cumulative impacts with serious environmental consequences (40 CFR, Part 1508.7). It appears that FERC has concluded that inefficiencies in passage at existing facilities is preventing successful restoration from being achieved. Having demonstrated this, FERC then concluded that the addition of only one more barrier was not a significant impact. This conclusion is based on the fact that, according to FERC's analysis, restoration could not succeed with or without the dam. The fact that FERC concluded that restoration could not succeed with existing dams in place indicates to NMFS that a balance between hydropower development and fish and wildlife resources does not currently exist in the Penobscot River basin. FERC's preferred alternative shifts the emphasis even further on hydropower to the detriment of fish and wildlife resources. NMFS believes the more appropriate conclusion from the cumulative impact analysis is that efforts should be pursued to seek improvements for fish and wildlife resources to restore balance to the basin.

NMFS-9

Application of the ASAL Model
The conclusions presented in the DEIS rely heavily on modeling conducted to project impacts of the proposed Basin Mills project on Atlantic salmon production and survival. The ASAL results presented in the DEIS are technically flawed. The marine survival rate (0.0073) used in the ASAL model is inappropriate. This inappropriate parameter was used in model runs that form the foundation of the argument in the DEIS that the probability of restoration over a 50 year time line is near zero, with or without Basin Mills dam being constructed. When run with appropriate rate of marine survival, smolt production, and fish passage, the ASAL model results suggest significant negative effects resulting from the Basin Mills project. The ASAL modeling is analyzed in detail in Appendix C.

NMFS-10

Given the significance and substance of our comments we recommend that the Commission prepare a supplemental DEIS which addresses these inadequacies and incorporates requirements for the required Army Corps of Engineers permit.

Sincerely,

Jon C. Rittgers
Acting Regional Director

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-8 Staff has evaluated the cumulative impacts of multiple developments in the river basin through its ASAL modeling, comprehensive examinations of alternatives, and survey of dam removal options. See Section 5.

NMFS-9 Our responses to your detailed comments on our ASAL model application are presented below. We note, however, that in your Appendix C, Dr. Rago, a co-author of the ASAL model, states "...The applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent...." In the FEIS, we have corrected the single model run made using the incorrect marine survival rate representing existing actual rates.

Our own ASAL model results are totally consistent with the BASNMILL spread-sheet model results presented by Dr. Rago in your Appendix C and we have incorporated a number of Dr. Rago's model results into our FEIS text. In particular, we acknowledge that construction of Basin Mills dam would reduce the equilibrium stock size for salmon and increase the rate of decline in specific tributary stocks by 13 percent.

NMFS-10 See our response to COE-3.

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

DRAFT

Attachment A: Section-by-Section Analysis

1.0 PURPOSE AND NEED FOR ACTION

NMFS-11 NEPA requires that the action agency identify the underlying purpose and need to which it is responding in proposing alternatives, including the proposed action. The purpose and need section of the DEIS fails to clearly identify the purpose of this action. This failure makes it impossible to analyze the relative ability of the various alternatives to achieve the project purpose. The introduction to this section references the purpose as whether the FERC should issue new licenses for the projects. NMFS believes this purpose is overly simplistic. Section 4(e) of the Federal Power Act (FPA) requires that in deciding whether to issue any license FERC, in addition to the power and development purposes for which licenses are issued, shall give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of, fish and wildlife (including related to spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Given this obligation, it seems more accurate to describe the purpose of the DEIS as the action agency's effort to identify if the proposed action is best adapted both for the improvement and utilization of water power development and for the adequate protection, mitigation, and enhancement of fish and wildlife. If the action agency determines that the applicant's proposed action does not achieve these purposes then it proposes its own preferred alternative that it believes satisfies its statutory mission and responsibilities. NMFS does not believe that the preferred alternative proposed by FERC meets its statutory mission and responsibilities. This conclusion is based on the determination that neither the proposed or preferred alternative adequately protect, mitigate, or enhance anadromous fish resources

NMFS-12 The DEIS states that the demand for power is forecast by NEPOOL and NERC to increase in the planning period 1993-2002 and that capacity will decrease due to the planned retirement of some existing facilities. This allows FERC to justify the need for power. The DEIS does not evaluate any concurrent increases in supply expected from planned expansions, other new facilities, conservation plans, or alternative energy sources. This analysis should be done for the area served by NEPOOL. Without this analysis it is impossible to balance the supply and demand to determine if there is a need to add the capacity of this project. FERC seems to justify the issuance of these three licenses by the fact that they will add capacity to the power pool. This is not adequate justification. The anticipated supply of and demand for power should be more fully explored by FERC. It is difficult to evaluate the need to issue a 30-50 year license against a 9 year forecast of demand.

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-11 The purpose of a licensing action under the FPA will be addressed in the orders issued for these projects. We only note here that the FPA requires the Commission to responsibly evaluate conflicting resource purposes and to balance developmental and nondevelopment values in a manner consistent with the purposes of the FPA.

NMFS-12 Please see the revised Need for Power Section 1.2.

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

1.3.3 Cumulative Impacts

NMFS-13 NMFS supports FERC's commitment to study cumulative impacts of hydropower development. However, for reasons described in greater detail later, in most cases when FERC analyzed the additional impact of this proposed action in combination with past and present actions, it used the cumulative impact of these actions and the resulting inability to reach resource agency goals (as determined by FERC) as justification to authorize activities that would further impact these resources. NMFS does not reach the same conclusion from studying the cumulative impact of hydropower development on the anadromous fish of the Penobscot River. The analysis presented by FERC in the DEIS indicates that the cumulative impact of hydropower generation is severely impacting efforts to restore sustainable anadromous fish runs and consequently efforts should be focused on ensuring that future actions do not result in additional impact and steps should be taken to reduce the impact of past and present actions.

2.0 PROPOSED ACTION AND ALTERNATIVES

NMFS-14 NEPA requires that the action agency rigorously explore and objectively analyze all reasonable alternatives to the proposed action. Of the alternatives presented, Alternative 5 (not constructing Basin Mills, refurbishing/relicensing Orono, and decommissioning and removing Veazie) most closely balances fisheries and power needs and consequently is NMFS' preferred option. The NMFS believes FERC should explore the following as a reasonable alternative to the proposed action: removal of Veazie, decommissioning Orono and constructing Basin Mills. This alternative provides energy benefits and more properly balances hydropower development with the protection of fish and wildlife resources as required by the FPA.

NMFS-15 FERC has defined the no-action alternative as continual operation of the Veazie and Orono projects under annual licenses for another 30-50 years. NMFS does not agree with this definition. At the time of relicensing FERC must decide whether to deny or issue a license, it is not a foregone conclusion that the relicensing request will be granted. Therefore, NMFS believes that the more appropriate no-action alternative would be that Basin Mills dam does not get built and Veazie and Orono do not get relicensed. No-action means, literally, that the action agency takes no-action. Issuance of an annual license clearly requires action by FERC.

The choice of a no-action alternative is a critical one as it serves as the benchmark for comparisons of the magnitude of environmental effects of the action alternatives. The fact that FERC incorrectly defined the "no-action" alternative means that the comparisons between it and the action alternatives are misleading.

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-13 NMFS and DOI Section 18 prescriptions for upstream and downstream fish passage facilities incorporated into all project alternatives constitute significant steps toward reducing past and present impacts on anadromous fish of the three hydroelectric projects evaluated in the Lower Penobscot River Basin DEIS. These measures include: new downstream passage facilities at all developments that would reduce current downstream mortality rates; new upstream passage facilities at Orono and Stillwater dams, where passage has not been possible to date; and, improved passage facilities at Veazie and Milford that would increase upstream passage efficiency for all species. The additional measures we incorporated into Alternative 3 (trap-and-truck from Veazie and stocking of salmon fry) mitigate for the new potential impacts to Atlantic salmon attributable to the new Basin Mills dam. In Alternative 4, we included trap-and-truck capability to provide agencies with means for enhancing anadromous fish restoration efforts. Taken together, these measures would result in a reduction of existing and potential impacts to anadromous fish stocks in the Penobscot River.

NMFS-13
Cont'd

NMFS-14 While NEPA requires that an EIS include a consideration of alternatives, a discussion of the alternatives need not be exhaustive and need only provide sufficient information to permit a reasoned choice among alternatives[1]. To give full consideration to your new suggested alternative, we conducted a preliminary economic and biological evaluation to determine whether it represented a viable alternative to our preferred alternative. The results of our evaluation of your alternative, as well as of a number of other new alternatives proposed by other respondents, can be found in section 2.5. Our analyses indicate that this alternative offered a range of power and fisheries benefits already encompassed in our DEIS alternatives. On this basis, we did not pursue this alternative further.

NMFS-15 See our response to NMFS-6.

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[1] See Richard Balagur, 57 FERC ¶ 61,315 at p. 62,018, citing State of North Carolina v. Federal Power Commission, 533F.2d 702, 707 (D.C. Cir. 1976). See also the analysis in Marysville Hydro Partners, 63 FERC ¶ 61,271 pp. 62,74-44 (1993).

COMMENTS FROM NATIONAL MARINE FISHERIES SERVICES ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-16 **2.1.2.1 Proposed Environmental Measures - Basin Mills Project**
Where impacts to anadromous fish and their habitats have been demonstrated to be unavoidable and all attempts have been made to minimize such impacts, then mitigation is warranted. Mitigation alternatives are explored first seeking in-kind mitigation. The preferred alternative does not reflect this sequencing. Passage inefficiencies are proposed to be mitigated by stocking. This mitigation is appropriate, only after all attempts have been made to improve passage efficiency, as lost numbers of fish are mitigated by adding fish to the system. Habitat impacts are also proposed to be mitigated by stocking efforts. This mitigation effort is not appropriate unless no in-kind alternatives are available. The NMFS maintains its position that habitat impacts should be mitigated by creation or restoration of habitat, not by stocking fish. Anadromous fish habitat that is lost due to inundation by creating a new impoundment is lost forever, unless the dam is removed. By contrast, the applicant is proposing to stock only for the term of license. At the time the license expires, the habitat impacts will remain and stocking will stop. Consequently, the impact to anadromous fish habitat has not been adequately mitigated and consequently the proposed environmental measures do not meet the balancing requirements of the FPA.

NMFS-17 **2.2.2 and 2.2.2.1 Section 18 Fishway Prescription and 4(e) Conditions**
FERC should acknowledge that Section 18 of the FPA provides the Secretary of Commerce with the authority to prescribe fishways. In addition, the DEIS should note that Commerce reserved its right to prescribe fishways for the Basin Mills Project (letter from Richard B. Roe and Anton P. Giedt, March 26, 1993).

NMFS-18 **2.3 Alternatives to Proposed Project Facilities or Operation**

2.3.1 Basin Mills
An alternative 7 should be explored which would involve decommissioning Orono, decommissioning and removing Veazie and constructing Basin Mills. This alternative would have power generation benefits and would reduce the impact to anadromous fish resources.

NMFS-19 This section references the Commission's Notice of Inquiry on Project Decommissioning at Relicensing. On December 14, 1994 the Commission issued a policy statement on this issue. This policy states that the Commission has concluded that it has the legal authority to deny a new license at the time of relicensing if it determines that no license can be fashioned that will comport with the statutory standard under section 10(a) of the FPA and other applicable law. This recognition, that the Commission has a choice to make at the time of relicensing, does not seem compatible with the position taken by FERC in this DEIS that if

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NMFS-16 We selected the fisheries enhancement and mitigation measures incorporated into Alternatives 3 and 4 based on two objectives: to provide for fisheries enhancement relative to current conditions for existing developments (Veazie, Orono, Stillwater, and Milford Alternatives 3 and 4); and, to completely compensate for any new unavoidable fisheries impacts attributable to the proposed new development (Basin Mills Alternative 3 only). Upstream and downstream passage efficiencies and survival of migrating anadromous fish at all existing developments would be substantially improved as a result of fish passage construction and improvements at the four existing developments addressed in this EIS (see discussions of upstream and downstream passage in Appendix E of the FEIS). For the new Basin Mills development, fish passage facilities stipulated in DOI and NMFS section 18 prescriptions and in the Maine Water Quality Certificate represent state-of-the art passage intended to achieve highest passage efficiencies possible. Mitigation measures required for the Basin Mills project (partial trap-and-truck and fry stocking) are intended to compensate only for the passage and habitat loss effects that remain and are, thus, unavoidable.

The trap-and-truck and stocking mitigation under Alternative 3 would continue for the term of the license (50 years). At the end of this license term, we would evaluate any proposal for

NMFS-16 Cont'd relicensing with regard to consequences to anadromous fish and all other natural resources. If such an evaluation indicates that mitigation should continue under the new license, stocking and trap-and-truck would not stop and any necessary mitigation measures would be required in a new license issued for the project. Under Alternative 4, use of trap-and-truck would be at the discretion of the fisheries agencies.

NMFS-17 We have corrected these oversights in Section 2.2.2 the FEIS.

NMFS-18 See response NMFS-14, above.

NMFS-19 NEPA does not require maximization of mitigation benefits, only mitigation adequate to compensate for any unavoidable adverse impacts incurred. The method of analysis we used in our dam removal analyses is a decision model that mixes a "goal satisfying" constraint with a cost minimization goal. The necessary goal satisfying constraint is that mitigation benefits must be at least equal in magnitude to the unavoidable impacts caused by the construction of Basin Mills. In our analysis, there is no upper limit on mitigation cost. However, since it is the Commission's responsibility to balance public interests, we seek fishery mitigation measures that at least fully compensate for the projected adverse impacts and that impose the least cost on other public interests. We have revised the presentation of our dam removal analysis in Appendix D to clarify our discussions of some of the issues you raise. However, under our recommended Alternative 4, dam removal would not be required to mitigate for project impacts.

NMFS-19 Cont'd

application number 10981 gets denied, Veazie and Orono would automatically be allowed to continue operation under an annual license for the next 30-50 years. FERC further states, in this policy, that when it determines that a project will no longer be licensed, it must be decommissioned. Forms of decommissioning mentioned in the policy range from no longer generating power to dam removal. It is also important to note that FERC recognizes in this policy that there will be times when the cost of environmental conditions it imposes on applicants, necessary to carry out its responsibilities under the FPA, will make a project uneconomical. Given this, it does not seem appropriate that FERC dismissed dam removal options from consideration based on 'efficiency" (cost effectiveness) prior to exploring their comparative ability to mitigate damage to fish.

NMFS-20

2.4.1 Alternative Energy Sources Eliminated from Further Analysis

FERC defines any energy source that does not burn fossil fuels as nonexclusionary. FERC further concludes that nonexclusionary resources are not reasonable alternatives to each other so they are not analyzed as alternatives to hydropower. FERC states that the purpose of its search of energy sources was to identify sources that are considered reasonable alternatives to the development of hydropower. It is not clear why the search would be limited to sources that could replace hydropower rather than sources that could achieve the project purpose (assuming that is clearly defined). If the purpose is to supply enough energy to service a demand then it seems the range of alternatives would be open all energy sources, including energy conservation. The NMFS requests clarification as to what the legal basis is for excluding non-fossil fuel burning energy sources from consideration.

NMFS-21

3.4.1.2 Anadromous and Catadromous Fishery Resources

DEIS states that most Atlantic salmon spawning activity takes place in tributaries below Bangor dam, in habitat that is unsuitable for successful reproduction. NMFS questions the basis for the conclusion that these tributaries are unsuitable for successful reproduction. These tributaries have consistently been used for spawning which indicates that successful reproduction has taken place.

NMFS-22

3.4.3 Summary - Existing Fish Community

The DEIS states that the Atlantic salmon run in the Penobscot River was extirpated in the early 1900's. NMFS requests that FERC provide information to substantiate that statement. The DEIS further states that the lower Penobscot is not presently

NMFS-20 We have revised the Purpose of Action (1.1) and Need for Power (1.2) sections of the EIS in response to this and similar comments received from other respondents. A number of issues related to Purpose of Action will also be addressed in the orders to be issued for these projects.

NMFS-21 We based our statement in the DEIS on information we had drawn from Baum (1983). A reexamination of Baum's discussion, in particular his Table 13, does suggest successful reproduction occurred in several tributaries discharging into the Penobscot River estuary (downstream of Bangor Dam). We have corrected the appropriate text in the FEIS.

NMFS-22 Baum (1983) states that "the Penobscot salmon run was developed from the progeny of Narraguagus and Machias River salmon during the late 1960's and early 1970's..." We infer from this statement that the wild salmon upstream of Bangor dam were extirpated. Cutting (1959) states that several tidal tributaries of the Penobscot Estuary support small salmon runs; we have modified the text appropriately. Our statement concerning the lower Penobscot not contributing substantially to natural reproduction refers to the Penobscot River mainstem, and we have clarified the FEIS text accordingly.

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NMFS-22 Cont'd contributing significantly to the natural reproduction of wild salmon in the river system. It is not clear if this statement refers only to the mainstem or if it includes tributaries. If this statement is meant to apply to the tributaries below Bangor dam then NMFS requests that FERC provide the sampling data which demonstrates that these tributaries are not suitable for successful reproduction.

4.3 Fisheries Resources

4.3.1 Introduction

NMFS-23 As stated in the DEIS, construction of the Basin Mills dam would change a 3.6-mile reach of the lower Penobscot River from a free-flowing riverine environment to an impounded environment. This section also discusses the fact that Basin Mills-related mortality would affect virtually the entire basin-wide stock of adults and juveniles of all anadromous species. This impact is very substantial, especially to a resource agency such as NMFS whose mandate is to protect and enhance fishery resources and their habitats.

NMFS-24 FERC analyzed whether restoration goals for all three anadromous fish species are likely to be achieved under the no-action alternative, which is defined as existing conditions. Once again, NMFS objects to this definition of no-action. FERC states that it did not address the nonbiological issue of whether the intrinsic value of a fish from a completely self-sustaining run is different from that of a fish from a population sustained by intervention measures such as trap and truck or stocking. NMFS does not believe FERC adequately explored the biological differences between a self-sustaining run and one dependent on human intervention. Handling of anadromous species during their migration can cause stress and disorientation both of which can lead to reduced fitness. Also, FERC downplays the importance of the fact that state and federal resource agency goals are explicitly stated as the restoration of self-sustaining runs of anadromous species.

4.3.3.1 Alternative 1: No-action

NMFS-25 Again, NMFS objects to defining the no-action alternative as continuation of operations at Veazie, Orono, Milford and Stillwater under existing terms and conditions. The significance of this difference in approach cannot be overstated as FERC uses the no-action alternative as the basis for assessing the merits of other project alternatives.

Atlantic salmon

NMFS-26 The DEIS lists the achievement of target numbers of wild smolts and adult salmon for spawning and harvest as the "goals" presented in Maine's Penobscot River Atlantic Salmon Management Plan (Baum 1983). The DEIS should state that these objectives,

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NMFS-23 Opinion noted.

NMFS-24 In Section 4.3.3.2 of the DEIS we presented the technical basis for our conclusion that the proposed mitigation measures would be effective and would not significantly alter the biological characteristics of the Penobscot River salmon stock (see Section 4.3.3.2 of the FEIS). Our evaluation of BHE's proposed handling procedures lead us to conclude that such impacts would be insignificant although uncertainty exists regarding the temperature at which fish would have to be transported. Our ASAL model runs account for the effects of disorientation of trucked salmon in the same manner as do the FWS model runs, by assuming a 20% drop back of transported fish and a 5% mortality of trucked fish (see Appendix E of the FEIS).

Our recommended Alternative 4 is consistent with all anadromous fish restoration goals for the Penobscot River.

NMFS-25 See our response to NMFS-6. This comment will be addressed in the orders issued for these projects.

NMFS-26 We have changed the designation of those numerical targets from "goals" to "objectives." The measures incorporated into Alternative 4 are consistent with the Strategic Plan for Management of Atlantic Salmon in the State of Maine (Beland 1984). We acknowledge state and federal fisheries goals in Section 4.3.3.1 of the FEIS. Also please see Section 5 conclusions and our response to NMFS-13.

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NMFS-26 Cont'd as presented in the Management Plan, were intended to lead to the restoration of Atlantic salmon to the Penobscot River. It is the restoration of a self-sustaining wild run that is the goal of the state and federal plans for this river. The DEIS should further recognize that recommendations included in the Management Plan state that the development and construction of hydroelectric sites that could have an adverse impact upon the fishery resources of the drainage should be prohibited. The goal statement contained in the Strategic Plan for Management of Atlantic Salmon in the State of Maine (Beland 1984) identifies the goal of the ASRSC as restoring Atlantic salmon to the rivers of Maine and conserving and managing Atlantic salmon in all Maine waters. The FEIS prepared by the USFWS for the restoration of Atlantic salmon in New England identifies the goal for the Penobscot River as the restoration of a self-sustaining population of Atlantic salmon by the year 2021. The primary goal of both state and federal fishery agencies is the attainment of a self-sustaining population.

NMFS-27 FERC states that its evaluation of marine survival issues lead it to conclude that no hard data exists to support the "optimistic" marine survival rates used by USFWS in its ASAL modeling. NMFS requests that FERC provide the basis for its conclusion that 3.5% is an overly optimistic average marine survival rate over the next 20 years. The ASAL model was developed from 1984 to early 1986. At that time little was known about the relative magnitude of fishing mortality and even less was known about the timing and determinants of natural mortality. Since that time much insight has been gained on both of these issues. Most natural mortality occurs in the first winter at sea and prior to the start of the marine fisheries. Interception fisheries account for losses of 50 to 70% of potential returns. And finally, not all the smolts make it out of the river due to inefficiency of passage at dams and predators. Therefore, applicant's substitution of a 0.7% return rate (total adult returns/total smolt releases) for marine mortality of a wild stock in the model is incorrect because it incorporates the effects of instream losses twice. In addition, the 0.7% average return rate is derived from runs dominated by hatchery fish, many of which have been tagged externally. Rates of survival of hatchery fish are generally thought to be lower than for wild fish. Moreover, externally tagged smolts generally have lower survival rates than untagged smolts.

NMFS-28 NMFS does not concur that an average marine survival rate of 0.76% is realistic. This is a significant disagreement as FERC uses this 0.76% to conclude that a fully restored run of between 8,000 and 11,000 fish will never be attained.

NMFS-29 FERC further states that it is a scientifically unproven assumption that at-sea fishery harvest is a primary factor contributing to marine mortality. Again, NMFS requests that FERC provide its analysis that form the basis for this conclusion.

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NMFS-27 We agree that the 0.7% average return rate incorrectly represented the instream loss of smolts. We corrected that error in the ASAL model results presented in the FEIS.

NMFS-28 We agree with Dr. Rago that our use of the 0.76% marine survival rate representing the marine survival rate for Penobscot River stocked smolts through 1987 incorrectly "double counts" in-river mortality of smolts migrating downstream. We have corrected that error in our ASAL model discussion and results in the FEIS (Appendix E and Section 4). The corrected marine survival rate is 0.79%.

NMFS-29 Cont'd

U.S. origin Atlantic salmon have been documented in the West Greenland, Newfoundland, New Brunswick, Nova Scotia and Labrador fisheries. Assessment scientists have estimated an average exploitation rate of 85% on Maine stocks for the combined West Greenland and Canadian fisheries from 1967-1991. The combined harvest of 1SW Atlantic salmon of U.S. origin in the fisheries of West Greenland and Canada averaged 5,060 fish and returns to U.S. rivers averaged 2,884 fish from 1968 to 1989 (ICES-NASWG 1993). U.S. Atlantic salmon caught in interception fisheries have been at sea from 12-15 months at their time of capture so most of the natural mortality that impacts a particular year-class of smolts would have occurred by this time. It is therefore generally accepted that the majority of salmon harvested by interception fisheries would have survived to return to U.S. rivers had they not been captured (Beland 1984). This information is difficult to reconcile with FERC's characterization of at-sea fishery harvest as a primary factor contributing to marine mortality as a scientifically unsupported assumption.

FERC further states that it is an unproven assumption that management measures being taken or considered will significantly alter the marine fishing mortality rate. NMFS believes that the following management measures will, in fact, reduce the marine fishing mortality rate for U.S. origin Atlantic salmon. In 1993, NASCO's West Greenland Commission accepted the West Greenland Fishery Regulatory Measure which sets quotas with the goal of reaching target spawning escapement for North American stocks. A moratorium is in place for the Newfoundland fishery and the Labrador fishery is being managed by quotas. The current and projected effect of these extensive reductions in fishing pressure could result in a twofold increase in the number of spawners returning to U.S. rivers over the next five years. Dramatic reduction or elimination of commercial fishing effort will most certainly alter the marine fishing mortality rate.

NMFS-30

ASAL Model Inputs

FERC used studies at existing hydroelectric facilities to indicate that the downstream and upstream mortality rates used by USFWS in its ASAL model were too low. FERC then went on to make its own independent ASAL model runs using less optimistic downstream and upstream passage efficiencies. The output of these runs, as presented in Table 4-3, obviously is a lower probability of achieving a self-sustaining population and a reduced run size achieved in the year 2043. It would seem more appropriate for FERC to be mandating that applicants reach the passage efficiencies recommended by the fishery agencies rather than seemingly accepting inadequate passage facilities as a given. It is especially disturbing as FERC uses the lower passage efficiencies to support a model output and conclusion that a fully resorted run can never be achieved.

NMFS-29 Our statement in the DEIS was meant to convey our view that at-sea fisheries may not be the major factor establishing current or future total marine survival rates of salmon. We completely agree that the elimination or severe restriction of such fisheries will eliminate or severely reduce at-sea marine fisheries mortality. We have revised the text in Section 4.3.3.1 to clarify this point.

NMFS-30 We presented this discussion in the DEIS to illustrate that a large number of factors, other than the presence or absence of the Basin Mills dam, play a significant role in determining the fate of the Penobscot River salmon restoration effort. However, we concur with Dr. Rago's conclusion that construction of Basin Mills dam would reduce the equilibrium size of the salmon stock, increase the rate of decline after restoration was achieved, and increase the number of tributary stocks that would be unsustainable. These conclusions have lead us to recommend Alternative 4 as our preferred alternative in this FEIS. However, we have modified our language in Section 4.3.3.1 and elsewhere to clarify the logic of our discussion and the sequence of our analyses.

NMFS-30 Cont'd

Because of these objections NMFS has with FERC's model inputs, NMFS cannot concur with FERC's conclusion that the establishment of a fully-restored, self-sustaining salmon stock is unlikely to occur under existing conditions (even without Basin Mills dam being constructed). Consequently, NMFS also disagrees with FERC's subsequent conclusion that the state and federal fishery agency goal of establishing a fully-restored and self-sustaining salmon population is unattainable under the no-action alternative. This is a critical difference of opinion. FERC uses its conclusion that agency goals cannot be met under the no action alternative as the benchmark to compare the impacts of the various alternatives. Although FERC concludes that agency goals cannot be met under the various alternatives, it is still able to conclude that the proposed or preferred alternatives would not have significant impacts because of their earlier determination that agency goals could not be met under the no-action alternative.

FERC's conclusion that resource agency goals will not be met with existing conditions is based partially on the fact that upstream and downstream passage efficiencies are actually lower than previously assumed. Yet having made this finding, FERC is nonetheless proposing the construction of a new dam located on the lower river, and consequently a barrier to over 90% of the fish in the Penobscot River Basin, is appropriate for this river. FERC's model demonstrates that there is not a balance between hydropower and fish and wildlife resources in this River. The more appropriate response by FERC would be to act to restore the balance through improved fish passage at existing facilities or through dam removal.

NMFS-31

American Shad

FERC's conclusion that resource agency goals for American shad will not be met is based on the assumption that restoration efforts will continue to be passive for the life of the license. This is not an appropriate assumption as resource agency activities are dynamic. The growth of the American shad population in the Penobscot River is limited by the current passive restoration program. That program could become active at any time - next year, in 5 years, or even 10 years. Construction of a new barrier is an impact that will exist at a minimum for the life of the license, up to 50 years and likely far beyond. Consequently, it does not seem appropriate to statically project the impacts from the proposed action to American shad based only on the current passive restoration program. The MDMR management plan for American shad specifically identifies the goal of improving fish passage. The DEIS contains a footnote which states that loss of migrating adult shad per dam are estimated to range between 20 and 40%. Given the difficulty of designing fish passages for American shad, the significant number of barriers already on the Penobscot River, and the fact that over 90% of the

NMFS-31 At the time we prepared the DEIS, nothing in the licensing record suggested that any shad restoration effort was planned for the Penobscot River. With their DEIS comments (February 16, 1995), the Penobscot Indian Nation (PIN) enclosed a Cooperative Agreement between FWS, PIN, and the State of Maine (Attachment 1), in which they agree to coordinate their programs and activities for the benefit of the Penobscot River shad stock. This agreement presents intentions of the parties to develop a plan of action. In the FEIS, we have considered the possibility that shad restoration may be initiated and we are recommending that BHE provide capability to trap shad at the new fish lift at Veazie and truck those fish to any location in the river to provide guaranteed support to shad restoration efforts not available by any other means. We are also recommending construction of upstream and downstream passage facilities at all developments addressed in the FEIS which would substantially enhance potential passage for American shad relative to potential passage under existing conditions.

NMFS-31 Cont'd spawning habitat for American shad is located upstream of Milford dam, the emphasis should be on reducing barriers.

4.3.3.2 Alternative 2: Applicant's Proposal

NMFS-32 FERC cites BHE's statement that there is relative genetic homogeneity across current Maine salmon stocks in all river basins in the state. Only one study, Roberts 1993, is cited as justification for FERC's statement. FERC should note that other genetic studies have been conducted on U.S. Atlantic salmon (Bentzen and Wright 1992; King and Smith 1994; May et al. 1994; Schill and Walker 1994; Kornfield 1994). Collectively, these studies suggest that there are modest but statistically significant differences among at least some U.S. populations of Atlantic salmon.

NMFS-33 FERC further states that the existing Penobscot River stock was developed from several river stocks, not a remnant Penobscot stock. NMFS requests that FERC provide evidence that a remnant Penobscot River stock was not included in the broodstock that is now held at Craig Brook hatchery and used to stock the Penobscot River. FERC states that the Penobscot River stock does not appear to be genetically distinct from stocks existing in other Maine Rivers. NMFS requests that FERC provide the information for the basis of its decision and whether this statement refers to the mainstem Atlantic salmon population or if it includes the fish in the tributaries below Bangor dam.

American shad

NMFS-34 The clupeid assessment team's model findings that the projected run size of American shad would decrease by 20 to 80% with the construction of Basin Mills are significant. As noted in the DEIS, the size of this impact is due to the fact that over 90% of shad production habitat is upstream of the proposed dam location. FERC uses the fact that the restoration program for shad is currently passive as justification for stating that trap and truck as proposed by BHEC would provide an opportunity for growth of the population. It must be noted that the license under consideration is for 30-50 years and it is not possible to predict at what point the MDMR, or another interested party, would pursue active restoration of American shad.

Alewife

NMFS-35 The DEIS notes that passage efficiency has a significant effect on alewife populations because of the number of barriers alewives have to pass to get to their spawning areas. FERC goes on to state the following: "...increased efficiency resulting from improving passage facilities at Veazie and Milford may compensate, at least to some degree, for the addition of Basin Mills by increasing the percentage of the annual run that is able to reach production waters upstream of Milford." NMFS questions

NMFS-32 We have expanded the discussion regarding Atlantic salmon in the Section 4.3.3.2 to incorporate the findings of the studies you have cited.

NMFS-33 Our statement that the existing Penobscot River stock was developed from several river stocks is based on Baum (1983), who states that "the Penobscot salmon run was developed from the progeny of Narraguagus and Machias River salmon during the late 1960's and early 1970's...." Our statement regarding the genetic similarity of the Penobscot River stock to stocks in other Maine rivers is based on Roberts (1993) and refers only to the mainstem salmon population. We have reviewed literature you identify, and while we can concur with your statement, we see no relevance of those findings to our specific statement.

NMFS-34 See response NMFS-31, above.

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NMFS-35 Cont'd	the validity of using improved passage efficiencies, that should have been accomplished when these licenses originally came up for review in 1985, to balance the introduction of a new barrier. The large number of barriers that alewife in the Penobscot River currently have to pass to get to production habitat should be used as justification for preventing the addition of new barriers, not as a reason for addition of another. The DEIS states that Basin Mills would "only be a single additional barrier," we believe the emphasis should be on additional, not single. Cumulative impact analysis, accomplished by combining projects into a single DEIS, is conducted so that the collective impact of a number of activities can be assessed, not so that reducing the impact of a current activity can be used to reduce the cumulative impact of a proposed activity.	NMFS-35	The statement to which you refer is intended to simply characterize the cumulative affect of the projects on alewife passage through the project area. Given that the baseline for our evaluation of alternatives is existing conditions, we have examined how alewife passage under each alternative compares to that under existing conditions, taking into account enhancements at all developments. The balancing that we apply in our selection of a preferred alternative is among the various beneficial public uses of the waterway, not among developments being evaluated.
NMFS-36	The discussion on trap and trucking seems to confuse the issue further. The resource agencies have objected to the characterization of trap and truck as a permanent fish passageway. As noted in the DEIS, fishery agencies commonly use trap and truck as a technique or tool during the restoration process. The key point is that the end goal is a restored self-sustaining population.	NMFS-36	Trap-and-truck is not included in Alternative 3 as a "permanent fish passageway," in lieu of fish passage. Full scale, state-of-the-art upstream fish passage facilities with capability for high efficiency passage of alewives are included in the design of the Basin Mills Dam. In our discussion, we indicate that trap-and-truck capability would enhance the probability of significant alewife population growth, a phenomenon not likely to occur in its absence (see Section 4.3.3.1 of the FEIS). This was the reason for its inclusion in our preferred Alternative 4.
NMFS-37	**American Eel** The DEIS notes that the Basin Mills dam would be an additional barrier to American eel but states that the enhancement of upstream facilities at all other lower Penobscot River projects may compensate for the addition of one more upstream migration barrier. Once again, NMFS objects to FERC's position that improved passage at existing facilities can compensate for the creation of a new obstacle. Improvements in passage, both upstream and downstream, should be pursued at all obstacles at all times and certainly at the time of relicensing. Consequently, such improvements should not come at further expense to the fishery resource by "trading" them for allowing the construction of a new barrier.	NMFS-37	Opinion noted.
NMFS-38	<u>4.3.3.3 Alternative 3: Applicant's Proposal with Staff Modifications</u> *Restriction of Salmon Recreational Harvest* FERC states that it considers restricting recreational fishery harvest as a potential mitigation measure for the proposed project. NMFS questions the appropriateness of this suggestion. It seems that the applicant should be required to mitigate impacts associated with their proposal on-site and in-kind. The suggestion that the state fishery agency should eliminate sport harvest on the Penobscot River to offset the impacts of dam construction does not seem appropriate. While elimination of sport harvest would have benefits to the resource, those are benefits the state should decide whether or not to pursue separate from this permit action under consideration. If the	NMFS-38	We have discussed the consequence of salmon sport harvest restrictions only within the context of all measures that may enhance the probability of successful salmon restoration. In the text, we suggest that BHE consult with the appropriate fisheries management agencies on the merits of this suggestion. We have not specified that BHE should, unilaterally, take such action.

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NMFS-38 Cont'd state were to decide to eliminate sport harvest then the benefits to the species would be in addition to any associated with this permit action, not as a substitute for what would otherwise be required as a permit condition.

Dam Removal

NMFS-39 FERC states that it eliminated all dams from consideration if the estimated removal costs exceeded the estimated net worth of the Basin Mills development. If dam removal is explored under Section 10(j) of the FPA to fulfill the Commission's obligation to establish adequate and equitable protection of, mitigation of damage to, and enhancement of fish and wildlife resources then it is not clear why economics is a factor. The Decommissioning Policy recently issued by the Commission clearly states that if the terms of a new license make it uneconomical it would not preclude the Commission from imposing the environmental conditions it deems appropriate in carrying out its responsibilities under FPA. Consequently, NMFS does not agree that economics should be used as the first screening for dam removal options before the environmental benefits had even been explored. We agree wholeheartedly with the Commission's statement, also contained in the decommissioning policy, that it must be recognized that meeting reasonable environmental costs is a part of doing business today. The determination of what is reasonable should be reached by balancing the costs of a specific action against the environmental benefits of taking that action, not against the monetary worth of a project.

NMFS-40 This section should discuss the potential of dam removal to mitigate impacts from the Basin Mills Project on all anadromous species, not just Atlantic salmon. As earlier sections of the DEIS acknowledge, American shad are particularly susceptible to passage mortality and alewife have to pass a multitude of barriers to reach production habitat. Consequently, it is critical that these species be included in any analysis of the environmental benefits of dam removal. Table D-8 contains a brief analysis of comparative benefits of dam removal to these species but this is not discussed or pursued in any detail and nor even mentioned in the main body of the DEIS.

NMFS-41 FERC concluded that none of the dam removal scenarios would result in benefits to Atlantic salmon equal to or approaching those for the existing conditions scenario. FERC uses this finding as partial justification for eliminating this mitigation option from consideration. NMFS believes the more proper conclusion would be that FERC should expand its analysis to include other dams or other combinations of dams, such as removal of Veazie and Howland dams. An expanded analysis should be conducted to cumulatively look at the benefits in terms of reclaiming free-flowing stretches of river and mitigating habitat and passage impacts to American shad, alewife and Atlantic salmon.

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NMFS-39 See response NMFS-13 and 19, above.

NMFS-40 The potential benefits of dam removal to American shad and alewife are addressed in FEIS Appendix D; Table D-8 quantifies habitat benefits of removal of a number of Penobscot River basin dams.

NMFS-41 See response NMFS-13 and 19, above.

NMFS-41 Cont'd

FERC concludes that removal of some dams to mitigate for impacts of Basin Mills could be accomplished without creating a negative present net worth for the project. They further state that the benefits realized would not be sufficient themselves to result in a high probability of reaching the goal of a fully-restored, self-sustaining salmon stock in the Penobscot River. NMFS does not believe that a comparison of the ability of mitigation alternatives to achieve a self-sustaining salmon stock is the proper analysis. The proper methodology would be to assess the comparative ability of the alternatives to mitigate the impacts associated with the project.

4.3.3.4 Alternative 4: Do not construct Basin Mills dam, relicense Veazie a) existing capacity, or b) at increased capacity, decommission Orono

NMFS-42

FERC includes trap-and-truck as a fisheries mitigation measure in all scenarios although it does acknowledge that the state and federal fisheries agencies do not view trap-and-truck as an acceptable permanent fish enhancement measure. The NMFS has stated in earlier correspondence on this project that permanent trap-and-truck would not be acceptable as a permanent fish passageway, pursuant to Section 18 of the FPA. NMFS does, however, acknowledge that trap-and-truck is an acceptable short-term enhancement measure during the process of fish restoration. FERC should clearly make the distinction between these two uses of trap-and-truck and should not pursue a feasibility study of trap-and-truck as a permanent fishway when both USFWS and NMFS have stated that their prescriptions would not include trap-and-truck as a permanent fishway.

NMFS-43

FERC states that the consequences of providing upstream passage at Orono and Stillwater and improving upstream passage at Veazie and Milford is clearly of benefit to Atlantic salmon but was not quantitatively incorporated into the ASAL model. This is an important point as it was the results of the ASAL model that FERC used to determine that Atlantic salmon restoration would not be successful under "existing conditions." If FERC intends to use the ASAL model to predict the likelihood of restoration succeeding, then that run should be done with full recognition that the resource agencies will prescribe fishways for the dams on the Penobscot. The NMFS believes that the effects of new dam construction on the likelihood of restoration should be compared with the likelihood of restoration with efficient passageways at existing facilities.

NMFS-42 The trap-and-truck is not a "fishway" under Section 18 of the FPA, and, therefore, is not subject to Interior or NMFS prescription. As we state in our response NMFS-13, above, we consider trap-and-truck capability as being a measure that would enhance the probability of significant anadromous fish stock growth, a phenomenon not likely to occur in its absence. Also, trap-and-truck would be implemented in addition to full scale, state-of-the- art fishways at all dams.

NMFS-43 We have revised the text to clarify that provision for passage at Orono and Stillwater is implicit in ASAL model runs, since fish passing from below Basin Mills to above Milford would have to pass the same number of dams regardless of whether they moved up the Penobscot River mainstem or up the Stillwater River split from the mainstem. While we believe that new fish passage facilities at Veazie would enhance passage efficiency, we did not modify ASAL model parameters to reflect such an improvement in order to have our model runs remain consistent with those of FWS (they assume 92% efficiency at all developments in the river, regardless of any proposed improvements; FWS 1988). We have modified the text to clarify the basis for our modeling of this alternative.

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4.3.3.5 Alternative 5: Do not construct Basin Mills dam, decommission and remove Veazie dam, and upgrade Orono dam

NMFS-44 The DEIS states that removal of Veazie dam would provide significant potential benefits to the Penobscot River Atlantic salmon stock. The benefit is great as all salmon, with the exception of those spawning in the tributaries below Bangor dam, must pass Veazie to reach spawning grounds. The ASAL model with Veazie removal factored in results in the highest probability of restoration succeeding among all of the alternatives analyzed. It is also critical to realize that the run under this scenario would be composed completely of wild fish. The significance of this is not discussed in the DEIS. Numerous studies indicate that wild fish have a higher return rate than do hatchery fish. Any improvement in marine survival rate is critical given the low rates experienced for U.S. origin Atlantic salmon.

NMFS-45 As noted in the DEIS, removal of Veazie dam would result in the conversion of 3.8 miles of impounded riverine environment into free-flowing riffle, run, and pool habitat above Veazie. This is significant in that the proposed Basin Mills impoundment would replace approximately 3.5 miles of natural run, riffle, and rapids riverine habitat. The mitigation measure of removing Veazie dam is best able to mitigate this habitat conversion resulting from construction of the Basin Mills dam. This mitigation measure seems best able to satisfy FERC's obligation to give equal consideration to the mitigation of damage to spawning grounds and habitat.

4.3.3.6 Staff Findings

NMFS-46 FERC presents its key finding that attainment of the goal of a fully-restored, completely self-sustaining salmon stock in the Penobscot River which persists into future without human intervention is unlikely under all scenarios. This key finding allows FERC to further conclude that project impacts cannot be evaluated against an unattainable goal. As stated previously, NMFS disagrees with the basis for FERC's finding that resource agency goals are unattainable. NMFS also questions whether it is appropriate for FERC to independently evaluate federal resource agency goals. Once again FERC states that the ASAL model runs were overly optimistic in the inputs used for downstream survival and possibly upstream passage efficiency. NMFS disagrees that the numbers used for passage efficiencies are unrealistic and optimistic. We recognize that these efficiencies are not currently attained at the facilities being considered in this DEIS, however that does not mean that applicants should not strive to reach these passage goals. The current failure of license holders to achieve passage efficiencies of 80-90% is being used as a reason by FERC to state that restoration will not be achieved, and justification for allowing additional barriers to be constructed. If anything, FERC's reasoning, which lead it

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NMFS-44 The fact that wild smolts are assumed to exhibit a higher marine survival rate than hatchery smolts is discussed extensively in Section 4.3.3.1 of the FEIS and is incorporated into all ASAL modeling (see Table E-1 of Appendix E). The fact that the salmon run in the year 2043 under Alternative 5 consists completely of wild fish is accounted for in the ASAL model run that produced the results you cite, which, in large part, are attributable to the higher survival rate of wild smolts employed in that model run.

NMFS-45 See NMFS-14 above.

NMFS-46 As we stated in response NMFS-4 above, the Commission is not exceeding its statutory authority by establishing fishery goals; it is attempting to resolve conflicts and to ensure that project impacts are adequately mitigated, as the FPA requires. Our evaluation of consequences of varying marine survival rates demonstrate that the number of "obstacles", alone, is not the sole factor determining the fate of the Penobscot River salmon stock. However, our recommendation of Alternative 4 as our preferred alternative renders these comments moot.

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NMFS-46 Cont'd to the conclusion that restoration could not be successful, points one to the finding that too many obstacles are already on the river and the emphasis should be on removing barriers not constructing new ones.

NMFS-47 Table 4-5 compares the consequences of project alternatives to Penobscot Atlantic salmon. The last row in this table asks the question of whether the achieved run is composed of wild fish. The response to this question is "yes" only for alternative 1, continued operation of Orono and Veazie, and alternative 5, relicensing Orono, removing Veazie and not constructing Basin Mills. The table also presents the finding that a fully-restored run size will be achieved under all alternatives. Yet, the table states that restoration goals will not be achieved under any alternative. These statements are contradictory. The goal of the NMFS is to achieve a wild self-sustaining run of Atlantic salmon in the Penobscot River. This restoration goal is achieved, according to the data presented by FERC, under alternatives 1 and 5. This is very significant in that project impacts would then be evaluated against an attainable goal.

NMFS-48 FERC attributes the significance of achieving a wild run versus one dependent on human intervention as 'existence value,' and does not attempt to assess that value. The difference between a wild run and one dependent on man's intervention is grossly understated by FERC. Marine survival of wild populations is higher than hatchery supported populations. The long term viability of a wild self-sustaining population is greater by virtue of the fact that it is independent of man. These benefits come in addition to any existence value attributed to a wild fish.

NMFS-49 FERC states that it is questionable whether there could ever be a salmon run considered truly "wild" from the perspective of the extirpated historical wild Penobscot River salmon stock. NMFS requests that FERC present the information it used to determine that the Penobscot stock has been extirpated. FERC should acknowledge the fact that tributaries below Bangor dam have a history of self-sustaining populations of Atlantic salmon and should explore the relationship between these fish and the mainstem population.

NMFS-50 FERC identifies its key point as to consider whether wild salmon are intrinsically more valuable to society than salmon that depend on human activity for their survival. Again, FERC has oversimplified the differences between a wild and supported population. The value of a wild salmon versus one dependent on man can be attributed to more than the mere value that we know one is wild and one is not. The increased value of a wild salmon can be attributed to its increased ability to survive in the marine environment and the ability for natural selection to occur. The process of natural selection in a wild population

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NMFS-47 Our answers in Table 4-5 are not contradictory, since a "fully-restored" run size, as defined in state and federal restoration goals, would not be sustained through the year 2043 under either Alternative 1 or 5. Also, we interpret "self-sustaining" as meaning a population which maintains its size indefinitely over time. Dr. Rago in your Attachment C (pg. 2) states that "...the set of parameter values used in the simulations [he is referring to the FWS parameter set] will cause the Penobscot population to decline. When the dam [he is referring to Basin Mills] is present however, the decline will be 13% greater per year." We have taken Dr. Rago's findings into account in recommending Alternative 4 as our preferred alternative.

NMFS-48 See our response NMFS-50, below.

NMFS-49 See our response NMFS-22, above. While we have modified the text to indicate remnant stocks exist in those tributaries, no data or information has been placed into the licensing record by any party suggesting or confirming that these stocks play any role in the existing mainstem salmon run that passes the projects we have evaluated.

NMFS-50 Cont'd allows for the selection of characteristics that lead to increased survival of the species. The factors that influence selection are not fully understood by man, cannot be quantified, and therefore cannot be duplicated in a hatchery.

NMFS-51 FERC states that the Applicant's Proposal and Alternative 3 are more likely to result in a consistently maintained salmon population (because their benefits to salmon can be measured, monitored and enforced) than a completely wild population which is subject to a variety of unknown, uncontrollable, and highly variable natural and man-made disturbances. Wild populations always have had to respond to changes in their habitats. NMFS does not endorse the policy of attempting to sterilize the life of these wild fish by controlling as many variables that could affect them as possible. The more preferable approach biologically is to reduce the anthroprogenic influence on the population and allow natural selection to occur. The ultimate goal of any restoration is to have a population that can sustain itself in the natural environment, not to achieve a consistently maintained population. Natural ecosystems are dynamic and wild populations react to those changing variables in ways we can only partially understand.

NMFS-52 **American Shad**
FERC uses the fact that MDMR's current restoration program for American shad is passive to again argue that the impact of the various alternatives to shad restoration is negligible. The action FERC is contemplating is issuing a license of a 30-50 year duration. It is not appropriate to measure the impact of such an action to American shad while assuming that the restoration program will continue to be passive for that time. The finding that Alternative 5 (Veazie removal) provides for the greatest benefits to a restored American shad population by eliminating significant upstream and downstream passage mortality and providing more spawning habitat is critical. One of the obstacles FERC identifies to restoring American shad is the fact that they experience high mortalities at artificial passageways. This fact argues to the point that FERC should be seeking ways to reduce the number of obstacles American shad must negotiate to reach spawning habitat not add another barrier.

NMFS-53 **Alewife**
FERC concludes that the removal of Veazie dam (Alternative 5) would provide little benefit to alewife because the species would still have to negotiate as many as six barriers to reach spawning habitat. Again, NMFS questions the logic of dismissing the significance of adding another barrier on the basis that numerous other barriers still would exist - this is clearly not the intent of cumulative impact analysis. FERC is acknowledging the cumulative impact of the addition of a new mainstem dam in the lower Penobscot but uses it as justification for allowing further

NMFS-50 As we point out in Appendix F, hatchery-based stock enhancement in the Penobscot River presently relies on returning Penobscot River fish as brood stock and has evolved toward a program of fry rather than smolt stocking. Both of these measures minimize hatchery influence on fitness of the resultant smolts. We note that in our Figure E-1, taken from the FWS Atlantic Salmon Restoration EIS (FWS 1989), smolts resulting from fry stocking are treated as wild smolts in FWS ASAL modeling, supporting our position. We anticipate that stocking mitigation we recommend under Alternative 3 would be implemented in the same manner as existing restoration efforts. However, we also recognize the uncertainty associated with our conclusions regarding these measures.

NMFS-51 Opinion noted.

NMFS-52 See our response NMFS-31, above.

NMFS-53 Please see Section 5 of the FEIS and NMFS-13 above.

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NMFS-53 Cont'd degradation rather than as an indication that the balance has shifted in favor of power generation at the expense of fish resources.

4.5 Wetlands

NMFS-54 The discussion of impacts to wetlands is grossly inadequate especially in light of the fact that the Corps is a cooperating agency and that this DEIS is intended for serving the purpose of the FERC permit application and the 10/404 application. Given this, the sequencing of avoiding, minimizing and lastly mitigating impacts to wetlands must be followed. While the DEIS states that BHE proposes a mitigation package including restoration, enhancement, creation and preservation, the details of these proposals are not presented. Consequently it is impossible to evaluate whether or not the functions and values lost due to this project are properly mitigated. This is not presented in the DEIS. If the Corps intends to use this EIS for its NEPA purposes then the document should be revised to satisfy the requirements of the EPA's 404(b)(1) Guidelines which govern decisions by the Corps under section 404 of the Clean Water Act. We recommend that the Highway Methodology approach be utilized to involve the Federal resource agencies in the identification of the basic project purpose and the subsequent systematic identification, review and evaluation of project alternatives.

4.6 Threatened and Endangered Species

NMFS-55 In correspondence dated January 27, 1995, the NMFS concurred with FERC's determination that the project, as currently proposed, is not likely to affect endangered shortnose sturgeon in the Penobscot River. FERC should be aware, however, that the NMFS and USFWS have received a petition to list Atlantic salmon as endangered throughout its historic range. The Services are currently reviewing this petition to determine if a listing action is warranted. Should this review result in a Proposed Rule we would be requesting a conference to FERC pursuant to Section 402.10 of the Endangered Species Act consultation regulations.

4.7 Biodiversity

NMFS-56 FERC concludes that the project as proposed (Alternative 2) would not significantly affect biodiversity in the lower Penobscot Basin. This conclusion is based on the fact that a large proportion of the lower Penobscot River is already impounded and that the proposed activity would only add to that. FERC also characterizes the lower river habitat as "common." It is not clear how FERC can on the one hand state that a large percentage of the lower river is impounded and then state that a free-flowing river segment is common. Once again, it appears FERC has identified the potential for cumulative impacts and has used it

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NMFS-54 Your comments on wetlands are similar to those raised by the Corps and EPA regarding our wetlands analysis. Please refer to our responses to those agencies' comments. See also COE-3 and 4.

NMFS-55 In the FEIS we note that FWS and NMFS declined to list Atlantic salmon under the ESA in a May, 1995 announcement.

NMFS-56 The FEIS has been modified to address the effect on converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in an existing mosaic of impounded and non-impounded reaches would not be affected.

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NMFS-56 Cont'd

as justification to further impact the affected ecosystem. The fact that so much of the lower river is impounded argues for preserving whatever free-flowing segments remain. FERC's analysis concludes that aquatic biodiversity would be affected as a result of creating the Basin Mills impoundment. However, at the end of this section FERC states that given the large proportion of impounded river already in the lower Penobscot River ecosystem, the small additional increment attributable to the proposed project, the commonness of the affected habitat, and the predicted lack of impact on other elements of the ecosystem, the project as proposed would not significantly affect biodiversity in the lower Penobscot River basin. We find it difficult to understand how FERC can make such a conclusion based on the information it has presented. The contribution of free-flowing river segments to the diversity of the lower river is elevated by the fact that so much of the lower river habitat is impounded. Also, FERC concluded that the aquatic biodiversity would be affected by the proposed project.

NMFS-57

5.0 Staff's Conclusions
This section presents FERC's finding (discussed further in Appendix F) that slight but biologically insignificant genetic differences may exist between wild Penobscot salmon and hatchery-supported Penobscot salmon. NMFS requests that FERC present the justification for stating that genetic differences, even slight ones, are biologically insignificant.

FERC further states that the progeny of fish that experienced truck transport would not be biologically different from the progeny of fish that did not. Again, NMFS requests that FERC provide the basis for this conclusion. Observations of migrating anadromous species have revealed that delays in migration from ineffective fishways or handling of fish in a trap and truck operation are enough to disrupt the drive to migrate upstream and spawn. This disorientation and disruption can result in failure to spawn or reduced fecundity.

NMFS-58

5.2.1.3 Conclusions and Recommendations
FERC presents its selection of Alternative 3 as the one which provides the best balance among the principal resource values of the lower Penobscot River. NMFS disagrees with this selection for the reasons outlined below.

FERC acknowledges that under alternative 3 the likelihood that a completely self-sustaining salmon population can be established is decreased but further states that this will result in the loss of the aesthetic and cultural benefits to the Penobscot Indian Nation. This is a substantial impact but it is not the only one. A wild population has a biological value that is again being disregarded by FERC.

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NMFS-57 See our responses NMFS-24, 33 and 50, above.

NMFS-58 Opinion noted.

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NMFS-59 FERC further states that virtually no biological difference will exist or be discernible between wild fish and other fish in the population that may have benefitted from human intervention. There is a fundamental difference between the statements that a wild fish is no different biologically from one that benefitted from human intervention and the statement that no biological difference is discernible. FERC should specify whether discernible refers to the outward appearance of the fish, behavioral observations, or genetic testing with state of the art methodologies.

NMFS-60 FERC states that one of the reasons for not recommending Alternative 1 (no action) is because it offered fisheries benefits substantially less than those attainable under Alternative 3. NMFS believes that Alternative 1, the no action alternative, should have been defined as not permitting any of the proposed projects which then introduces the potential for decommissioning and possible removal of one or more of these facilities. It is not realistic, or legally permissible, to expect that if the current application were to be denied that FERC would continue to issue annual licenses to these facilities for the next 30-50 years. Using this definition, Alternative 1 would offer greater benefits to anadromous fish than Alternative 3.

NMFS-61 The DEIS acknowledges the fact that Interior (March 24, 1993) reserved its authority to prescribe fishways for the Basin Mills Project pursuant to Section 18 of the FPA. Commerce also reserved its right to prescribe fishways (March 26, 1993) and therefore is doing so at this time (Appendix B).

Appendix B: Methodology and Assumptions Used in the Economic Analysis

NMFS-62 To compute the cost of alternative energy FERC used only fossil-fuel alternatives. NMFS requests clarification as to what FERC used as its justification for excluding from evaluation alternatives other than fossil fuels such as conservation and wind power.

NMFS-63 Footnote 9 on page B-6 states that the construction cost of Veazie C did not include the cost of proposed mitigation. NMFS believes that the cost of mitigation is a cost of doing business and should be included.

Appendix D: Evaluation of Dam Removal in the Penobscot River Basin as Mitigation for the Impacts of the Basin Mills Development on Atlantic salmon - Methodology and Results

NMFS-64 Step 6 of the dam-removal study was identified as the process to eliminate dams for which the cost of removal exceeds the present

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NMFS-59 We have clarified the text to indicate that the existing data and information lead us to conclude that there would be no genetic or behavioral differences between the salmon stock which would exist under Alternative 3 and that which would exist under Alternatives 1 and 5. See our responses NMFS-24, 33, and 50, above.

NMFS-60 See comments NMFS-6 and 13. This comment will be addressed in the orders issued for these projects.

NMFS-61 We have documented your reservation of Section 18 authority in the FEIS and it will be incorporated into the orders for these projects.

NMFS-62 We have revised our discussion of alternative power sources in Section 2.4 of the FEIS to address this comment.

NMFS-63 Veazie mitigation costs are included in project costs specified in Section 2 of the FEIS. This appendix table is intended only to present the base economic costs of each alternative independent of required integration.

NMFS-64 We have revised the text of Appendix D to clarify our evaluation approach. See our response NMFS-19, above.

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NMFS-64 Cont'd net worth of the Basin Mills development. FERC's recent policy statement on decommissioning states that mitigation options should not be excluded based on cost alone. Consequently, NMFS recommends that steps 4, 5, and 6 (economic analysis) should come after steps 7 and 8 (biological analysis).

Step 4 - Estimation of the Total Cost of Dam Removal

NMFS-65 FERC estimated the total cost of dam removal as the sum of fair market value (value of the structures (construction costs + tax assessment) and present worth of the net power benefits of the project). The inclusion of the value of both the dam structures and the present value of the worth of net power benefits in the estimate of market value is duplicative. The value of the dam should be evaluated with either the market value of the dam or the present value of its net earnings stream over its life. This double counting introduces the possibility that dams were improperly removed from analysis in Step 4. Another element should be added to the estimation of the total cost of dam removal, consumer surplus. Consumer surplus is the difference between the consumer's willingness to pay for the electricity the dam produces and the consumer's actual payment. Furthermore, the cost of removing Veazie dam should have been calculated realizing the benefits of not having to comply with mitigation requirements of fishway construction.

NMFS-66 Table D-5 compares the benefits of dam removal for salmon. The last column of this table is very significant. The ASAL model run by FERC finds a 68.2% probability of restoring a self-sustaining population by the year 2043 under current conditions and only a 33.4% probability with Basin Mills. Removal of Veazie Dam is best able to mitigate the impacts of Basin Mills by achieving a 69.4% probability of achieving a self-sustaining restoration of Atlantic salmon by 2043. This should be combined with the evaluation presented in Table D-8 which presents the fact that Howland dam removal results in the greatest benefit to American shad and alewife.

NMFS-67 Table D-6 presents the estimated smolt production in each Penobscot River segment. The smolt production for the river segment from the mouth of the river to Veazie dam is documented as 3299. Does this include the smolt production units in tributaries below Veazie? The fourth column in this table presents the smolt production in the population subsegments as a percentage of the smolt production in the Penobscot River basin. The geographic scope of the DEIS has been defined by FERC as the lower Penobscot so it would seem that the evaluation of impacts to available smolt production should be compared to the total salmon habitat in the lower Penobscot basin and likewise the potential gain in habitat through dam removal should be calculated for the lower river basin only.

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NMFS-65 We have modified our method used to calculate the Total Cost of Dam Removal in Appendix D. The "fair market value" of the dam structures has been eliminated. Power benefits foregone are computed using the current cost method referenced in Section 2.6 of the FEIS. We assume that the private sector market accurately reflects consumers' willingness to pay. However, note that we employ a restrictive current cost approach to economic analysis which values "benefits" not at consumer validated revenue rates but at the alternative cost of power, without any attempt to forecast economic benefits.

NMFS-66 We have changed the characterization of the ASAL model output in Table D-5 to reflect that the figures represent the probability that the expected run size in the year 2043 for each scenario would equal or exceed the fully restored run size. Tables D-5 and D-8 cannot be combined, since they present different impact assessment parameters. We address benefits to shad and alewife in the text.

NMFS-67 The smolt production numbers in Table D-6 for below Veazie do not include the estuary tributaries; the river segment surveyed by ASRSC (Dube 1987) extends down the mainstem to the upper extent of tidal influence (approximately Bangor Dam).

Based on scoping comments from all respondents, including state and federal fisheries agencies, we indicated in Scoping Document 2 (October 1993) that we would address the cumulative impacts of the three projects evaluated on the Penobscot River salmon population as a single stock and we have done this in the FEIS.

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NMFS-68 **Appendix E: Documentation of ASAL Modeling**
The modeling is analyzed in detail in Attachment C.

NMFS-69 **Appendix F: Development-Specific Fisheries Impacts**
FERC contrasts the situation below Basin Mills dam and the situation below Great Works where several tributaries have been documented as salmon nursery habitat and juveniles produced from the Great Works tailrace spawning areas probably use that habitat. As noted previously, tributaries below Bangor dam do support self-sustaining wild runs of Atlantic salmon, so the contrast may not be appropriate under the scenario of potential removal of Veazie dam.

NMFS-70 FERC concludes that the use of a fish pump to transport fish trapped at the exit of the existing fishway to handling and sorting facilities at Plant C fish lift would alleviate the current logistical problems involved in handling fish from the existing facility and make optimal use of the new Plant C handling facilities. USFWS stated in earlier correspondence that fish pumps were not acceptable. The NMFS suggests that FERC explore the alternative of creating a channel that would allow the fish to swim freely from the exit of the existing fishway to the handling and sorting facilities at Plant C. This alternative removes all logistical problems associated with handling fish and does not subject fish to the impacts of a fish pump.

NMFS-71 The section of this portion of the DEIS which discussed Orono dam states that the existing tailrace serves as a resting or holding area for upstream migrants. This characterization is misleading. The fact that migrating adults are found in the tailrace is likely the result of adults being attracted to the flow as they are migrating upstream and are searching for a way to continue their migration upstream.

NMFS-72 The section regarding Veazie dam and physical habitat modifications is confusing regarding the potential of the tailrace to serve as resting/holding habitat. This section includes a statement that creating a deep, high-velocity tailrace would create new salmon resting/holding habitat. Subsequent discussions regarding Basin Mills dam however, state that resting/holding areas are generally characterized by deep water and low velocity. NMFS requests clarification on this issue.

NMFS-73 The physical habitat modification discussion regarding Stillwater mentions the potential removal of a berm in the east channel of the Stillwater bypass reach to enhance salmon habitat. NMFS supports the study of this potential modification and recommends that modeling be conducted to project habitat alterations that would result.

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NMFS-68 We have carefully reviewed Dr. Rago's technical assessment of our ASAL modeling. We note that Dr. Rago states (pg. 1), "The applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent." We have no disagreement with any of the analyses or model results that Dr. Rago presents in your attachment C. We have incorporated a number of Dr. Rago's BASNMILL model outputs into appropriate portions of the text of the FEIS.

NMFS-69 Our discussion in this instance contrasts the situations below Great Works and Basin Mills dams. Bangor Dam is downstream of Veazie dam and not relevant to our discussion.

NMFS-70 In Appendix F, we fully evaluate the feasibility of fish pumps and conclude that they represent an acceptable fish transport methodology for the modifications to the proposed Veazie development. No new data or information have been submitted by any respondent that has caused us to alter our conclusion.

NMFS-71 We cite radio-tracking studies showing that migrating salmon have remained in the Orono tailrace for substantial periods of time, which we interpret as resting or holding. The studies provide no insight into the motivation of the fish participating in those studies.

NMFS-72 We have revised the text to indicate that construction of tailraces would result in creation of deep water habitat, and within such habitat, a range of velocities would be present, including some within the range of resting/holding habitat, as described in Section 3.4.1.2.

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	NMFS-73 One condition of Maine's WQC for the Stillwater project requires BHE to conduct studies of the fisheries benefits of berm removal. In any license issued for this project, we would require that BHE consult with fisheries agencies in the design of those studies. You would have an opportunity to recommend modeling studies at that time.

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NMFS-74 The DEIS includes the following statement: "BHE proposed a lift at Plant C because lifts are the most effective kind of passage for all species of anadromous fish (emphasis added)." Fish passage needs and preferences differ for different species of anadromous fish and design differs according to site and target species. To suggest that a fish lift is always the most efficient design is to greatly oversimplify the issue.	NMFS-74 We intended to convey in that sentence that fish lifts are generally the single most effective fish passage device for the largest number of species, and in particular those species of interest in the Penobscot River. We have revised the text to reflect the overall complexity of selection of appropriate fish passage technology for any individual project.

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NMFS-75

Attachment B: Revised Section 18 Fishway Prescription

The following modified fishway prescription is provided pursuant to the Commission's regulations which allow for such revisions when a DEIS is prepared for a project.

Section 18 Fishway Prescription applicable to all Projects
The following constitutes the NMFS' modified fishway prescription for the hydroelectric projects included in the Lower Penobscot River DEIS.

1. Trap and trucking of anadromous species is not an acceptable permanent means of fish passage.

2. Fish pumps are not an acceptable component of any fishway.

3. Fishway maintenance and operational plans for all fishways shall be developed in coordination with NMFS, USFWS, PIN and other federal agencies and must be approved by NMFS prior to implementation.

4. Fish passage efficiency studies for all upstream and downstream facilities, and all migrating species, must be designed and undertaken in consultation with NMFS, USFWS, PIN and other federal and state fishery agencies. These studies must include mitigation measures to be instituted if desired efficiencies are not attained, and must be approved by NMFS prior to implementation.

5. The NMFS, Department of Commerce, reserves the right to modify this prescription based on new information or a change in project conditions.

6. Maintain flows as prescribed by the USFWS.

Veazie Dam included in Application for the Basin Mills Project
Plant C should be operated as first on, last off during the migratory period.

Upstream Facilities

Plant C
Construct either a vertical slot fishway or a fish lift at the powerhouse with a fish collection gallery, and a biological monitoring and sorting facility in the exit channel.
Plant B
Study and design either a vertical slot fishway or a fish lift to be located at the powerhouse with a fish collection gallery, and a biological and sorting facility in the exit channel. The need for this facility should be evaluated in consultation with NMFS, USFWS, and other fishery agencies.

RESPONSES TO NATIONAL MARINE FISHERIES SERVICE COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

NMFS-75 No response required.

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Cont'd

Plant A

Enhance existing vertical slot fishway to improve passage efficiencies by, among other measures, smoothing edges to reduce injuries. A counting facility, with electronic monitoring, should be added to the existing fishway.

Downstream Facilities

Plants A, B, and C

Install one inch trash racks at Plant A powerhouse and Plant B powerhouse. Install louvers, one inch trashracks or angled bar racks at Plant C powerhouse intake.

Basin Mills dam as part of Basin Mills Project

Upstream Passage Facilities

Construct either a vertical slot fishway or a fish lift at the powerhouse with a collection gallery and fish counting facility in the exit channel. Construct either a vertical slot fishway or a fish lift at the gated spillway.

Downstream Passage Facilities

Install angled bar racks or louver system at the powerhouse intake.

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Orono dam as part of Basin Mills Project

Upstream Passage Facilities

Construct either a vertical slot fishway, Denil fishway or a fish lift.

Downstream Passage Facilities

Install one inch trash racks at the powerhouse intake, if the dam is relicensed not decommissioned.

Stillwater Project

Upstream Passage Facilities

Construct either a vertical slot fishway, Denil fishway or a fish lift at both the powerhouse and spillway.

Downstream Passage Facilities

Install one inch trash racks at the powerhouse intake.

The NMFS endorses the fishway requirements included in DEIS under Alternative 3 with the following exceptions:

Milford Project

Upstream Passage Facilities

At the west end of the spillway construct a vertical slot fishway, Denil fishway or fish lift.

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Attachment C: Review of the Application of the ASAL Model to the Assessment of Impacts on Atlantic Salmon

NMFS-75
Cont'd

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northeast Fisheries Science Center
166 Water Street
Woods Hole, MA 02543-1026

NMFS-75
Cont'd

February 14, 1995

To: Allen E. Peterson Jr., Science and Research Director

From: Paul Rago, NEFSC

Subject: Review of FERC Draft Environmental Impact Statement on Lower Penobscot River Basin

NMFS-75
Cont'd

I have examined the subject document concerning the proposed construction of the Basin Mills Hydroelectric Project on the Penobscot River, Maine. I have focused my attention on the application of the ASAL model to the assessment of the dam's impacts on Atlantic salmon population. Results of the ASAL model are incorporated throughout the text (Chapters 2,3,4,5, Appendices D, E). To facilitate my review of the Applicant's proposal I developed a simplified version of ASAL on a spreadsheet (BASNMILL.WQ1). This highly simplified version of the model helps to clarify some of the basic principles in ASAL and allows rapid estimation of approximate responses to variation in key parameters. Following the summary section I present some additional background on ASAL, develop the BASNMILL spreadsheet and analyze its results, and evaluate some recent information on marine survival rates.

1. Summary

The applicant appears to have done a good job of implementing the ASAL model and no technical errors were apparent. A large number of scenarios were developed and evaluated using the stochastic ASAL model. Baseline runs were compared to the effects of including Basin Mills, removing other dams in the Penobscot, and implementing mitigation strategies. Although the applicant provides the dam specific-parameters for development of scenarios, the computational details and actual parameter values (i.e. input files) are omitted. This makes it time-consuming to determine the actual segment specific parameter values used for each scenario.

Although the implementation of the model appears solid. the applicant chose an inappropriate estimate of marine survival rate (=0.0073) to illustrate that the probability of restoration over a 50-yr time horizon is near zero, even if Basin Mills is not constructed. This diverts attention away from the relative impacts of the proposed dam by calling into question the merits of restoration as a whole. My approximate results suggest that a marine survival rate of 0.03 would be sufficient to ensure persistence of a restored stock *if all of the other model parameters were held constant.*

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The net effects of Basin Mills project can be summarized as follows:

1. Reduce smolt habitat by 3.65%
2. Reduce upstream passage to all upstream segments by 1.6%
3. Reduce downstream passage for all upstream areas by 8%
4. 94.8% of smolt production units lie above Basin Mills dam.

Item 1 implies a 3.65% reduction in system productivity. Items 2 and 3 imply a net reduction of 9.5% [=(1 - 0.92 * 0.984) * 100] in survival rate for upstream populations which comprise 94.8% of the smolt production units. Using a simplified version of the ASAL model and assuming a marine survival rate of 0.025, the composite annual effects at equilibrium of these decreases are an approximately an annual 13.5% reduction adult returns (= (1-1916/2216)*100) and a 13.8% (= (1-211049/244873) *100) reduction in smolt output. As the Applicant has noted, the set of parameter values used in the simulations will cause the total Penobscot population to decline. When the dam is present however, the rate of decline will be 13% greater per year. Not all of the population segments would be driven to extinction at the same rate. For marginal areas the cumulative decremental effects of the dam would be sufficient to push the population from sustainability to decline. It also means that fluctuations in marine survival will have greater impact on restoration probabilities for individual segments.

The Applicant has attempted to portray scenarios in which marine survival increases as unrealistic. Recent reductions and eliminations of fisheries in Canada and Greenland are, in fact, consistent with the magnitude of the projected increases in marine survival. Estimates of exploitation on both US stocks and North American stocks, reported in the ICES North Atlantic Salmon Working Group Report (1994), indicate average exploitation rates in excess of 50% for maturing 2 Sea-Winter stocks. Cessation of these fisheries alone should increase marine survival on the order of two-fold. Unfortunately, the contemporary reductions in fishing mortality appear to coincide with a period of declining survival in the ocean. If the current period of unfavorable environmental conditions is part of a long term cycle, then improvements in marine survival are likely.

I am sure that other reviewers have evaluated the costs, logistics, and biological impacts of the proposed mitigation measures of trapping and trucking adults upstream and additional smolt stocking. Within the model formulation however, there should be some allowance for mortality induced by the trap and truck operation. If this mortality equals that which would have been experienced in the river, then the net mitigation effect is zero. If the induced mortality from trap and truck exceeds the expected in-river mortality, then the trap and truck operation will exacerbate rather than mitigate the effects of the Basin Mills dam. A review of hatchery records at Craig Brook might reveal the magnitude of expected losses due to trucking brood stock and also give insights into possible delayed mortality effects.

The projected loss of habitat due to the Basin Mills facility is relatively minor, but every upstream habitat loss in the Penobscot River decreases the likelihood that a smolt will replace

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itself in the next generation. The goal of restoration has been pursued for over two decades. While much remains to be learned, the clearest lesson thus far is that free-flowing streams are the best way of ensuring successful migration to and from the sea. Additional dams impede restoration, decrease the probability of attaining target population levels, and increase the need for human intervention in the life cycle of Atlantic salmon.

2. ASAL Background

The initial version of ASAL was written in 1984 by Phil Goodyear of the US Fish and Wildlife Service in response to requests by the Regional Office for assistance on development of restoration strategies. The model incorporated spatial distribution of the population, management interventions (removal of broodstock, and stocking of fry, parr, and smolts), impacts of upstream and downstream mortality at dams, and age composition of the population. In 1985 I began a series of revisions to the deterministic model that included additional management options, and more complexity in the spatial structure. The most significant change was the implementation of a stochastic version of the model. In this version of the model, variability in underlying rates of freshwater and marine survival rates and upstream and downstream passage rates was evaluated with respect to the management objective of developing a self-sustaining population of Atlantic salmon. The composite effect of uncertainty in the input parameters was evaluated by examination of the derived empirical distribution of future population sizes. The stochastic version of ASAL was used extensively for evaluation of the impacts of the proposed Sewalls Falls Hydroelectric project on the Merrimack River.

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ASAL is a basic age-structured model that follows the generally accepted paradigms for Atlantic salmon life history:

1. Freshwater smolt production is ultimately limited by habitat. Smolt production within a stream segment reaches an asymptotic limit after egg production exceeds a certain level and remains constant despite of additional increases.

2. Adults return to their natal river, specifically to their subreach within the river

3. Spawners that fail to return to their natal river do not reproduce (e.g., adults destined for upstream reaches that do not pass the necessary dams do not spawn). In the ASAL model these fish are assumed to die.

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Complexities not incorporated in the model include:

1. Spawners that fail to reach their natal area may ultimately spawn in a lower reach of the river, but the magnitude of this component below existing dams has never been evaluated.

2. Upstream and downstream survival rates are assumed to vary independently. In reality high flow years that would enhance downstream survival of smolts might impede upstream passage rates.

3. Variations in freshwater productivity limits.

4. Partitioning of natural and fishing mortality in the ocean. Recently developed information would allow us to partition marine mortality into its natural and fishing mortality components and to more completely model maturation rates.

5. Restoration target is fixed. Evaluation of restoration may be better assessed as the fraction of the stochastic realizations which exceed some lower percentile (say 25%) of restoration target range.

6. The survival rate from egg to smolt may decrease continuously with density. In ASAL the egg to smolt survival rate is constant until the maximum smolt production is reached. An alternative hypothesis is that compensatory survival (higher) may occur at very low levels of abundance.

ASAL was designed as both a tactical and strategic planning tool. As a tactical model it can be used to compare and contrast stocking strategies for restoration. These include identification of: 1) better techniques (fry vs parr vs smolt stocking), 2) alternative spatial distributions for stocking, 3) critical subsegments or areas, 4) parameters to be estimated and evaluated, and 5) cumulative impacts of new projects e.g. dams. The model can also assist in the design of management experiments and to illustrate the magnitude of detectable changes. As a strategic model ASAL can be used to evaluate long term prospects for restoration with respect to variation in underlying rates e.g.. upstream, downstream, marine survival etc. and to assess chances of viable population in future. If long-term prospects are dim, then the magnitude of necessary change can be evaluated.

With respect to environmental impact assessment the model can be used to compare scenarios with and without the project. The detrimental effects of hydroelectric projects tend to propagate over time. If population cannot renew itself, then population will eventually become extinct but the timing is critical. A few examples illustrate the point. A 1% decline per year implies a 69 yr half-life; a 7% decline per yr implies a 10 yr half-life and a 15% /yr implies a 4 yr half-life. If a population is declining at 1% per year, 60% of the initial population will remain after 50 years; if the rate of decline is 2% /yr only 36% percent of the population will remain.

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Therefore the future time period when projected populations are compared is a critical consideration.

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3. Simplified ASAL Model for Penobscot River

To address the issues raised by DEIS I developed a simplified version of the ASAL model on a spreadsheet (BASNMILL.wq1). Unlike the ASAL model, BASNMILL does not include age structure of the smolts or marine population, nor does it incorporate stocking. The objective of BASNMILL is to examine the expected equilibrium behavior of the spatially distributed population segments in response to changes in egg-to-smolt survival, passage efficiency at dams and marine survival.

The persistence of salmon in any segment of the river depends on the ability of a generation to replace itself. Smolts that migrate to the ocean must produce enough adult returns whose eggs survive to produce an equal or greater number of smolts in the next generation. Consider a population comprised of J population segments. Let **Smolts (j,t)** represent the number of smolts produced in segment j at time t. The number of smolts that are produced at time t+Δt, denoted as **Smolts(j,t+Δt)**, can be written as:

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$$Smolts(j,t+\Delta t) = S_{ETS}(j)\ EGG\ W_{AVE}\ f_{FEM}\ S_U(j)\ S_A\ S_M\ S_D(j)\ Smolts(j,t) \quad (1)$$

where

$S_{ETS}(j)$ = Survival from egg to smolt

EGG = Number of eggs produced per pound (= 880 eggs/lb)

W_{AVE} = average weight of returning adult (= 9.1 lb)

f_{FEM} = female fraction in adult returns (= 0.496)

$S_U(j)$ = Upstream survival rate for adults destined to reach segment j

S_A = Fraction of adults which survive in-river angling =1-Exploitation Rate

S_M = Fraction of smolts which exit the river and return as adults

$S_D(j)$= Fraction of smolts which exit segment j that survive downstream passage at dams and exit the river

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Smolt production in the next time period (Eq. 1) was assumed to be density dependent such that the total number of smolts produced at time t+Δt could not exceed the carrying capacity of the population segment (CAP(j)).

$$\begin{aligned} Smolts(j,t+\Delta t) &= CAP(j), && \text{if } Smolts(j,t+\Delta t) \geq CAP(j) \\ &= Smolts(j,t+\Delta t), && \text{if } Smolts(j,t+\Delta t) < CAP(j) \end{aligned} \qquad (2)$$

The upstream and downstream survival rates, $S_U(j)$ and $S_D(j)$, respectively, depend on the number of dams that must be passed between segment j and the ocean. Including Basin Mills, there are a total of 10 dams which impede upstream and downstream passage.

The sequence of dams that must be passed en route to or from segment j is dependent on the spatial distribution of tributaries and the manner in which population segments are defined. For example, a single population segment can consist of one or more dams and smolt production reaches. Overall upstream or downstream passage is assumed to be the product dam specific passage probabilities. Let U(k) and D(k) represent the upstream and downstream survival probabilities, respectively, for dam k. Let $\{K_j\}$ denote the set of indices for dams associated with passage to and from segment j. Then the downstream survival probability for segment j is defined as

$$S_D(j) = \prod_{k \in \{K_j\}} D(k) \qquad (3)$$

The upstream survival probability for segment j is similarly defined as

$$S_U(j) = \prod_{k \in \{K_j\}} U(k) \qquad (4)$$

The maximum number of dams that must be passed in any population segment is seven. The applicant assumed that 92% of all adult salmon encountering a dam would successfully pass upstream, irrespective of the type of passage facility present. Downstream passage efficiencies were assumed to be dam-specific and are summarized in Table 1a, b. The applicant defined several population segments in which several dams were present. In these instances the composite upstream or downstream passage (=survival) rate was estimated as a weighted average of individual dams within the population segments. Smolt production capacities immediately above the dam were used as weighting factors.

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The equilibrium replacement rate RR(j) for a given population subsegment can be defined as

$$RR(j) = \frac{Smolts(j,t+\Delta t)}{Smolts(j,t)} \qquad (5)$$

If RR(j) >1 then the population will increase until the density dependent cap on smolt production takes effect. If RR(j) <1 then the population will decline. A simple metric for depicting the rate of decline is the populations half-life, HL(j)--defined as the number of time units (Δt), required for the population to decline to one half of its current level. The half life of a population subsegment is

F

$$HL(j) = \frac{\log_e(0.5)}{\log_e(RR(j))} \qquad (6)$$

or the purpose of this analysis I assumed that Δt was 4 years, corresponding to a 2 year old smolt and a 2 sea-winter returning adult.

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4. Equilibrium Effects of the Basin Mills Hydroelectric Project

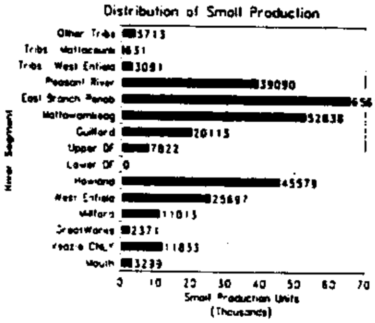

Figure 1

The key questions in the Applicant's use of the ASAL model are the 1) marine survival rate, 2) passage efficiencies and 3) freshwater survival rates. I used the simplified BASNMILL model to examine the implications of variations in these parameters on the ability of the population to replace itself and differential effects of the Basin Mill dam on upstream reaches.

I used the parameters summarized in the DEIS for passage efficiencies at each dam, the smolt production rates for each river segment, and the basic life history parameters (average weight, eggs per pound, egg to smolt survival etc.) The Applicant used 9 population subsegments which were derived from a total of 15 river reaches. Figure 1 illustrates the spatial distribution of smolt production units by population subsegment. When Basin Mills dam is added the smolt production units above Veazie are decreased by 10,688 units to 1,145.

The cumulative effects of dams on the upstream and downstream passage rates are summarized in Table 1a (without Basin Mills), 1b(with Basin Mills). For population subsegments with multiple dams I computed a weighted average passage rate for the subsegment

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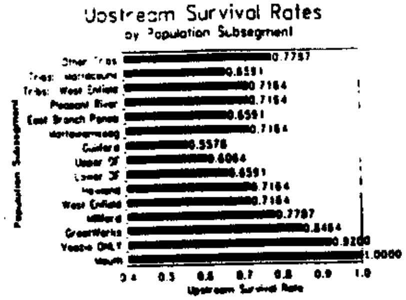

Figure 2a. Without Basin Mills

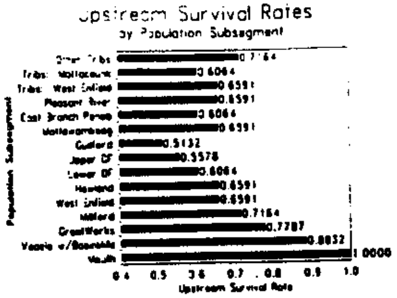

Figure 2b. With Basin Mills

corresponding to the smolt production units present in the river reach. The effect of the Basin Mills dam on upstream passage rates can be seen by comparison of Figure 2a with 2b. In

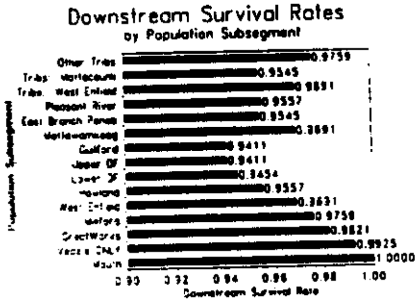

Figure 3a. Without Basin Mills

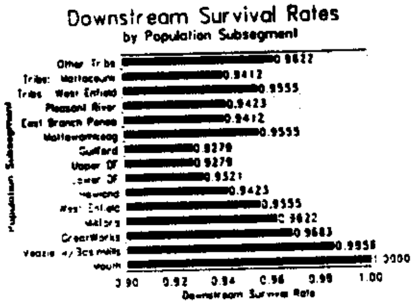

Figure 3b. With Basin Mills

general the survival rates for populations in all upstream segments decreases by 8%. Changes in downstream survival rates are less dramatic than those observed for upstream rates (Fig. 3a, 3b) because the overall reduction in downstream passage is only 1.6% for Basin Mills.

I used the Applicant's values of life history parameters for angling exploitation, fraction female, average weight of 2SW female spawners, and eggs per pound. The parameters values necessary to compute Eq. 1, with and without Basin Mills, are summarized in Tables 2a and 2b, respectively. The corresponding subsegment specific rates are summarized in Tables 3a and 3b. For initial analyses I let marine survival rate = 0.025 and egg to smolt survival = 0.0138. These two variables were later varied in sensitivity analyses.

Although the magnitude of the reductions in upstream and downstream passage rates

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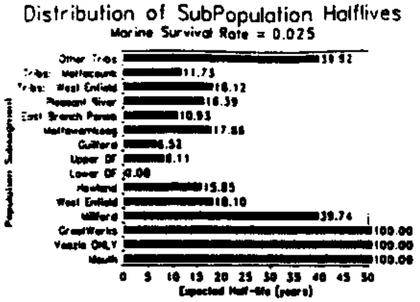

Figure 4a. Without Basin Mills

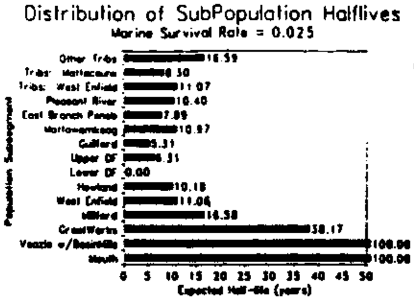

Figure 4b. With Basin Mills

appear small, they are sufficient to increase the rate of decline in the "restored" populations. The half-lives of populations (Eq. 6) in each segment (Fig. 4a.,b) show that only 3 of the 15 population segments would be self sustaining in the absence of Basin Mills (given a 0.025 marine survival rate). When Basin Mills is added (Fig. 4b) the population half lives are decreased by roughly half in all upstream segments. Note that the half lives without the dams in the upstream segments are on the order of 10 to 40 years.

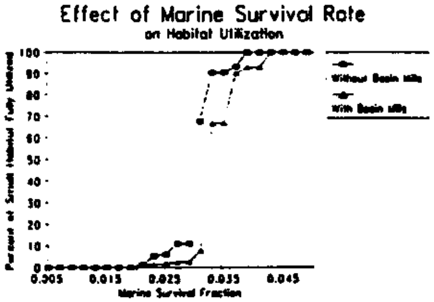

Figure 5.

5. Sensitivity Analyses of BASNMILL.WQ1 model

The fraction of habitat at full smolt production can be computed at the proportion of population segment that are self-sustaining. This value changes markedly as the level of marine survival increases from 0.025 to 0.035 (Fig 5). When Basin Mills is present the fraction of the habitat that is self sustaining is reduced greatly, particularly for S_M in the neighborhood of 0.03. Thus any benefits of improved marine survival rates are greatly diminished for population segments when Basin Mills is present.

As marine survival increases the average rate of upstream passage necessary for full habitat utilization decreases (Fig. 6). When average marine survival falls below 0.02 the model suggests that the Penobscot River population could

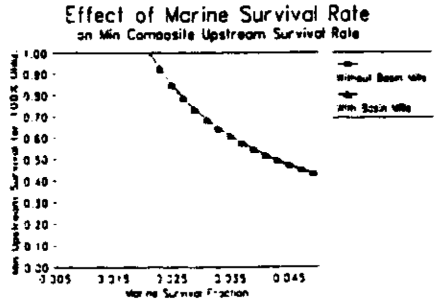

Figure 6.

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not be sustained. However, as marine survival increases to 0.035, full habitat utilization could occur with the weighted average upstream survival rate as low as 50%.

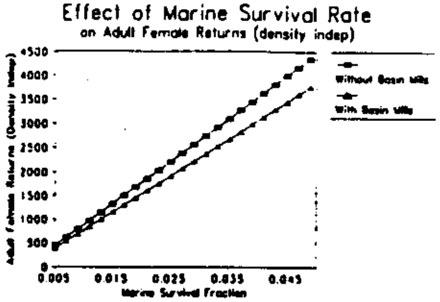

Figure 7.

The direct cumulative effects of Basin Mills on the equilibrium adult returns (Fig 7) vary directly with marine survival. As marine survival increases, the magnitude of the difference in numbers of adult returns with and without the dam will increase.

The density-dependent effects of Basin Mills on smolt production are depicted in Figure 8. Note that the rate of increase in smolt production declines and the maximum level is decreased when Basin Mills dam is present.

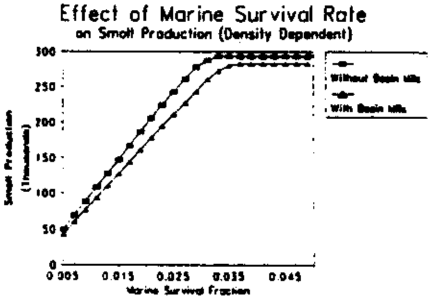

Figure 8.

Finally, it is important to note that survival rates in the river can vary in magnitude. The applicant assumed that 1.38% of the eggs produced survived to become smolts(S_{ETS}). Figure 9 and Table 4 demonstrate the marked effect of small variations in S_{ETS} on habitat utilization (or equivalently, restoration). Small increases in freshwater survival can offset declines in marine survival. When both freshwater and marine survival rate increase, self sustainability is highly likely. The major influence of freshwater survival highlights an aspect of salmon biology not captured in the ASAL model. Impounded water behind dams can support cool- and warm-water predators (e.g., pickerel and smallmouth bass) that potentially can consume juvenile salmon. As the number of impoundments grow the potential effects of such predation may increase.

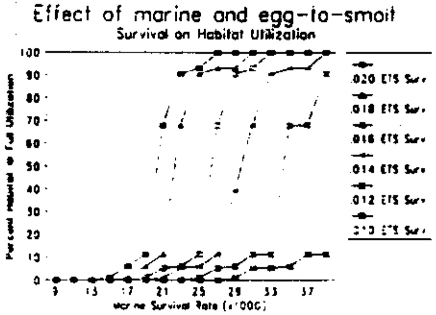

Figure 9

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6. Estimate of Marine Mortality

The ASAL model was developed from 1984 to early 1986. At that time little was known about the relative magnitude of fishing mortality and even less was known about the timing and determinants of natural mortality. Since then much insight has been gained on both of these issues. Most natural mortality occurs in first winter at sea and prior to the start of the marine fisheries. Interception fisheries account for losses of 50 to 70% of potential returns. And finally, not all the smolt make it out of the river due to lack of passage at dams and predators. Therefore applicant's substitution of a 0.7% return rate (total adult returns/total smolt releases) for "marine mortality" of a wild stock (see Table 4-2, p 4-25) in the model is incorrect because it incorporates the effects of instream losses twice. In addition, the 0.7% average return rate is derived from runs dominated by hatchery fish, many of which have been tagged externally. Rates of survival of hatchery fish are generally thought to be lower than for wild fish. Moreover, externally tagged smolts generally have lower survival rates than untagged smolts.

Figure 10.

In the last 3 years there has been a near cessation of interception fisheries on USA stocks. Based on a range of estimates for marine exploitation rates (50 to 70%), the composite marine survival rate should increase by a factor of 2 to 3 over what would have occurred in absence of fisheries. Overall return rates could still be low if unfavorable environmental conditions continue to prevail. Results presented in the reports of the ICES North Atlantic Salmon Working Group (1993, 1994) demonstrate that overall production of salmon in the Northwest Atlantic has been declining over the last decade. Much of this decline has been attributable to increases in marine mortality, apparently driven by colder temperatures. Longer term records suggest that these changes are cyclical. If, as expected, currently unfavorable weather patterns reverse then the potential for higher return rates is likely. Figure 10 illustrates the coherence between the return rate for Maine origin salmon and pre-fishery abundance of the North American stock. Decreases in prefishery abundance could occur due to increases in marine mortality, decreases in smolt production or both factors operating simultaneously. However, marked declines in smolt production have not been documented in recent years. Therefore, the decline in prefishery abundance most likely can be attributed to increases in marine mortality.

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Table 4. Effect of marine survival and egg-to-smolt survival on fraction of habitat at 100% utilization.

MARINE Survival Rate	EGG TO SMOLT SURVIVAL RATE											
	0.028	0.026	0.024	0.022	0.02	0.018	0.016	0.014	0.012	0.01	0.008	0.006
0.005	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.009	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.011	5.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.013	6.0	6.0	5.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.015	67.8	11.0	6.0	5.2	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
0.017	90.5	68.0	38.9	11.0	6.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
0.019	100.0	93.1	90.5	67.8	11.0	8.0	1.1	0.0	0.0	0.0	0.0	0.0
0.021	100.0	100.0	93.1	90.5	67.8	11.0	5.2	1.1	0.0	0.0	0.0	0.0
0.023	100.0	100.0	0.0	93.1	90.5	67.8	6.0	5.2	0.0	0.0	0.0	0.0
0.025	100.0	100.0	100.0	100.0	93.1	90.5	11.0	6.0	1.1	0.0	0.0	0.0
0.027	100.0	100.0	100.0	100.0	100.0	93.1	67.8	11.0	5.2	0.0	0.0	0.0
0.029	100.0	100.0	100.0	100.0	100.0	93.1	90.5	38.9	6.0	1.1	0.0	0.0
0.031	100.0	100.0	100.0	100.0	100.0	100.0	93.1	67.8	11.0	5.2	0.0	0.0
0.033	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.5	11.0	5.2	0.0	0.0
0.035	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.1	67.8	6.0	1.1	0.0
0.037	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.1	68.0	11.0	1.1	0.0
0.039	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.5	11.0	5.2	0.0
0.041	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.1	52.3	5.2	0.0
0.043	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.1	67.8	6.0	0.0
0.045	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.5	6.0	0.0
0.047	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	90.5	11.0	1.1
0.049	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	93.1	11.0	1.1

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Table 1a Estimation of upstream and downstream survival rates by population subsegment (without Basin Mills)

Population Subsegment #	Population Subsegment	Number of Dams	Downstream Survival Rate(top) and index (bottom) of dam passed for fish in the subsegment										Expected Downstr Survival	Expected Upstream Survival
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]		
			38	36	38	47	56	58	65	70	82	BasinMill		
1	Mouth	0										0	1	1
2*	Veazie ONLY	1	1									0	[illegible]	0.92
3	GreatWorks	2	1	1								0	[illegible]	[illegible]
4a	Milford	3	1	1	- 1							0	[illegible]	[illegible]
4b	West Enfield	4	1	1	1					1		0	[illegible]	[illegible]
5a	Howland	4	1	1	1	1						0	[illegible]	[illegible]
5b	Lower DF	5	1	1	1	1	1					0	[illegible]	[illegible]
5c	Upper DF	6	1	1	1	1	1	1				0	[illegible]	[illegible]
5d	Guilford	7	1	1	1	1	1	1	1			0	[illegible]	[illegible]
6	Mattawamkeag	4	1	1	1					1		0	[illegible]	[illegible]
7	East Branch Penob	5	1	1	1					1	1	0	[illegible]	[illegible]
8	Pleasant River	4	1	1	1	1						0	[illegible]	[illegible]
9a	Tribs West Enfield	4	1	1	1					1		0	[illegible]	[illegible]
9b	Tribs. Mattaceunk	5	1	1	1					1	1	0	[illegible]	[illegible]
9c	Other Tribs	3	1	1	1							0	[illegible]	[illegible]
	Dam Name		Veazie	GreatWor	Milford	Howland	Lower DF	Upper DF	Guilford	W. Enfld	Mattaceu	BasinMills		

Note 1: when the Veazie Reach excludes Basin Mills, upstream passage is computed as a weighted average of two passage probabilities [illegible]
Note 2: when the Veazie Reach includes Basin Mills, downstream passage is computed as a weighted average of two passage probabilities
Note 3: Basin Mills is assumed to partition the Veazie reach into two small production areas of equal size.

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Table 1b Estimation of upstream and downstream survival rates by population subsegment (with Basin Mills)

Population Subsegment #	Population Subsegment	Number of Dams	Downstream Survival Rate(top) and Index (bottom) of dam passed for fish in this subsegment										Expected Downstr Survival	Expected Upstream Survival
			[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	[illegible]	[illegible]	[illegible]		
			30	35	38	47	55	58	65	70	80	BasinMills		
1	Mouth	0										0	1	1
2*	Veazie w/BasinMills	2	1									1	[illegible]	[illegible]
3	GreatWorks	3	1	1								1	[illegible]	[illegible]
4a	Milford	4	1	1	1							1	[illegible]	[illegible]
4b	West Enfield	5	1	1	1					1		1	[illegible]	[illegible]
5a	Howland	5	1	1	1	1						1	0.84201	[illegible]
5b	Lower DF	6	1	1	1	1	1					1	[illegible]	[illegible]
5c	Upper DF	7	1	1	1	1	1	1				1	[illegible]	[illegible]
5d	Guilford	8	1	1	1	1	1	1	1			1	[illegible]	[illegible]
6	Mattawamkeag	5	1	1	1					1		1	[illegible]	[illegible]
7	East Branch Penob	6	1	1	1					1	1	1	0.84116	[illegible]
8	Pleasant River	5	1	1	1	1						1	0.84201	[illegible]
9a	Tribs West Enfield	5	1	1	1					1		1	[illegible]	[illegible]
9b	Tribs. Mattawamk	6	1	1	1					1	1	1	0.84116	[illegible]
9c	Other Tribs	4	1	1	1							1	[illegible]	[illegible]
	Dam Name		Veazie	GreatWks	Milford	Howland	Lower DF	Upper DF	Guilford	W. Enfield	Mattawam	BasinMills		

Note 1. when the Veazie Reach includes Basin Mills, upstream passage is computed as a weighted average of two passage probabilities [illegible]

Note 2. when the Veazie Reach includes Basin Mills, downstream passage is computed as a weighted average of two passage probabilities

Note 3 Basin Mills is assumed to partition the Veazie reach into two small production areas of equal size.

NMFS-75
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Table 2a. Analysis of smolt replacement rates and habitat utilization by population segment (without Basin Mills).

Life History Factor	Ppoulation Segment Number (see Table 1)									Composi or SUM
	1	2	3	4	5	6	7	8	9	
Smolt Production	3299	11833	2371	36710	73514	52838	65616	39090	7425	292696
Downstream Surv. (Table 2,	1.0000	0.9825	0.9821	0.9711	0.9502	0.9891	0.9546	0.9557	0.9712	0.9610
Marine Survival	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	
Survival (in-river angling)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Upstream Survival (Table 2)	1.0000	0.9200	0.8464	0.7351	0.6613	0.7164	0.6591	0.7164	0.7427	0.7052
Fraction Female	0.496	0.496	0.496	0.496	0.496	0.496	0.496	0.496	0.496	
Predicted # Female Spawn	37	121	22	292	516	409	461	299	60	2216
Ave Wt/Female 2SW	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	
Eggs/lb	880	880	880	880	880	880	880	880	880	
Egg to Smolt Survival	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	
Predicted # Smolts (density	4069	13325	2431	32319	56968	45239	50910	33007	6605	244873
Replacement Ratio	1.2333	1.12612	1.02515	0.88038	0.77493	0.85619	0.775878	0.84438	0.88959	Composi 0.83661
Replace. Ratio w/DensityDe	1	1	1	0.88038	0.77493	0.85619	0.775878	0.84438	0.88959	0.82868
Min Upstream Survival req'd for Replacement	0.81084	0.81696	0.82563	0.83496	0.85337	0.83672	0.849485	0.84843	0.83485	0.84388
Habitat Units @100% Utiliza	3299	11833	2371	0	0	0	0	0	0	17503
38 Year Projection	1	1	1	0.0079	6.2E-05	0.00274	6.49E-05	0.00162	0.01173	0.06183

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Table 2b. Analysis of smolt replacement rates and habitat utilization by population segment (with Basin Mills).

Life History Factor	Ppoulation Segment Number (see Table 1)									Composi or SUM
	1	2	3	4	5	6	7	8	9	
Smolt Production	3299	1145	2371	36710	73514	52638	65616	39090	7425	282008
Downstream Surv. (Table 2,	1.0000	0.9856	0.9683	0.9575	0.9368	0.9555	0.9412	0.9423	0.9576	0.9465
Marine Survival	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025	
Survival (in-river angling)	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	
Upstream Survival (Table 2)	1.0000	0.9832	0.7787	0.6763	0.6084	0.6591	0.6084	0.6591	0.6833	0.6424
Fraction Female	0.496	0.496	0.496	0.496	0.496	0.496	0.496	0.496	0.496	
Predicted # Female Spawn	37	11	20	265	468	371	418	271	54	1915
Ave Wt/Female 2SW	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	9.1	
Eggs/lb	880	880	880	880	880	880	880	880	880	
Egg to Smolt Survival	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	0.0138	
Predicted # Smolts (density	4069	1229	2205	29317	51677	41037	46182	29941	5992	211649
										Composi
Replacement Ratio	1.2333	1.07351	0.92994	0.79861	0.70296	0.77667	0.703815	0.76595	0.80696	0.75051
Replace. Ratio w/DensityDe	1	1	0.92994	0.79861	0.70296	0.77667	0.703815	0.76595	0.80696	0.74746
Min Upstream Survival req'd for Replacement	0.81084	0.82272	0.83735	0.84661	0.86549	0.8486	0.861527	0.86048	0.8467	0.85673
Habitat Units @100% Utiliza	3299	1145	0	0	0	0	0	0	0	4444
38 Year Projection	1	1	0.06328	0.00019	1.5E-06	6.7E-05	1.6E-06	4E-05	0.00029	0.01634

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Table 3a Analysis of Downstream and Upstream Survival Rates by Population subsegment (without Basin Mills).

Seg#	Population Subsegment	Smolt Products	Number of Dams	Subsegment Spec Downstr Survival	Subsegment Spec Upstrea Survival	Segment Wtd Ave Downstr Survival	Segment Wtd Ave Upstrea Survival	Predicted # Female Spawners	Predicte # Smolt	Smolt Units @ 100% Ut	Replacement Ra Pred/Init	Population Half-life (generati)	(years)
1	Mouth	3296	0	1.0000	1.0000	1.0000	1.0000	37	4068	3296	1.2333	100.00	100.00
2*	Veazie ONLY	11833	1	0.9925	0.9800	0.9925	0.9800	121	13325	11833	1.1261	100.00	100.00
3	GreatWorks	2371	2	0.9851	0.9604	0.9851	0.9604	22	2431	2371	1.0252	100.00	100.00
4a	Milford	11813	3	0.9780	0.7767	0.9711	0.7361	83	10871	0	0.9326	9.83	38.74
4b	West Enfield	25897	4	0.9691	0.7104			180	22040	0	0.868	4.83	18.10
5a	Howland	48579	4	0.9667	0.7104	0.9662	0.6813	348	36283	0	0.8306	3.96	15.85
5b	Lower DF	0	5	0.9454	0.6601			0	0	0	0	0.00	0.00
5c	Upper DF	7622	6	0.9411	0.6604			50	5856	0	0.7166	2.08	8.11
5d	Guilford	20113	7	0.9411	0.5675			110	13146	0	0.6537	1.83	6.52
6	Mattawamkeag	62636	4	0.9691	0.7104	0.9691	0.7104	409	48236	0	0.8562	4.48	17.98
7	East Branch Penob	65610	5	0.9645	0.6601	0.9645	0.6601	461	60610	0	0.7730	2.73	10.89
8	Pleasant River	39090	4	0.9667	0.7104	0.9657	0.7104	288	33007	0	0.8444	4.10	16.38
9a	Tribe: West Enfield	3081	4	0.9691	0.7104	0.9712	0.7427	24	2844	0	0.8601	4.83	18.12
9b	Tribe: Mattaseunk	631	5	0.9646	0.6601			4	486	0	0.7896	2.93	11.73
9c	Other Tribe	3713	3	0.9780	0.7767			31	3468	0	0.9327	9.86	39.82
	Total	282896						2216	244873	17868			
					Percent @100% utilization==>					5.96			

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Table 3b Analysis of Downstream and Upstream Survival Rates by Population subsegment (with Basin Mills).

Seg#	Population Subsegment	Smolt Products	Number of Dams	SubSegment Speci		Segment Wtd Ave		Predicted	Predicte	Smolt Units @	Replace-ment Ra	Population Half-life	
				Downstr Survival	Upstrea Survival	Downstr Survival	Upstrea Survival	# Female Spawners	# Smolt	100% Ut	Pred/Initi	(generati	(years)
1	Mouth	3256	0	1.0000	1.0000	1.0000	1.0000	37	4088	3256	1.2383	100.00	100.00
2*	Veazie w/BasinMills	1146	2	0.9656	0.8832	0.9656	0.8832	11	1236	1146	1.0736	100.00	100.00
3	GreatWorks	2371	3	0.9089	0.7767	0.9089	0.7767	20	2366	0	0.9890	9.84	38.17
4a	Milford	11013	4	0.9682	0.7164	0.8675	0.6763	86	8317	0	0.848	4.14	16.56
4b	West Enfield	25697	5	0.8585	0.6601			181	26606	0	0.7786	2.77	11.08
5a	Howland	48579	5	0.9423	0.6601	0.6369	0.6084	316	34760	0	0.7615	2.84	10.18
5b	Lower DF	0	6	0.9321	0.6064			0	0	0	0	0.00	0.00
5c	Upper DF	7022	7	0.9279	0.5679			46	5042	0	0.6446	1.86	8.31
5d	Guilford	20113	8	0.9279	0.5132			107	11927	0	0.593	1.33	5.31
6	Mattawamkeag	52938	5	0.9685	0.6601	0.9585	0.6601	371	41687	0	0.7767	2.74	10.87
7	East Branch Penob	66616	6	0.9412	0.6064	0.9412	0.6064	416	46182	0	0.7680	1.97	7.80
8	Pleasant River	38080	5	0.9423	0.6601	0.9423	0.6601	271	29641	0	0.780	2.80	10.40
9a	Tribe: West Enfield	3081	5	0.9685	0.6601	0.9679	0.6683	22	2380	0	0.7704	2.77	11.07
9b	Tribe: Mattanawcook	631	6	0.9412	0.6064			4	482	0	0.7161	2.08	8.30
9c	Other Tribs	3713	4	0.9622	0.7164			29	3141	0	0.6461	4.15	16.60

	Total	282008						1816	211849	4444			
					Percent @100% utilization==>					1.58			

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COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

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VERSAR, INC.
FEB 23 '95
ECOLOGICAL SCIENCES AND ANALYSIS

February 16, 1995

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, DC 20426

-000 -005 -004

RE: FERC PROJECTS #10981; #2534; #2712: COMMENTS AND RECOMMENDATIONS ON DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR THE LOWER PENOBSCOT RIVER BASIN.

Dear Secretary Cashell,

PIN-1 The Penobscot Indian Nation (PIN) submits the following comments and recommendations on the Draft Environmental Impact Statement (DEIS) for the Lower Penobscot River Basin in Maine, issued in November of 1994 by FERC Staff ("Staff" will be used throughout the remainder of this letter to refer interchangeably to FERC staff and/or its consultants). This DEIS includes Staff's recommended licensing/relicensing/decommissioning alternatives for FERC Projects #10981, #2534, and #2712, which in total involve five existing dams on the lower Penobscot River, four of which include generating facilities, plus a proposed new hydropower project at the site known as "Basin Mills".

INTRODUCTORY REMARKS

The Penobscot Indian Nation (PIN) is a Federally-recognized Indian Tribe, with reservation lands consisting of all lands in the Penobscot River upstream of and including Indian Island near Old Town, Maine. The PIN retains sustenance fishing rights within its reservation waters, based on aboriginal rights reaffirmed by the 1980 Maine Indian Land Claims Settlement Act (MICSA).

The decisions that the Commission ultimately makes on these proposed licensing actions will determine the long term future and viability of the Penobscot Indian's livelihood, historical tradition, and cultural values, all of which depend on the ability of the tribe to fully exercise its sustenance fishing rights. The PIN's sustenance fishing rights, and the closely intertwined traditional and cultural values so associated, must therefore be treated as core issues in all Federal agency decisions forthcoming on the hydropower projects involved in this proceeding.

Although protection of the PIN's sustenance fishing rights and consideration of its cultural and traditional values were absent in the State Board of Environmental Protection's (BEP), decision

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-1 No response required.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-1 Cont'd

to issue a 401 Water Quality Certification for the Basin Mills Project, we were confident that, when this project reached the Federal licensing level, FERC Staff would understand its fiduciary responsibility to protect these rights and values. Unfortunately, while the DEIS mentions these rights and values, it is clear that Staff's understanding and treatment of the PIN's sustenance fishing rights is negligent. This broad and pervasive inadequacy in the DEIS is sufficient in itself to compel us to flatly reject this DEIS.

PIN-2

Nevertheless, we also expected a much more comprehensive and objective approach to the complex environmental issues and cumulative environmental impacts surrounding these projects, and a more balanced decision-making process, compared to the relatively subjective approach, and the significant errors in judgement, which occurred during the State level permitting. To our great dismay, this did not occur. Instead, our detailed review indicates that the DEIS is severely inadequate in many critical areas, inappropriately subjective in many others, and is fraught with conceptual, judgmental, process, technical, and analytical flaws and shortcomings.

While each of these instances could be considered significant within themselves, the problem with Staff's analysis goes much deeper than the simple identification and revision of individual problem areas. Because many errors in concept, judgement, and process occur <u>at the fundamental level</u>, and because the resulting flawed assumptions and conclusions establish the underlying basis for Staff's resource impact analyses, these errors carry forward, and become irreparably compounded and integrated into virtually all of the Staff's significant analyses and findings regarding the most critical issues in this proceeding, including, but not limited to, those findings used to support the Staff-recommended alternative. This has caused the PIN's staff great difficulty in reviewing this document. This is unfortunate, since most of Staff's errors were preventable, had Staff approached this task with the level of objectivity and responsibility that we expected.

In the comments which follow, we have attempted to identify as many of the major problems with this document as was possible in the time we had available. However, because of the enormous complexity and extent of this task, it is impractical to address all of the deficiencies with this document. Also, because of Staff's abject failure to properly address PIN fishing rights, or to demonstrate any attempt to discharge its fiduciary responsibility to protect PIN resources, we require a new DEIS, in order to determine the adequacy of Staff's efforts in this regard. As currently prepared, we consider this DEIS to be a breach of this fiduciary responsibility.

GENERAL COMMENTS

TRIBAL FISHING RIGHTS

PIN-3

The single most significant inadequacy in this DEIS is how Staff deals with the PIN's fishing rights. Both Staff's understanding of how these rights circumscribe the power of the State and Federal governments, and its demonstration of how these rights are affected by alternative mitigation scenarios, are strikingly absent in this DEIS.

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-2 We have acknowledged and corrected a number of errors and omissions in the DEIS identified by you and other commentors. For some of your concerns, we explain the basis for our positions in our responses to your detailed comments below.

PIN-3 The Commission's Licensing decision in this matter will not compromise the PIN'S fishing rights or PIN's ability to "obtain (fish) without unreasonable effort", "limit (y)our ability to take these fish", or reduce "the amount of fish resource available to the PIN."

We note that the Act to Implement the Maine Indian Claims Settlement Act, 30 MRSA, 6201 <u>et seq.</u>, provides at § 6207 ¶ 4, that "the members of ...the Penobscot Nation may take fish, within the boundaries of their respective Indian Reservations, for their individual sustenance." Your comment states that "anything which reduces the amount of fish resource available to the PIN ..., or lessens the prospect for self-sustaining restoration of anadromous species, cannot be permitted."

Alternative 3 and 4 would provide benefits in several resource areas, including increasing runs of anadraomous fish. Under Alternative 4, our recommended alternative, all salmon passing upstream would be available to PIN if agencies choose to not employ trap-and-truck.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-3
Cont'd

The PIN for time immemorial has had an aboriginal right to the water and resources of the Penobscot River, its reservation, from Indian Island northward. We never relinquished those rights and specifically retained our right to take fish for individual sustenance in our settlement with the State in 1980 (MICSA). Furthermore, the PIN retains from the sale of the islands upon which the Milford dam was built the exclusive right and privilege of taking fish from those islands between Indian Island and a point immediately below Milford Dam in the season of taking shad and alewives. In other words, our exclusive right to fish begins immediately below the Milford Dam.

The potential impact of the Basin Mills Project on our fisheries is especially severe because, subsequent to MICSA, the State issued a consumption advisory, which limited to two eight-ounce meals per month for adult males, the amount of <u>resident</u> fish that can be safely consumed from PIN waters below the Lincoln Pulp and Paper mill. These fish are so contaminated with dioxin and other organochlorines that tribal members, and especially women of child-bearing age, are fearful of eating any resident species. Because of this, the only fish now considered safe for consumption are the anadromous species; salmon, shad, and alewife. For this reason, it is particularly important that nothing be done to limit our ability to take these fish for sustenance.

Where reserved Indian rights are properly established, they arise without regard to equities that may favor competing users. FERC must, therefore, consider in its deliberations, first and foremost and without regard for other competing interests, PIN's right to the opportunity to obtain without unreasonable effort a portion of the resource sufficient to meet its sustenance right. Transporting anadromous fish on a permanent basis around the principal site of PIN habitation, Indian Island, blatantly reduces the availability of uncontaminated, and thus edible, fish. As a trustee of Indian resources, FERC and its staff have an obligation to ensure that it's actions do not deny these resources to the PIN and that it does not condone or legitimize improper interference by the State of Maine in this matter. It is inconceivable how Staff could rationalize that trucking fish around Indian Island would not diminish the PIN's fishing rights. As a Federal agency with Federal fiduciary responsibility to protect PIN resources, this should have been intuitively obvious to Staff.

Anything which reduces the amount of fish resource available to the PIN through State or Federal action, or lessens the prospect for self-sustaining restoration of anadromous species, cannot be permitted. We take great meaning in terms of identity from our hunting, fishing, and gathering activities. We do not hunt domestic cattle in penned yards, which conceivably could be done; we hunt creatures of the forest, the moose, bear, and deer. These creatures are wild and self-propagating. We view the situation with salmon and other fish in similar light. We consider hatchery stocking to be a short-term activity that we want terminated as soon as possible, and we absolutely abhor the thought of trucks on a permanent basis delivering hatchery fish to our doorstep. This latest proposal of home delivery, which the applicant is currently advocating in the press, is adamantly opposed as culturally degrading and biologically unsound.

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-3
Cont'd

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-4 In Section 4.3.3.6 of the DEIS, Staff has decided that existence value is extremely difficult to determine and is outside the scope of this EIS. It is our view that this understanding, and preservation of an Indian cultural practice of pursuing the wild creatures of the land, the air and the water in our own way and for our own good, is a necessary component of the scope of the EIS. The value of our accustomed practice of taking wild, self-propagating fish cannot be so casually dismissed by a Federal trustee as too difficult to determine, or as being outside the scope of the EIS. Dismissal renders incomplete any environmental analysis of hydro-related costs and benefits and undermines the concept of Federal trusteeship in which native resources and values are intended to be preserved and protected.

TRIBAL SOCIOECONOMICS

PIN-5 No treatment of how the various licensing alternatives would impact PIN's economic situation was attempted in the DEIS. As Staff points out in sections 3.14.1.1 and 3.14.2.2, PIN's 1990 unemployment rate of 13.8% was over three times the 3.4% rate within the immediate impact area.

PIN pointed out in its December 20, 1993 response to FERC's AIR to PIN that subsistence hunting and fishing continue to play a very basic role in Indian economic survival. No evidence exists in the DEIS indicating that Staff has meaningfully considered in any way project impacts on PIN's economic situation.

STAFF'S APPROACH TO BASELINE IMPACT ASSESSMENT

PIN-6 In a recent filing to FERC (Whittaker, Bangor Hydro, to Cashell, FERC, November 1, 1994), BHE writes, "The Milford Project has been operating for 90 years without "destroying" or "devastating" the PIN reservation...". Obviously the Reservation still exists, but the Milford Project did indeed destroy the greatest anadromous fishing ground that we possessed, radically altered our fishing practices, and contributed to a cancerous progression of lost cultural identity.

Just as the raised water level within the Milford impoundment began eroding the newly exposed soil of the Reservation where once bedrock contained the river, the fishing culture began to erode due to the diminishment of our anadromous fish runs. This erosive action is ongoing and will continue to destroy and devastate our cultural values and identity until corrective measures are put in place. For this reason and in order to fully protect that which still remains available to us in terms of resources and culture, FERC cannot accept existence or continuation of the status quo as its baseline.

We do not read in the FPA, as amended by ECPA, the intention to authorize a continued, terminal destruction of a resource or a culture, which may be inevitable if FERC continues to accept existing conditions as baseline, against which it evaluates developmental alternatives. We believe, instead, that FERC's trustee responsibility to the PIN requires that it consider how best to preserve the reason and purpose for which the Reservation exists. FERC's responsibility is not to simply decide how much additional harm is possible short of immediate extirpation, but

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PIN-4 We do not dispute that the existence of a wild Atlantic salmon run in the Penobscot would have intrinsic value to the PIN or others. We further recognize that various methods have been developed that attempt to express existence values in dollars. While we do not attempt to reduce the value of a restored wild Atlantic salmon run to dollars, we consider in qualitative terms the potential existence values associated with restoration of a wild Atlantic Salmon population in the Penobscot River. We examine the probabilities of restoration success under project alternatives designed to maximize the probability of restoring wild and non-wild Atlantic salmon, with and without the provision of power values. The PIN have been invited to comment on the cultural significance of Atlantic salmon to their heritage. We also evaluate the biological and recreational character of wild versus non-wild Atlantic salmon runs (See Section 4.3.3.2). We conclude that PIN cultural values outweigh potential fish population abundance in recommending Alternative 4 as our preferred alternative.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-6 Cont'd

to seek the balance between energy production and the preservation of native culture. To do otherwise would be to advance a policy of cultural extermination. The Penobscot River has reached a point where the status quo is unquestionably not an acceptable baseline. The continuing harm is so severe that the proverbial band-aid is grossly insufficient; selective dam removal will be required whether or not the Basin Mills Project proceeds forward.

STAFF'S APPROACH TO CONSULTATION AND INFORMATION SOURCES

PIN-7

The potential level of objectivity, the probability of making proper and informed judgements regarding issues about which there may be insufficient or conflicting information, and the capability of Staff to reach a defensible and balanced solution to these proposed licensing actions, have been significantly compromised due to a fundamental flaw in Staff's approach to information sources and consultation during the development of this DEIS.

We recognize, and do not dispute, the fact that the applicant, by necessity, has provided the bulk of the information that constitute the applications and additional information filings for these projects. However, we do not believe that either sheer volume, or for that matter, any aspect which is unrelated to the accuracy or quality of the information in question, would be an appropriate basis for what appears to be a clear tendency in the DEIS, to assign greater overall weight to the applicant's (including their consultants) opinions, analyses, conclusions, and recommendations, than that given to similar filings by other parties to this proceeding, particularly those with significantly more resource management authority, expertise and experience than the applicant (e.g. USFWS, EPA, ASRSC, DMR, PIN, as appropriate to the resource(s) in question). An excellent example is the ASAL modelling issue. Instead of consulting with USFWS, the developer of the model, Staff relied instead on the applicant's modelling activities and its own misguided applications of the model, generating numerous compounded analytical and judgmental errors regarding the impacts of proposed licensing actions on the Atlantic salmon restoration program.

This tendency for bias in terms of the treatment of available information sources extends beyond the applicant's required filings on the Federal level, and includes an extensive reliance by Staff on testimony of paid "expert" witnesses, hired directly by the applicant specifically to testify on their behalf at the State BEP hearings. We are not advocating that Staff ever ignore any particular information source that could have a bearing on a particular issue. However, it is quite obvious by simply looking at what is cited within the narrative portions of the DEIS, and in what context, and by reviewing Section 6 (Literature Cited), that none of State level testimony filed by the PIN, USFWS, EPA, Conservation Intervenors, ASRSC, or DMR is referenced anywhere in the document. This occurred despite the fact that all these testimonies have been filed as part of the Federal record for this proceeding. We can only surmise from this that Staff did not consider, or has chosen to ignore, these parts of the record. In contrast, several of the applicant's witnesses' direct testimonies to the BEP are cited in the main body of the DEIS and in Appendix G, and are often used to draw significant conclusions regarding critical issues in this proceeding. This highly questionable approach casts serious doubts regarding the overall objectivity of Staff's analyses, and thus the conclusions drawn from those analyses.

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PIN-5 Our analysis of economic impacts resulting from the various licensing alternatives address state, regional, and local effects. We have discussed PIN's existing socioeconomic situation utilizing data provided by PIN members.

While PIN lands are included in the immediate impact area of the projects, we do not see any primary economic impacts, positive or negative, to the PIN as a result of the proposed action. We have discussed the short-term increases in regional employment, but cannot predict specific communities or individuals to be hired. The PIN could experience secondary benefits from increased tax revenues received by the adjacent communities in terms of improved schools, infrastructure, or other government sources. As previously discussed, Alternative 3 would result in increased populations of anadromous fish, a benefit continually sought in PIN comment letters.

PIN-6 This issue will be addressed in the orders issued for these projects.

PIN-7 In preparation of the DEIS and FEIS, we reviewed and evaluated all data and information placed into the record for this project, including all State level testimony by all parties. Our review sought factual data or analyses which would contribute to an objective evaluation of what are clearly very contentious issues among the parties to this licensing process. In addition, we independently identified and requested technical data and information from a number of sources, such as the Atlantic

PIN-7 Cont'd Sea Run Salmon Commission, that had not been entered into the record but that we believed would contribute to our assessment. The citations made in the DEIS and FEIS text refer to sources that contained original data and analyses that we used in our analyses. As you note, much of the relevant data and analyses were collected or performed by BHE staff or consultants. Many of the BHE submittals also were comprehensive in identifying and summarizing existing data and information on the respective topics, thus serving as source documents for much of the relevant data and information. We also analyzed and interpreted all other appropriate data and information submitted by other parties, including PIN (e.g., benthic macroinvertebrate data and water temperature data, as analyzed and cited in Sections 4.7.2 and 4.2.2). BHE submitted extensive written testimony in the Maine WQC hearings, including numerous exhibits presenting relevant data and analysis. Our review of State level testimony by most intervenors revealed that most was narrative in nature, and was not accompanied by substantial new data or analysis that would contribute to our objective analyses. In this comment, you do not identify any specific oversights on our part of factual data or information that you submitted in your State level testimony. We will address specific issues you raise in your detailed comments through our responses, below.

Regarding the propriety and validity of our ASAL model applications, in our review and solicitation of data and information for DEIS preparation we are required to operate within FERC ex parte rules. Thus, while we were permitted to contact individuals or organizations to request new data or information, or clarify data or information that had already been submitted, we were not permitted to work cooperatively with any party in conducting our analyses. Thus, FERC's ex parte rules prohibited any cooperative ASAL modeling effort with FWS, as is appropriate considering the divergent positions assumed by the parties to this process. We did not "...rely on the applicant's modeling activities...." in our assessment, merely citing BHE, as well as FWS and ASAL Working Group, PIN-7 Cont'd modeling outputs as appropriate to the issue being discussed (see Section 4.3.3.1 and Appendix E). Regarding possible "...misguided applications...generating numerous compounded analytical and judgmental errors...." in our ASAL model analysis, we note that NMFS' review of our ASAL model application, authored by one of the model developers, Dr. Paul Rago, states (pg. 1 of Attachment C to NMFS DEIS comments) that " The applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent."

Our citation of Baum (1983) in the DEIS was primarily for characterization of the history of the Penobscot River salmon stock, salmon life history, and habitat distribution in the basin. You do not specify the manner in which you believe that our use of Baum (1983) as a data and information source has lead to any inaccuracies in our analyses. We have employed all data entered into the record and identified by respondents in their comments on the DEIS to update the FEIS text, as appropriate and necessary to account for the most recent data and information available.

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PIN-7 Cont'd In addition, many of Staff's information sources on the current status of resource stocks or management plans for those resources are outdated. A good example, discussed in more detail below, is Baum (1983). While certainly a good reference for general descriptive information on the Penobscot River in relation to salmon restoration, information regarding the status and understanding of the salmon resource in the Penobscot contained which is over 12 years old certainly would not be considered very pertinent to the current level of knowledge and understanding.

We recommend that Staff seriously reevaluate their approach to information sources and consultation during the preparation of the new DEIS for these projects.

STATUS/FEASIBILITY OF AGENCY/TRIBAL FISH RESTORATION PLANS AND GOALS

PIN-8 Staff has demonstrated questionable conceptual understanding with regard to resource agency and Tribal plans and goals for anadromous fish restoration in the Penobscot River. The DEIS is pessimistic regarding the feasibility of these goals, and makes a number of crucial decisions based on the absolute numbers of these goals as contemplated <u>today</u>. We point out later that Staff used the wrong alewife numerical goal, thus the findings in this DEIS in terms of the feasibility of achievement of restoration for alewife are in error.

However, for the other species where a specific number of fish is contemplated within a plan, we do not think evaluation of alternatives against these absolute numbers is very appropriate. Numerical goals are simply best estimates based on the current state of knowledge, but they are neither exact nor static; instead they are dynamic, and are routinely updated as the programs progress. We see little difference in fisheries restoration goals and plans, and the economic or energy forecasts which FERC deals with routinely. Neither is cast in stone; both are regularly updated and adjusted based on the most current level of knowledge and understanding.

Staff is also highly critical of the lack of active shad and alewife restoration on the part of DMR, and is pessimistic about the development of any significant future active efforts. Staff carries forward this pessimism to justify discounting the realistic future of these restorations. This is inappropriate. A perfect example is the new Cooperative Agreement for the planning of active shad restoration on the Penobscot, which we discuss in more detail later in our comments.

We would suggest that Staff put more time into developing a more adequate and accurate DEIS, and less time attempting to find fault in agency and Tribal plans, programs, goals and activities, which are neither within their authority to manage, nor at their discretion to manipulate.

MITIGATION

PIN-9 Staff has relied heavily on the opinions and speculations of the applicant, and the poor judgement and questionable decision-making demonstrated by the BEP during its deliberation on the water quality certification for the Basin Mills Project, in its discussions regarding mitigation. In particular, Staff has taken this approach in supporting the adoption of permanent stocking and

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PIN-8 In our NEPA analyses, we address only reasonably foreseeable future actions and employ existing conditions as our baseline for evaluation of alternatives. We are not "....attempting to find fault...." with fisheries management plans for the basin, simply attempting to extract from those plans concrete goals and objectives against which we can objectively and quantitatively assess the consequences of proceeding with each of the alternatives addressed in our analyses. We note that our recommended Alternative 4 does not conflict with any of the comprehensive plans for the Penobscot River.

PIN-9 Opinion noted.

trapping and trucking of fish as "mitigation" for the adverse site-specific and cumulative fish habitat and fish passage impacts of their proposed licensing actions and alternatives. However, in doing this, Staff has carried forward the same analytical errors, feasibility inadequacies, conceptual flaws, and inconsistencies with agency and Tribal restoration and management plans and goals, which have precluded objective resolution of this critical issue throughout this proceeding.

PIN-10 Staff's piecemeal, out-of-kind, approach to mitigation demonstrates a fundamental conceptual flaw. The DEIS fails to recognize the overriding reasons which have required the applicant and Staff to consider mitigation measures that contain, as their underlying basis, an extremely high level of human intervention. The question Staff should be asking is, why are permanent trap-and-truck and permanent stocking needed to mitigate the impacts of the Basin Mills Project on Atlantic salmon? The only possible answer is that this river is already so out of balance with respect to competing developmental and non-developmental demands, that the only out-of-kind mitigation that will permit yet another hydro development to be built essentially involves some form of permanent, intensive human intervention into the most basic life history and behavioral aspects of the Atlantic salmon. Using Staff's rationale, developers could conceivably develop every single remaining hydraulically attractive stretch on this river, and as long as they trucked migratory fish around or between strings of these developments, and permanently stocked millions of hatchery fish, this situation would apparently still be acceptable to Staff despite clear legal mandates to the contrary (e.g. Section 10(a) of FPA and ECPA amendments).

PIN-11 Staff has also misjudged the feasibility and overrated the value of many of its mitigation measures. First, Staff incorrectly states that "Currently, 600 fish per year are taken at Veazie for brood stock" (page 4-39). Without a citation, it is not possible to determine how Staff came up with this errant information. The take of broodstock over the past 7 years (1988 to 1994) has ranged from 341 to 574 and has averaged 507 (ASRSC Veazie Trap Annual Summaries). The current agency goal is for 600 broodstock, but this has not been reached for at least 7 years, even in 1990 when the total run was nearly 3,000 fish at Veazie.

PIN-12 Staff subsequently concludes that obtaining the hatchery products the applicant will need for mitigation can be easily accomplished, since it is assumed, incorrectly, that it has not been a problem getting the 600 fish per year for the agencies' and tribe's restoration program. Staff offers that private or Federal hatcheries could grow the fish from additional broodstock taken from the river. Beyond the questionable feasibility of obtaining this rearing space, somehow, Staff fails to recognize that such an approach is counterproductive. Staff is proposing the take of additional broodstock from the stock under restoration to compensate for adverse impacts to that very same stock. The realistic value of this mitigative approach, even if permanent stocking were otherwise acceptable, is essentially zero.

PIN-13 Trap-and-truck will never be implemented by the resource managers to any level close to that which Staff contemplates in its discussions on this measure. There are critical biological, logistical, social, and legal issues which the Staff has failed consider in determining the feasibility and realistic value of permanent trap-and-truck mitigation. In addition to the example

PIN-10 NMFS and DOI Section 18 prescriptions for upstream and downstream fish passage facilities incorporated into Alternatives 3 and 4, as appropriate, constitute significant steps toward reducing past and present impacts of the three hydroelectric projects evaluated in the Lower Penobscot River Basin DEIS on anadromous fish. These measures include: new downstream passage facilities at all developments that would reduce current downstream mortality rates; new upstream passage facilities at Orono and Stillwater dams, where passage has not been possible to date; and, improved passage facilities at Veazie and Milford that would increase upstream passage efficiency for all species. The additional mitigation measures we have incorporated into Alternative 3 (trap-and-truck from Veazie and stocking of salmon fry) completely mitigate for the new impacts to Atlantic salmon attributable to the new Basin Mills dam. We incorporated into Alternative 4 trap-and-truck to contribute to agency anadromous fish restoration programs. Taken together, these measures would result in a reduction of existing and potential impacts to anadromous fish stocks in the Penobscot River.

PIN-11 We have corrected the FEIS text to specify the number of brood fish taken each year at the Veazie collection facility in recent years and to indicate that the 600 fish mentioned in the DEIS text is the goal of the program, to be achieved if the stock is fully-restored. We have also revised the text to reflect the uncertainty associated with brood fish availability.

PIN-12 As indicated in Section 4.3.3.2, BHE project costs include funds for construction of hatchery capacity required to meet mitigation objectives, in the event the required hatchery capacity would not be available from other sources. Our assessment of the availability of brood stock is based on the FWS projections of salmon stock growth discussed in Section 4.3.3.1. Recent returns to the Penobscot River have been substantially lower than FWS projections (see our revised Figure 3-8 that presents the most recent data on total returns). The intention of this measure is to ensure that BHE would compensate for the unavoidable impacts that the new Basin Mills project would

PIN-12 Cont'd cause. Because responsibility for the salmon restoration effort would remain with the agencies having fisheries management authority, it would be left to these agencies to decide the extent to which they would utilize the hatchery resources that BHE would be required to make available and the number of brook stock to be taken.

PIN-13 FERC cannot dictate to fisheries management agencies measures to be taken in restoration activities. We are obligated to make findings that license conditions would adequately protect the resource involved. Our recommended Alternative 4 includes a requirement that the applicant provide the resources necessary to implement measures for protection, mitigation, and enhancement of anadromous fish populations. Whether the agencies avail themselves of those resources would be their own choice.

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PIN-13 Cont'd of the legal and social issues related to the violation of Tribal sustenance fishing rights, as described earlier, one particularly critical example of a biological issue regarding trap-and-truck that is not addressed, is the inherent and integral conflict between proposed trap-and-truck mitigation and the water temperature impacts we discuss in detail in an upcoming section. We believe that Staff's conclusion that "there are no insurmountable biological (genetic) or logistical obstacles to implementing either of BHE's proposed mitigation alternatives" (page 4-39) is flawed.

PIN-14 In contrast to Staff's piecemeal, out-of-kind approach to the most significant mitigation issues in this proceeding, dam removal mitigates the same impacts as stocking and trap-and-truck, plus innumerable others, but in a much more comprehensive, balanced, and benign way with respect to the life history of the impacted resources. Properly selected dam removal allows nature, rather than man, to provide for the critical life history aspects and long term rehabilitation and viability of the resources, by restoring natural process and function. It removes any uncertainty as to whether all passage or habitat impacts are addressed and precludes the need for long term post licensing study to determine its effectiveness. Unfortunately, as we discuss below, Staff's misguided approach to the "Dam Removal Study", presented as Appendix D of this DEIS, precluded the development of a objective and useful assessment of this option as mitigation.

DAM REMOVAL STUDY

PIN-15 First of all, we note on page 4-57 and elsewhere in the DEIS that Staff concludes that dam removal as mitigation for Basin Mills is "not the most...desirable means of accomplishing that objective" (mitigation). We take strong exception to this statement, since it clearly represents only the opinion of the Staff (and, presumably the applicant), and does take into account the clearly documented "desirability" of this mitigation strategy to all of the resource agencies and non-proponent intervenors involved in this proceeding.

Approach

PIN-16 The PIN was encouraged when it read in Scoping Document 2 that Staff would be conducting a dam removal study. We believed this represented a very positive step towards solving the contentious issues of mitigation. We were, therefore, extremely disappointed when we reviewed this section of the DEIS and determined that Staff had contrived a prioritization scheme, which began with all the dams on the Penobscot, but which effectively eliminated any of those developments that would be significant in terms of providing acceptable and proper mitigation for these projects, before they ever could enter the resource benefit evaluation stage. Staff's basis for elimination of key candidate dams is purely economic, and, while we disagree with this approach in general, we would also note that Staff's economic criteria are flawed.

For example, Staff uses nameplate capacities to estimate the monetary value of lost generation resulting from removal of various dams. However, we would assert that nameplate generation capacities are in reality achieved only part of the time at the most modern facilities, because of inflows less than station capacity, and rarely if ever at the older, antiquated facilities such as

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PIN-14 We selected the fisheries enhancement and mitigation measures incorporated into our alternatives based on two objectives: to provide for fisheries enhancement relative to current conditions for existing developments (Veazie, Orono, Stillwater, and Milford-Alternatives 3 and 4); and, to completely compensate for any new unavoidable fisheries impacts attributable to the proposed new development (Basin Mills-Alternative 3). Partial trap-and-truck and fry stocking under Alternative 3 are intended to compensate only for the passage and habitat loss effects on fish stocks that remain after incorporation of state-of-the-art upstream and downstream passage facilities into the Basin Mills development and are, thus, unavoidable. We have revised Appendix D of the DEIS, where we evaluate the feasibility of in-kind mitigation (i.e., dam removal) for habitat loss attributable to construction of Basin Mills, in response to a number of comments from respondents. We still conclude that dam removal is inappropriate as mitigation for construction of a new Basin Mills dam.

PIN-15 The method of analysis we used in our dam removal analyses is a decision model that mixes a "goal satisfying" constraint with a cost minimization goal. The necessary goal satisfying constraint is that mitigation benefits must be at least equal in magnitude to the unavoidable impacts caused by the construction of Basin Mills. In our analysis, there is no upper limit on mitigation cost. However, since it is the Commission's responsibility to balance public interests, we seek fishery mitigation measures that at least fully compensate for the projected adverse impacts and that impose the least cost on other public interests. Our analyses demonstrate that the mitigation measures we incorporated into Alternative 3 (trap-and-truck and stocking) meet those objectives while dam removal does not. We have revised the presentation of our dam removal analysis in Appendix D to clarify our discussions of the technical points and issues you raise.

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PIN-16 Cont'd

Great Works or Stillwater, because of less than optimum generating efficiency in addition to inflow limitations.

Staff's approach to this economic analysis, and the failure to consider the value of environmental benefits associated with various dam removal scenarios up front (i.e. with all candidates on the table), seriously compromises the value and utility of this section of the DEIS. At the very least, when Staff prepares the new DEIS on these projects, it should include more realistic economic criteria and evaluation process for Penobscot River dams, and should present the quantity and value of all environmental benefits associated with each possible removal scenario, including combination scenarios involving two or more dams, at least one of which is a lower mainstem dam.

Treatment of Stillwater Branch Dam Removal

PIN-17

We disagree strongly with Staff's undocumented assumption that conditions at the Stillwater project area would be similar to those observed in the Orono Project area during the Orono drawdown study conducted by the applicant, during the State-level permitting of the Basin Mills Project (page D-6). Since the full drawdown goal at the Orono facility was never achieved, due to the presence of natural ledge outcroppings above the Orono Dam which kept the water from being drawn down any further, the situation at Orono is probably more unique than typical. Certainly it would seem unwise to equate the findings at Orono to what might be at Stillwater without even a basic level of investigation of the Stillwater project site.

PIN-18

Staff further attempts to discount the potential upstream fish passage value of removing Stillwater by stating that there is no basis for determining the proportion of adult salmon would use this channel for migration (page D-6). Staff further argues that most fish would pass upstream along the Penobscot (mainstem) because most flow is there (depending on how one defines "most", this could be a valid assessment), and then, incredibly, continues by concluding that removal of Orono or Stillwater would not benefit upstream migration at all. Finally, Staff then implicitly includes this assumption (no upstream benefit) in their analysis.

This assessment is appalling. We would agree that specific information as to what percentage of fish might use the Stillwater channel for migration is not readily available (chiefly because the applicant has never been required by FERC to install fish passage at Orono or Stillwater, thus, there has been no opportunity for direct study). However, we believe that it is reasonable, lacking such specific information, to postulate, at least for the purposes of providing a more realistic assessment of the potential upstream passage value of removing Stillwater (with removal or fish passage at Orono), that the "competitive flow" theory applied by Staff its downstream passage assessments for the Stillwater Branch projects could be used to estimate the potential usage of this channel. In addition, the applicant's radio telemetry studies clearly show attraction to the inflow from the Stillwater Branch, so, even if the competitive flow theory is not valid for upstream migrants, certainly the radio tag studies indicate that usage would be greater than the zero value assumed by Staff.

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PIN-16 See our response PIN-15, above. We have revised Appendix D and eliminated the economic screen (step 6) from our analyses. However, we retain economics as a basis for establishing the merits of various dam removal scenarios, comparing their cost and anadromous fisheries benefits to those of BHE's proposed mitigation measures. We also note that removal of an existing dam may have extensive negative impact on a large number of non-fisheries resources (e.g., socioeconomics, recreational opportunities, wildlife, and wetlands habitats) that we have not addressed in our analyses. Our intention in Appendix D is to consider only the feasibility of dam removal and not its potential overall impact.

PIN-17 Our consideration of Stillwater Dam removal was very preliminary in nature, done only within the context of our overview of the feasibility of dam removal, in general, as mitigation for construction of the Basin Mills development. The preliminary nature of our feasibility assessment did not warrant the acquisition of detailed, site specific data, thus our use of assumptions in evaluation of Stillwater. We have revised the text in Appendix D to indicate the uncertainties associated with our assumptions.

PIN-18 We made a number of simplifying assumptions in assessing the potential benefits to salmon of removal of Stillwater Dam in Appendix D. We have revised our discussion of the potential benefits of Stillwater Dam removal with regard to benefits to upstream passage in response to your comments. We have also made ASAL model runs consistent with our revised discussion of potential salmon benefits. Our results are presented in the revised Appendix D.

PIN-19 Along these lines, we would point out that archaeological evidence produced by Dr. David Sanger, a contract archaeologist for the applicant, verifies the historical presence of American shad in the Stillwater Branch (Phase II Report on the Archaeology of the Milford Reservoir, December, 1988). Furthermore, the September 26, 1820 entry in Joseph Treat's Journal and Plans of Survey (his survey of the Penobscot River under contract with the State of Maine) refers to the falls at the present day Orono Dam as "a good place for taking fish". This strongly suggests that the Stillwater Branch historically was a conduit for anadromous fish migration.

TECHNICAL COMMENTS

ATLANTIC SALMON IMPACT ANALYSES

PIN-20 In the comments that follow, we have addressed two major analytical flaws (ASAL and temperature impact analysis), and we also point out a few other significant deficiencies in concept or analysis regarding Atlantic salmon impacts in this DEIS. However, because of the inherent complexity of these issues and the fact that, as we have noted in other sections of our comments, errors at the fundamental level are rapidly compounded and incorporated into the more detailed levels of the resource impact assessments, it is virtually impossible to identify each and every instance of error, misjudgment, or analytical shortcoming that is present in the extensive sections of this DEIS that deal with Atlantic salmon. Since the underlying basis for many of Staff's findings and conclusions in these sections is flawed, it makes little sense for us to spend our time identifying each of them individually.

Status of Atlantic Salmon Populations in the Penobscot River

PIN-21 On page 3-22, the DEIS states "Natural reproduction of Atlantic salmon in the Penobscot drainage is very limited", citing Baum (1993). As we pointed out earlier, while this reference is suitable for general resource descriptive information, it is outdated in terms of assessing the current status of the population in the Penobscot. More recent ASRSC electrofishing data, particularly that for representative smaller tributaries throughout the drainage, clearly indicate that many of these waters support abundant natural populations of juveniles. Annual data from the West Enfield fishway counting window, and the Weldon Dam fishway trap located about 7 miles below the confluence of the East and West branches, also indicate that at least some adults are reaching the East Branch and Mattawamkeag subdrainages each year. Since there is little in terms of spawning or nursery habitat limitations once fish reach these subdrainages, it can be assumed with some confidence that these fish are completing their life cycle and producing annual wild cohorts of juveniles to grow in these waters.

We would add that our own electrofishing investigations on the Mattamiscontis Stream subdrainage (the PIN owns and manages trust land in this area), which enters the river from the west about 5 miles south of the town of Lincoln, and which, in our opinion is only moderate in quality relative to spawning and juvenile nursery habitat, has been used every year between 1988 and 1992 by adult salmon (redd counts) and has supported abundant, multiple cohort, juvenile populations (all wild) every year from 1988 to 1993. Late in 1993, a large beaver dam was built

PIN-19 We have revised the text to include this historical information.

PIN-20 No response required.

PIN-21 We obtained the data you cite in your comments, either directly from you or from sources you identified. We have revised the text to incorporate this new data and information into our discussion of natural reproduction of salmon in the Penobscot River basin.

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PIN-21 Cont'd

and precluded salmon from reaching the middle portions of the drainage where our sampling index section is located. Therefore, 1993 spawning would have been limited to the area well below our redd count index sites (we did not check other sites downstream), and 1994 juvenile populations were represented by only one cohort.

In summary, we believe current data indicates that natural reproduction in the Penobscot is significantly greater than the DEIS characterizes in its citation of Baum (1983). We recommend obtaining up to date records of pertinence to the true status of salmon in this river from the ASRSC (and we would be willing to submit our information on Mattamiscontis if Staff wishes), prior to preparing the new DEIS for these projects.

ASAL Modelling

PIN-22

The PIN has consulted with USFWS regarding Staff's application of the Service's ASAL model in the DEIS. We understand from that consultation that the ASAL model has been inappropriately applied in the DEIS, and that many of these instances are significant in relation to Staff's findings and conclusions with respect to Atlantic salmon restoration under the licensing action alternatives investigated by Staff. Based on our understanding of the purpose and application of the model, as one of the participants in the initial working group modelling efforts, and our review of the pertinent sections of the DEIS, we would concur with USFWS's contention.

We believe that Staff's misapplication of this model resulted primarily from a serious error in judgement, namely, the failure to consult with USFWS during their ASAL analyses. This occurred despite USFWS's sincere request, during the EIS scoping meetings and comment process in July and August of 1993, that they be included as a cooperating agency in the development of the DEIS, not only in terms of ASAL, but also regarding other critical resource issues for which they have both responsibility and expertise. Staff chose not to include USFWS as a cooperating agency, and, furthermore, not to consult with USFWS specifically regarding ASAL during development of this DEIS. We recognize the restrictions on ex parte communications, however, many of the problems that Staff experienced in working with the model, and many of the misapplications that occurred, could have been prevented without requiring project-specific discussions, had Staff conducted the proper consultation.

PIN-23

The PIN realized early in the consultation process that the application of ASAL could become a highly contentious issue, even when it really shouldn't be. Assuming that the model is used solely for what it was designed to do, namely, to predict the relative impact of new hydroelectric development on Atlantic salmon populations, it can play a valuable role in this proceeding. However, it is only a model, and thus its application and usefulness is limited by the accuracy of the input parameters and the comprehensiveness of those impacts to the population which are the functional variables in the model.

PIN-24

A major conceptual flaw by Staff in its application of ASAL is the reliance on the absolute numerical values of restoration probability, rather than on the difference in probability among

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PIN-22 Cooperative ASAL modeling effort with FWS was not appropriate considering the divergent positions assumed by the parties to this process. We disagree with your characterization of our modeling efforts as a "misapplication" of the ASAL model. We note that NMFS' review of our ASAL model application, authored by the model developer, Dr. Paul Rago, states (pg. 1 of Attachment C to NMFS DEIS comments) that " The applicant [he is referring to the authors of the DEIS] appears to have done a good job of implementing the ASAL model and no technical errors were apparent."

PIN-23 We disagree with your statement that "...the model [should be] ... used solely for what it was designed to do, namely, to predict the relative impact of new hydroelectric development on Atlantic salmon populations...." We note that Dr. Rago, the author of the ASAL model, states (NMFS' DEIS comment letter, Attachment C, pg. 4) that "As a strategic model ASAL can be used to evaluate long term prospects for restoration with respect to variation in underlying rates e.g., upstream downstream, marine survival etc. and to assess changes of viable population in future...." This is exactly the manner in which we have applied the ASAL model in our analyses.

PIN-24 In our presentation of the output of our ASAL model runs (in particular in Sections 4.3.3.1 and 4.3.3.2, and Appendix E), we present five model outputs that can be used to evaluate the potential consequences to salmon of each alternative evaluated: probability of a fully restored run size being present 50 years after licensing, numbers of lost smolts and adults, expected run size 50 years after licensing, and the year a fully restored run size would be reached. All these parameters are presented in the DEIS and all are discussed at one point or another. We have not ignored the differences between alternatives in probability of a fully restored run size being present 50 years after licensing; we have simply not selected that single model output as the sole basis for our evaluation. We have included text in the FEIS to acknowledge the uncertainty associated with ASAL model outputs.

PIN-24 Cont'd

modelled scenarios. Relying on the absolute value of probability as a decision-making criterion includes the overriding assumption that the model comprehensively addresses every single possible impact to the population, and that it accurately accounts for both random and directed changes in each of those impacts, for as far into the future as one attempts to run the model. The model does not even begin to approach this level of sophistication, and it was never designed to. In contrast, if the absolute value of a modelling output probability is essentially ignored, and the relative difference in probabilities among scenarios is the primary decision-making criterion sought, then it matters much less how comprehensively the impacts to the resource are included in the model, or how accurately the user can predict changes in those impacts into the distant future.

At this point, we would defer to USFWS for additional detailed comments on these issues, because they are the most capable entity in terms of comprehensively reviewing this issue. However, we are certain that Staff's misapplication of the ASAL model, and the subsequent adoption of model outputs resulting from this misapplication as the underlying basis for Staff's crucial decisions regarding the feasibility of numerical and time frame goals for agency and tribal salmon restoration plans under different licensing/removal scenarios, has severely and irreparably compromised Staff's conclusions regarding the future of salmon restoration under the licensing alternatives evaluated in the DEIS.

Water Temperature Impact Analysis

PIN-25

The 1993 water temperature data that the PIN submitted is identified and displayed in Section 3.3.2.2, and Staff's "analysis" is presented in Section 4.2.2.2..

While Staff correctly identifies, on page 4-14 of the DEIS, the scientific basis for how the impoundment of water can cause changes in water temperature regimes, staff's subsequent analysis of site-specific and cumulative impacts of existing and proposed lower river impoundments, on lower river water temperatures, is flawed, as described below. Staff's errors are then compounded, in Sections 4.2.3 through 4.2.6, because Staff chose to ignore water temperature impacts in its "findings" on Water Quality, subsequent to its initial incorrect conclusion of statistical insignificance. Staff's errors are further compounded, and in a much more critical way, in Appendix F (pages F-33 to F-35). This is because, as Staff notes throughout the fisheries assessment portions of the DEIS, the detailed discussion of development-specific fisheries impacts in Appendix F forms the underlying basis from which Staff draws all of its significant findings and conclusions, and formulates its analysis of alternatives, regarding fisheries issues. Furthermore, and presumably due to initial analytical errors, the DEIS fails to follow up and provide the cumulative water temperature impact analysis and temperature modelling that PIN requested in its August 26, 1993 comments on Scoping Document 1 for this DEIS, and which Staff agreed would be done in Section 6.3.2 (page 40) of Scoping Document 2 for this project. The ramifications of these compounded shortfalls are discussed in more detail below.

PIN-24 Cont'd We maintain that the fisheries mitigation incorporated into Alternative 3 results in ASAL model probabilities very similar to but somewhat higher than probabilities calculated for the No-action alternative.

PIN-25 We have re-evaluated the temperature data provided by PIN and the comments from EPA, PIN, and others on the statistical analysis performed on the data. Section 4.2.2.2 has been revised to include the new analyses, and our evaluation of possible temperature impacts on fish.

PIN-25
Cont'd

In response to Staff's "analysis" presented in Section 4.2.2.2, the PIN attempted to determine the basis, during the December 13, 1994 public meeting held by FERC in Bangor, Maine on this DEIS, for Staff's selection of an "unpaired t-test" for analyzing the 1993 water temperature data submitted to FERC by PIN in December of 1993 (see page 55, line 24 through page 56, line 18 of the official meeting transcript). The PIN also inquired as to whether the data had been tested for normality, a critical aspect in terms of selecting appropriate statistical analyses. Staff's consultants represented at the meeting could provide no insight as to how these data were analyzed or why this statistical test was selected. Because of the restrictions on communication between intervenors and Staff or its consultants, we were forced to look elsewhere for answers to these questions.

To this end, we consulted with EPA water quality and statistical experts, and with a professor of statistics at the University of Maine. EPA tested the 1993 data for normality and found that it was not normally distributed. Consultation with the University expert confirmed that the data were not normally distributed and that parametric tests, particularly those that depend heavily on the data being normally distributed (such as an unpaired t-test), were not appropriate for these data. EPA tested the hourly data for the three sites using a non-parametric Kruskal-Wallis Test, which our University expert confirmed was the most appropriate test for determining whether differences in temperature among sites were statistically significant. The results indicated that the differences among the three sites were significant to the 0.0001 level (i.e. there is less than one chance in ten thousand that the differences among sites are due to random variation), and that temperatures at Freese Island (free-flowing site above Milford impoundment) were significantly lower than those at Milford Dam which were significantly lower than those at Great Works Dam. Thus, statistically significant site-specific and cumulative impacts are clearly indicated.

Because Staff conducted an improper initial analysis, failed to follow up by examining its statistical procedures and the underlying assumptions of those procedures, carried forward their erroneous findings into their detailed fisheries impact assessment, and failed to conduct the cumulative impact analysis or modelling requested by PIN, Staff has severely compromised the integrity of the entire Atlantic salmon impact assessment. The particular failure to conduct cumulative impact analysis on water temperature, even though Staff admits on page 4-15 that "the data do suggest the existence of a small increasing trend in temperature downstream (0.5 °C over 2 impoundments)", is a critical one. This is because, while the site-specific impact of the Basin Mills impoundment may be on the order of a 0.25 °C increase in average summer water temperature or daily minimums, the cumulative increase in average or minimum daily water temperature, due to what would become 4 consecutive impoundments from the head of the Milford Project to the Veazie Dam, can now be reasonably estimated to be about 1.0 °C at the Veazie Dam, since there would be little or no opportunity for increased (or, "normal" rates of) radiational cooling in the very small reaches between impoundments.

In contrast, without the Basin Mills impoundment, the water in the lower river has at least some opportunity for increased radiational cooling, in the 3.6 miles that are not impounded, mitigating at least partially for the temperature impacts of the two consecutive upriver impoundments, prior

PIN-25
Cont'd

PIN-25
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to river water entering the Veazie impoundment. Thus, without the Basin Mills dam, cumulative increase in average or minimum daily temperature due to existing conditions in the lower river would be expected to be about 0.25 °C at the Veazie Dam. This differs markedly from the 1.0 °C impact at Veazie which we predict will occur if the Basin Mills impoundment is built.

This brings us to Staff's conclusion (page F-35) that "changes in temperature and DO from construction of the Basin Mills development would be small and biologically insignificant". We have clearly established that the effects of lower river impoundments on summer water temperatures are both significant and additive. Taken together with the commonly accepted notion that lower river summer water temperatures are already routinely stressful (as confirmed by the applicant in its reports on radio telemetry studies of adults in the river below Veazie), and at least occasionally lethal to adult salmon (as confirmed by ASRSC records showing regular, and occasionally large scale (e.g. 1988) mortalities at the Veazie trap attributable to water temperature), we are puzzled by Staff's conclusion that temperature impacts of the Basin Mills development would be biologically insignificant.

In its next DEIS for this project, staff should keep in mind that, when PIN questioned the Staff's consultants regarding the definition, and flexibility of application, of the term "biologically insignificant", during the December 13 public meeting on the DEIS (see page 56, line 19 through page 59, line 11 of the meeting transcripts), the consultant's Project Manager implied that biological significance is a relative term, with flexibility depending on the situation in question, and in relation to water temperature, stated that "the closer you get to the maximum value, it certainly would become more important". We cannot imagine a situation that would better reflect the need for a conservative approach to "biological significance" than the situation represented by the existing water temperatures in the lower river, with the added potential for an 0.75 °C increase at Veazie due solely to Basin Mills, in relation to Atlantic salmon restoration efforts.

There are additional problems with Staff's characterization of the temperature issue in relation to adult Atlantic salmon migration and survival. Specifically, on page F-34, Staff states that "most of the salmon run occurs during June and July, whereas maximum temperatures and lowest DO values normally occur late during summer and early fall". Because our 1993 data set did not begin until July 22, because BHE's data is much too spotty in terms of frequency to draw such a conclusion, and because we see no other data in Figures 3-3 through 3-5 that would support this statement, we strongly question the basis for this contention. ASRSC temperature data for 1993 at the Veazie fishway indicates that the highest temperatures for the entire summer occurred between July 6 and July 19, prior to our data set, and well within Staff's assumed window of June and July for "most of the salmon runs". Similarly, 1994 ASRSC temperature data at Veazie showed the highest temperatures occurring between July 14, when they began taking records, and August 6. While this pattern may not be consistent every year, our experience and available data sources indicate that Staff's statement regarding the overlap of migration and temperature, characterized as a general conclusion, is incorrect.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-25 Cont'd Furthermore, Staff has failed to identify the distinct possibility that what is assumed as the timing of migration "by free choice of the fish" is actually a manifestation of instinctive avoidance by adult salmon already in the lower river but deterred from moving upstream through Veazie because of unsuitable water temperatures. Concurrent Veazie trap data for 1993 shows that, immediately prior to, and immediately after, the period of warmest water temperatures, which occurred, as indicated above, between July 6 and July 19, daily catch at the Veazie trap averaged about 30 salmon. However, during the two-week period of warmest temperatures in mid-July, daily catch was at or near zero. This indicates an almost certainty that salmon migration was delayed in 1993 because of existing water temperature conditions, and lends strong support to the distinct possibility that adult salmon migration has been delayed to some extent each year in the lower river due to adverse water temperature conditions, and that adult salmon are routinely experiencing undue stress, and possibly direct mortality, before they ever reach Veazie, with at best only a small likelihood of detection. The applicant's adult salmon radio telemetry studies confirm that significant migrational delays due to temperature conditions occurred at Veazie during their studies, and are probably continuing to occur on a regular basis, under existing conditions. The additional cumulative impact of the Basin Mills development on lower river temperatures can only exacerbate this situation, shortening the available migratory time window even further, and subjecting salmon below Veazie to even higher temperatures and for even longer periods than occurs under existing conditions, again with any sublethal or lethal impacts below Veazie essentially going undetected.

Definition, Value, Use and Function of Specific Habitats for Salmon

PIN-26 Staff discounts the value of the free-flowing habitat reach at Basin Mills towards juvenile salmon production and adult resting and holding needs. Staff bases its contention on the assumption that, because either juveniles, or adults exhibiting resting and holding behavior, are not currently in high abundance in this reach (but, certainly are present in significant numbers), that the future value of this reach is low for these purposes. This is a short-sighted approach.

Regarding resting and holding habitat, Staff fails to recognize that there have been many fewer adults available in the river above Veazie in recent years than what will be the case as restoration advances. We believe that the applicant's radio tag studies show extensive use of this reach by the few salmon that are available to use it under existing conditions, including those that ultimately travel far upstream once they have left this area (contradicting Staff's contention that resting and holding habitat is almost always right near the ultimate spawning grounds).

PIN-27 Regarding juvenile nursery habitat, the same logic holds. It has been well documented that in rivers undergoing salmon restoration, very often the building juvenile populations first use the highest quality nursery habitat available close to where they were spawned. As these habitats become filled, additional fish spread down tributaries and begin to inhabit mainstem sites. This is exactly what we expect will happen in the Basin Mills reach assuming the Basin Mills impoundment is not built, which would cause all of the habitat in this reach to become unsuitable for juvenile salmon production. We would therefore ask Staff where it contemplates that the juvenile salmon produced in the lower mainstem and its tributaries will reside and be able to survive, grow, and contribute to the overall smolt population of the Penobscot River, if Basin

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PIN-26 Our analysis of potential impacts to salmon does not discount the value of the free-flowing habitat reach at Basin Mills. All ASAL model runs addressing scenarios under which Basin Mills dam was assumed constructed account for loss of potential salmon production from the inundated habitat (see Appendix E), with the smolt production estimates based on ASRSC assessments of habitat quality and quantity (Dube 1987). Our discussion simply summarizes all data that have been entered into the record to characterize the current usage of this habitat by salmon. Regarding resting and holding habitat, the radio tracking study data that we discuss shows that nearly all of the tracked fish move rapidly through the Basin Mills area, with the only exceptions being fish that held in the Orono tailrace. While the number of tracked fish was not large, those data offer no support for your contention that the area experiences "...extensive use," except as the only route for moving from Veazie to upstream spawning areas. We have corrected our statement that resting and holding habitat is "...almost always right near the ultimate spawning grounds" to reflect that it applies only to holding habitat (Frenette et al 1972, see Section 3.4.1.2)

PIN-27 In Appendix F, Section II, under physical habitat modification, we indicate that because of the loss of nursery habitat, we assume that, with Basin Mills dam constructed, that segment of the Penobscot River would not contribute to smolt production in the river basin (see Table D-6 for production estimates and sources). This loss of production is the basis for recommending stocking as mitigation under Alternative 3.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

Mills Dam is built?

PIN-28 Staff should reevaluate its approach to the salmon habitat values in the Basin Mills reach when the new DEIS is prepared, and should consider the long term value (i.e. the life of the license, at least) of preserving free-flowing lower river habitats to provide for local and specialized habitat needs of this species.

PIN-29 Lastly, we believe that Staff has confused resting and holding habitat with "fishing lies". While there is perhaps some overlap, resting and holding habitat is just that, an area of the river with proper depths and velocities and other characteristics which allow migrating fish to recover from the rigors of their journey from the sea and up the river. In contrast, fishing lies are more equivalent to a type of cover than a broad habitat type. While a migrating fish may use a "fishing lie" to rest and hold, not all resting and holding areas would necessarily be considered suitable fishing lies. Staff should further investigate these difference in the literature, or through agency consultation, and include clarification in the new DEIS.

Unidentified/Unquantified Impacts

PIN-30 In addition to omitting water temperature impacts, the assessments of development-specific and cumulative impacts presented in the DEIS for Atlantic salmon fail to identify and incorporate predation impacts on juveniles and smolt. Cormorants are well known for their annual raids on migrating smolt in the Penobscot, and, as a recently completed University of Maine study clearly indicates, the presence of dams greatly exacerbate this impact, because they delay smolt passage and concentrate both predators and prey into relatively small areas of river (i.e. the turbine forebays). Dams also cause smolt that do pass through turbines to be more susceptible to predation in the tailraces because of injury of disorientation.

In addition, bass and pickerel, which are abundant in the mainstem and larger tributaries, prey on smolt. Staff is proposing to enhance bass and pickerel habitat by allowing the construction of the Basin Mills Dam. This will not only increase cormorant predation on smolts, but also likely facilitate the ease at which these other predators can pick off the smolts, by converting relatively steep, rugged, riffle/run habitat to impoundment.

The new DEIS for these projects must include evaluation of these impacts in relation to the licensing action alternatives considered.

AMERICAN SHAD AND ALEWIFE IMPACT ANALYSES

American Shad

Occurrence of American Shad in the Penobscot River

PIN-31 Staff discounts DMR's assessment of the probable size of the shad population in the Penobscot River below Veazie. In fact, Staff implies that it doubts that there are any shad at all remaining

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PIN-28 Staff accounted for the salmon habitat value in the Basin Mills reach in the ASAL modeling used to evaluate project effects on salmon. As is documented in Appendix E, our modeling assumed that there would be no future production of salmon in the habitat inundated by the Basin Mills project. That loss is compensated for through the mitigation measures included in Alternative 3. Such mitigation is not required under our recommended Alternative 4.

PIN-29 Our discussions of fishing lies and resting/holding habitats reflects the non-scientific character of "lies" (see BHE 1990h, Appendix D). We regard resting and holding areas as habitat types, and "lies" as resting or holding areas that offer recreational salmon fishing opportunity, thus our statement that "Lies cannot exist without resting or holding areas..." (pg. F-30); we did not state the converse. We are not aware of any additional literature on this topic and conclude that our statements are correct as presented.

PIN-30 We obtained the studies which you reference and have incorporated their findings into Section 3 (Affected Environment) and Section 4 (Environmental Impacts).

PIN-31 We have sought additional information on the presence of American shad in the Penobscot River from the sources you identify and have revised our discussion in the FEIS to incorporate these additional findings. However, in our search for additional information, we did not find any data suggesting that American shad have been taken in the Veazie fish trap over at least the last decade.

PIN-31 Cont'd

in the lower river. Staff has erred here by failing to conduct even the most basic level of follow up in an effort to obtain more definitive information, such as consulting with at least one group with hands-on experience, the salmon anglers. The PIN made a single phone call to a prominent member of one of the salmon clubs and asked if that person could poll some of the more avid salmon anglers in the various clubs to determine if they ever catch shad while salmon fishing. Our contact reported back to us, and as we suspected, shad are likely present in much higher numbers than Staff's pessimistic outlook postulates. Three anglers who were contacted have caught at least 11 shad, from several different areas below Veazie Dam, between 1986 and 1994. This may not sound like very many, however, one must consider the significant differences in angling method (including time of day when the activity occurs) between salmon anglers (relatively large flies, quick water, rapid retrieve, dawn and dusk) and shad anglers (smaller flies, slower water, slower retrieve, tides more important than time of day, etc.). We would also point out that on the Saco River, there was little evidence of remnant shad populations in that drainage until shortly after the proper fish passage for this species was installed at the Cataract Project on that river.

While it was necessary to point out these insights, it is even more important that Staff recognize that the current level of occurrence of American shad in the Penobscot River is really not pertinent to future restoration plans or activities for this species in the Penobscot. Certainly it would be preferable to have river-specific stocks to work with, and this may indeed become possible, however, all current active State restoration programs for shad obtain their stocks from out of State. As Staff will see upon review of the Cooperative Agreement for shad restoration planning discussed in the following section of our comments, location of suitable off-site stocks is an identified objective in the document.

Status of Restoration Planning

PIN-32

The DEIS is critical of the fact that the State DMR does not currently have in place an active shad restoration plan for the Penobscot River. The DEIS is also generally pessimistic regarding the feasibility of shad restoration or the realistic possibility that active restoration efforts will occur anytime in the "reasonably foreseeable future". While the PIN finds these attitudes inappropriate, the DEIS fails to identify the likely reasons why an independent active State restoration is not in place. We would assert that the primary cause of this lacking is not a voluntary one on the part of the State, but rather is due in large part to the fact that DMR must use all of its current staff, equipment, and time resources in actively restoring shad to the Kennebec and Androscoggin rivers. We would further assert without doubt that much of this unilateral delegation of resources to these rivers is a result of having to deal with the numerous impacts of existing hydro developments on these rivers, in other words, developments and impacts that FERC itself regulates, but permits to continue.

This brings us to the point of introducing FERC to our recently completed Cooperative Agreement with USFWS, DMR, and DIFW, which lays the foundation for development of a multilateral active shad restoration plan for the Penobscot River (Attachment 1). The PIN initiated the process for developing this agreement nearly two years ago, when we realized that

PIN-32 We have revised our FEIS text to acknowledge the plans to which you refer and the Cooperative Agreement submitted with your comments.

In the Cooperative Agreement between FWS, PIN, and the State of Maine (Attachment 1), the parties agree to coordinate their programs and activities for the benefit of the Penobscot River shad stock. In the FEIS we considered the possibility that shad restoration may be implemented and we are recommending that BHE provide capability to trap shad at the new fish lift at Veazie and truck those fish to any location in the river to provide guaranteed support to shad restoration efforts not available by any other means. We are also recommending construction of upstream and downstream passage facilities at all developments addressed in the FEIS which would substantially enhance potential passage for American shad relative to potential passage under existing conditions.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-32 Cont'd

DMR would not be able to move into an active restoration on the Penobscot on its own, because of limited resources. As you can see, the agreement is finalized and has been signed by three of the four signatories. As far as we are aware, the only reason why the Commissioner of DMR has yet to sign the plan is that the State administration is in the transition process following the November, 1994 elections during which Maine elected a new Governor. While the ex-Commissioner has already left office, the new Commissioner has yet to be sworn in, although we expect that this is imminent. We recognize that this is only a planning agreement, not a restoration plan, nevertheless, we are extremely encouraged by the progress to this point and we plan to remain very proactive in our efforts to implement this agreement and begin the development of an active shad restoration plan for the Penobscot River.

Along these same lines, we would point out that, in USFWS's recently issued "gulf of Maine River Ecosystem Plan" (pertinent excerpts included as Attachment 2), Resource Priority #5 directly addresses the overall needs and planned efforts for both shad and alewives (river herring) in several large Gulf of Maine river systems, including the Penobscot. Action Strategy 1 under this resource priority specifically addresses the above agreement and the subsequent restoration planning to be undertaken on the Penobscot.

These documents now become extremely significant in relation to the proposed or possible hydro licensing action by FERC in regard to the projects in the DEIS. We expect that Staff will comprehensively incorporate these plans and address their significance into the shad and alewife discussions and impact assessments forthcoming in the new DEIS for these projects.

Alewife

PIN-33

We would initially note that the DEIS has used an errant numerical goal for alewife restoration in the Penobscot River. Despite clearly pointing this out to Staff on page 2 of our December 20, 1993 filing with FERC (PIN response to FERC AIR), this error, which has pervaded both the State and Federal licensing process, continues to be drawn forward. The 14.5 million fish "goal" that Staff cites on page 3-27 is actually the total restoration potential of the drainage given no human induced impacts to that restoration (i.e. no dams, no pollution, etc.). Under existing conditions and without Basin Mills, DMR's restoration goal is actually 6.2 million fish. Please consult with DMR, verify that this is the case, and incorporate the proper value into the alewife impact assessments for the new DEIS.

Occurrence of Alewives in the Penobscot River

PIN-34

While the DEIS correctly identifies that alewives have been recently documented in the Piscataquis and Passadumkeag tributaries of the Penobscot, Staff is incorrect in stating, on page 3-25, that none have been observed at West Enfield. The applicant's 1993 and 1994 downstream passage study reports for that facility indicate a count of 1 and 7 alewives, respectively, for these two years. We are uncertain whether this is a full count or just an incidental/partial count, and we suggest that Staff contact the applicant to verify the actual case.

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-33 The only existing published alewife management plan for the State of Maine remains Flagg (1984), the source of the 14.5 million figure. While Mr. Flagg testified during the WQC hearing that the 6.2 million figure you cite is a more realistic figure, no document has been submitted into the record that officially alters the numerical goals specified in Flagg (1984). We note, however, that the revised Section 18 prescriptions submitted by Interior in May 1997 (letter from R. Lamberston, May 20, 1997) provide for a design alewife population of 2.1 million. We have expanded the discussions of alewife restoration in the FEIS text to acknowledge the basis for the revised restoration figures that you cite.

PIN-34 We have revised the FEIS text to incorporate the new information that you identified.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-34 Cont'd

We believe that the occurrence of alewives in recent years at West Enfield and in the Piscataquis and Passadumkeag subdrainages is significant. We believe this is a very positive development with respect to the feasibility of advancing restoration of alewives even under DMR's current passive plan, providing that existing/continuing fish passage impacts to this species are properly mitigated through upcoming relicensing/decommissioning/removal actions, and assuming that additional new fish passage impacts (e.g. Basin Mills) are not permitted to occur.

PIN-35

Staff characterizes existing runs of alewife as sporadic, but fails to identify why. We believe that the adverse impacts of existing hydro development impacts on this species, in combination the cyclical nature often associated with the initial restoration of species like alewife, which exhibit multi-year life histories and robust proportions of repeat spawners, are primarily responsible for what Staff characterizes as a sporadic run. It may take a few years before the repeat spawner component manifests itself in terms of dampening the year-to-year variations as the runs otherwise build. Again, these projections depend heavily on FERC making the correct decisions regarding the mitigation of impacts to this species in its licensing actions on the projects in this proceeding, as well as others that arise in the future.

Interrelationship of Alewife and Atlantic Salmon Restoration

PIN-36

The DEIS fails to identify, or consider under impact assessments for various licensing alternatives, the value that alewife restoration has in relation to predation on Atlantic salmon smolts by cormorants, bass and pickerel. These top level predators are generalists, that is, they feed on whatever is most available. Therefore, considering the relative timing (i.e. at least some overlap) between the upstream migration of alewives and the downstream migration of smolt, and the relative numbers of each component (i.e. a few hundred thousand smolt versus several million alewives), progressive alewife restoration could be a very significant benefit to overall smolt survival rates during downstream migration. This is particularly important considering the exacerbation of smolt predation caused by the delays and other behavioral impacts associated with smolt having to pass down through multiple hydro developments to reach the sea. The new DEIS should discuss these insights with respect to the licensing alternatives considered.

AMERICAN EEL IMPACT ANALYSES

PIN-37

The site-specific and cumulative impacts of existing and proposed new hydropower development in the Penobscot River drainage are inadequately addressed in this DEIS. We recognize that there is less published information available regarding impacts of hydro development on eels compared to, for example, salmon. However, we do not agree with Staff's assertion that there are no impacts on this species under existing conditions (page 4-22: No-Action Alternative), nor do we agree with Staff's conclusion that the applicant's proposal (or, Staff's recommended alternative, which differs little from the applicant's) would not appreciably alter eel stocks in the Penobscot River. We do not agree with Staff's contention that "an incremental increase in loss of downstream migrating eels in the Penobscot is unlikely to alter the number of elvers recruited to the Penobscot River each year and, thus, to alter the size of the eel stock in the river" (page 4-49).

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PIN-35 Opinion noted.

PIN-36 Bass and pickerel are not large enough to forage on adult alewife. While cormorant predation on salmon smolts might be reduced with the presence of alewife, no literature has been submitted into the record to support your theory. Thus, we have not addressed the potential effects of alewife restoration on salmon smolt survival in our discussion.

PIN-37 We have obtained the numerous data sources you identify in your comments and have revised the FEIS text to include the new information in them. In addition, we note that Section 18 prescriptions submitted by DOI and NMFS require provision for eel passage at all developments, and we have addressed the benefits to eels of that requirement in our impact assessment discussions.

PIN-37
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We base these disagreements in large part on insight provided during two recent meetings on this subject matter. The first was held by the State DIFW with commercial eel fishers in December, 1994, and a PIN representative was in attendance. The second was a State Fisheries Division meeting held on February 1, 1995, at which a presentation was given by Dr. James McCleave, widely recognized as the eel expert in Maine.

Input from the meeting with eel fishers (Attachment 3) indicated that many felt strongly that losses of downstream migrating adults at hydro facilities on rivers in Maine were large, were more significant than most people realize, and were severely impacting their ability to capture enough eels to make a living. In fact, while the summary notes in Attachment 3 do not reflect this, we spent perhaps one third of the two hours of meeting time discussing this impact and trying to come up with ways that we could lessen it. One eel fisher who also worked for over 20 years as a hydro station operator at a facility on the Kennebec River stated that, during the height of the fall downstream migration at his dam, literally thousands of eels were chopped up in the turbines each night. The tailrace would appear saturated with blood and sliced up body parts of eels during these regular occurrences. The operator noted that these downstream migrating adults rarely showed near the surface, and that, based on his 20 plus years of observation and experience, he was fairly certain that most of them were entering the turbines from deep in the forebay, on or near the bottom. He wasn't certain if this was a typical behavior, or a behavior dictated by the unusual current patterns and upwellings in the forebay area immediately above the intakes. Given this fairly reliable and on-site source of information, we would contend that Staff's speculation that, because eels may migrate near the surface in the ocean, they may also do so in freshwater and upon encountering dams, is unsupported and highly unlikely (page 4-49), unless attraction currents are of such magnitude that the migrants are behaviorally forced to surface in order to continue downstream. Along these lines, we note in Attachment 3 that one eel weir fisher has developed an agreement with the hydro operator upstream on the tributary he fishes, wherein the operator ceases generation after dark from mid-August to mid-October, passing all inflow over the dam or down the sluiceway.

The presentation by Dr. McCleave at the second meeting was enlightening. Over a decade of detailed research on this species has led him to believe that the widely held contention that loss of adults from a given river system does not significantly impact subsequent populations in that river, is probably incorrect. Furthermore, given the serious and steady decline in eel populations and commercial catches not only in Maine but up and down the East Coast over the past 20 to 30 years, protection of adult females during freshwater migration is probably much more critical than anyone has thought in the past.

Based on this new information, and the fact that Staff failed to conduct the cumulative impact analysis on eels that the PIN requested in our August 26, 1993 comments on EIS Scoping Document 1, we feel we have demonstrated that the current level of analysis of this issue in the DEIS is inadequate, and dominated by speculation and opinion, rather than available facts. We expect a much more comprehensive assessment in Staff's next DEIS on these projects, to include the development of mitigation proposals, such as night time shutdowns during certain times of the year, that would address known or suspected adverse impacts on eel populations due to

PIN-37
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hydro project operation. We expect Staff to investigate current sources of data from DMR and elsewhere, conduct and document (i.e. include in the DEIS) an up to date literature search on this subject matter, contact eel fishers from Maine and elsewhere to obtain their perspective and input, and consult with Dr. McCleave, DMR, DIFW, USFWS and PIN in developing its assessment. We expect Staff to fully address the impacts of existing and proposed new hydro development on the populations of eels available for tribal sustenance fishing in the reservation, and the long-term sustainability and viability of that population/fishery under the licensing alternatives examined in the DEIS.

PIN-37 Cont'd

Lastly, we would point out that the statement on page 3-30, indicating that harvesters use weirs to capture adult eels in the Penobscot is misleading, because it implies, by omission, that other harvest methods do not occur or are insignificant in the Penobscot. While weirs are certainly used and take some eels, DMR statistics show that only 2% of all adult eel harvest in Maine waters is taken with weirs. The other 98% is taken primarily with pot gear placed in the estuaries of rivers. This is significant, because any impacts of downstream loss of adult eels at hydro facilities are fully manifested prior to the remaining population reaching the primary fishing grounds in the estuary. In contrast, if most eels were taken by weirs, above one or more dams, the impact on the fishable population could be incrementally less. Because of the general concern in Maine as to the non-target impacts of weirs (e.g. blockage of salmon passage during night time hours, capture and handling of non-target fish, etc.), it is unlikely that weir fisheries for eels will expand in proportion to pot fisheries anytime in the near future, thus, Staff should keep this in mind during its assessment of eel fishery impacts in the new DEIS for these projects.

BIODIVERSITY IMPACT ANALYSIS

PIN-38

Staff is correct in its characterization of the underlying scientific basis for seeking to maintain biodiversity when confronted with a decision that may adversely impact it (pages 3-45, 3-46, and 4-100). Staff correctly makes the connection between biodiversity, the maintenance of natural ecosystem process and structural diversity, and, ultimately, ecosystem health. Staff also estimates that creation of the Basin Mills impoundment would increase the total proportion of impounded mainstem river miles from 27% to 32% (page 3-46). The actual figures are higher than Staff's estimate, at 32% without Basin Mills and 36% with Basin Mills, as determined by direct measurement from the river elevation profile (Attachment 4) that PIN redrafted (for cosmetic purposes only) from an Army Corps Hydraulic Study of the Penobscot River Basin ("Penobscot River Basin Study", U. S. Army Corps of Engineers, Waltham, Mass., April, 1990).

Subsequently, in Staff's analysis of biodiversity impacts (pages 4-100 through 4-107), Staff correctly concludes that invertebrate communities, an excellent and well-recognized index of biodiversity and impacts thereto, are significantly different in impounded sections of the lower river when compared to adjacent unimpounded sections.

PIN-38 We have calculated 28 to 33% based on 74 miles and 3.6 miles. Your figures are incorrect because they include a Bangor Dam impoundment which no longer exists.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-38 Cont'd Unfortunately, staff's conceptual and analytical approach regarding biodiversity impacts and their significance in relation to proposed licensing actions deteriorates rapidly beyond this point, for the following reasons.

PIN-39 The DEIS fails to point out a key corollary indicator as to the extent of mainstem hydropower development, namely, the proportion of the mainstem river gradient that is currently impounded. As we stated in our testimony to the State BEP, 50% of the available mainstem gradient is already impounded, and Basin Mills without concurrent mainstem dam removal will increase this proportion to 62%. Furthermore, close examination of Attachment 4 indicates that, with Basin Mills and without concurrent mainstem dam removal, virtually every significant reach of high gradient (high in relative terms among the mainstem gradients represented) free-flowing habitat available in the mainstem will be impounded.

The consideration of gradient in biodiversity impact analysis is critical. As we stated in our testimony to the State BEP, the relationship between gradient and the general habitat types (pools, riffles, runs, rapids), and gross physical structure (pool size, pool, riffle and run depths, current velocity, substrates, etc.), resulting from the physical forces associated with differing river gradients is widely recognized in the scientific community and literature. If fundamental quality and quantity aspects of biodiversity are at least partly determined by gross river gradients, and we believe it would be very difficult to establish that they are not, it would follow logically that true preservation of biodiversity requires preservation of the gross physical characters which lead to that diversity, including gradient. Since the health of the riverine ecosystem depends intimately on maintaining biodiversity, as Staff implies in its initial conceptual discussion on this issue, then preservation of diversity of gradients is clearly indicated. Beyond the fact that this river, in our opinion, is already out of balance in terms of the cumulative loss of specific mainstem free-flowing gradient, Staff's recommended alternative for the licensing of these projects directly contradicts this fundamental conceptual basis.

PIN-40 Vannote et al. (1980) (Canadian Journal of Fisheries and Aquatic Sciences 37:130-137) first described this concept to the general scientific community in their paper entitled "The River Continuum Concept", and their writings essentially formed the conceptual basis for the development of biodiversity as a key issue in today's developmental impact analysis process. It has taken some years for the concept to catch on in the general science community, but it was long overdue and is here to stay. We say this with confidence because the PIN has unsurpassed experience, about 10,000 years worth, in the management and proper utilization of the natural resources within its reservation lands and waters. On a less technical, but equivalent conceptual scale, the PIN has always practiced their natural resource management and utilization activities with the holistic perspective that the entire river drainage, from headwater to tidewater, is closely intertwined, and that any activity or impact on one part or resource of the river inevitably generates numerous impacts on a diversity of other aspects of that same continuous unit (i.e. the River Continuum).

PIN-41 Unfortunately, Staff's current understanding of this concept in the DEIS is poorly demonstrated. Apparently, Staff's analytical methods for the aquatic life sampling data that the PIN submitted in our January 18, 1994 filing with FERC are also questionable. EPA has examined our data,

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-39 The FEIS has been modified to address the effect on converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in a existing mosaic of impounded and non-impounded reaches would not be affected.

PIN-40 The FEIS has been modified to better address ecosystem functioning. FERC staff contends that theories such as the River Continuum Concept cannot be validly applied to the modified river system addressed in this EIS beyond the general consideration of regional and local ecosystem functioning.

PIN-41 The FERC staff agrees that invertebrate species contribute to biodiversity and the FEIS has been modified to clarify this. The FEIS concludes that the loss of benthic communities characteristic of riffle habitats would not significantly affect biodiversity because the composition of benthos in the Basin Mills rips is the same as in other riffle sites.

COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-41 Cont'd Staff's analytical methods, and Staff's interpretation of that analysis, and will likely comment more specifically on these aspects in their comments.

PIN-42 We find little utility or pertinence towards biodiversity impact issues in Staff's conclusion that "the invertebrate communities in both the impoundments and riverine reaches are indicative of good water quality" (page 4-103). Since the PIN is in close touch with the Penobscot River ecosystem at all times, we already know that the Penobscot River has "generally good water quality", thus, we would expect nothing less given the circumstances. Similarly, Staff's statement that, "forage value of the two different invertebrate communities for many fish is not substantially different", is of marginal pertinence, at best, toward conceptually sound biodiversity impact analysis.

Instead of looking for ways to escape the real-life implications of its own conclusion that "aquatic biodiversity would be affected as a result of creating the Basin Mills impoundment" (page 4-103), Staff should demonstrate a more progressive approach, by admitting that these potential impacts are indeed highly significant in the context of these licensing decisions, and by making the tough decisions; namely, requiring the proper and in-kind mitigation for both development-specific and cumulative impacts of existing and proposed new hydropower development on the biodiversity and overall health of the Penobscot River ecosystem.

TOXICS AND FISH CONTAMINATION IMPACT ANALYSIS

PIN-43 Staff demonstrates an inadequate understanding in this DEIS with respect to issues of contamination of sediment, water and biota of the Penobscot River. As with many other areas of this DEIS, we believe that Staff's performance regarding these issues reflects a basic negligence in the preparation of this DEIS.

PIN-44 On page 3-12, the DEIS states that "additional paper mills located upstream also may use the bleached kraft process..." (emphasis added). We are surprised that Staff would choose to speculate regarding such information, rather than conduct what would amount to a very basic investigation to determine the actual case. For Staff's future information, there are four major pulp and paper mills upstream of the Veazie Dam. Two of these located in Millinocket and East Millinocket, respectively, and do not use the Kraft process on site, although they purchase Kraft-bleached pulp from elsewhere to combine with their sulfite-bleached pulp. The third and fourth are located in Lincoln and Old Town, Maine, respectively, are Kraft mills, and the discharge from these mills is responsible for much of the dioxin contamination in resident Penobscot River fish at least as far downstream as Penobscot River estuary.

PIN-45 Staff identifies only dioxin as a potential contaminant from Kraft mill discharges. Dioxin and its isomers are only one small group, among a whole range of complex chlorinated compounds, contained in Kraft mill discharges. Many have not even been isolated or identified yet, while others, such as the chlorophenol group, that are known to be present, and suspected to be potentially dangerous in terms of human consumption, have received little attention. While we would not expect Staff to discuss in detail every individual chlorinated compound that could be

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PIN-42 The FEIS has been modified to address the effect of converting the remaining free-flowing habitat within the 12-mile reach of the river to an impoundment. We conclude that this change would reduce the diversity of the local ecosystem by altering physical processes and structural diversity, but that the regional biodiversity in an existing mosaic of impounded and non-impounded reaches would not be affected.

PIN-43 Opinion noted.

PIN-44 We have revised our Affected Environment section to identify the paper mills upstream of Veazie.

PIN-45 The EIS (section 3.3.1.3) has been rewritten to include additional information on dioxin and related toxic compounds in the lower Penobscot River, as provided by various respondents including PIN and EPA. We have included information on the greater uncertainty with respect to the health risks of consuming fish from the lower river. However, we have found no evidence that construction of a new dam would change these health risks, whatever they may be. Impacts of industrial dischargers on anadromous fish is a topic outside the scope of this EIS, as these impacts are unrelated to hydropower licensing and relicensing.

FEIS section 3.3.1.3 has been revised to include information on mercury in Maine's aquatic environment. However, we have no evidence that any mercury contamination problem would be worsened by construction of the Basin Mills impoundment, a very small reservoir as compared with some of those in the Ripogenus and Penobscot Mills projects referred to by EPA, or the James Bay/Hydro Quebec Projects referred to by PIN. In addition, we found no evidence in the Ripogenus and Penobscot Mills projects that project operations had any impacts on mercury contamination or mobility in the west branch of the Penobscot River.

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present. Staff's current characterization of the issue of contamination from mill effluents implies that dioxin itself is the only concern, and this represents an inappropriate diminishment of the wide ranging contamination problems that these discharges represent, particularly to people of subsistence fishing tradition such as the Penobscot Indians (see additional discussion under items 7.a and 7.b below).

Staff contradicts itself in two consecutive sentences which comprise the last paragraph of page 3-12. In the first sentence, Staff suggests (and presumably does not offer to conclude at this point because of limited data, however, see below) that current levels of dioxin in Penobscot River fish do not present a human health risk. In the very next sentence, Staff notes the existence of a State fish consumption advisory for dioxin in resident fish. These two statements are in direct contradiction. Furthermore, Staff translates what is offered as a suggestion (and what in actually is a poorly informed opinion) on page 3-12 into a conclusion (last sentence, top paragraph page 4-16), without providing any additional data, discussion, or rationale. Staff then subsequently dismisses contaminant issues from further consideration in the DEIS, based on that erroneous conclusion. As we have pointed out in other sections of our comments, this tendency by Staff to diminish the importance of, or delete from further consideration, known or potential impacts, without sufficient justification, leads invariability to the compounding of such flaws into every relevant area of this document. In the case of unjustified diminishment or deletion of issues from consideration, this "compounding" manifests itself by a failure to include discussion of the pertinent impacts in subsequent analyses and assessments.

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Staff uses two EPA reports on dioxin contamination to establish the available data base for its evaluation of this contaminant. Not only are these reports outdated, but they represent only a small fraction of the data available on levels of dioxin in Penobscot River biota. Apparently, Staff conducted virtually no investigation into the availability of additional information on this subject, for if they had, it would have been evident that there are much more recent and more comprehensive studies of this problem in the Penobscot River. The PIN has conducted a significant portion of these studies, including multiple sites, species, and a wide range of analytes in addition to dioxin, in 1988 and again in 1993. Maine DEP has also conducted nearly annual dioxin monitoring from at least one site below each known Kraft mill discharge on the Penobscot River. None of this data was either sought or considered by Staff during its preparation of this DEIS.

Staff attempts to justify its conclusion that "current fish tissue levels of dioxin in the Penobscot do not present a human health risk" by citing Food and Drug Administration action levels (page 3-12). If Staff had conducted a minimum level of investigation, however, they would have realized that FDA criteria are designed solely to address permissible levels for commercial fisheries. FDA action levels are invariably much higher than those developed for protection of recreational, or, more importantly, subsistence, consumers of fish. Since FDA does not develop or administer contaminant action levels of consumption guidelines for non-commercial fisheries, use of their criteria to support Staff's conclusions is clearly misguided. Furthermore, while Staff also cites EPA criteria, which are more appropriate for non-commercial fisheries, Staff has used outdated EPA guidelines (cited as EPA 1992).

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In June 1994. EPA released "Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories". Using Table 3-30 of this document, and assuming an 8 oz. meal size and 1 x 10^{-6} cancer risk level, it is advised that to protect the general public from cancer no fish consumption be allowed if fish tissue levels exceed 0.2 ppt. This differs markedly from the 14 pg/g level Staff uses in the DEIS.

In addition, Staff failed to consider or even acknowledge Maine Department of Human Services' recommendations that the concentration of dioxin in fish tissue not exceed 0.15 ppt to protect average human consumers from cancer risk (1 x 10^{-6}) and 0.37 ppt to protect against adverse reproductive effects. These levels, established by the State's lead agency for protecting the health of average human consumers, are far exceeded by current levels of dioxin in fish of the lower Penobscot River. Significantly lower levels must be acheived to protect subsistence fishers such as Penobscot Indians.

EPA is presently in the process of finalizing its comprehensive reassessment of dioxin and dioxin-like compounds. The draft reassessment clearly demonstrates that dioxin is a serious public health risk, and that current background levels in the general public are at or near levels known to cause adverse or toxic effects. More highly exposed populations such as subsistence fishers may be at higher risk for non-cancer effects including developmental toxicity and reproductive effects. Although EPA's document is still in draft form, it has received extensive scientific peer review during all stages. It is highly unlikely that the scientific findings will be substantially modified; instead, changes to the document will focus on public policy decisions on how to deal with the scientific findings. Considering these abovementioned findings, it seems highly improbable that future tissue level criteria will be anywhere near the 14 pg/g value Staff cites, particularly for subsistence fishers such as the PIN.

As pointed out in the DEIS, hydroelectric projects can trap toxic substances behind dams, where they accumulate in sediments. Additionally, particulate matter bound with toxic substances can settle out of the water column and into the sediments. Staff cites an October 13, 1993 letter from DEP (Courtemanch, DEP to Zukowski, SCLDF) and incorrectly treats its content as empirical evidence that sediment, and therefore dioxin, does not accumulate behind hydroelectric dams in the lower Penobscot River. While this letter provides a plausible theory, the fact remains that no one has conducted any studies to identify or characterize sediments behind lower Penobscot River dams. Additionally, the letter specifically states that DEP "does not have any empirical data regarding the quality of sediments behind the dams on the lower Penobscot". However, rather than requesting more data, Staff instead uses this <u>lack</u> of pertinent data to draw conclusions that are neither warranted nor protective of human or natural resource health.

Lastly, the DEIS ignores at least four additional significant issues with respect to toxins and contaminants in the Penobscot River, as follows:

1. There is no discussion as to how consumption rates, and human health and welfare aspects related to the consumption of contaminated fish, differ markedly for subsistence fishers such as Penobscot Indians in comparison to the mainstream recreational angler

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that may occasionally consume fish from the river but who do not depend on that aspect for survival.

2. The DEIS fails to recognize the relationship between the existing level of contamination of resident fish, the impact that this has on the PIN's ability to utilize resident fish for subsistence, and the increased importance that the anadromous species assume, when restored, in terms of fulfilling subsistence fishery needs and rights of the PIN. This same shortcoming was identified more generally under our earlier section on tribal fishing rights.

3. The DEIS fails to address the possibility that industrial discharges, particularly those associated with kraft mills, are affecting the survival and well being of the anadromous fish that must migrate through the waters contaminated with these discharges, including the distinct possibility that viability of Atlantic salmon eggs is being affected through maternal transfer of waterborne chlorinated compounds from the migrating female to the eggs. Numerous available studies indicate that very low levels in the water can cause a reduction in egg viability or fry survival, while never manifesting themselves either in terms of direct effects on the adult organism or by accumulation in the tissue of the adult. This issue was pointed out to Staff in our August 26, 1993 comments on EIS Scoping Document 1. In addition, we pointed out at that time that there was a fairly comprehensive document put out by EPA on these subject areas. Scoping Document 2, page 41, indicates that these issues would be addressed. We see no evidence that Staff has addressed these issues at even a cursory level, and no indication that the recommended document was either obtained or reviewed.

4. The DEIS ignores the issue of mercury contamination in resident fish. That this could occur would seem unlikely, considering that many of the same consultants, including the Deputy Project Manager, are among the list of preparers for both this DEIS, and the one recently issued for the West Branch hydro project relicensings. Mercury contamination is recognized in this other DEIS as an important issue, and has also been documented elsewhere as a critical issue with respect to the inundation of terrestrial land areas due to new dam construction (e.g. James Bay/Hydro Quebec Projects). Existing data on mercury contamination in Penobscot River resident fish, while indicating that the highest concentrations occur in fish from West Branch waters, also document that levels in fish from downstream waters, including the entire mainstem, far exceed current EPA mercury contamination guidelines for unlimited consumption. In most cases, even the lowest levels found in resident fish tested preclude safe consumption of any resident fish by children or pregnant or nursing mothers. The fact that such levels already exist, and are likely to persist because of the nature of mercury deposition and its half-life in water and sediments, in combination with an activity (building a new dam at Basin Mills and flooding over 100 acres of terrestrial land) that could, at least on a local level, further exacerbate mercury contamination levels in fish, dictates that this issue be thoroughly addressed in Staff's next DEIS for these projects. In addition, as with dioxin or any other contaminant which limits the safe consumption of fish, the relationship between this

PIN-45 Cont'd

limitation, tribal sustenance fishing rights, and Staff actions which may diminish the current or future availability or quality of anadromous fish to the PIN, must be addressed in Staff's new DEIS for these projects.

SUMMARY AND CLOSING

The Lower Penobscot River DEIS has been extremely difficult to analyze because of Staff's errors in method, logic, and judgement noted in our comments. Nevertheless, we have tried to address the salient problems with the document, but this patient requires major surgery before we can recommend any fine tuning. We deliberated as to whether to recommend a supplemental DEIS, but we believe that the deficiencies in this document are too severe and that a new DEIS is required.

PIN-46

Most importantly, this DEIS as currently written reflects an anticipated breach of FERC's trust responsibility to the Penobscot Indian Nation. We cannot emphasize enough how serious we are about ensuring that the PIN's legal rights and cultural values are properly and adequately addressed in the DEIS, and protected by FERC. Casual treatment of PIN issues and an incorrect definition of our Reservation obtained from Great Northern Paper is not acceptable performance from a Federal trustee.

This concludes our comments on this DEIS. Please feel free to contact me (207-539-8219) should you have any questions.

Sincerely,

Paul Bisulca
Special Assistant to the Governor

Distribution

FERC Service List Projects #10981; #2534; #2712

PIN-46 Opinion noted.

PIN-47

ATTACHMENT 1

COOPERATIVE AGREEMENT

between

Fish and Wildlife Service
U.S. Department of the Interior

and

Penobscot Indian Nation

and

Department of Marine Resources and
Department of Inland Fisheries and Wildlife,
State of Maine

1995-2000

PIN-47 No response required.

PIN-47 Cont'd

THIS AGREEMENT, is effective on signature by all parties, hereinafter referred to as the "Signatories", by and between the U.S. Fish and Wildlife Service, hereinafter referred to as the "Service"; the Penobscot Indian Nation, hereinafter referred to as the "Nation"; the Departments of Marine Resources and Inland Fisheries and Wildlife of the State of Maine, hereinafter referred to as "DMR" and "IF&W" respectively.

WITNESSETH THAT,

WHEREAS, the formerly abundant American shad in Maine rivers has become seriously depleted through a variety of adverse circumstances, with a consequent loss of valuable fishing assets, and

WHEREAS, the Nation has approached the State of Maine and Service to assist in the restoration of American shad, to their historic range in the Penobscot River and

WHEREAS, the Congress of the United States, State of Maine and Penobscot Indian Nation have expressed an interest in and intent to maintain and increase the public opportunities for use of our fisheries resources, and

WHEREAS, the DMR and IF&W are charged with the responsibility for the management of American shad within the State of Maine, and are authorized to conduct such activities and to cooperate with other government entities such as the Nation which has statutorily identified sustenance fishing rights as defined under the Maine Indian Land Claims Settlement Act of 1980.

WHEREAS, the Service is authorized in the Fish and Wildlife Coordination Act (48 Stat. 401, as amended, 16 U.S.C. 661 et seq.) and other laws to provide assistance to and cooperate with other Federal and state agencies, and federally recognized Native American governments in the maintenance and development of fisheries resources, and

WHEREAS, the Federal government and State of Maine have respective responsibilities to cooperate with Native Americans in protecting, restoring, conserving and utilizing their reserved, treaty guaranteed, or statutorily identified trust assets, and

WHEREAS, it is the priority of the State of Maine to restore American shad to the Kennebec and Androscoggin rivers as well as other Maine rivers as resources become available, and

WHEREAS, it is the desire of the Service, the Nation, DMR and IF&W to cooperate in a program of American shad restoration in the Penobscot River.

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NOW, THEREFORE, the parties enter into this Agreement for the purpose of coordinating their individual programs and activities for the benefit of the shad fishery resources of the Penobscot River and other rivers in Maine, to provide as appropriate and feasible, technical advice, facilities, equipment, and personnel in support of investigations, research and studies, for the purpose of developing a comprehensive plan for restoring shad fishery resources; it is MUTUALLY AGREED, as follows:

ARTICLE 1. American Shad Restoration Planning

1a. The Signatories will develop an American Shad Restoration Plan (the Plan) defining program goals, objectives, implementation strategies, costs, and the respective roles and responsibilities of the Signatories. The primary focus of this Plan will be the Penobscot River, but will outline and develop strategies and resources that will benefit shad restoration programs in other Maine rivers. The Plan will address out-of-basin collection and transfers of shad adults and eggs; production, survival and habitat evaluations; restoration time frames; fish passage requirements; and required fiscal and personnel resources.

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1b. The Signatories will establish an American Shad Plan Working Group (Working Group) to compile the information required for Plan development, to get required public input, and to draft and submit Plan to the Signatories for final approval and adoption.
Each Signatory will designate a representative to the Working Group and the Working Group may solicit advice and information from sources outside the Working Group as appropriate.
Administrative support and coordination for the Working Group will be provided by the Service, through the Maine Fisheries Coordinator Office.

1c. The Plan development and content will be consistent with existing plans, policies, goals and legislative mandates for each Signatory.

1d. Formal implementation and revisions of the adopted Plan will be determined by the Signatories based upon the contents of the final Plan.

1e. The Signatories recognize that actual implementation of the adopted Plan will require new fiscal and personnel resources and the extent of any such implementation will be subject to each agency's ability to provide such resources for this purpose.

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ARTICLE 2. Sharing of Equipment and Supplies

In accordance with each agency's regulations, the Signatories agree to share, on a temporary basis, available equipment and supplies necessary to conduct activities towards the development of the Plan.

ARTICLE 3. Service Obligations to Tribes.

The Signatories recognize that the Service has obligations to Native American Indian tribes under Department of the Interior's (DOI) trust responsibilities, and that this Agreement is established in furtherance of those obligations. Accordingly, IT IS FURTHER AGREED, that in fulfilling the terms of this Agreement with respect to restoration, rehabilitation, and maintenance of American shad in Maine, Service activities will be guided by obligations to tribal needs under existing statutory requirements, internal DOI agency agreements and policies.

ARTICLE 3a. State Obligations to Tribes.

The Signatories recognize that the State of Maine has obligations to Maine tribes through the Indian Land Claims Settlement Act of 1980. IT IS FURTHER AGREED that in fulfilling the terms of this agreement the State of Maine will consider obligations to tribal needs as appropriate under existing state statutory requirements.

ARTICLE 3b. Penobscot Indian Nation Obligations to State of Maine.

The Signatories recognize that the Penobscot Indian Nation has obligations to Maine through the Indian Land Claims Settlement Act of 1980. IT IS FURTHER AGREED that in fulfilling the terms of this Agreement the Penobscot Indian Nation will consider obligations to State needs as appropriate under the Indian Land Claims Settlement Act of 1980.

ARTICLE 4. Administrative Items

4a. Appropriations. This Agreement is made by the Signatories contingent on the availability of funds for the expenditures contemplated hereunder. In case such funds as may be necessary to carry out the terms of this agreement are not available to a signatory agency, to that extent the agency is released from performance hereunder. Nothing herein contained shall be construed as binding on an agency to expend in any one fiscal year, any sum in excess of appropriations administratively allocated for the purposes of this agreement, or to involve any signatory agency in any contract or other obligation for the further expenditure of money in excess of such allocations.

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4b. Non-Discrimination. During the performance of this Agreement, the Signatories agree to not discriminate against any person because of race, color, religion, sex or national origin. The cooperators will take affirmative action to ensure that applicants are employed without regard to their race, color, religion, sex or national origin.

4c. Officials Not To Benefit. No member of or delegate to Congress, or resident Commissioner shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this Agreement if made with a corporation for its general benefit.

4d. Effective Date and Termination. This Agreement becomes effective on the date of final signature, and shall terminate December 31, 2000, unless cancelled at a prior date by any party, cancellation to occur by written notice of not less than 60 days, or is superseded by a new agreement.

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COMMENTS FROM PENOBSCOT INDIAN NATION ON LOWER PENOBSCOT RIVER BASIN DEIS

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IN WITNESS WHEREOF, the said parties hereunto subscribe their names.

Maine Department of Inland Fisheries and Wildlife

By: ______________________ 1/31/95
Commissioner, Dept. of Inland Fisheries and Wildlife of the State of Maine
Date

Maine Department of Marine Resources

By: ______________________ ______________
Commissioner, Dept. of Marine Resources of the State of Maine
Date

Penobscot Indian Nation

By: ______________________ 1/31/95
Director, Dept. of Natural Resources of the Penobscot Indian Nation
Date

United States Fish and Wildlife Service

By: ______________________ 2-7-95
Regional Director, Northeast Region
U.S. Fish and Wildlife Service
Date

RESPONSES TO PENOBSCOT INDIAN NATION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

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ATTACHMENT 2

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GULF OF MAINE RIVERS ECOSYSTEM PLAN

INITIAL RESOURCE PRIORITIES, ACTION STRATEGIES AND BUDGETS

SEPTEMBER 1994

U.S. Fish & Wildlife Service
Region 5

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[illegible] #5: Rebuild American shad and river herring populations in the following rivers: Merrimack, Saco, Kennebec/Androscoggin, Penobscot, and Saint Croix.

Action Strategy: 1) Initiate and complete planning for restoration of American shad to the Penobscot River by 12/29/96.

Action Item: 1a) Develop final cooperative agreement with the Penobscot Indian Nation, Maine Inland Fish and Wildlife and Maine Department of Marine Resources.

Field Stations	Potential Partners
*MFO (lead)	NAG
GLNFH	State Agencies

Action Item: 1b) Develop shad restoration plan for the Penobscot River.

Field Stations		Potential Partners	
*MFO (lead)	NEFC	NAG	NMFS
GLNFH	SRC	State Agencies	
LOFA	CNEC	Utilities	ASMFC
MEFO		Other Federal Agencies	

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Action Strategy: 2) Develop methods to trap and transport adult shad from the Lower Merrimack River to facilitate inter/intra-basin transfer by 7/30/96.

Action Item: 2a) Locate access sites on the Lower Merrimack River and determine efficiency of commercially available capture and transport equipment.

Field Stations		Potential Partners
*LOFA (lead)	NNFH	State Agencies
PKR	NEFC	NAG
MFO	CNEC	Merrimack River Policy Committee

Action Strategy: 3) Identify and evaluate potential environmental threats to American shad and river herring spawning and nursery habitats, (i.e. point and non-point sources of pollution, contaminants and predation) for the Penobscot and Merrimack Rivers by 1998.

Action Item: 3a) Sample contaminant and fish pathogen levels in juvenile and adult clupeids and water, initially in the Merrimack River and estuary.

Field Stations		Potential Partners	
MEFO	*NEFO (lead)	EPA	NMFS
*NEFC (lead)	CNEC	State Agencies	
PKR		Other Federal Agencies	

ATTACHMENT 3

file

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PIN-47
Cont'd

John R. McKernan, Jr.
Governor

Ray B. Owen, Jr.
Commissioner

DEPARTMENT OF INLAND FISHERIES AND WILDLIFE
Telephone (207) 287-3371

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650 State Street
Bangor, Maine 04401

14 December 1994

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Public meetings were held with commercial eel harvesters and Department personnel in Machias and Bangor in early December, 1994. The purpose for these meetings was to develop a better understanding of the fishery and a working relationship between the users of the eel resource and the State, the managers of the resource. Discussions ranged over a variety of topics which are summarized below. If you don't recognize some of what is listed here, it was probably discussed at the meeting that you didn't attend. This letter is being sent to all holders of permits to harvest eels with pots. If you were not able to attend one of these meetings, and still wish to comment, please contact me by letter, fax, or phone.

1. Elvers and glass eels

- some States (eg. Rhode Island, etc.) have banned the harvest of elvers in the interest of conservation. At this time Maine scientists do not see the need for such a limitation.

- glass eels (small, unpigmented, transparent eels) command a very high price ($750 per Kilo was mentioned) and are sent to the Japanese market. Buyers are particular about quality and will assist harvesters with handling techniques to reduce mortality and increase quality. It was suggested that some training in handling these small eels be a requirement prior to issuance of a license or permit.

- elvers (small, pigmented eels 3 to 5 inches long) are sold to eel farms where they are raised to market size. Eels approximately 12 inches long are valued as bait by striper anglers and as a food fish.

- several anglers report that in rivers which support an elver fishery the numbers of large eels has noticeably declined.

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2. Gear

- Eel pots with 1/2-inch bar mesh will capture eels 12 inches long, and larger. One fisherman reported using 3/4-inch mesh, because he only wanted eels larger than 16 inches. Small mesh "window screen" nets are used to capture eels smaller than 12 inches.

- Minnow trappers are limited to a pot no larger than 50 cubic feet. Eel fishermen felt that if they were given the same limits they would not feel handicapped. The pots they use are smaller than this and a 50 cubic foot pot would be too large to be easily handled from a boat.

- the funnel size in most eel pots is 2-to-2 1/2 inches. This precludes most large fish from entering and still is efficient at catching eels.

- some eel harvesters are using fyke nets or trap nets in lakes and rivers. Some of these nets are fished for in-migrating elvers (very small mesh and set in the estuaries) and some are fished, un-baited, in upstream areas for larger eels. The nets vary in size, shape, placement, mesh size, and twine type. It was generally agreed that these nets should be placed so as to limit conflict with other water users (anglers, boaters, etc.). It was also agreed that we need to carefully consider what limits or regulations to apply to these nets: very small, compact nets do not need the same regulations as do the very large nets.

- low water levels, and high water temperatures limit efficiency and catch rate for any harvesting gear.

- sometimes, in mid to late summer, eels caught in pots in deep water die in the pots even if only left one day. Perhaps low oxygen levels kills these fish which may have become trapped when on short foraging trips into oxygen depleted areas.

3. By-catch

- most fishermen report catching few game fish. Once in a while a brown trout or brook trout will be captured but they are easily released. Smallmouth bass are commonly captured in some areas. Cusk, minnows, sunfish, and lampreys are also caught.

- sometimes muskrats are caught in pots. Cormorants, seals, and snapping turtles can cause problems by killing eels already in the pots.

- crawfish and musk turtles are also commonly caught.

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- most by-catch is easily released alive and there is no indication that any of this gear, if properly placed, is a problem for other organisms.

4. Conflicts

- most people reported that there are very few conflicts among or between eel harvesters. Even the large elver harvesting groups from out of state try to get along.

- pot fishermen in lakes report lost, stolen, damaged gear. Most blame it on boaters and camp owners who do not understand what the fishermen are doing or do not want them there.

- some eel fishermen who work in estuaries report that striped bass anglers steal bait-size eels from their traps. One even reported finding $2 in one of his pots which contained no eels.

- fishermen in the marine environment have been told by marine wardens that they (the wardens) cannot, or will not, challenge anyone molesting or stealing eel capturing gear. They claim that the law protects lobster pots and gear but not eel pots and gear. Potters who have lost gear in lakes and reported the loss to local IF&W game wardens report a similar lack of interest.

- many eel harvesters commented on the loss of large numbers of migrating eels at power generating turbines on rivers. Apparently eels are attracted to the current drawn by the turbines while migrating at night. One eel weir operator has, as the result of legal action, an agreement with a dam operator to cease generating after dark from mid-August to mid-October, the prime time for migrating eels. This agreement has resulted in a noticeable increase in the pounds of eels captured at his weir, downstream from the dam. It was suggested that screens with a 1 inch bar mesh be placed above turbines. Perhaps research can produce an eel-exclusion device to be placed above turbines or generation agreements can be reached with other dam owners similar to the above example.

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COMMENTS FROM PENOBSCOT RIVER COALITION ON LOWER PENOBSCOT RIVER BASIN DEIS

[illegible] LINCOLN, ME. 04457
(207) 794-9062

FERC #10981 (BASIN MILLS)

RE: STAFF RECOMMENDATIONS D.E.I.S

COPY

IT'S VERY DISTURBING TO THE ENVIRONMENTAL GROUPS THAT YOU CHOSE TO SIMPLY RUBBER STAMP THE MITIGATION MEASURES OFFERED BY THE APPLICANT (BANGOR HYDRO ELECTRIC)

DIDN'T IT EVEN OCCUR TO YOU TO CONTACT THE VERY AGENCIES; I.E. ATLANTIC SEA RUN SALMON COMMISSION, THE U.S. FISH + WILDLIFE SERVICE WHO ARE RESPONSIBLE FOR THE RESTORATION OF THE ANADROMOUS FISH TO THE PENOBSCOT RIVER TO SEE WHAT THEY THINK ABOUT TRAP + TRUCKING SALMON OVER THE LOWER THREE DAMS? YOU WOULD AND PERHAPS YOU WILL FIND THAT ALL THESE AGENCIES AS WELL AS THE CONSERVATION GROUPS ARE ADAMENTLY OPPOSED

PRC-1 TO TRAP + TRUCKING AS A MITIGATION MEASURE.

IF THEY REFUSE TO ACCEPT THIS, WHAT WE HAVE IN AFFECT IS NO MITIGATION AT ALL.

ALSO WHAT YOU ARE SAYING IS A PRIVATE COMPANY HAS THE RIGHT TO TELL THE RESOURCE AGENCIES THE A S S R S C, AND THE U S F + W L S HOW TO GO ABOUT THEIR RESPONSIBILITIES, WHICH IS LUDICROUS.

THE CONSERVATION GROUPS HAVE STATED REPEATEDLY THAT THE ONLY TRUE MITIGATION IS IN KIND MITIGATION.

THE BASIN MILLS PROJECT WILL INUNDATE A LARGE AREA, OF SALMON HOLDING SPOTS IN FREE FLOWING RIVER AS WELL AS ELIMINATE NURSERY + SPAWNING AREAS

THE LOST HABITAT SHOULD BE REPLACED WITH A NET GAIN IN HABITAT BY THE REMOVAL OF A MAIN STEM DAM (GREAT WORKS DAM, JAMES RIVER) AND A MAJOR TRIBUTARY DAM SUCH AS THE HOWLAND DAM WHERE THE PISCATAQUIS RIVER ENTERS THE PENOBSCOT.

THE KILOWATTS PRODUCED BY THESE TWO IMPOUNDMENTS WOULD BE MORE THAN MADE UP FOR, WITH AN EFFICIENT BASIN MILLS, BY AT LEAST 5 TIMES.

THIS WOULD GO A LONG WAY TOWARD RESTORING SOME BALANCE ON THE RIVER BETWEEN HYDRO-POWER AND THE SALMON FISHERY. WHAT YOU RECOMMEND WOULD PREVENT ANY MEANINGFUL RESTORATION OF THE ANADROMOUS FISH, PARTICULARLY WILD FISH POPULATIONS

YOUR D.E.I.S SHOULD BE REVISED TO INJECT THIS BALANCE.

SINCERELY
Taylor
VICE CHAIRMAN, PENOBSCOT RIVER COALITION

✓

RESPONSES TO PENOBSCOT RIVER COALITION COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

PRC-1 We address the effects of trap-and-truck operations in the EIS in Section 4.3.3.2. We discuss and consider the differences in the intrinsic value of wild and stocked fish in Section 5.2.1.3. We evaluate the effects of removing mainstem and tributary dams in Section 5.2.1.5 and Appendix D.

COMMENTS FROM UNITED STATES GEOLOGICAL SURVEY ON LOWER PENOBSCOT RIVER BASIN DEIS

9 PM 2:25

United States Department of the Interior
GEOLOGICAL SURVEY
Water Resources Division
Maine District Office
26 Ganneston Drive
Augusta, Maine 04330

December 5, 1994

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol St. N.E.
Washington DC 20426

P-10981
2712-004
2534-005

Re: Lower Penobscot River Basin
Draft Environmental Impact Statement (FERC/DEIS-0082)

Dear Ms Cashell:

USGS-1

The U.S. Geological Survey has reviewed the draft Environmental Impact Statement for the Lower Penobscot River and has the following comment regarding the streamflow statistics computed on the river.

Streamflow statistics for the lower Penobscot River in the draft Environmental Impact Statement (EIS) were taken exclusively from records kept at Veazie Dam. The U.S. Geological Survey (USGS) has maintained streamflow gages on the Lower Penobscot River at West Enfield (drainage area 6,671 square miles) since 1901 and at Eddington (drainage area 7,764 square miles) since 1979. Comparison of data from the USGS gages with data from Veazie Dam shows some discrepancies which must be addressed. In particular, analysis of the data from West Enfield indicates that the 100- and 500-year flood discharges from the FEMA report for the Penobscot River are more accurate than those computed using the data from Veazie Dam (Sec. 3.3.2.1). These discrepancies should be addressed prior to publication of the final EIS.

Questions on this matter can be directed to Joseph Nielsen of my staff at (207) 622-8209.

Sincerely,

Derrill J. Cowing

Derrill Cowing
District Chief

RESPONSES TO UNITED STATES GEOLOGICAL SURVEY COMMENTS ON LOWER PENOBSCOT RIVER BASIN DEIS

USGS-1 In response to your comment, we requested the applicant to consult with you regarding this issue. You and the applicant agreed that the differences in flood flows would be reconciled at the time of FEMA mapping, prior to final project design. We have modified the text of the DEIS to indicate this. Sufficient contingencies exist in the engineering design for any additional structural modifications which might be needed if required by a change in flood levels.