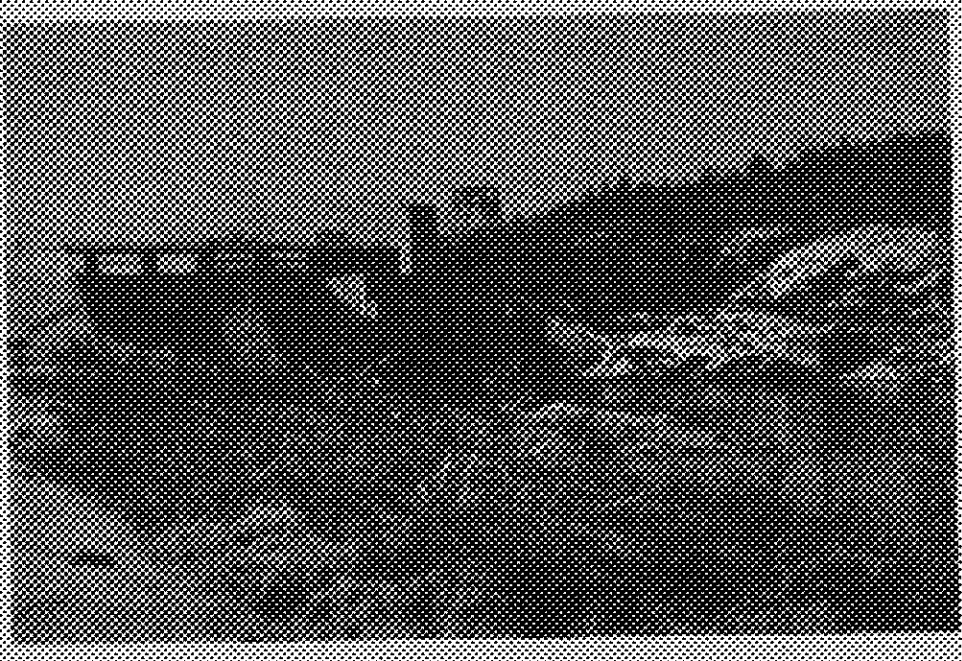
Office of Hydropower Licensing

August 1996

FERC/FEIS-0077

FINAL ENVIRONMENTAL IMPACT STATEMENT FOR SACO RIVER PROJECTS



Maine

(FERC Project Nos. 2528, 2194, 2531, 2529, 2530, 11365)

August 1996

888 1st Street N.E., Washington, D.C. 20426

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING

FINAL ENVIRONMENTAL IMPACT STATEMENT

SACO RIVER PROJECTS

FERC Project Nos. 2528, 2527, 2194, 2531, 2529, 2530, 11365

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August 1996

COVER SHEET

a. Title: Existing and Proposed Hydropower Developments in the Saco River, Maine, FERC Project Nos. 2528, 2527, 2194, 2531, 2529, 2530, and 11365

b. Final Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: Central Maine Power Company (CMP) filed applications for new licenses (relicense) for two projects on the mainstem of the Saco River, Maine. Swans Falls Corporation filed an application for exemption for the unlicensed Swans Falls Project. Additionally, CMP filed the Saco River Fish Passage Agreement (Agreement) which establishes a proposed process and means to install fish passage facilities at all seven mainstem Saco River projects. In order to implement the proposed Agreement, CMP has subsequently filed amendment applications for three of the Saco River projects.

The primary environmental resource issues are potential impacts to and effects on: (1) water quality and quantity, (2) fishery resources, (3) terrestrial resources, (4) recreational resources, (5) geology and soils, (6) aesthetic resources, (7) archeological and historic resources, and (8) air quality. In addition, the cumulative effect issues of the projects are anadromous fisheries, wetlands, recreational resources, and hydroelectric generation.

The staff's recommendation is to relicense the Bonny Eagle and Skelton Projects as proposed with additional resource enhancement measures, to issue an exemption for the Swans Falls Project; to approve the Agreement; and amend the licenses of the Bar Mills, West Buxton, and Hiram Projects affected by the Agreement.

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f. Transmittal: This final environmental impact statement prepared by the Federal Energy Regulatory Commission's staff in connection with the relicense applications filed by Central Maine Power for the existing Bonny Eagle Project (FERC No. 2529) and Skelton Project (FERC No. 2527); the exemption application filed by Swans Falls Corporation for the existing unlicensed Swans Falls Project (FERC No. 11365); and the Fish Passage Agreement filed by Central Maine Power for amending the licenses of Bar Mills (FERC No. 2194), West Buxton (FERC No. 2531), and Hiram (FERC No. 2530) is being made available to the public on or about August 15, 1996 as required by the National Environmental Policy Act (NEPA) of 1969 and the Commission's Regulations Implementing the 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 (DOE) Organization Act[2] is authorized to issue licenses for up to 50 years for the construction and operation of non-federal hydroelectric developments subject to its jurisdiction, on the necessary conditions:

> [T]hat the project adopted . . . shall be such as in the judgement 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 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 licensing period is required.

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1 16 U.S.C. §§791(a)-825(r), as amended by the Electric Consumers Protection Act of 1986, Public Law 99-495 (1986) and the Energy Policy Act of 1992, Public Law 102-486 (1992)

2 Public Law 95-91, 91 Stat. 556 (1977)

3 16 U.S.C. §803(a).

4 16 U.S.C §803(g).

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ACRONYMS AND ABBREVIATIONS

ABF	Aquatic Base Flow
Agreement, the	Saco River Fish Passage Agreement
AF	acre-feet
AMC	Appalachian Mountain Club
AR	American Rivers
ASRSC	Maine Atlantic Sea Run Salmon Commission
AWA	American Whitewater Affiliates
bbl	barrels
Bar Mills	Bar Mills Hydroelectric Project, FERC No. 2194
Biddeford	City of Biddeford, Maine
BOD	biological oxygen demand
Bonny Eagle	Bonny Eagle Hydroelectric Project, FERC No. 2529
Btu/hr	British thermal unit per hour
BP	before present
Cataract	Cataract Hydroelectric Project, FERC No. 2528
CEA	cumulative effects analysis
cfs	cubic feet per second
CMP	Central Maine Power Company
Commission, the	Federal Energy Regulatory Commission
CLF	Conservation Law Foundation
Coalition, the	Saco River Salmon Club, American Rivers, Trout Unlimited, Atlantic Salmon Federation, Maine Council - Atlantic Salmon Federation, and Maine Council - Trout Unlimited
Corps	Department of the Army, Corps of Engineers
Council, the	Advisory Council on Historic Preservation
DEIS	draft environmental impact statement
DO	dissolved oxygen
DOE	U.S. Department of Energy
DPCA	Division of Project Compliance and Administration
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
F	Fahrenheit
FEIS	Final environmental impact statement
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FPS	Feet per second
gpm	gallons per minute
GWh	gigawatthours
Hiram	Hiram Hydroelectric Project, FERC No. 2530
hp	horsepower
IFI	Incremental Flow Index
IFIM	Instream Flow Incremental Methodology
Interior	U.S. Department of the Interior
kV	kilovolt
kVa	kilovolt-ampere
kW	kilowatts
kWh	kilowatthours
mgd	million gallons per day
MDOC	Maine Department of Conservation
MDIFW	Maine Department of Inland Fisheries and Wildlife

MDMR	Maine Department of Marine Resources
mi^2	square miles
MSPO	Maine State Planning Office
MDEP	Maine Department of Environmental Protection
MDOT	Maine Department of Transportation
MOA	Memorandum of Agreement
msl	mean sea level
MW	megawatt
MWh	megawatt-hours
NHPA	National Historic Preservation Act
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NEPLAN	New England Power Planning
NEPOOL	New England Power Pool
NERBC	New England River Basin Commission
NGVD	National Geodetic Vertical Datum
NGO	Non-governmental organization
NMFS	National Marine Fisheries Service
NO_x	nitrogen oxides
NPCC	Northeast Power Coordinating Council
NPS	National Park Service
NHDFG	New Hampshire Department of Fish and Game
NYPP	New York Power Pool
O&M	operation and maintenance
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PSNH	Public Service of New Hampshire
Public Health	New Hampshire Division of Public Health Services
Saco	City of Saco, Maine
SAV	submerged aquatic vegetation
SDI	Scoping document I
SHPO	State Historic Preservation Officer, Maine Division of Historic Resources
Skelton	Skelton Hydroelectric Project, FERC No. 2527
staff, the	Federal Energy Regulatory Commission's Staff
SFC	Swans Falls Corporation
SMRPC	Southern Maine Regional Planning Commission
SRCC	Saco River Corridor Commission
SRSC	Saco River Salmon Club
Swans Falls	Swans Falls Hydroelectric Project, FERC No. 11365
TU	Trout Unlimited
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey Datum
WQC	Water Quality Certificate
West Buxton	West Buxton Hydroelectric Project, FERC No. 2531

EXECUTIVE SUMMARY

Located in southern Maine and New Hampshire, the Saco River drains almost 1,700 square miles at the head-of-tide in Saco, Maine. Within the mainstem of the Saco River there are seven hydroelectric projects: six of the projects are owned by Central Maine Power Company (CMP) and the Swans Falls Corporation (SFC) owns the remaining project, the Swans Falls Hydroelectric Project (Swans Falls). This Final Environmental Impact Statement (FEIS) evaluates the potential environmental benefits, economic costs, and environmental effects associated with three proposed actions: (1) approval and implementation of the proposed "Saco River Fish Passage Agreement" (Agreement), which would require amendments to the existing licenses for CMP's Bar Mills, West Buxton, and Hiram Hydroelectric Projects; (2) relicensing the Bonny Eagle and Skelton Hydroelectric Projects (Bonny Eagle and Skelton); and (3) issuing an exemption for the unlicensed Swans Falls.

The Agreement is a negotiated arrangement that sets a proposed sequence and time table regarding the development of fish passage facilities along the Saco River. For Bonny Eagle, Skelton, and Swans Falls, the basic plan contained in the Agreement would be included in any new license or exemption issued for these projects. For the Bar Mills, West Buxton, and Hiram Projects, CMP filed amendment applications for the existing licenses to include proposals contained in the Agreement.

The total energy generated at CMP's Saco River Projects is currently about 294,420 MWh under median flow conditions. Of this total, Bonny Eagle and Skelton have an average annual generation of about 43,632 MWh and 103,008 MWh of energy, respectively. CMP proposes several environmental enhancements at Bonny Eagle and Skelton to include: limiting impoundment level fluctuations, minimum flow releases, fish passage facilities, fish habitat improvements, cultural resource protection measures, and recreation enhancements. Under CMP's proposal, including provisions of the Agreement, cumulative energy generation of the Saco River Projects would decrease by about 7,565 MWh annually. The Maine Department of Environmental Protection (MDEP) is reviewing CMP's requests for Section 401 water quality certification (WQC) for Bonny Eagle and Skelton, filed on December 1, 1995, and has not issued the WQC for either project. We will address any WQC for Bonny Eagle and Skelton in any Commission order issued for these projects.

Swans Falls is an operating unlicensed facility located in Oxford County, Maine. Presently, the project has a total nameplate generator capacity of 350 kilowatts (kW) and an average annual generation of about 2,500 MWh of energy. SFC is proposing to increase the installed rated capacity of the project from 350 to 820 kW. SFC is also proposing several environmental enhancements to include: a run-of-river mode of operation, fish passage facilities, a submerged berm to deflect tailrace flows, fish habitat improvements, and continued maintenance of the canoe portage trail. The MDEP issued the WQC for Swans Falls on July 6, 1993; the WQC includes six conditions to protect and enhance environmental resources at Swans Falls.

In addition to the proposed actions, the Federal Energy Regulatory Commission's staff evaluated alternatives to the proposed actions and recommendations raised during the scoping process The issues addressed in this FEIS are impacts to and effects on: (1) water quality and quantity, (2) fishery resources, (3) terrestrial resources, (4) recreational resources, (5) geology and soils, (6) aesthetic resources, (7) archeological and historic resources, and (8) air quality. We also analyzed the cumulative effects of the proposed actions on anadromous fisheries, wetlands, recreation, and hydropower generation.

Because the proposed actions involve tradeoffs between energy production and enhancement of environmental quality, we gave equal consideration to developmental and non-developmental values in accordance with the Federal Power Act (FPA). Based on our independent review and evaluation of the proposed Agreement under Sections 4(e) and 10(a) of the FPA, we recommend approving the Agreement and approving the amendments for the Bar Mills, West Buxton, and Hiram Projects.

For Bonny Eagle and Skelton, we recommend relicensing the proposed projects with additional staff recommended measures. Measures that we recommend in addition to CMP's proposed measures include providing: project operation monitoring plans, additional minimum flows, wetland enhancement, and additional recreation enhancements. Under the staff's recommended alternative, CMP's Saco River Projects would cumulatively generate about 9,153 less MWh annually than under existing conditions.

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations provided by the federal and state fish and wildlife agencies for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources affected by the project(s). We believe that our recommendations for Bonny Eagle and Skelton are consistent with those filed by the agencies. Further, we recommend issuing an exemption for Swans Falls with all of the terms and conditions mandated by the state and federal resource agencies. We independently conclude that the fish and wildlife agencies' recommended terms and conditions for Swans Falls adequately protect all resources in the project area.

We believe our recommended alternative would be best adapted to a comprehensive plan for the use of water power development, while concurrently protecting and enhancing environmental resource values and uses, because: (1) implementing the proposed Agreement and amending CMP's licenses for Bar Mills, West Buxton, and Hiram Projects would assist in the restoration of anadromous fish along the Saco River; (2) issuing new licenses for Bonny Eagle and Skelton would allow CMP to operate their Saco River Projects as beneficial and dependable sources of electric energy for CMP's customers; and (3) implementing our required environmental measures would enhance the existing resources.

1. PURPOSE AND NEED FOR ACTION

1.1 PURPOSE AND NEED FOR ACTIONS

The proposed actions pending before the Federal Energy Regulatory Commission (Commission or FERC) consist of three separate interrelated actions. The first proposed action deals with the proposed "Saco River Fish Passage Agreement" (Agreement), which required Central Maine Power Company (CMP) to file amendment applications for the Bar Mills, West Buxton, and Hiram Hydroelectric Projects. The Agreement is a negotiated arrangement that sets a proposed sequence and time table upon which fish passage facilities would be developed along the Saco River mainstem. The proposed Agreement affects, either directly or indirectly, all seven mainstem Saco River Projects that are subject to relicensing, exemption, license amendments, or existing license conditions (see Table 1-1).

CMP filed the Agreement as an offer of settlement for Commission approval on November 23, 1994. The Commission subsequently noticed the Agreement on December 2, 1994. Further, CMP filed license amendment applications, as stipulated in the Agreement, for the Bar Mills, West Buxton, and Hiram Hydroelectric Projects on May 18, 1995. The Commission must decide on approving the Agreement and decide on approving the license amendments for the Bar Mills, West Buxton, and Hiram Projects.

The second proposed action deals with the issuance of new licenses (relicense) for the continued operation of the Bonny Eagle Hydroelectric Project (Bonny Eagle) and the Skelton Hydroelectric Project (Skelton). Applications for new major licenses for the existing projects were filed by CMP, a utility, on December 17 and 18, 1991. The Commission must decide if it's going to issue licenses to CMP for the projects and what conditions should be placed in any licenses issued. Issuing new licenses for the projects would allow CMP to generate electricity at the projects for the term of the new licenses, making electric power from a renewable resource available to their customers. The projects generate an average of about 146,640,000 kilowatthours (kWh) of energy annually.

Finally, the third proposed action deals with the issuance of an exemption for the continued operation of the unlicensed Swans Falls Hydroelectric Project (Swans Falls). The Swans Falls Corporation (SFC) filed an

Table 1-1 Mainstem Saco River hydroelectric projects and Commission action needed (listed from downstream to upstream) (Source: FERC, 1994).

Project	Project Number	Commission Action Needed	Capacity (MW)
Cataract	2528	None	7.7
Skelton	2527	Relicense	16.8
Bar Mills	2194	Amendment	4.0
West Buxton	2531	Amendment	7.9
Bonny Eagle	2529	Relicense	7.2
Hiram	2530	Amendment	10.5
Swans Falls	11365	Exemption	0.82

application for license exemption for the existing project on December 2, 1992. The Commission must decide if it's going to issue an exemption to SFC for the project and what conditions should be placed in any exemption issued. Issuing an exemption for the project would allow SFC to generate electricity at the project. The project would generate an average of about 2,500,000 kWh of energy annually.

This final environmental impact statement (FEIS) is prepared as required by the National Environmental Policy Act (NEPA)[1] and Commission regulations, to provide the Commission with descriptions and evaluations of the potentially significant environmental effects associated with the three aforementioned proposals. The Federal Power Act (FPA) provides the Commission with the exclusive authority to license nonfederal water power projects on navigable waterways and federal lands.

In deciding whether to issue any license, exemption, or amendment, the Commission must determine that the project would be best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation, the protection, 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. This FEIS reflects the above considerations.

1.2 NEED FOR POWER

CMP constructed Skelton during the period April 1947 through 1949. The first hydroelectric unit was put in service on December 30, 1948 and the second unit was put in service on March 18, 1949. Bonny Eagle, as presently developed, was acquired by CMP in 1942 through a merger with Cumberland County Power and Light Company.

We note, from this history, that CMP, the utility's customers, and the public have benefitted from the unique virtues of the hydropower generation from Bonny Eagle for about 51 years and for about 45 years from the generation of Skelton. Hydropower generation in the long-run, if not immediately, is the lowest-cost form of electric power generation; it produces no atmospheric pollution; and it derives its primary energy from a renewable source.

CMP reports to the Northeast Power Coordinating Council (NPCC). CMP's service area is located in NPCC's reliability council region. The NPCC reliability region consists of the New England Power Planning (NEPLAN) and the New York Power Pool (NYPP). CMP

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[1] National Environmental Policy Act of 1969, as amended (Public law 91-190, 42 U.S.C. 4321-4347, January 1, 1970, as amended by Public Law 94-52, July 3, 1975, Public Law 94-83, August 9, 1975, and Public Law 97-258, Section 4(b), September 13, 1982).

reports--on matters related to the reliability of electric power supply--to New England Power Pool (NEPOOL).

Each year the NPCC and the other eight reliability councils prepare "regional reliability council long range coordinated bulk power supply program reports" from data provided by the reporting parties located within the council regions. The NEPOOL is a reporting party that reports to NPCC. These data are edited, coordinated and consolidated by each council; and the consolidated data reports are assembled to complete each council's Regional Reliability Council Long Range Coordinated Bulk Power Supply Program Report that is known to the electric power industry and others as the "OE-411 Report." These reports are published in April of each year.

The data offered in the OE-411 Report are actual data for the year prior to the reporting year and projected data for the reporting year and the remaining years of the 10-year planning period.

The OE-411 Reports provide the reliability councils, the United States Department of Energy (DOE), the electric power industry and others with a wide range of valuable data and information. These data include projections of summer and winter peak hour demands; existing generating resources (as of January 1 of the reporting year); projections of capacity resources required to meet load growth and to provide adequate reserve margins; and projections of net annual energy requirements, et cetera.

The introduction to the NEPOOL portion of the 1993 OE-411 Report projects the annual compound growth rate for 1993 through 2002 to be 2.4 percent for summer peak load, 2.1 percent for winter peak load and 2.0 percent for net annual energy requirements.

Considering the extended periods of time during which CMP and CMP's customers have benefitted from the hydropower output of Skelton and Bonny Eagle and NEPOOL's growth rate projections, the Commission's staff (staff) concludes that the short-term and long-term needs of the applicant for the electricity generated by the projects have been adequately established.

1.3 SCOPE OF THE FINAL ENVIRONMENTAL IMPACT STATEMENT

Pursuant to a Commission notice seeking additional scientific studies for Skelton and Bonny Eagle in January 1992, the U.S. Fish and Wildlife Service (USFWS), the Coalition[2], and the Conservation Law Foundation (CLF) requested, among other things, that a comprehensive cumulative impact assessment be prepared on the Saco River. Additionally,

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[2] The Coalition includes the following entities: Saco River Salmon Club, American Rivers, Trout Unlimited, Atlantic Salmon Federation, Maine Council - Atlantic Salmon Federation, and Maine Council - Trout Unlimited

the Coalition and the U.S. Department of the Interior (Interior) requested the Commission to consolidate all of CMP's proceedings on the Saco River and to prepare a comprehensive environmental impact statement (EIS) addressing the impacts of all Saco River Projects.

In response to these comments, we issued a notice in the Federal Register in March 1994, of our intent to prepare an EIS that would analyze all seven mainstem Saco River Projects. The notice also scheduled scoping meetings and site visits.

We reviewed public and agency comments filed with the Commission; prepared a *Scoping Document I* (SDI); visited the sites in March 1994; held a public scoping meeting in the city of Saco, Maine on March 23, 1994; held an agency scoping meeting in Augusta, Maine on March 24, 1994; and reviewed public and agency comments resulting from this process.

Based on the scoping comments on SDI, the license applications, the proposed Agreement, agency comments, and preliminary staff analysis, we prepared and distributed to agencies, non-governmental organizations (NGOs), the public, and interested parties a document entitled *Scoping Document II*, which identified the issues to be addressed in the FEIS. These issues include potential impacts to and effects on (1) water quality and quantity, (2) fishery resources, (3) terrestrial resources, (4) recreational resources, (5) geology and soils, (6) aesthetic resources, (7) archeological and historic resources, (8) air quality.

We also reviewed all resources to see whether they could be affected in a cumulative manner by the proposed actions, other hydroelectric projects, and non-hydro activities and used these to determine the geographic and temporal scope of our cumulative effects analysis. In *Scoping Document II*, we identified anadromous fish, wetlands, and hydroelectric generation as resources that could be affected in a cumulative manner by the Saco River Projects, the Agreement and proposed actions, and other activities on the mainstem Saco River.

In response to SDI, Appalachian Mountain Club (AMC) filed comments April 15, 1995, with the Commission expressing a concern that the staff consider recreational issues in a cumulative manner in the FEIS. Since the Saco River is recognized as one of Maine's most heavily used recreational rivers and because anadromous fish restoration would likely affect angling opportunities in the basin, we expanded the scope of our cumulative effects analysis to include recreational resources.

1.3.1 CUMULATIVE EFFECTS

1.3.1.1 Geographic scope

The geographic scope of our cumulative effects analysis defines the physical limits or boundaries of the proposed actions' effects on the resources. Since the proposed actions affect the resources differently, the geographic scope for each resource varies.

For fishery resources, the geographic scope of our cumulative effects analysis encompasses the Saco River Basin. We chose this geographic scope because of Atlantic salmon restoration efforts and the anadromous fish issues related to the Agreement. While our fishery resources analysis considered the entire Saco River Basin, the resource agencies' Atlantic salmon restoration plans and the Agreement concentrated our analysis on the Saco River mainstem.

Anadromous fish have inhabited the Saco River Basin and been a valuable contribution to both sport and commercial fisheries. Anadromous fishes inhabiting the Saco River include alewife, American shad, Atlantic salmon, blueback herring, rainbow smelt, Atlantic tomcod, mummichog, threespine stickleback, ninespine stickleback, and striped bass (Dube, 1983). Additionally, the American eel is a catadromous fish occurring in the basin.

Historically, alewife, American shad, and Atlantic salmon were common in the Saco River Basin (Foster and Atkins, 1868), but have diminished in numbers from adverse impacts associated with dam construction and industrial development in the Saco-Biddeford area (USFWS *et al.*, 1987). As such, these species are targeted for restoration by the USFWS, the Maine Department of Inland Fisheries and Wildlife (MDIFW), the Atlantic Sea Run Salmon Commission (ASRSC), and the Maine Department of Marine Resources (MDMR) (USFWS *et al.*, 1987).

At present, fish passage facilities in the basin are insufficient for passage of these fishes and for meeting the collective management goals and objectives of the Saco River management plan (USFWS *et al.*, 1987). Only at the Cataract Hydroelectric Project (Cataract), the lowermost project on the river, have adequate upstream fish passage facilities been recently installed.

Atlantic salmon is an important sport fish in the northeastern United States. Since the loss of the Saco River's (and most other northeastern rivers) viable Atlantic salmon fishery in the early 19th century, restoration of Atlantic salmon stocks has been an ongoing effort. Stocking efforts in the late 19th century and in the 1970's and 1980's have had only limited success (USFWS *et al.*, 1987). However, habitat assessments for the Saco River indicate that suitable habitat for Atlantic salmon currently exists (USFWS *et al.*, 1987).

American shad and alewife were also historically important in the lower Saco River. Commercial fisheries for both species existed below Cataract but were adversely affected by development and textile mill pollution. Currently, alewife are harvested locally in the Cataract area for use as lobster bait and American shad are only taken as incidental to the alewife fishery.

Due to the efforts of federal and state resource agencies, NGOs, and CMP to restore anadromous fish to the Saco River, the potential for successful anadromous fisheries in the basin has improved greatly. Water quality in the river has been enhanced due to local improvements and new state-of-the-art fish passage facilities have recently been installed at

Cataract. However, inadequate fish passage continues to have adverse cumulative effects on the anadromous fish resources in the river upstream of Cataract.

For wetlands and dependent wildlife resources, the geographic scope of our cumulative effects analysis encompasses the mainstem Saco River. We chose this geographic scope because of the effects of the projects' operations (reservoir drawdowns and fluctuating reservoir water surface elevations) on the location and amounts of wetlands and littoral zone habitat. We limited our geographic scope to the mainstem, since all the hydroelectric development on the Saco River tributaries (Ossipee, Little Ossipee, and Ellis River) operate in a run-of-river mode and do not contribute to the wetland cumulative effects occurring on the mainstem Saco River.

The Wetlands Resources Act (Wetlands Act), P.L. 99-645, states that wetlands play an integral role in maintaining the quality of life through material contributions to our national economy, food supply, water supply and quality, flood control, and fish, wildlife, and plant resources, and thus to the health, safety, recreation, and economic well-being of all our citizens of the Nation (U.S. Congress, 1986).

The wetlands along the Saco River exhibit, at least in part, all of the functions and values that Congress describe in the Wetlands Act. Historically, these wetlands have been affected, both adversely and beneficially, by a variety of influences, both natural and man-induced, including hydroelectric development. Current laws and regulations are designed to preserve and enhance remaining wetlands, and in some cases restore some wetlands that have been lost.

For recreational resources, the geographic scope of our cumulative effects analysis encompasses the Saco River Basin. We chose this geographic scope because the Saco River is one of Maine's most heavily used recreational rivers and is one of the most popular flat-water canoeing rivers in the New England region.

Principal recreational activities along the Saco River include both canoe touring and angling. Although canoe touring primarily occurs between the New Hampshire border and Hiram, occasional groups travel from the headwaters in New Hampshire to the Atlantic Ocean. Regarding angling, the Saco River supports a variety of important recreational resident fishes, including trout, largemouth bass, and smallmouth bass. The Maine Rivers Study indicates that the Saco River is generally regarded as Maine's most valuable canoe touring river and is highly valuable to Maine fishing interests (Maine State Planning Office, 1987)

Canoe touring as a recreation experience has developed over the past century with the most significant increase in canoeing on the Saco River occurring between 1960 and 1990 (Southern Maine Regional Planning Commission, 1983). Currently, dams along the lower section of the Saco River inhibit canoe touring opportunities by obstructing continuous float trips. The difficulty of portage sites below Hiram is likely one of the reasons that the lower

Saco River receives lower usage by canoeists. The impoundments in the lower portion of the Saco River are also responsible for the smaller and more infrequent sandbars which limit camping areas along the river (Southern Maine Regional Planning Commission, 1983).

Historically, dam construction along the Saco River has adversely effected angling use opportunities by diminishing an anadromous fishery. The Saco River once supported an Atlantic salmon fishery that was essentially eliminated from the river as a result of dam development in the early 19th century.

Future canoe touring use of the lower Saco River could increase due to the population increases in southeastern Maine and as a result of improved canoe portage facilities. Canoe touring along the lower Saco River may also increase as a result of perceived crowding along the heavily used upper reach of the river. Additionally, current and future efforts to restore anadromous fish habitat by installing upstream and downstream fish passage facilities at the dams along the mainstem Saco River could benefit angling opportunities in a cumulative manner. Atlantic salmon are an important recreation fish in the New England region and efforts to restore an Atlantic salmon fishery on the mainstem Saco River could lead to a substantial increase in recreational fishing pressure.

For hydroelectric generation and the cost of energy, the geographic scope of our cumulative effects analysis encompasses the lower mainstem Saco River at and downstream of Bonny Eagle. We chose this geographic scope because the lower portions on the river are regulated through the operation of Bonny Eagle. Hydroelectric development above Bonny Eagle and on the Saco River tributaries all operate in a run-of-river mode and do not contribute in a cumulative manner to the energy generation effects below Bonny Eagle.

Maine has a long history of hydropower due to its abundant river systems and their suitability for hydropower development. Currently, Maine has 122 hydroelectric generating dams including utility, industrial, and small hydro generating dams. Together, these facilities provide 731 megawatts (MW) of capacity and represent 31 percent of Maine's electricity supply (Maine State Planning Office, 1992).

In the Saco River Basin, there are 12 hydroelectric projects generating 56.6 MW of capacity (FERC, 1994) (Table 1-2). Within the mainstem of the Saco River, there are six licensed hydro- electric projects that represent about 54 MW of capacity.

While the Saco River contains no true storage projects, the lower portions on the river are regulated through the operation of Bonny Eagle. Bonny Eagle, however, has no long term storage capacity. Flows from Bonny Eagle are released on a variable daily discharge schedule depending on system energy demand and total available river flow (*see section 2.1 for further discussion of current project operations*).

Hydroelectric generating stations below Bonny Eagle are generally started concurrently with the Bonny Eagle units. Bonny Eagle's hydroelectric units are run until the Bonny Eagle

impoundment is drawn down to an elevation from which it can be refilled overnight. Similar operations occur at the downstream projects, from Bonny Eagle to lowermost Cataract, with each station normally passing close to the same total volume of water on a 24-hour basis.

For the remaining resource areas, we focused our analysis to the specific project areas of Bonny Eagle, Skelton, and Swans Falls.

Table 1-2 Saco River Basin hydroelectric projects (listed from downstream to upstream) (Source: FERC, 1994).

Project	Project Number	River	Capacity (MW)
Cataract	2528	Saco	7.55
Skelton	2527	Saco	16.8
Bar Mills	2194	Saco	4.0
West Buxton	2531	Saco	7.9
Bonny Eagle	2529	Saco	7.2
Ledgemere	8788	Little Ossipee	.45
Kezar Falls (Lower)	9340	Ossipee	.65
Kezar Falls (Upper)	11124	Ossipee	.35
Hiram	2530	Saco	10.5
Swans Falls	11365	Saco	0.64
Goodrich Falls	None	Ellis	.5
Days Mill	6684	Kennebunk	.07

1.3.1.2 Temporal scope

The temporal scope of our cumulative effects analysis includes a discussion of the past, present, and future actions and their effects on anadromous fish, wetlands, recreational resources, and hydroelectric generation. Based on the new license term and the proposed Agreement, the temporal scope looked 30 - 50 years into the future, concentrating on the effects on the resources from reasonably foreseeable future actions (for example, the effect on anadromous fisheries and wetlands from potential future water withdrawals within the basin). The historical discussion was, by necessity, limited to the amount of available information for each resource. We've adequately identified the present resource conditions based on the license applications, the Agreement, and previous comments. These are documented in the FEIS.

2. PROPOSED ACTIONS AND ALTERNATIVES

This section discusses the proposed actions and alternatives regarding the Agreement, the issuance of new licenses for Bonny Eagle and Skelton, and the issuance of an exemption for the unlicensed Swans Falls. Section 2.1 deals with the proposed Agreement and the subsequent amendments of license. Section 2.2 deals with the current operation of the Saco River Projects. The proposed new licenses for Bonny Eagle and Skelton and the alternatives considered are presented in section 2.3, while section 2.4 contains the proposed exemption for Swans Falls. Section 2.5 deals with alternatives considered but eliminated from further consideration and section 2.6 compares the economics of the proposed actions and the alternatives.

2.1 SACO RIVER FISH PASSAGE AGREEMENT

This FEIS examines the plan for installation of fish passage facilities outlined in the Saco River Fish Passage Agreement as one of several alternatives for fish passage. The Agreement, as described below in section 2.1.1, was signed by all parties as of October 6, 1994, and formally submitted to the Commission for approval as an offer of settlement on November 23, 1994. The FEIS concludes that the plan outlined in the Agreement generally offers the most effective approach for installing fish passage facilities at dams on the mainstem Saco River. We note that as part of any public interest review of an Agreement, the Commission would not be able to approve those parts of an Agreement that would abrogate the Commission's statutory responsibilities and authority over licensed projects.

2.1.1 Agreement as Proposed and Amendments of License

The Saco River Fish Passage Agreement is a negotiated agreement among CMP, resource agencies, and interested parties. The Agreement was negotiated to reach a consensus approach for the installation of fish passage facilities at dams on the mainstem of the Saco River and sets the general sequence and time table upon which fish passage facilities would be developed along the Saco River. The Agreement also establishes a proposed process and means by which the exact installation dates would be determined (see Appendix A). Fish passage facilities are anticipated to be needed to assist in the restoration of populations of anadromous fish such as Atlantic salmon, American shad, and river herring. The Agreement affects, either directly or indirectly, all projects on the mainstem of the Saco River and presents a comprehensive approach to the development and installation of fish passage facilities needed for the restoration of anadromous fish to the Saco River Basin.

For Skelton and Bonny Eagle, conditions and requirements of the Agreement would be included in any new license issued for the projects. For the Bar Mills Hydroelectric Project (Bar Mills), the West Buxton Hydroelectric Project (West Buxton), and the Hiram Hydroelectric Project (Hiram), conditions and requirements of the Agreement would be included in any license amendments issued for these projects. Amendment applications for Bar Mills, West Buxton, and Hiram were filed by CMP on May 18, 1995, to include

conditions and requirements of the Agreement in the current project licenses. For Cataract, no additional Commission action would be necessary.

In summary, Table 2-1 sets forth the proposed actions for each affected project under the Agreement (discussed from most downstream to upstream).

Table 2-1 Status and proposed actions under the Agreement (Source: FERC, 1994).

Project	License Expiration	Current Upstream Fishway	Proposed Upstream Fishway	Current Downstream Fishway	Proposed Downstream Fishway	Commission Action
Cataract #2528	2029					
Cataract & York Dams		Completed	Completed	Completed	Completed	None
Springs Dam		5/1/97	5/1/97	None needed	None needed	None
Bradbury Dam		5/1/97	5/1/97	None needed	None needed	None
Skelton #2527	1993	Pool & weir with trap	5/1/98	Interim log sluice	5/1/98 or within 3 years of license	Relicense
Bar Mills #2194	2005	As prescribed by FERC	Treated as group (see text)	When needed	Interim now; Permanent within 3 years	Amendment
West Buxton #2531	2017	1/1/2004	same as Bar Mills	Pending	same as Bar Mills	Amendment
Bonny Eagle #2529	1993	None	same as Bar Mills	None	Within 2 years	Relicense
Hiram #2530	2022	None	same as Bar Mills	None	Within 2 years of upstream stocking	Amendment
Swans Falls #11365	None - UL	None	Installed in tandem with Hiram	None	Within 2 years of upstream stocking	Exemption

Cataract (Project No. 2528)

Cataract, the lowermost project on the Saco River, consists of a four-dam complex composed of Cataract (East Channel), West Channel, Bradbury, and Spring Island dams. The project was issued a new license by the Commission on June 29, 1989, requiring the provision of fish passage facilities at the East and West Channel Dams and at the upstream Spring Island and Bradbury Dams[1].

Upstream and downstream fish passage facilities have recently been constructed and are operational at the two lower dams - East Channel and West Channel. By order issued August 26, 1993, the Commission extended the deadline for providing fish passage facilities at the two upper dams. Under the Agreement, CMP would construct upstream fish passage facilities at either Spring Island or Bradbury Dam beginning in 1995 and the facilities would be operational by May 1, 1996. Construction of the upstream passage facility at the other dam would be completed by May 1, 1997[2]. Because there are no power facilities at either Spring Island or Bradbury Dam, downstream fish passage facilities would not be necessary.

Since the current project license already contains the requirement to provide fish passage facilities, no further Commission action would be required (*for further discussion see section 2.1.3 below*).

Skelton (Project No. 2527)

The Agreement would require that upstream and downstream fish passage facilities be operational by May 1, 1998, or within 3 years of the receipt of a new license, whichever occurs later. Included with Skelton's fish passage facilities would be a fish lift with trap-and-truck facilities for implementation of an interim trap-and-truck program for passage of fish above dams upstream of Skelton.

Bar Mills (Project No. 2194), West Buxton (Project No. 2531), Bonny Eagle (Project No. 2529), Hiram (Project No. 2530), and Swans Falls (Project No. 11365)

For upstream passage, Bar Mills, West Buxton, Bonny Eagle, and Hiram would be treated as a group with passage to be recommended by state/federal fisheries agencies based on the progress of fish restoration in the basin. Progress would be measured by criteria

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[1] 47 FERC ¶ 62,296.

[2] By letter dated April 28, 1995, CMP requested an one year extension of time to have operational upstream fish passage facilities at Springs and Bradbury Dams by May 1, 1997. The Commission approved CMP's requested extension of time by order issued May 30, 1995.

developed by the fisheries agencies[3]. Assessments would be conducted every 4 years beginning in 1996 and progressing through 2011, to determine the identity of, the need for, and the design and timing of the first upstream fish passage facility to be constructed. Passage at the first of the four dams would be required to be operational no earlier than May 1, 2005, and could be later if an assessment determines that the facility is not needed until a later date.

Subsequent construction of passage facilities at the remaining three dams would be spaced at intervals of at least 2 years. The identity of, the need for, and the design and timing of the subsequent facilities to be constructed would be determined by the assessments. Until passage is provided at the dams, trap-and-truck would continue from Skelton under the supervision of the fisheries agencies. At Hiram, however, upstream passage would be used only for Atlantic salmon.

Under the Agreement, the schedule for installation of upstream fish passage facilities at Swans Falls is tied to conditions outlined in the Agreement. Specifically, the installation of passage facilities at Swans Falls is dependent upon the periodic fisheries assessments delineated in the Agreement. Under the Agreement and Swans Falls' exemption terms and conditions, upstream passage would be scheduled to be completed no later than 2011. However, the schedule could be modified so that construction was concurrent with the construction of facilities at Hiram.

For downstream fish passage, permanent downstream fish passage facilities at Bonny Eagle would be constructed within 2 years of receipt of the new license, and at Bar Mills and West Buxton within 2 years of the receipt of any license amendment.

At Hiram and Swans Falls, the need for permanent downstream fish passage for salmon would be dependent on the presence of juvenile or adult fish resulting from either the annual production stocking[4] of juvenile salmon or the trap-and-trucking of adults and their subsequent natural production. Both events would be dependent upon the participation of appropriate state and federal fisheries agencies in Maine and New Hampshire. Permanent downstream passage would be provided at each dam no more than 2 years from the commencement of annual production stocking of salmon above the dams.

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[3] The "criteria" are in an Annex to the Agreement and was filed with the Commission on April 15, 1996.

[4] Annual production stocking is defined in the Agreement as scheduled annual stocking based on an interagency agreement and a written fishery management plan by the fisheries agencies with the specific objective of establishing a continuous run of returning fish. It does not include intermittent, unplanned or one time stockings, including, for example, stocking for studies of habitat utilization, growth rates, etc. (From Saco River Fish Passage Agreement, November 23, 1994).

2.1.2 Modifications to the proposed Agreement

2.1.2.1 Agency and interested party recommendations

The signatories to the Agreement include: CMP, USFWS, National Marine Fisheries Service (NMFS), ASRSC, MDMR, MDIFW, Maine State Planning Office (MSPO), NHDFG, the Coalition, SFC, and the Cities of Saco and Biddeford. As such, no state or federal agency, or other interested party has recommended any modifications to the proposed Agreement.

In response to the Commission's notice of the Agreement, issued on December 2, 1994, both the City of Saco and SFC recommended approving the Agreement in letters dated December 20, 1994, and December 28, 1994, respectively. The Commission issued a public notice on June 19, 1995 of the license amendment applications for Bar Mills, West Buxton, and Hiram Projects. SFC filed a motion to intervene on August 4, 1995, but not in opposition, in these proceedings. Further, in response to the amendment application notice, the Maine Department of Environmental Protection (MDEP) filed comments on July 26, 1995. MDEP indicated that on March 15, 1995, it had modified the conditions of the Section 401 water quality certification's (WQC) for Hiram and West Buxton to incorporate the relevant terms and conditions of the Agreement[5]. MDEP recommends including the WQC conditions in the licenses for Hiram and West Buxton.

2.1.2.2 Staff alternatives

Staff evaluated several different types of fish passage for the proposed upstream fish passage facilities at Cataract and Skelton. Additionally, two principal alternatives to the proposed upstream fish passage approach at Bar Mills, West Buxton, Bonny Eagle, Hiram, and Swans Falls were evaluated as an approach to the future installation of fish passage facilities. Details of the alternatives are discussed in section 4.1.2.

2.1.3 No Agreement alternative

The no Agreement alternative would result in the continuation of the existing license conditions at Cataract, Bar Mills, West Buxton, and Hiram. In the case of Cataract and West Buxton, current project licenses require fish passage measures that have yet to be fully implemented. Therefore, in lieu of the development of fish passage facilities as contemplated by the Agreement, these requirements would be carried out and some environmental enhancement would occur.

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[5] Since Bar Mills was issued a license prior to the enactment of the Clean Water Act, the State of Maine never issued a WQC for this project.

In the case of Skelton and Bonny Eagle, the no Agreement alternative would be any provisions or proposals for fish passage facilities contained in the applications for new license.

Specifically, the no Agreement alternative would result in the following for each affected project (discussed from most downstream to upstream):

Cataract

Cataract was issued a new license on June 29, 1989. Pursuant to license article 403, CMP was required to install, operate, and maintain fish passage facilities necessary to provide efficient upstream passage of Atlantic salmon, American shad, and alewife at the Cataract, West Channel, Spring Island, and Bradbury dams and downstream passage at the Cataract and West Channel dams. Facilities at Cataract and West Channel have been installed and are operational.

Facilities at Spring Island and Bradbury dams were approved by Order Approving Fish Passage Design Drawings, Schedule, and Study Plan, issued on January 29, 1991. Denil fish ladders were approved for installation with a projected operational date of September 1992. By Order Approving Change in Impoundment and Granting extension of Time, issued on July 13, 1992, the deadline for completion of construction of these fish ladders was extended until September 1, 1993, while CMP studied alternative fish passage means.

Following the completion of studies and the submission and subsequent withdrawal of an amendment application to lower the Springs and Bradbury dams 4 feet from 49 feet to 45 feet and raise the height of the downstream East and West Channel dams 2 feet from 44 feet to 46 feet[6], CMP, by letter dated August 13, 1993, requested an extension of the deadline for construction of fish passage facilities at Spring Island and Bradbury dams in order to negotiate a comprehensive fish passage agreement for its projects on the mainstem Saco River. The Agreement suggested alternative passage measures at Spring Island and Bradbury dams. CMP also requested an extension of time until June 1, 1994, to start construction of fish passage facilities at two of the four project dams. By order issued August 26, 1993, the Director, Division of Project Compliance and Administration (DPCA), approved CMP's request to extend the September 1, 1993 deadline for fish passage installation at Spring Island and Bradbury dams to a fish passage construction start date of June 1, 1994.

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[6] The expected result of lowering the two upstream dams and raising the two downstream dams would be a permanent drop in the full pool level above Springs and Bradbury dams of three feet. This would allow anadromous fish to swim over Springs and Bradbury dams or through open gates and eliminate the need for the construction of fish ladders required by license article 403.

CMP requested a further extension of time for the construction of upstream fish passage facilities at either Spring Island or Bradbury Dam. The requested construction schedule, under the Agreement, would be for construction to commence in 1995 and for the facilities to be operational by May 1, 1996. Construction of the upstream passage facility at the other dam would be completed by May 1, 1997. By Order issued July 18, 1994, the Director of DPCA approved CMP's request to extend the construction start date consistent with that provided by the Agreement.

On October 11, 1994, CMP filed functional design drawings for upstream fish passage at Springs and Bradbury under license article 403. The Commission approved CMP's drawings by Order issued December 14, 1994. CMP requested an additional extension of time, by letter dated April 28, 1995, to have operational upstream fish passage facilities at both Springs and Bradbury dams by May 1, 1997. The Commission approved CMP's requested extension of time by order issued May 30, 1995.

Therefore, the no Agreement alternative would result in the continuation of the current license requirement and schedule for the installation of fish passage facilities, as outlined in the Agreement. To effectively analyze cumulative effects, we have decided to include an analysis of the Agreement's effects on Cataract.

Skelton

Even with the no Agreement alternative the new license application contains a proposal for the fish passage facilities.

Currently, CMP operates an existing upstream fishway (May to November) and interim downstream fish passage measures (April to November). CMP has, however, developed conceptional designs for the proposed new upstream fishway and within 6 months of receipt of the new license proposes to initiate consultation with the fisheries agencies on functional design drawings for both upstream and downstream facilities. Construction of the facilities would be completed within 3 years of receipt of a new license.

Fishway design specifics, including spillage and/or transport flows during operation, is proposed to be determined during the final design phase in consultation with the fishery agencies. Following fishway installation, CMP proposes to monitor the effectiveness of both facilities for 3 years and to continuously monitor the upstream passage facility use over the term of a new license. Results of the first 5 years of upstream fish passage monitoring efforts would be reported to the agencies and the Commission. CMP also proposes to continue monitoring upstream fish passage use for the new license term on a 5 year report and review cycle.

Bar Mills

Bar Mills was issued a hydroelectric license on May 11, 1956, which expires on July 1, 2005. Article 21 of the project license states that the licensee shall construct, operate, and maintain protective devices, including fish passage facilities as may be prescribed by the Commission upon the recommendation of the Secretary of the Interior and the MDIFW. The no Agreement alternative would result in continued inclusion of Article 21.

West Buxton

West Buxton was issued a new hydroelectric license on January 29, 1988. Article 404 of the license requires the licensee to file a fish passage plan addressing design, scheduling of construction, operation and maintenance, and evaluating the effectiveness of required upstream and downstream fish passage facilities. Fish passage drawings and plans were filed on June 5 and November 8, 1989, March 7 and April 5, 1991, March 31, 1992, and March 17, 1993. On November 30, 1992, the Commission granted CMP an extension of time to file the functional design drawings for an upstream fish passage facility at West Buxton until January 1, 2004. The Commission deferred the required filing date primarily because the agencies stated that permanent upstream fish passage facilities would not likely be needed until the year 2007.

On March 31, 1992, CMP filed an *Operational Plan for Fish Passage on the Saco River, Maine* (Operational Plan) as part of its relicensing efforts for the upstream Bonny Eagle and the downstream Skelton. With respect to West Buxton, as outlined in the Operational Plan, CMP proposed to: (1) continue operation of interim downstream fish passage measures; (2) construct a permanent downstream passage facility within 2 years of license issuances at Skelton and Bonny Eagle based on the plans filed on June 5, 1989 and March 7, 1991; and (3) conduct a study of the effectiveness of the downstream passage facility.

However, because the Operational Plan contained new schedules for permanent downstream passage facility installation at West Buxton, was not filed for Commission approval with respect to West Buxton, and did not include resource agency comments, CMP was requested to file new drawings and other materials that reflected its latest downstream fish passage plans at the project and to solicit agency comments.

By letter dated March 16, 1993, CMP stated that the functional design drawings filed on March 7, 1991, reflected its current downstream fish passage plans, with the construction schedule as presented in the Operational Plan. Further, CMP requested the option to modify the downstream fish passage drawings for West Buxton in the future if new technology or information became available.

USFWS, by letter dated April 12, 1993, outlined its review of the Operational Plan. With respect to downstream passage at West Buxton, the USFWS noted that the Operational

Plan tied the completion of permanent downstream fishways to the issuance of new licenses for Skelton and Bonny Eagle. The USFWS also noted that because CMP was not in total agreement with the state and federal fishery agencies over permanent fish passage plans and instream flow needs on the Saco River, issuance of new licensees for these projects may be delayed. Therefore, USFWS requested CMP follow the schedule for installation of downstream passage facilities at West Buxton as identified in USFWS's June 2, 1992 letter to the Commission. The schedule contained in the letter, implementing upstream and downstream fish passage measures at all projects on the Saco River, calls for the installation of downstream passage measures at West Buxton in 1995.

The no Agreement alternative would result in the continued actions surrounding license article 404.

Bonny Eagle

Even with the no Agreement alternative the application contains a proposal for fish passage facilities.

Currently, interim downstream fish passage measures are operated from April to November. CMP has developed conceptional designs for the proposed new downstream fishways (at the powerhouse and New River dam[7]) and within 6 months of receipt of the new license proposes to initiate consultation with the fisheries agencies on functional design drawings for the facilities. Construction of the facilities would be completed within 2 years of receipt of new license.

Fishway design specifics, including spillage and/or transport flows during operation, is proposed to be determined during the final design phase in consultation with the fishery agencies. Following fishway installation, CMP proposes to monitor the effectiveness of the facilities for 3 years.

Hiram

Hiram was issued a license on December 22, 1982, which expires in 2022. No special articles with respect to fishery issues are included in the license. The no Agreement alternative would result in no immediate future provisions to add fish passage facilities.

2.2 DESCRIPTION OF CURRENT PROJECTS' OPERATIONS

Located in southern Maine and New Hampshire, the Saco River drains almost 1,700 square miles at the head-of-tide in Saco, Maine. Within the mainstem of the river, there are

[7] New River Channel Dam is a diversion dam located at the head of Bonny Eagle Island.

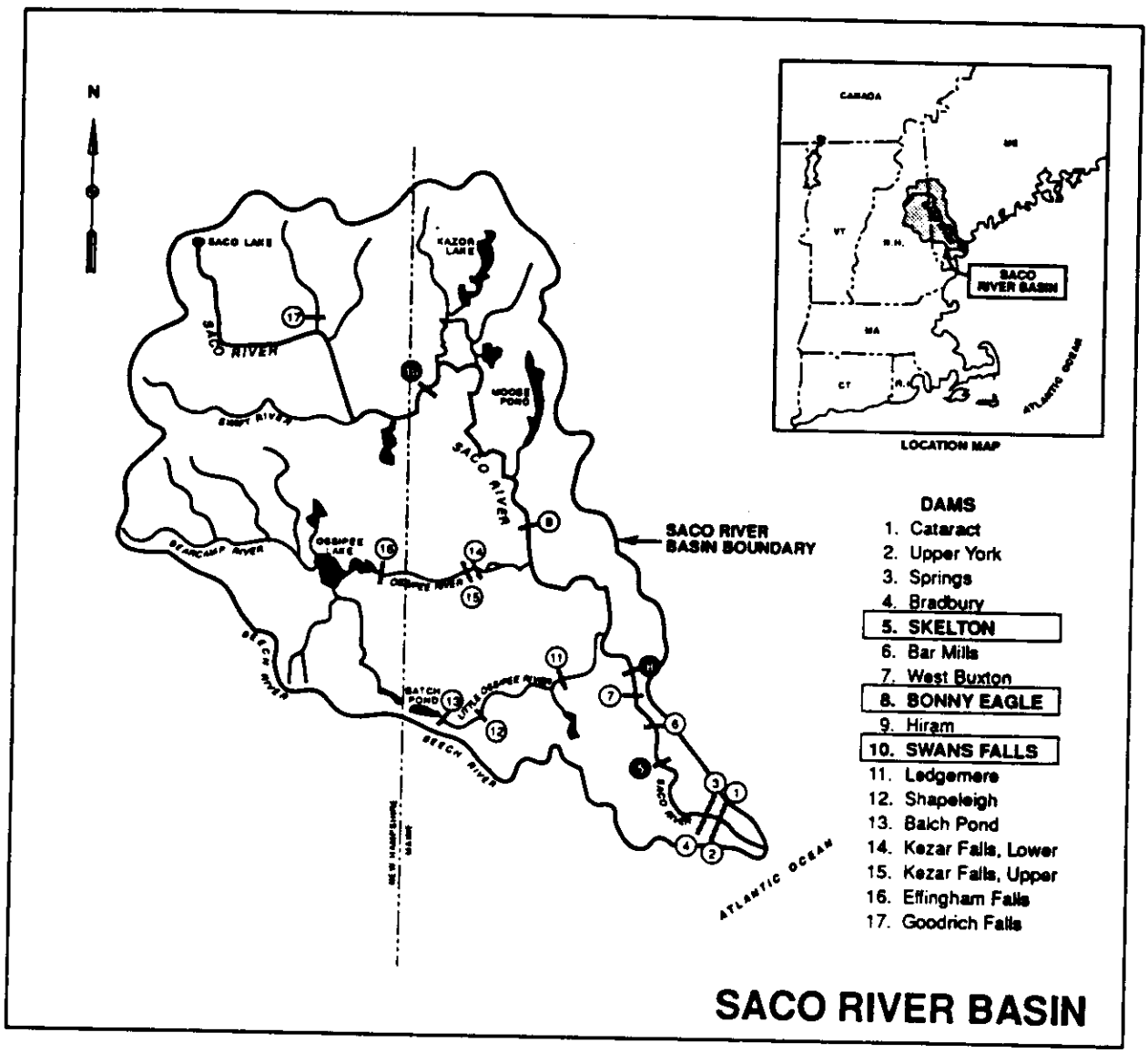

Figure 2-1 Location of Saco River Basin and project areas (Source: the staff, as modified from Swans Falls Co., 1992, and Central Maine Power Co., 1991).

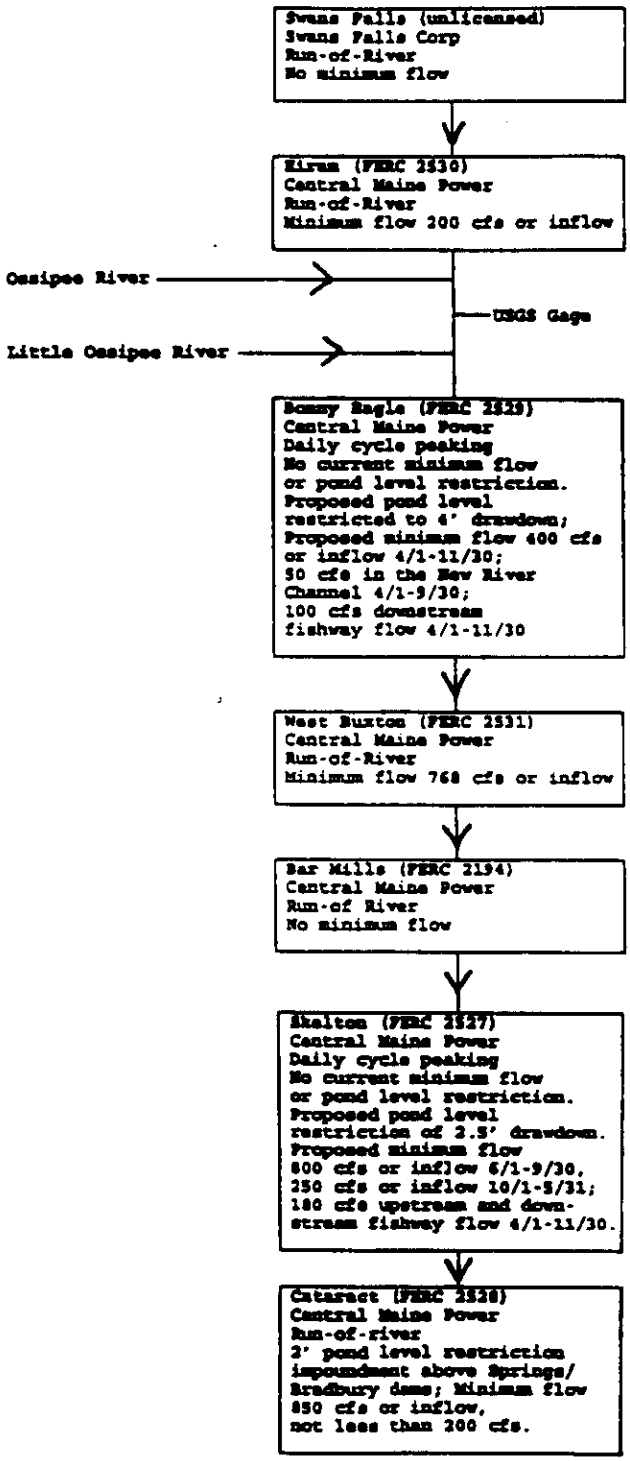

Figure 2-2 Operational schematic of mainstem Saco River Projects (Source: Central Maine Power Co., 1991).

seven hydroelectric projects. Six of the projects are owned by CMP. The uppermost project on the mainstem, Swans Falls, is currently an unlicensed project owned by the SFC (Figure 2-1). Swans Falls is operated as a run-of-river facility.

As discussed in section 1.3.1, there are no true storage projects located on the Saco River. The lower portions on the river, however, are regulated through operation of Bonny Eagle.

Currently, flows from Bonny Eagle are released on a variable daily discharge schedule depending on system energy demand and total available river flow. During periods of high flow, Bonny Eagle's units are run 24 hours a day. As river flows decrease, the units are run less frequently. River flow is considered controlled when inflows to Bonny Eagle are less than 4,500 cubic feet per second (cfs), at which water is then stored overnight and released during the day to maximize energy generation during daily peak electrical loads. During daily peak electrical demand periods, up to 4,500 cfs is discharged from Bonny Eagle. During non-peak hours available inflow is used to replenish the usable capacity of the Bonny Eagle impoundment. Weekend operation is normally reduced to allow the impoundment level to return to a normal full pond.

Stations below Bonny Eagle are generally started concurrently with the Bonny Eagle units with each station normally passing close to the same total volume of water on a 24-hour basis.

Skelton is located about 10 miles downstream of Bonny Eagle. Operation of Skelton is based on several factors: operating efficiency, system load, river flow and impoundment storage capacity management. Unit operation is dictated by the available river flow. During spring and fall high flow periods, the units are run 24 hours a day. Inflow in excess of the storage capacity of the impoundment and the 3,800 cfs maximum station capacity is discharged through the gates in the dam.

During periods of the year when inflow to Skelton is significantly below the station's capacity of 3,800 cfs, the project operates on its normal daily peaking cycle. In order to efficiently utilize the available river flow during daily peaking periods, the turbines are normally set at the optimal setting resulting in a flow of about 3,600 cfs.

The normal daily cycle consists of generating during the morning and evening peak power periods when industrial and residential electric demand is highest. The cycle requires that the Skelton impoundment elevation be drawn down during peaking generation by an average of about 2 to 2.5 feet. This drawdown allows the capture of inflows from Bonny Eagle which would otherwise exceed the hydraulic capacity of the Skelton units and be spilled. The extent and duration of the daily drawdown within this range is dependent upon available outflows from Bonny Eagle. Discharge from Skelton is curtailed when the impoundment reaches an elevation from which it can be refilled overnight. An operational schematic of the mainstem Saco River Projects is shown in Figure 2-2.

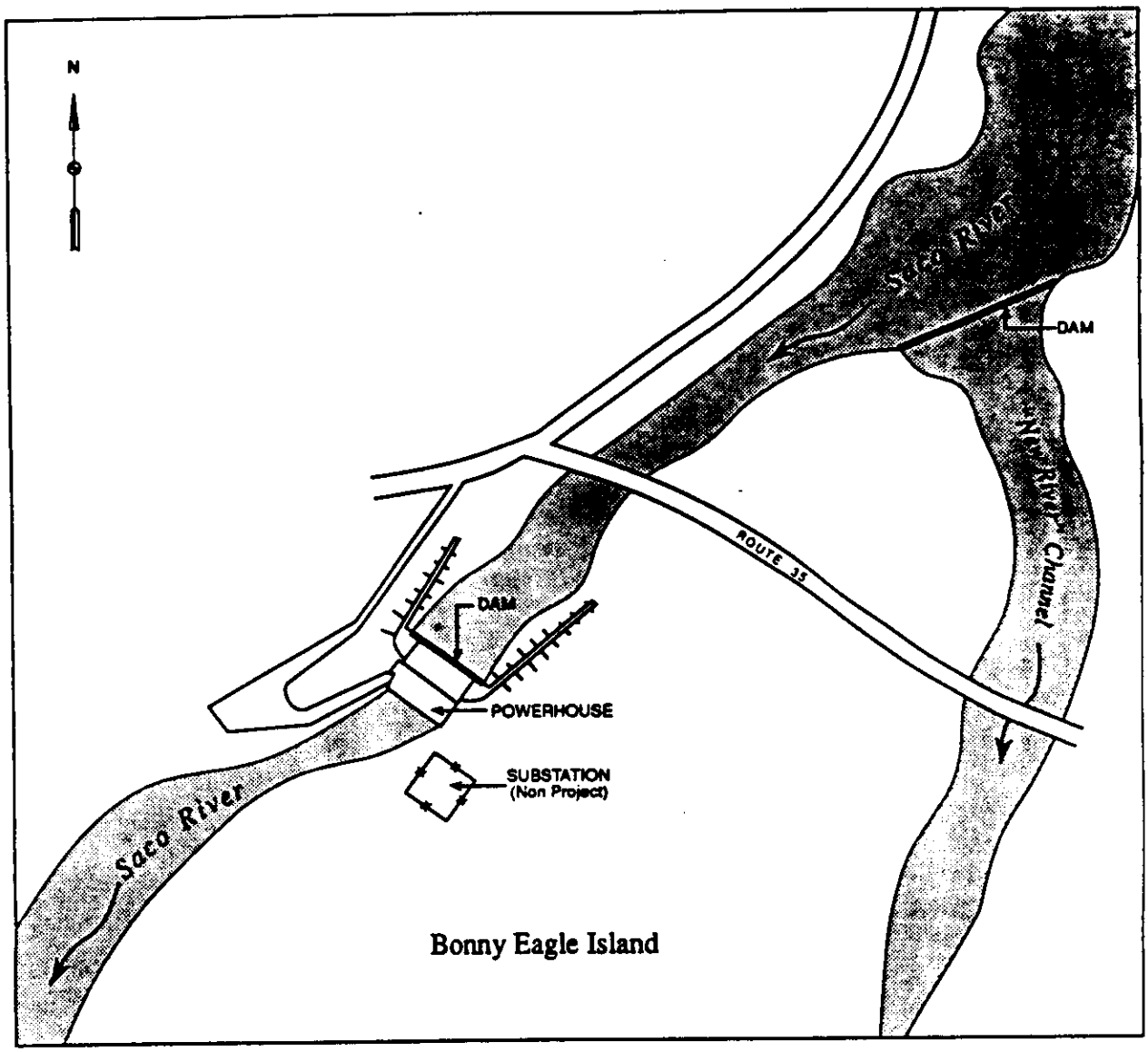

Figure 2-3 Location and project features of Bonny Eagle Hydroelectric Project, FERC No. 2529, Maine (Source: the staff, as modified from Central Maine Power Co., 1991).

2.3 NEW LICENSES

2.3.1 Projects as proposed

2.3.1.1 Bonny Eagle (FERC No. 2529)

2.3.1.1.1 Project facilities

Bonny Eagle is located in York and Cumberland Counties, Maine, in the towns of Hollis, Standish, and Limington. The Saco River drains an area of about 1,560 square miles at the Bonny Eagle dam.

Bonny Eagle's principal features consist of two dams, two earthened dikes, a powerhouse, an impoundment, and appurtenant facilities (Figure 2-3). The project has a total nameplate generator capacity of 7.2 MW and an average annual generation of about 43,632 megawatt-hours (MWh). No additional capacity is proposed.

The existing project is described as follows: (1) a 784-foot-long earth and concrete main river dam (including a 67-foot-high and 164-foot-long concrete intake section, a 12-foot-high and 370-foot-long east earth dike, and a 12-foot-high and 250-foot-long west earth dike), and a 13-foot-high, 350-foot-long concrete gravity New River dam; (2) an impoundment having a surface area of 347 acres with a storage capacity of 1,150 acre-feet at a normal water surface elevation at 216.3 feet (local datum[8]); (3) a intake structure; (4) eight steel penstocks 64 feet long, six are 13 feet in diameter and two are 4.5 feet in diameter; (5) a 159-foot by 51-foot powerhouse containing six turbine-generator units with a total installed capacity of 7,200 kilowatts (kW); (6) a tailrace; (7) a transmission line; and (8) appurtenant facilities.

The dam and existing project facilities are owned by CMP. Project power would be utilized by CMP for sale to its customers. CMP is not proposing any new development.

2.3.1.1.2 Proposed environmental measures

CMP is proposing several environmental enhancements at Bonny Eagle to include: (1) limiting the impoundment level fluctuations; (2) providing a continuous minimum flow (zone-of-passage flow) of 400 cfs or inflow from May 1 to October 31, a minimum flow of 50 cfs in the New River Channel from May 1 to September 30, a continuous minimum flow of 250 cfs or inflow from November 1 to April 30, and a downstream fishway flow of 100 cfs from

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[8] All elevations cited are local datum; subtract 0.8 feet from elevation references to obtain the National Geodetic Vertical Datum (N.G.V.D.) of 1929.

May 1 to October 31;[9] (3) providing new upstream and downstream fish passage facilities, as delineated in the proposed Agreement; (4) conducting archeological investigations in accordance with the Programmatic Agreement; (5) conserving historical resources; (6) installing an interpretive sign; (7) developing a barrier-free picnic area on Bonny Eagle Island; (8) monitoring recreational use; (9) maintaining existing recreational facilities; and (10) continuing the existing agreement governing the Limington Rips recreational facility.

2.3.1.1.3 Water Quality Certificate

CMP requested WQC, required by the Clean Water Act, on December 16, 1991. CMP withdrew their WQC request and refiled for the WQC on December 8, 1992, December 8, 1993, December 5, 1994, and again on December 1, 1995. To date, the MDEP is currently reviewing CMP's request and has not issued the WQC for Bonny Eagle.

2.3.1.2 Skelton (FERC No. 2527)

2.3.1.2.1 Project facilities

Skelton is located in York County, Maine in the towns of Buxton and Dayton. The Saco River drains an area of about 1,622 square miles at the Skelton dam.

Skelton's principal features consist of a dam, an integral powerhouse, an impoundment, and appurtenant facilities (Figure 2-4). The project has a total nameplate generator capacity of 16.8 MW and an average annual generation of about 103,008 MWh. No additional capacity is proposed.

The existing project is described as follows: (1) a concrete gravity and earth embankment dam, totaling about 1,695 feet long, consisting of: (a) an earthen embankment section, 1,200 feet long by 59 feet high, with a crest elevation at 143.0 feet NGVD; (b) a west bulkhead and spillway gate section, about 170 feet long by 75 feet high, surmounted with four Taintor gates, each 32.5 feet wide by 20 feet high, with a sill elevation at 108.0 feet; (c) an intake structure, 107 feet long by 146 feet wide, with two inflow openings protected by trashracks of 5/8-inch steel bars at 3-inch openings; (d) a fishway and sluice section, about 30 feet long; (e) an east bulkhead and spillway gate section, about 188 feet long by 75 feet high, surmounted with four Taintor gates, each 32.5 feet wide by 20 feet high, with a sill elevation at 108.0 feet; and (f) a concrete retaining wall, traversing along the western embankment for about 763 feet long, with a crest elevation at 143.0 feet; (2) a concrete and brick powerhouse about 63 feet high by 70 feet wide by 107 feet long, topped with an entrance tower about 10.5 feet wide by 21 feet long by 89 feet high, equipped with two 8,400-kW General Electric generators driven by 13,350 horsepower (hp) vertical Kaplan

[9] In response to the DEIS, CMP revised their minimum flow proposal for Bonny Eagle by letter dated February 21, 1995 (*see Appendix C*).

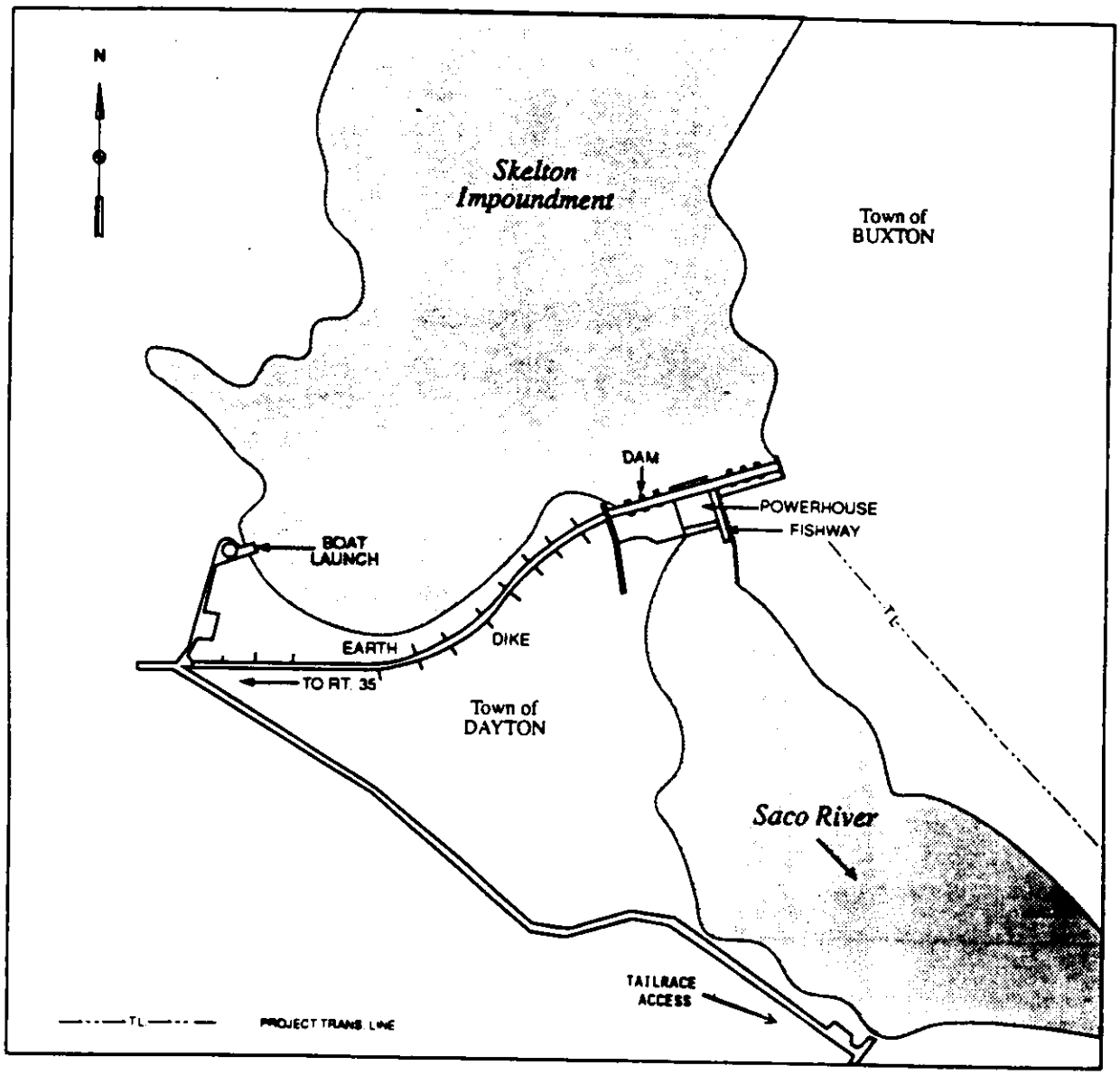

Figure 2-4 Location and project features of Skelton Hydroelectric Project, FERC No. 2527, Maine (Source: the Staff, as modified from Central Maine Power Co., 1991)

turbines, totaling (a) a rated capacity of 16,800 kW, (b) a hydraulic capacity of 3,800 cfs, and (c) each having a rated head of 76 feet; (3) an impoundment of about 2.8 miles long, having: (a) a surface area of about 488 acres, (b) a gross storage capacity of 25,250 acre-feet (AF), (c) a useable storage capacity of 1,720 AF, (d) a normal pool headwater elevation at 127.5 feet, and (e) an excavated tailrace with a retaining wall about 150 feet long with a tailwater elevation at 51.5 feet; (4) a 34.5-kilovolt (kV) transmission line about 10 miles long; and (5) appurtenant facilities.

The dam and existing project facilities are owned by CMP, a private utility. Project power would be utilized by CMP for sale to its customers. CMP is not proposing any new development.

2.3.1.2.2 Proposed environmental measures

CMP is proposing several environmental enhancements at Skelton to include: (1) limiting the impoundment level fluctuations; (2) providing a continuous minimum flow of 400 cfs or inflow from May 1 to October 31, a continuous minimum flow of 250 cfs or inflow from November 1 to April 30, and an upstream and downstream fishway flow of 180 cfs;[10] (3) providing new upstream and downstream fish passage facilities, as delineated in the proposed Agreement; (4) providing tailrace fisheries habitat enhancement; (5) constructing downstream channel habitat alterations; (6) conducting archeological investigations in accordance with the Programmatic Agreement; (7) installing an interpretive sign; (8) investigating the feasibility of providing impoundment campsites; (9) monitoring the need for sanitation facilities at the tailwaters; (10) monitoring recreational use; and (11) maintaining existing recreational facilities.

2.3.1.2.3 Water Quality Certificate

CMP requested WQC, required by the Clean Water Act, on December 12, 1991. CMP withdrew their WQC request and refiled for WQC on December 8, 1992, December 8, 1993, December 5, 1994, and again on December 1, 1995. To date, the MDEP is currently reviewing CMP's request and has not issued the WQC for Skelton.

2.3.2 Modification to the proposed project (operation or facilities to further protect, enhance, or mitigate adverse impacts to environmental resources and values)

Commission regulations require applicants to consult with the appropriate resource agencies before filing a hydropower license, relicense, or exemption application. This consultation is required in order to comply with the Fish and Wildlife Coordination Act, the Endangered Species Act, the National Historic Preservation Act, the Coastal Zone

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[10] In response to the DEIS, CMP revised their minimum flow proposal for Skelton by letter dated February 21, 1995 (*see Appendix C*).

Management Act, and other federal statutes. Prefiling consultation must be completed and documented in accordance with the Commission's regulations. After acceptance of the application, the Commission issues public notices and seeks formal comments in accordance with these statutes.

2.3.2.1 Bonny Eagle

2.3.2.1.1 Agency and interested party recommendations

Interventions

On November 17, 1992, a public notice was issued that requested filing for protests or motions to intervene. All motions to intervene were granted. The following entities filed a motion to intervene, but not in opposition, in the proceeding:

Intervenor	Date of motion
U.S. Department of the Interior	1/11/93
U.S. Environmental Protection Agency	1/13/93
The Coalition	1/15/93
Maine State Planning Office	1/7/93
American Whitewater Affiliation & New England FLOW	1/14/93

Commentors

Pursuant to the public notice issued August 12, 1993, various state and federal agencies and NGOs provided comments and recommendations for inclusion in any new license issued for Bonny Eagle. Following the issuance of the Draft Environmental Impact Statement (DEIS), commenting parties are afforded the opportunity to revise their formal recommendations. A list of DEIS comment letters and the staff's responses are included in Appendix C of this document.

The agencies, NGOs, and the dates of their comments for Bonny Eagle are listed below. All comments received from concerned entities become part of the record and are considered during the staff's analysis of the proposed action.

Commentor	Comment Dates
U.S. Department of the Interior	10/1/93 & 10/6/93

U.S. Environmental Protection Agency 2/24/94

The Coalition 1/24/94

U.S. Department of the Interior

- Operate the project in the following manner:

May 1 - July 15	Run-of-river operation
July 16 - August 31	800 cfs minimum flow
September 1 - October 15	Run-of-river operation
October 16 - April 30	800 cfs minimum flow
New River Channel	100 cfs (April 1 - Sept. 30)

  Run-of-river operation is defined as outflows from the project equal inflows on an instantaneous basis, and water levels in the impoundment are maintained relatively stable (plus or minus 1 foot).

  Minimum flow discharges are defined as the specified instantaneous flow releases, or inflow, whichever is less. Flow release into the New River Channel can be part of the specified minimum flows.

- Limit drawdowns in the impoundment to no more than 1 foot during the period October 15 through ice-out.

- Develop a plan for maintaining minimum flow releases and assuring project operation restrictions. The monitoring plan should include descriptions of the mechanisms and structures to be used, the level of automatic or staffed facility operation, the methods to be used for recording data on project operations and minimum flows, and a plan for maintaining these data.

- Develop a plan for new boat launching facilities at the project.

- Monitor recreational use of the project area to determine whether existing access facilities are meeting demands for public use. Monitoring studies should begin within 5 years of the new license and should consist, at a minimum, of annual recreational use figure data (using recreational visitor days) and meetings with the agencies every 5 years.

  Every 5 years, the licensee should file a report including: (1) annual use figures; (2) a discussion of the adequacy of existing facilities; (3) a discussion of the need for additional facilities; (4) any proposed recreational plans; and (5) agency comments.

- Develop a plan for monitoring fish populations and the adequacy of instream flow releases in the New River Channel.

- Develop a plan and schedule for monitoring aquatic invertebrate populations in downstream areas affected by the operation of Bonny Eagle.

- Accommodate fishing opportunities and whitewater boating in the 4,000-foot-long New River Channel

- Develop a water access campsite at the South end of Bonny Eagle Island

Interior filed the following mandatory conditions pursuant to Section 18 of the FPA[11], as follows:

- The licensee shall ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS.

- Interior requests reservation of authority to prescribe the construction, operation and maintenance of fishways.

U.S. Environmental Protection Agency (EPA)

- Recommends that any benefits to the benthic community of alternative flow regimes be evaluated along with the benefits to the fishery itself.

- Recommends a thorough evaluation of the cumulative impacts on aquatic habitat and dependent wildlife, free flowing river segments, and resident and anadromous fisheries prior to the issuance of a new license for the project and other projects on the Saco River.

- Recommends that the EIS, at a minimum, include a thorough analysis of alternatives to the proposed projects as well as operating regimes for the facilities and a full assessment of environmental impacts. The EIS should evaluate the cumulative impacts from all the facilities on the lower Saco River and any mitigation necessary to offset adverse related impacts should be identified.

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[11] Section 18 of the FPA provides: "The Commission shall require construction, maintenance, and operation by a licensee at its own expense of... such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce as appropriate."

The Coalition

- Supports Interior's instream flow recommendation.
- Supports Interior's recommendation concerning the need for monitoring studies to evaluate the response of invertebrate communities to changes in flow regimes.
- Supports Interior's seasonal drawdown restriction recommendation.
- Recommends CMP periodically sample fish populations in the New River Channel to determine the need for future flow alterations.
- Supports Interior's recommendation for a new boat launching facility on the impoundment.
- Recommends free public access (including disabled access where possible) to the impoundment and both sides of the river below the dam.
- Supports the provisions contained within the Saco River Fish Passage Agreement.

2.3.2.1.2 Staff alternatives

Staff considered several alternatives and modifications at Bonny Eagle. For flow related resources, we considered operating Bonny Eagle under four additional alternatives to those proposed by CMP and Interior: (1) a year round run-of-river scenario; (2) a year round minimum flow of 600 cfs; (3) a year round minimum flow of 800 cfs; and (4) a seasonal minimum flow of 800 cfs from April 1 to October 31 and 250 cfs from November 1 to March 31.

For recreational resources, alternatives we considered were: (1) enhancing the existing canoe portage trail; (2) developing CMP's proposed barrier-free picnic facility near the New River Channel to improve fishing and boating access to the bypassed reach; (3) improving the public's awareness of the recreation resources at Bonny Eagle by providing additional signs at the recreational facilities; and (4) providing a buffer zone around the impoundment to protect recreational and aesthetic resources.

2.3.2.2 Skelton

2.3.2.2.1 Agency and interested party recommendations

Interventions

On November 17, 1992, a public notice was issued that requested filing for protests or motions to intervene. All motions to intervene were granted. The following entities filed a motion to intervene, but not in opposition, in the proceeding:

Intervenor	Date of motion
U.S. Department of the Interior	1/11/93
U.S. Environmental Protection Agency	1/13/93
The Coalition	1/15/93
Maine State Planning Office	1/7/93

Commentors

Pursuant to the public notice issued August 12, 1993, various state and federal agencies and NGOs provided comments and recommendations for inclusion in any new license issued for Skelton. Following the issuance of the DEIS, commenting parties are afforded the opportunity to revise their formal recommendations. A list of DEIS comment letters and the staff's responses are included in Appendix C of this document.

The agencies, NGOs, and the dates of their comments for Skelton are listed below. All comments received from concerned entities become part of the record and are considered during the staff's analysis of the proposed action.

Commentor	Comment Dates
U.S. Department of the Interior	10/1/93 & 10/6/93
The Coalition	1/12/94

U.S. Department of the Interior

° Operate the project in the following manner:

May 1 - July 15	Run-of-river operation
July 16 - August 31	811 cfs minimum flow

September 1 - October 15	Run-of-river operation
October 16 - April 30	811 cfs minimum flow

Run-of-river operation is defined as outflows from the project equal inflows on an instantaneous basis, and water levels in the impoundment are maintained relatively stable (plus or minus 1 foot).

Minimum flow discharges are defined as the specified instantaneous flow releases, or inflow, whichever is less.

- Develop a plan for maintaining minimum flow releases and assuring project operation restrictions. The monitoring plan should include descriptions of the mechanisms and structures to be used, the level of automatic or staffed facility operation, the methods to be used for recording data on project operations and minimum flows, and a plan for maintaining these data.

- Monitor recreational use of the project area to determine whether existing access facilities are meeting demands for public use. Monitoring studies should begin within 5 years of the new license and should consist, at a minimum, of annual recreational use figure data (using recreational visitor days) and meetings with the agencies every 5 years.

  Every 5 years, the licensee should file a report including: (1) annual use figures; (2) a discussion of the adequacy of existing facilities; (3) a discussion of the need for additional facilities; (4) any proposed recreational plans; and (5) agency comments.

- Develop a plan and schedule for installing habitat improvement structures in the Saco River downstream from the project. The plan should include a description of the number, type and location of structures, and should discuss how they would be installed.

- Develop a plan and schedule for monitoring dissolved oxygen (DO) levels and aquatic invertebrate populations at the project.

- Evaluate developing a canoe portage that allows for users to pass near or over the dam.

- Develop a mitigation plan for resolving conflict among anglers and other recreational use below the dam.

Interior filed the following mandatory conditions pursuant to Section 18 of the FPA, as follows:

- The licensee shall ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS.

- Interior requests reservation of authority to prescribe the construction, operation and maintenance of fishways.

The Coalition

- Supports Interior's instream flow recommendation.

- Supports Interior's recommendation concerning the need for monitoring studies to evaluate the response of invertebrate communities to changes in flow regimes.

- Supports Interior's recommendation to enhance fish habitat below the dam as proposed by CMP.

- Supports CMP's proposal to limit the impoundment level fluctuations.

- Recommends free public access (including disabled access where possible) to the impoundment and to both sides of the river below the dam.

- Supports the provisions contained within the Saco River Fish Passage Agreement.

2.3.2.2.2 Staff alternatives

Staff considered several alternatives and modifications at Skelton. For flow related resources, we considered operating Skelton under four additional alternatives to those proposed by CMP and Interior: (1) a year round run-of-river scenario; (2) a year round minimum flow of 600 cfs; (3) a year round minimum flow of 800 cfs; and (4) a seasonal minimum flow of 800 cfs from April 1 to October 30 and 250 cfs from November 1 to March 31.

For recreational resources, alternatives we considered were: (1) improving the public's awareness of the recreation resources at Skelton by providing additional signs at the recreational facilities, and (2) providing a buffer zone around the impoundment to protect recreational and aesthetic resources.

2.3.3 No Action alternative

Under the no action alternative, the projects would continue to operate under the terms and conditions of the existing licenses, and CMP would not implement any new environmental protection, mitigation, or enhancement measures. We use this alternative to establish baseline environmental conditions for comparison to other alternatives. The

alternative of license denial and project decommissioning is discussed subsequently in section 2.5.1.

2.4 EXEMPTION

2.4.1 Exemption as proposed - Swans Falls (FERC No. 11365)

2.4.1.1 Project facilities

Swans Falls is an operating unlicensed facility located in Oxford County, Maine, in the town of Fryeburg. The Commission found the project jurisdictional in August 1989. The Saco River drains an area of about 446 square miles at the Swans Falls dam.

The Swans Falls dam and existing project facilities are owned by the applicant, SFC. The project's principal features consist of a dam, an integral powerhouse, an impoundment, and appurtenant facilities (Figure 2-5). Presently, the project has a total nameplate generator capacity of 350 kW and an average annual generation of about 2,500 MWh. SFC is proposing to increase the installed rated capacity of the project from 350 to 820 kW. After increasing the project capacity from 350 kW to 820 kW the average annual generation would increase to about 4,000 MWh. Project power would be utilized by the applicant for sale to Public Service Company of New Hampshire.

The existing project is described as follows: (1) a concrete gravity and timber crib dam about 630 feet long consisting of: (a) a 10-foot-high ogee-shaped concrete gravity section about 140 feet long (including an abandoned powerhouse) with crest elevation at 395.7 feet NGVD controlled by 8-inch-high wooden flashboards with a crest elevation at 396.4 feet; (b) a 7.5-foot-high concrete-filled timber crib section about 340 feet long, 12 feet wide, with a crest elevation at 393.9 feet, controlled by 2.5-foot-high flashboards with a crest elevation at 396.4 feet; (c) a 9-foot-high ogee-shaped concrete gravity section about 90 feet long with crest elevation at 393.9 feet, controlled by 2.5-foot high wooden flashboards with a crest elevation at 396.4 feet; (d) a sluiceway section about 20 feet long with two steel sluice gates, each 7 feet wide and 12 feet high; and (e) a powerhouse inlet section about 40 feet wide and 17 feet high, protected by trashracks consisting of 2.5-inch steel bars at 1.5-inch openings, and controlled by four wooden inlet gates each 9 feet wide and 10 feet high; (2) an impoundment about 4.1 miles long with a surface area of about 150 acres and a storage capacity of about 450 AF, and normal pool headwater elevation at 395.9 feet; (3) a concrete powerhouse 50 feet by 50 feet in size, housing one 350-kW generating unit driven by a vertical Francis type turbine; (4) a 150-foot-long and 39 to 70-foot-wide forebay; (5) a tailrace about 30 feet long and 45 feet wide with normal tailwater elevation at 380.9 feet; (6) a 34.5-kV transmission line owned by Public Service Company of New Hampshire; and (7) appurtenant facilities.

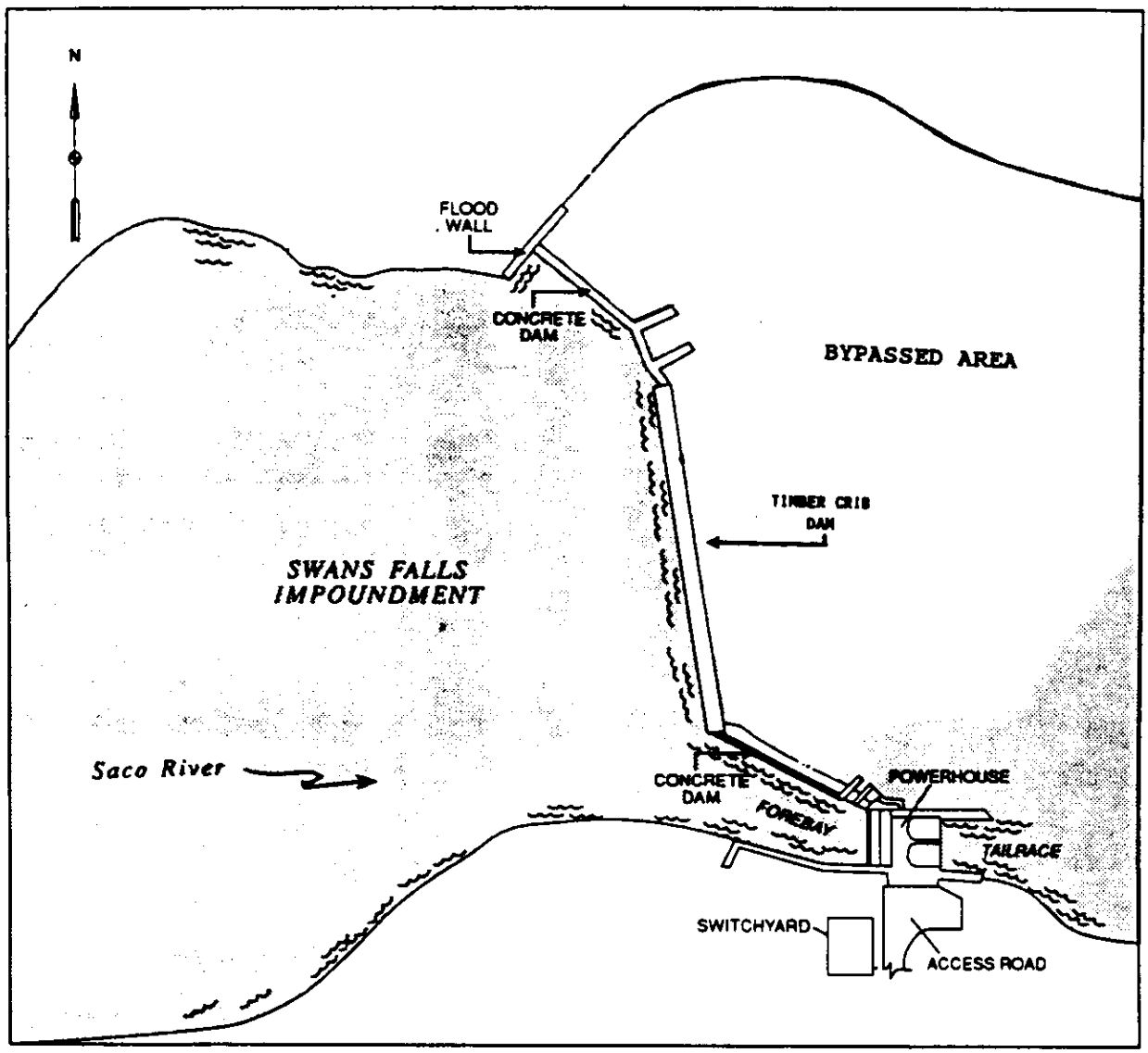

Figure 2-5 Location and project features of Swans Falls Hydroelectric Project, FERC No. 11365, Maine (Source: the staff, as modified from Swans Falls Co., 1992).

2.4.1.2 Proposed environmental measures

SFC is proposing several environmental enhancements to include: (1) operating the project in a run-of-river mode; (2) constructing a submerged berm to deflect tailrace flows; (3) providing new upstream and downstream fish passage facilities, when required by the agencies; (4) providing tailrace fisheries habitat enhancement; and (5) maintaining existing recreational facilities.

2.4.1.3 Water Quality Certificate

SFC requested WQC, required by the Clean Water Act, on November 11, 1992. While a WQC is not required for an exemption from licensing, the MDEP issued the WQC on July 6, 1993, that would require SFC to: (1) operate the project in a run-or-river mode, while providing a minimum flow of 223 cfs or inflow, whichever is less; (2) maintain the Swans Falls impoundment within one foot of normal pond elevation of 395.9 feet; (3) construct and operate upstream fish passage facilities within one year following the installation and successful operation of upstream fish passage facilities at Hiram; (4) construct and operate downstream fish passage facilities following successful passage of adult Atlantic salmon above the project, or no later than two years following the initiation of stocking juvenile Atlantic salmon above Swans Falls; (5) implement the provisions of SFC proposed tailwater and fish habitat improvement plan within one complete field season following an exemption issuance; and (6) maintain the existing canoe portage trail around the Swans Falls dam. We considered the WQC as recommendations under Section 10(a) of the FPA.

2.4.2 Modification to the proposed project (operation or facilities to further protect, enhance, or mitigate adverse impacts to environmental resources and values)

2.4.2.1 Agency and interested party recommendations

Interventions

On May 5, 1993, a public notice was issued that requested filing for protests or motions to intervene. All motions to intervene were granted. The following entity filed a motion to intervene, but not in opposition, in the proceeding:

Intervenor	Date of motion
Maine State Planning Office	5/27/93

Commentors

Pursuant to public notices issued December 16, 1992 and November 10, 1993, state and federal fish and wildlife agencies may prescribe terms and conditions to protect fish and

wildlife resources, according to Section 30(c) of the FPA. These terms and conditions would be part of any exemption issued for Swans Falls.

Following the issuance of the DEIS, commenting parties are afforded the opportunity to revise their formal recommendations. The agencies and the dates of their comments for Swans Falls are listed below. All comments received from concerned entities become part of the record and are considered during the staff's analysis of the proposed action.

Commentor	Comment Dates
U.S. Department of the Interior	1/5/94
State of Maine Department of Environmental Protection	7/20/93
State of New Hampshire Department of Fish and Game	1/21/93

U.S. Department of the Interior

- The exemptee shall provide upstream and downstream fish passage facilities in accordance with the specifications of the USFWS. Unless otherwise notified by the USFWS, the final plans for upstream and downstream fish passage facilities shall be based on conceptual designs contained in Exhibit G-2 of the application for exemption, dated December 1992.

- Unless otherwise notified by USFWS, the exemptee shall complete construction of upstream and downstream fish passage facilities according to the following schedule:

  Upstream passage: no later than 2011;

  Downstream passage: no later than 2 years following the initiation of Atlantic salmon stocking above Swans Falls, or 2011, whichever comes first.

  Unless otherwise notified by USFWS, the exemptee shall prepare and file for approval final plans for upstream and downstream fish passage facilities according to the following schedule:

  Upstream passage: no later than 2009;

  Downstream passage: no later than 1 year following the initiation of Atlantic salmon stocking above Swans Falls, or 2009, whichever comes first.

- The exemptee shall, no later than 6 months prior to the completion of upstream and downstream fish passage facilities, file for approval by the USFWS, plans and schedules for the operation, maintenance, and monitoring of all fishways. The operation and maintenance plan shall include a description of facility oversight and personnel commitments, and should identify back-up equipment and supplies that would be available to ensure fast repairs in the event of fishway malfunction.

- The exemptee shall operate the project in the following manner:

June 1 - September 30	270 cfs minimum flow
October 1 - May 31	400 cfs minimum flow

Minimum flow discharges are defined as the specified instantaneous flow releases, or inflow, whichever is less.

In lieu of discharging the above flows, the exemptee may operate the project in a run-of-river mode. Run-of-river operation is defined as outflows from the project equal to inflows on an instantaneous basis, and water levels in the impoundment not drawn down for the purposes of generating power.

- The exemptee shall carry out the habitat improvement plans as described in the application dated December 1992, whereby boulders are placed in an area of no less than 37,425 square feet, located immediately below the project tailrace. Final construction plans are to be approved by, and supervised by, the agencies.

- The exemptee shall develop a plan for maintaining minimum flow releases and assuring project operation restrictions. The monitoring plan should include descriptions of the mechanisms and structures to be used, the level of automatic or staffed facility operation, the methods to be used for recording data on project operations and minimum flows, and a plan for maintaining these data.

- The exemptee shall notify the USFWS when the project modifications have been completed. A set of as-built drawings shall be furnished with the notification.

- The exemptee shall allow the USFWS to inspect the project area at any time while the project operates under an exemption to monitor compliance with terms and conditions.

- The exemptee shall permit access to the project area wherever possible to allow public utilization of fish and wildlife resources.

- The USFWS reserves the right to add or alter these terms and conditions as appropriate to carry out its responsibilities with respect to fish and wildlife resources.

- The exemptee shall allow public access to the project area for utilization of recreational resources, subject to reasonable safety and liability limitations. Such access should be permanently and prominently posted so that its availability is made known to the public.

- The exemptee shall incorporate the above terms and conditions in any conveyance - by lease, sale or otherwise - of his interests so as to legally assure compliance with said conditions for as long as the project operates under an exemption.

State of Maine Department of Environmental Protection

- Except as temporarily modified by operating emergencies, the exemptee shall operate the project in a run-of-river mode (outflows from the project equal inflows on an instantaneous basis) while providing a minimum flow of 223 cfs or inflow, whichever is less.

- Except as temporarily modified by approved maintenance activities, inflows to the project, or by emergencies beyond the exemptee's control, water levels in the impoundment shall be maintained within 1 foot of normal pond elevation of 395.9 feet.

- Upstream fish passage facilities shall be constructed and operational within 1 year following the installation and successful operation of upstream fish passage facilities at the downstream Hiram.

- Downstream fish passage facilities shall be constructed and operational following successful passage of Atlantic salmon above the project, or no later than 2 years following the initiation of stocking juvenile Atlantic salmon above Swans Falls.

- The exemptee shall within one complete field season following the issuance of exemption, implement the provisions of the Tailwater and Fish Habitat Improvement Plan under the supervision of the appropriate agencies.

- The exemptee shall continue to maintain the existing canoe portage trail around the project dam.

State of New Hampshire Department of Fish and Game

- The exemptee shall operate the project in a run-of-river mode in which outflows from the project equal inflows on an instantaneous basis.

- Unless otherwise notified by NHDFG, the exemptee shall prepare for approval, final plans for upstream and downstream fish passage facilities according to the following schedule:

Upstream passage: no later than 2009;

Downstream passage: no later than 1 year following the initiation of Atlantic salmon stocking above Swans Falls, or 2009, whichever comes first.

- The exemptee shall develop an operation, maintenance, and monitoring plan for the fish passage facilities prior to their installation.

- The exemptee shall incorporate the above terms and conditions in any transfer of the exemption in order to insure the protection of fish and wildlife resources.

2.4.2.2 Staff alternatives

Staff had no alternatives to the proposed project and the various fish and wildlife terms and conditions.

2.4.3 No Action alternative

Under the no action alternative, the unlicensed project would continue to operate, and no new environmental protection, mitigation, or enhancement measures would be implemented. We use this alternative to establish baseline environmental conditions for comparison to other alternatives. The alternative of exemption denial is discussed below in section 2.5.1.

2.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER CONSIDERATION

2.5.1 New licenses

We considered several other alternatives to the applicant's relicensing proposals but eliminated them from detailed study in the FEIS because they are not reasonable in the circumstances of this case. They are: (a) federal government takeover and operation of the projects; (b) issuance of nonpower licenses and (c) decommissioning of the projects.

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

Issuing nonpower licenses wouldn't provide a long-term resolution of the issues presented. A nonpower license is a temporary license which the Commission would terminate whenever it determines that another governmental agency would assume regulatory authority

and supervision over the lands and facilities covered by the nonpower license. In this case, no government agency has suggested its willingness or ability to do so. No party has sought a nonpower license and we have no basis for concluding that the projects should no longer be used to produce power. Thus, a non-power license is not a realistic alternative to relicensing in these circumstances.

Project decommissioning could be accomplished with or without dam removal. Either alternative would involve denial of the relicense applications and surrender or termination of the existing licenses with appropriate conditions. No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. We don't regard this alternative as reasonable here because it would result in the loss of substantial electric power generation in exchange for possible significant environmental impacts. For example, dam removal could result in sediments accumulated behind the dams to be washed downstream, lacustrine habitats would be converted to riverine habitats, and wetlands could be drained.

The second decommissioning alternative would involve retaining the dams and removing or disabling the equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. This would require the Commission to identify another government agency willing and able to assume regulatory control and supervision of the facilities. No agency has stepped forward and no participant has advocated removal of electric generating equipment. Nor have we any basis for recommending it. Because the power supplied by the projects is needed, a source of replacement power would have to be identified. Under these circumstances, we don't consider removal of the electric equipment to be a reasonable alternative.

2.5.2 Exemption

We considered denial of the exemption but eliminated it from detailed study in the FEIS because it was not reasonable in the circumstances of this case. The alternative of exemption denial for SFC to continue operating the project would result in no further production of low-cost power at the site. The denial would not be in the best interest of the public since the energy produced by a reliable, low cost generating facility, which produces no atmospheric pollution, would have to be replaced. Replacing the project's energy with high-cost energy, produced by fossil-fueled generating facilities, would increase atmospheric pollution and consume non-renewable energy resources.

2.6 DEVELOPMENTAL RESOURCES

2.6.1 Economic comparison of the alternatives

We evaluated the costs and power generation impacts at all six CMP projects that would be associated with: (1) the fishery enhancement measures specified in the Agreement,

and (2) the various operational change scenarios we considered for Bonny Eagle and Skelton. The cumulative changes for all six of the projects are included in Table 2-2, which follows.

CMP proposes no power expansion of the existing Bonny Eagle or Skelton; thus, in our economic analyses we evaluate the annual costs of various environmental enhancement measures as applied to the projects as they currently exist.

Changes in minimum flows and reservoir fluctuation limitations at Bonny Eagle and Skelton would affect the power operations at downstream projects. In addition, the

Table 2-2 Changes in production, power values, incremental costs, and net benefits for all CMP's Saco River Projects[1] under each operational alternative considered (Source: the staff).

Min. Flow Proposed by:	On-peak Energy Generation Loss/Gain in 1,000 kWh	Off-peak Energy Generation Loss/Gain in 1,000 kWh	Operational Incremental Annual Costs or Benefits in Dollars	Total Annual Costs Including Non-Operational Environmental Enhancement Costs in Dollars	Total net annual benefits/loss considering all capital costs and operational costs
CMP's	-5,686	-1,879	-$217,075	-$5,222,375	-$3,570,375
Interior's	-22,097	+12,944	-$302,898	-$5,218,688	-$3,566,688
Staff's 800 cfs	-17,609	-3,473	-$520,399	-$5,551.629	-$3,899,629
Staff's 600 cfs	-13,321	-4,798	-$436,867	-$5,468,097	-$3,816,097
Staff's R-O-R	-28,982	+20,588	-$324,617	-$5,355,847	-$3,703,847
Staff's 800/250 cfs scenario	-13,891	-1,641	-$386,079	-$5,417,309	-$3,765,309
Staff's recommended scenario	-22,097	+12,944	-$302,898	-$5,334,128	-$3,682,128

[1]Hiram, Bonny Eagle, West Buxton, Bar Mills, Skelton, & Cataract.

construction of any new facilities, including fish passage facilities at all projects on this stretch of the river, in accordance with the Agreement, would affect the economics of all the projects. Therefore, we have evaluated the cumulative effects and costs of all new facilities and various operational scenarios on all six projects in the affected reach of the Saco River. The projects we studied, from upstream to downstream, are Hiram, Bonny Eagle, West Buxton, Bar Mills, Skelton, and Cataract. Hiram is the most upstream of the six projects and would not be affected by operational changes of Bonny Eagle or Skelton. However, we

included Hiram in our studies because the fish facilities required by the Agreement would affect the projects economic benefits.

We estimate that cumulatively, all six projects as they currently exist and operate would have a net economic benefit of about $1,652,000. In other words, the six projects together would produce power at an annual cost of about $1,652,000 less than CMP's current avoided costs for the same amount of power.

Table 2-2 summarizes how the various alternatives would (1) cumulatively affect peak- and base-load energy production levels; (2) change the cumulative value of the projects' power; (3) be subjected to the cumulative capital, operational, and maintenance costs; and (4) affect the cumulative net annual economic benefit.

On the following pages we discuss the power and economic impacts of the various environmental enhancement measures we considered.

For the existing or baseline conditions, we discuss the energy generation, both peak- and base-load, and its total annual value for each of CMP's six Saco River Projects (Table 2-3).

We discuss and show the effects of the combined enhancement measures proposed by CMP (Table 2-4) and Interior (Table 2-5); as well as four alternative options including an 800 cfs minimum flow (Table 2-6), a 600 cfs minimum flow (Table 2-7), a run-of-river option (Table 2-8); and an 800/250 cfs minimum-flow option (Table 2-9). Finally, we discuss and show the effects of the combined enhancement measures of staff's recommended alternative (Table 2-10).

In the tables which follow, we show both project specific and cumulative effects of the various enhancement alternatives including: (1) energy losses or energy gains; (2) annual power value losses or gains at the projects due to the minimum flow releases and reservoir fluctuation limits at Bonny Eagle and Skelton; and (3) the annual costs of those non-operational enhancement measures which would require a capital expenditure and an additional operation or maintenance expense. Non-operational enhancement measures included providing fishways, picnic area improvements, boat launch improvements, wetlands enhancement, cultural resource protection plans, recreation investigations, habitat improvement, and buffer zones. Staff used its own recommended non-operational enhancement measures, for Bonny Eagle and Skelton, in computing the overall costs of the various minimum flows of 800 cfs, 600 cfs, run-of-river, 800/250 cfs, and staff's recommend option in Tables 2-6 through 2-10.

In addition, we discuss the details of our economic studies for each project separately. We include the details of Bonny Eagle and Skelton in Sections 2.6.2.1. and 2.6.2.2 herein. We include the economic details of our studies for Hiram, West Buxton, Bar Mills, and Cataract in Appendix B. Finally we discuss the pollution abatement benefits provided by

continued operation of the existing projects, and the reduction in those benefits that could result from our recommended operational changes.

2.6.1.1 Baseline Conditions

Table 2-3 shows the existing, or baseline, energy generation under median flow conditions and its annual value for CMP's six Saco River Projects. Cumulatively, the projects would produce 294,420,000 kWh of energy, with 160,766,000 kWh of on-peak energy and 133,654,000 kWh of off-peak energy. The cumulative power generation would have a total value of about $10,519,480 annually.

Table 2-3 Existing energy generation under median flow conditions for CMP's Projects and under **existing operations** (Source: the staff).

Project Name	Total Energy Generation in 1,000 kWh	On-peak energy Generation in 1,000 kWh	Off-peak energy Generation in 1,000 kWh	Total Annual Power Value in Dollars
Hiram	57,023	26,800	30,223	$2,014,280
Bonny Eagle	43,632	23,593	20,039	$1,558,140
West Buxton	31,339	17,443	13,896	$1,122,300
Bar Mills	20,783	11,692	9,091	$744,440
Skelton	103,008	60,727	42,281	$3,702,530
Cataract East	34,961	18,877	16,084	$1,377,790
Cataract West	3,674	1,634	2,040	
Total	294,420	160,766	133,654	$10,519,480

2.6.1.2 CMP's Proposal

We evaluated both project specific and cumulative effects of CMP's proposed operational and non-operational enhancement measures for Bonny Eagle and Skelton. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River Projects. The proposed enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-4 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from CMP's proposed operational and non-operational

Table 2-4 Energy generation, power values, and enhancement costs for CMP's Projects under **CMP's proposed operations and proposed enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	+5	-112	+117	+$345	-$970,010
Bonny Eagle	-614	-420	-194	-$52,566	-$889,850
West Buxton	-1,182	-657	-525	-$27,612	-$748,970
Bar Mills	-614	-420	-194	-$14,765	-$687,300
Skelton	-4,810	-3,443	-1,367	-$112,053	-$1,367,820
Cataract East	-399	-651	+252	-$11,338	-$341,350
Cataract West	+49	+17	+32	+$914	
Total	-7,565	-5,686	-1,879	-$217,075	-$5,005,300
Grand Total (Column 4 + 5):					-$5,222,375

enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-4 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 7,565,000 kWh (about 2.6 percent) with on-peak energy generation decreasing by about 5,686,000 kWh. Off-peak energy would decrease by about 1,879,000 kWh. The cumulative net power value would decrease by about $217,075 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,222,375 annually.

2.6.1.3 Interior's and NGO's Alternative

We evaluated both project specific and cumulative effects of Interior's and the NGO's recommended operational and non-operational enhancement measures for Bonny Eagle and Skelton. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River Projects. The recommended enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-5 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific

Table 2-5 Energy generation, power values, and enhancement costs for CMP's Projects under **Interior's recommended operations and recommended enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	0	0	0	0	-$970,010
Bonny Eagle	+11	-3,288	+3,299	-$17,638	-$813,540
West Buxton	+282	-2,629	+2,911	-$8,591	-$748,970
Bar Mills	-1,046	-2,286	+1,240	-$33,742	-$687,300
Skelton	-8,046	-12,690	+4,644	-$228,965	-$1,367,820
Cataract East	-363	-1,198	+835	-$13,619	-$341,350
Cataract West	+9	-6	+15	+$343	
Total	-9,153	-22,097	+12,944	-$302,898	-$4,915,790
Grand Total (Column 4 + 5):					-$5,218,688

and cumulative, that would result from Interior's and the NGO's recommended operational and non-operational enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-5 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 9,153,000 kWh (about 3.1 percent) with on-peak energy generation decreasing by about 22,097,000 kWh. Off-peak energy, however, would increase by about 12,944,000 kWh. The cumulative net power value would decrease by about $302,898 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,218,688 annually.

2.6.1.4 Staff's 800 cfs Minimum Flow Alternative

We evaluated both project specific and cumulative effects of a year-round 800 cfs minimum flow, combined with our recommended non-operational enhancement measures for Bonny Eagle and Skelton. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River Projects. The proposed or recommended enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-6 shows the total, peak-, and base-load energy losses or energy gains and

Table 2-6 Energy generation, power values, and enhancement costs for CMP's Projects under **Staff's 800 cfs minimum flow and recommended enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	0	0	0	0	-$970,010
Bonny Eagle	-1,796	-2,422	+626	-$49,742	-$915,780
West Buxton	+276	-1,246	+1,522	-$1,140	-$748,970
Bar Mills	-2,263	-1,678	-585	-$55,154	-$687,300
Skelton	-15,639	-10,487	-5,152	-$371,011	-$1,367,820
Cataract East	-1,681	-1,789	+108	-$43,359	
Cataract West	+21	+13	+8	+$7	-$341,350
Total	-21,082	-17,609	-3,473	-$520,399	-$5,031,230
Grand Total (Column 4 + 5):					-$5,551,629

annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from the Staff's 800 cfs minimum flow operating proposal and non-operational enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-6 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 15,532,000 kWh (about 5.3 percent) with on-peak energy generation decreasing by about 13,891,000 kWh. Off-peak energy would decrease by about 2,659,000 kWh. The cumulative net power value would decrease by about $520,399 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,551,629 annually.

2.6.1.5 Staff's 600 cfs Minimum Flow Alternative

We evaluated both project specific and cumulative effects of a year-round 600 cfs minimum flow, combined with our recommended non-operational enhancement measures for Bonny Eagle and Skelton. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River

Projects. The proposed or recommended enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-7 Energy generation, power values, and enhancement costs for CMP's Projects under **Staff's 600 cfs minimum flow and recommended enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental enhancement Costs in Dollars
Hiram	0	0	0	0	-$970,010
Bonny Eagle	-4,205	-2,411	-1,794	-$98,639	-$915,780
West Buxton	+163	-920	+1,083	-$1,863	-$748,970
Bar Mills	-1,494	-1,092	-402	-$36,295	-$687,300
Skelton	-11,507	-7,633	-3,874	-$271,330	-$1,367,820
Cataract East	-1,104	-1,283	+179	-$29,020	-$341,350
Cataract West	+28	+18	+10	+$280	
Total	-18,119	-13,321	-4,798	-$436,867	-$5,031,230
Grand Total (Column 4 + 5):					-$5,468,097

Table 2-7 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from the Staff's 600 cfs minimum flow operating proposal and non-operational enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-7 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 18,119,000 kWh (about 6.1 percent) with on-peak energy generation decreasing by about 13,321,000 kWh. Off-peak energy would decrease by about 4,798,000 kWh. The cumulative net power value would decrease by about $436,867 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,468,097 annually.

2.6.1.6 Staff's Run-of-River Alternative

We evaluated both project specific and cumulative effects of a year-round, run-of-river operation scheme, combined with our recommended non-operational enhancement measures for Bonny Eagle and Skelton. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River Projects. The proposed or recommended enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-8 Energy generation, power values, and enhancement costs for CMP's Projects under **Staff's run-of-river operation and recommended enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	0	0	0	0	-$970,010
Bonny Eagle	-568	-4,197	+3,629	-$34,318	-$915,780
West Buxton	+249	-3,220	+3,469	-$12,504	-$748,970
Bar Mills	-921	-2,813	+1,892	-$34,055	-$687,300
Skelton	-7,007	-17,471	+10,464	-$233,785	-$1,367,820
Cataract East	-164	-1,242	+1,078	-$9,723	-$341,350
Cataract West	+17	-39	+56	-$232	
Total	-8,394	-28,982	+20,588	-$324,617	-$5,031,230
Grand Total (Column 4 + 5)					-$5,355,847

Table 2-8 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from the Staff's year-round, run-of-river operating proposal and non-operational enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-8 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 8,394,000 kWh (about 2.9 percent) with on-peak energy generation decreasing by about 28,982,000 kWh. On the other hand, off-peak energy would increase by about 20,588,000 kWh. The cumulative net power value would decrease by about $324,617 annually. The cumulative cost of CMP's

non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,355,847 annually.

2.6.1.7 Staff's 800/250 cfs Minimum Flow Alternative

Using the results of CMP's model for 800/250 cfs minimum flow, we evaluated the cumulative effects on all of CMP's six Saco River Projects under an 800 cfs minimum flow requirement from April 1 through October 31 and a 250 cfs minimum flow requirement from November 1 through March 31 for Bonny Eagle and Skelton.

Table 2-9 Energy generation, power values, and enhancement costs for CMP's Projects under **Staff's 800/250 cfs minimum flow and recommended enhancements** (Source: the staff).

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	+15	-102	+117	+$343	-$970,010
Bonny Eagle	-4,007	-2,566	-1,441	-$95,224	-$915,780
West Buxton	-293	-1,015	+722	-$11,502	-$748,970
Bar Mills	-1,619	-1,241	-378	-$39,593	-$687,300
Skelton	-8,586	-7,383	-1,203	-$210,269	-$1,367,820
Cataract East	-1,085	-1,594	+509	-$30,275	-$341,350
Cataract West	+43	+10	+33	+$441	
Total	-15,532	-13,891	-1,641	-$386,079	-$5,031,230
Grand Total (Column 4 + 5):					-$5,417,309

Table 2-9 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from the Staff's 800/250 cfs minimum flow operating proposal and non-operating enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-9 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 15,532,000 kWh (about 5.27 percent) with on-peak energy generation decreasing by about 13,891,000 kWh. Off-peak energy would decrease by about 1,641,000 kWh. The cumulative net power value

would decrease by about $386,079 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,417,309 annually.

2.6.1.8 Staff's Recommended Alternative

We evaluated both project specific and cumulative effects of staff's recommended operational and non-operational enhancement measures for Bonny Eagle and Skelton; the staff's recommended operational scenario is consistent with Interior's. Our analysis also included evaluating the effects of the non-operational enhancement measures under the Agreement on all of CMP's six Saco River Projects. The recommended enhancement measures for Bonny Eagle and Skelton can be found in Tables 2-11 and 2-12, respectively.

Table 2-10 Energy generation, power values, and enhancement costs for CMP's Projects under **Staff's recommended operations and recommended enhancements** (Source: the staff)

Project Name	(1) Total Energy Generation Loss/Gain in 1,000 kWh	(2) On-peak Energy Generation Loss/Gain in 1,000 kWh	(3) Off-peak Energy Generation Loss/Gain in 1,000 kWh	(4) Operational Incremental Annual Costs or Benefits in Dollars	(5) Annual Non-Operational Environmental Enhancement Costs in Dollars
Hiram	0	0	0	0	-$970,010
Bonny Eagle	+11	-3,288	+3,299	-$17,638	-$915,780
West Buxton	+282	-2,629	+2,911	-$8,591	-$748,970
Bar Mills	-1,046	-2,286	+1,240	-$33,742	-$687,300
Skelton	-8,046	-12,690	+4,644	-$228,965	-$1,367,820
Cataract East	-363	-1,198	+835	-$13,619	
Cataract West	+9	-6	+15	+$343	-$341,350
Total	-9,153	-22,097	+12,944	-$302,898	-$5,031,230
Grand Total (Column 4 + 5):					-$5,334,128

Table 2-10 shows the total, peak-, and base-load energy losses or energy gains and annual power value losses or gains for CMP's six Saco River Projects, both project specific and cumulative, that would result from staff's recommended operational and non-operational enhancement measures for Bonny Eagle and Skelton. In addition, Table 2-10 shows the annual costs of the non-operational enhancement measures proposed at all six projects.

Overall, cumulative net energy generation would decrease by about 9,153,000 kWh (about 3.1 percent) with on-peak energy generation decreasing by about 22,097,000 kWh. Off-peak energy, however, would increase by about 12,944,000 kWh. The cumulative net power value would decrease by about $302,898 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,334,128 annually.

2.6.2 Detailed Economics of Bonny Eagle and Skelton

Here we discuss the details of our economic analyses for Bonny Eagle and Skelton. Our detailed economic analyses for Hiram, West Buxton, Bar Mills, and Cataract are attached in Appendix B.

2.6.2.1 Bonny Eagle (FERC No. 2529)

A. Power and Economic Benefits

Bonny Eagle would generate on average about 43,632,000 kWh of energy annually without any additional environmental enhancement measures. According to CMP's revised data filed on June 3, 1996, the net project investment and projected non-enhancement capital improvements are equal to $1,461,000 through December 31, 1994; the construction work in progress is equal to $1,394,000 through December 31, 1994; and the projected non-enhancement capital improvements would equal to $722,000 in year 1995.

CMP proposes the following environmental measures at Bonny Eagle: (1) constructing downstream fish passage facilities to cost $250,000 (revised); (2) constructing upstream fish passage facilities to cost $3,300,000 (revised), with an annual operation and maintenance (O&M) cost of $17,000; (3) conducting fish passage studies to cost $510,000; (4) conducting studies of aquatic invertebrates below the project for $20,000; (5) constructing minimum flow facilities to cost $525,000 (we included this cost for all minimum flow scenarios at Bonny Eagle); (6) providing interpretive facilities to cost $4,000; (7) developing and implementing phase III of an archeological mitigation plan to cost $521,000 (revised); (8) performing recreation investigations to cost $25,000; (9) conducting recreational facility maintenance to cost $1,000 annually; (10) conducting periodic recreation-use assessments (every 6 years) for $2,000; and (11) developing a barrier-free picnic area on Bonny Eagle Island for $20,000.

The current license contains no requirements for minimum flow releases at Bonny Eagle. CMP has proposed and the resource agencies recommend various minimum flow releases for Bonny Eagle. In addition to these minimum flows, at our request, CMP analyzed four additional minimum flow releases or operational schemes: release of 800 cfs year-round, release of 600 cfs year-round, run-of-river operation, and release of 800/250 cfs year-round.

CMP developed a computerized hydraulic model, for which 43,632,000 kWh annual energy generation, under median-flow conditions, has been used as the baseline energy production condition for analyzing the various proposed minimum flows scenarios. This model was developed for projects in three major river basin systems including CMP's projects on the Saco River. We verified CMP's energy-production and power-value modeling results using a spreadsheet model we developed in-house.

CMP estimates that operating the project with a proposed revised minimum flow[12] would reduce the project generation to about 41,373,000 kWh annually. This would be about 2,259,000 kWh less energy than the baseline condition. About 1,230,000 kWh of the loss would be from on-peak energy and about 1,029,000 kWh from off-peak energy. We estimate the value of the lost energy would be about $52,635 annually.

With the resource agencies' recommended minimum flow of 800 cfs from July 16 to August 31 and from October 16 to April 30, and run-of-river operation from May 1 to July 15 and from September 1 to October 15, plus a seasonal 100 cfs minimum flow in the New River Channel, CMP estimates the project would generate about the same amount of energy (43,643,000 kWh) as for the baseline condition (43,632,000 kWh). However, the resource agencies' minimum flow regime would force the project to generate less on-peak energy and more off-peak energy. The on-peak energy generation would decrease by about 3,288,000 kWh, and the off-peak energy would increase by about 3,299,000 kWh. While the difference in total generation would be less than one-half percent, about 3,300,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. The estimated lost value of the energy shift would be about $17,638 annually, or about $34,929 less than the loss caused by CMP's proposed operating regime ($52,567).

We estimate that the flow spilled to operate the proposed downstream fish passage facility (about 2 percent of generation flows or up to 100 cfs) would reduce the power generation of the project by about 872,640 kWh (2 percent of 43,632,000 kWh). With CMP's proposed minimum flow release, and losses due to operating the downstream fish passage, the total annual generation would decrease from about 41,373,000 kWh to about 40,500,360 kWh. With the resource agencies' recommended minimum flow regime, and losses due to downstream fish passage, the total annual generation would decrease from about 43,643,000 kWh to about 42,770,360 kWh.

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include the net

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[12] CMP's proposed minimum flow for Bonny Eagle: (1) 400 cfs between May 1 and October 31 each year, (2) releasing 50 cfs through the New River Channel from May 1 through September 30, (3) 250 cfs or inflow between November 1 through April 30, (4) downstream fishway flow of 100 cfs between May 1 through October 31, and (5) limiting the pond level drawdown to 4.0 feet.

Table 2-11 The annual economic impact, or costs, of the various enhancement measures considered at Bonny Eagle and the recommending entity (Source: the staff).

Enhancement Measures	Annual Costs	Costs in mills/kWh[1]	Recommending Entity[2]
Cultural Resource Protection	$87,480	2.00	CMP, Staff
Recreation Investigations, Monitoring, & Maintenance	$8,250	0.18	CMP, RA, Staff
Downstream Fish Passage-Bypass	$57,590	1.32	CMP, RA, NGO, Staff
Upstream Fish Passage Effectiveness Studies	$80,690	1.85	CMP, RA, NGO, Staff
Loss of Energy Due to Proposed Fish Passage	$20,310	0.28	CMP, RA, NGO, Staff
Upstream Fish Passage - (no earlier than 2003)	$540,140	12.38	CMP, RA, NGO, Staff
Fish Studies in New River Channel	$4,750	0.10	RA, NGO, Staff
Studies of Aquatic Inv. Below Project	$3,160	0.07	CMP, RA, NGO, Staff
Wetland Enhancement	$17,090	0.39	Staff
New River Minimum Flow Release Structure	$10,580	0.24	CMP, RA, NGO, Staff
Bonny Eagle Island Picnic Area	$3,360	0.07	CMP
Boat Launch	$9,780	0.22	RA, NGO
Canoe Portage Trail Improvements	$610	0.01	NGO, Staff
Bypass Access Area	$5,300	0.12	Staff
Access Signs	$1,540	0.03	NGO, Staff
500 feet Buffer Zone around Impoundment	$3,592,260	82.33	NGO
Minimum Flow Release Facility	$78,290	1.79	CMP, RA, Staff
Totals:	$915,780	20.76	Staff
	$889,850	20.18	CMP
	$813,540	18.43	RA
	$4,321,410	98.83	NGO

[1]Based on baseline energy production.
[2]Entity: CMP - Central Maine Power Company; RA - Resource agencies; NGO - The Coalition or AMC.

investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, operation and maintenance costs estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity additional available. We assumed the total O&M expenses of $600,000 estimated by CMP for 1995. We used CMP's 1995 avoided costs of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which are based on Gulf Island Hydroelectric Project's avoided cost (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates - with net project investment of $1,461,000 (1994), construction work in progress of $1,394,000 (1994), and project non-enhancement capital improvements of $722,000 (1995) - but without any recommended environmental enhancements. We also evaluated the project's economic benefits with the recommended environmental enhancements requested by the resource agencies, a release of 800 cfs minimum flow year-round, a release of 600 cfs minimum flow year-round, the run-of-river operation, and a release of 800/250 cfs minimum flow year-round.

The annual project cost, without any environmental measures, would be about $1,140,400 in 1995 dollars, or about 26.1 mills/kWh of energy produced. We estimate the cost of alternative power over the license term would be about 35.7 mills/kWh. The project's net economic benefit, without any additional enhancement measures, would be about $417,740 or about 9.6 mills/kWh.

B. Cost of environmental measures

There are currently no minimum flow requirements in the license for Bonny Eagle. Table 2-11 shows the costs (reduction of the project's economic benefits) that would result from the various enhancement measures we evaluated. We discuss the environmental effects of the current project operations, enhancement measures, agencies and NGO's recommendations, and the need or lack of need for enhancements in sections 3 and 4.

2.6.2.2 Skelton (FERC No. 2527)

A. Power and Economic Benefits

Skelton would generate on average about 103,008,000 kWh of energy annually without any additional environmental enhancement measures. According to CMP's revised data filed on June 3, 1996, the net project investment and projected non-enhancement capital improvements are equal to $4,866,000 through December 31, 1994; the construction work in progress is equal to $765,000; and the projected non-enhancement capital improvements would equal to $180,000 in year 1995.

CMP proposes the following environmental enhancement measures at Skelton: (1) constructing downstream fish passage facilities to cost $250,000 (as revised) with an annual operation cost of $70,000; (2) constructing upstream fish passage facilities to cost $4,700,000 (as revised) with an annual operation cost of $70,000; (3) developing trap-and-truck facilities for $500,000 (CMP, 1994b) with an annual operation cost of $110,000; (4) conducting fish passage effectiveness studies for $450,000 (CMP, 1994b); (5) conducting channel modification/alteration to cost $18,000; (6) improving tailrace habitat with boulder clusters to cost $82,000; (7) constructing a minimum flow release facility to cost $525,000 (estimated by CMP for Bonny Eagle - we used this cost estimate for minimum flow facilities for all minimum flow scenarios at Skelton); (8) investigating the feasibility of Island campsites to cost $3,000; (9) providing interpretive facilities to cost $4,000; (10) conducting recreation facility maintenance to cost $8,000 annually; and (11) conducting periodic recreation use assessments to cost $18,000 (every 6 years @ $3,000).

The current license contains no requirements for minimum flow release at Skelton. CMP and the resource agencies are recommending various minimum flow releases and project operations for Skelton. In addition to these minimum flows, CMP analyzed four additional minimum flow releases or operation schemes: release of 800 cfs year-round, release of 600 cfs year-round, run-of-river operation, and release of 800/250-year round.

CMP developed a computerized hydraulic model, for which 103,008,000 kWh annual energy generation, under median-flow conditions, has been used as the baseline-energy-production condition for analyzing the various proposed or recommended minimum flows scenarios. This model was developed for projects in three major river basin systems including CMP's projects on the Saco River. We verified CMP's energy-production and power-value modeling results using a spreadsheet model we developed in-house.

CMP estimates that operating the project with its proposed revised minimum flow[13] would reduce the project generation to about 98,198,000 kWh annually. This would be about 4,810,000 kWh less energy than the baseline condition. About 3,443,000 kWh of the loss would be from on-peak energy and about 1,367,000 kWh from off-peak energy. We estimate the value of the lost energy would be about $112,053 annually.

With the resource agencies' recommended minimum flow of 811 cfs from July 16 to August 31 and October 16 to April 30, and run-of-river operation from May 1 to July 15 and from September 1 to October 15, CMP estimates the project would generate only about 94,962,000 kWh, or about 8,046,000 kWh less energy than the baseline condition. The on-peak energy generation would decrease by about 12,690,000 kWh, however, the off-peak

[13] CMP's proposed minimum flow for Skelton includes: (1) 400 cfs or inflow between May 1 and October 31, (2) 250 cfs or inflow between November 1 and April 30, (3) an upstream and downstream fishway flow of 180 cfs, and (4) limiting the pond level drawdown to 2.5 feet.

Table 2-12 The annual economic impacts, or costs, of the various enhancement measures considered at Skelton and the recommending entity (Source: the staff).

Enhancement Measures	Annual Costs	Costs in mills/kWh[1]	Recommending Entity[2]
Tailrace Habitat Improvement	$14,170	0.13	CMP, RA, NGO, Staff
Channel Habitat Alterations	$3,020	0.03	CMP, NGO, Staff
Downstream Fish Passage-Bypass	$113,820	1.10	CMP, RA, NGO, Staff
Fish Passage Studies	$72,000	0.69	CMP, RA, NGO, Staff
Upstream Fish Passage	$825,790	8.01	CMP, RA, NGO, Staff
Trap-and-Truck Facility	$195,960	1.90	CMP, RA, NGO, Staff
Studies of Aquatic Inv. Below Project	$3,160	0.03	CMP, RA, NGO, Staff
Loss of Energy Due to Proposed Fish Passage	$48,410	0.06	CMP, RA, NGO, Staff
Interpretive Sign - 1996	$670	0.01	CMP, Staff
Investigate Feasibility of Island Campsites- 1996	$500	0.01	CMP, Staff
Annual Recreational Facility Maintenance	$9,010	0.08	CMP, Staff
Periodic (6 year) Recreation Use Assessment	$3,020	0.03	CMP, RA, Staff
500 feet Buffer Zone Around the Impoundment	$3,071,840	29.82	NGO
Minimum Flow Release Facility	$78,290	0.76	CMP, RA, Staff
Totals:	$1,367,820	12.84	Staff & CMP
	$1,354,620	12.71	RA
	$4,348,170	41.77	NGO

[1]Based on baseline energy production.
[2]Entity: CMP - Central Maine Power Company; RA - Resource agencies; NGO - The Coalition or AMC.

energy would increase by about 4,644,000 kWh. In other words, 8,046,000 kWh of energy generated during peak periods would be lost, and additional 4,644,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. The estimated value of the energy loss and energy shift would be about $228,965 annually, or about $116,912 more than the loss caused by CMP's proposed operating regime ($112,053).

We estimate that the flow spilled to operate the proposed downstream fish passage facility (about 180 cfs) would reduce the energy generation of the project by about 2,060,160 kWh (2 percent of 103,008,000 kWh). With CMP's proposed minimum flow release, and losses due to operating the downstream fish passage, the total annual generation would decrease from about 98,198,000 kWh to about 96,137,840 kWh. With the resource agencies' recommended minimum flow regime, and losses due to downstream fish passage, the total annual generation would decrease from about 94,962,000 kWh to about 92,901,840 kWh.

Our independent economic studies are based on current electric power condition. We do not consider future inflation or escalation of prices. The project costs include the net investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, operation and maintenance costs estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity additional available. We assumed the total O&M expenses at $686,000 estimated by CMP for 1995. We used the CMP's 1995 avoided costs of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which are based on Gulf Island Hydroelectric Project's avoided cost (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates - with net project investment of $4,866,000 (1994), construction work in progress of $765,000 (1994), and projected non-enhancement capital improvements of $180,000 (1995) - but without any recommended environmental enhancements. We also evaluated the project's economic benefits with the recommended environmental enhancements requested by the resource agencies, a release of 800 cfs minimum flow year-round, a release of 600 cfs minimum flow year-round, the run-of-river operation, and a release of 800/250 cfs minimum flow year-round.

The annual project cost, without any environmental measures, would be about $1,588,530 in 1995 dollars, or about 15.4 mills/kWh of energy produced. We estimate the cost of alternative power over the license term would be about 35.9 mills/kWh. The project's net economic benefit, without any enhancement measures, would be about $2,114,000 annually, or about 20.5 mills/kWh.

B. Cost of Environmental Measures

There are currently no minimum flows required in the license for Skelton. Table 2-12 shows the costs (reduction of the project's economic benefits) that would result from the various enhancement measures we evaluated. We discuss the environmental effects of the current project operations, enhancement measures, agencies and NGO's recommendations, and the need or lack of need for enhancements in sections 3 and 4.

2.6.3 Pollution Abatement Benefits

Besides economic benefits, Skelton and Bonny Eagle provides air pollution reduction benefits by displacing the generation from fossil-fueled generators.

Since hydropower generation produces no atmospheric pollution, the two projects provide pollution reduction benefits by displacing fossil-fueled generation.

With the resource agencies' recommended minimum-flow and reservoir-fluctuation-restriction operating regime, and losses due to operation of downstream fish passage facilities, the total annual generation of Skelton would decrease from about 103.0 gigawatt-hours (GWh) to about 92.9 GWh--a reduction of about 10.1 GWh.

With the resource agencies' recommended minimum-flow and reservoir-fluctuation-restriction operating regime, and losses due to operation of downstream fish passage facilities, the total annual generation of Bonny Eagle would decrease from about 43.6 GWh to about 42.7 GWh--a reduction of about 1 GWh.

Subjected to the resource agencies' minimum flow requirements, and reservoir-fluctuation regimes, and considering the losses due to the operation of downstream fish passage at both Skelton and Bonny Eagle, the two hydropower projects could displace about 135.6 GWh of fossil-fueled generation.

In the Maine service area, the 135.6 gigawatt-hours of project generation, cited in the previous paragraph, would most probably be replacing energy generated by oil-fired facilities. This amount of oil-fired generation would require the combustion of about 229,850 barrels of oil annually.

The generation of 135.6 gigawatt-hours of electric energy by oil-fired plants annually would produce the following approximate quantities of atmospheric pollutants:

Oxides of sulfur.....455 tons per year
Oxides of nitrogen.....355 tons per year
Carbon monoxide.....24 tons per year
Carbon dioxide.....120,670 tons per year

State-of-the-art pollution control technology is capable of removing about 95 percent of the oxides of sulfur and about 60 percent of the oxides of nitrogen from the uncontrolled flue gases before the gases are released to the atmosphere.

Published figures on the cost of removing a ton of the oxides of sulfur from the uncontrolled flue gases range from $300 to $700. The cost of removing a ton of the oxides of nitrogen ranges from $210 to $560. We use the mid-points of the ranges.

Using a removal cost of $500 per ton, the estimated cost of removing 95 percent of oxides of sulfur, or 447 tons, would be about $216,000 annually. Using a removal cost of $385 per ton, the estimated cost of removing 60 percent of the oxides of nitrogen, or 349 tons, would be about $82,000 annually.

Complying with our recommended minimum flow regimes, and accounting for the losses due to downstream fish passage, would decrease the total annual energy production of all six hydropower projects by about 18 gigawatt-hours. Assuming that this reduction in energy production would be replaced by oil-fired generation, about 61 tons of the oxides of sulfur and about 48 additional tons of the oxides of nitrogen would be produced annually.

We estimate the annual costs of removing 95 percent of the 61 tons of the oxides of sulfur and 60 percent of the 48 tons of the oxides of nitrogen would be about $28,800 and $10,900, respectively.

3. AFFECTED ENVIRONMENT

This section provides a general description of the Saco River Basin; a discussion on the cumulatively effected resources within the basin; and site specific information on the existing environment at Bonny Eagle, Skelton, and Swans Falls. The general description of the basin and regional resources within the basin are presented in section 3.1. Section 3.2 contains a discussion of resources that the proposed actions could cumulatively effect, including anadromous fisheries, wetlands, recreation, and hydroelectric generation. Site specific resources at Bonny Eagle, Skelton, and Swans Falls are described in section 3.3.

3.1 REGIONAL RESOURCES

3.1.1 General setting (Source: U.S. Army Corps of Engineers, 1989, unless indicated otherwise).

Located in east-central New Hampshire and southwestern Maine, the Saco River Basin drains about 1,698 square miles (mi^2) with about 828 mi^2 of this area within Maine. The basin is about 75 miles long with a maximum width of about 44 miles. Originating at the Saco Lake outlet in Crawford Notch, New Hampshire, the Saco River flows about 120 miles in a southeast direction to its mouth at the Atlantic Ocean. Within the first 14 miles below Saco Lake, the river drops nearly 1,240 feet. The river's total fall is about 1,900 feet.

The three principal headwater tributaries of the Saco River are the Swift, Ossipee, and the Little Ossipee rivers. These tributaries account for nearly 45 percent of the basin's total drainage. Originating in the White Mountain National Forest, the Swift River drains an area of about 90 mi^2 and has a total fall of about 1,400 feet. The Swift River flows in a easterly direction for about 24 miles to its confluence with the Saco River at Conway, New Hampshire. The Ossipee River originates at the outlet of Ossipee Lake at Effingham Falls, New Hampshire, and flows in a easterly direction for about 18 miles where it meets the Saco River at Cornish, Maine. The Ossipee's total drainage area is 455 mi^2 with a total fall of about 140 feet. The Little Ossipee originates at Balch Pond in the towns of Newfield and Acton, Maine, draining an area of 187 mi^2. The Little Ossipee flows about 33 miles in an easterly direction, falling about 340 feet before it joins the Saco River at East Limington, Maine.

The Saco River Basin topography includes three distinct land physiographic regions: the White Mountain region, the Northern New England Upland region, and the Seaboard Lowland region (USFWS *et al.*, 1987). Where the Saco River originates in the White Mountains of New Hampshire, the region is characterized by mountains and deep valleys heavily forested with pine, hemlock, and northern hardwoods. Elevations exceed 5,000 feet above mean sea level (msl) and the highest elevation is Mount Washington's summit at 6,288 feet above msl.

The central region of the basin, the Northern New England Upland region, is characterized by steep rounded hills and broad flat valleys with elevations ranging from 500 to 800 feet msl. Traversing this region, the river meanders through glacial depressions creating numerous wetlands and ponds in the region. Below the confluence of the Little Ossipee and the Saco River, the landscape is characterized by low rolling hills and flat plains. Known as the Seaboard Lowland, this region was formed by both glaciers and the ocean.

The basin's geology consists of glacial and marine sediments underlain by igneous and metamorphic rocks, mostly granites and schists. The region's bedrock is generally hard, stable and resistant to erosion. Thick layers of glacial till overlays the bedrock in the valleys and the till thins out on the upper slopes. The glacial till is overlain along the rivers by deposits of glacial outwash and marine sediments. In the southeastern portion of the basin, glacial outwash sediments were reworked and redeposited by the ocean waters. Overall, surficial deposits in the region are thicker than in many other parts of Maine and contribute to maintaining summer flows in the Saco River, as well as cool water temperatures for salmonid fish (CMP, 1989).

The climate of the Saco River Basin varies depending on elevation and proximity to the ocean, but is generally characterized by relatively cool summers and cold, snowy winters. Influenced by mountain elevations at the basin's northern most portion and by the ocean at southeastern portion of the basin, the average annual temperature in the basin is 45 degrees Fahrenheit (F). Extremes range from highs of near 100 degrees F to lows less than minus 30 degrees F.

Average annual precipitation in the basin amounts to about 45 inches, varying from about 40 inches along the coast to about 60 inches in the mountainous headwaters. Precipitation is generally distributed uniformly throughout the year. Annual snowfall over the watershed varies from about 40 inches near the coast to over 115 inches in the White Mountains

The historic development of towns along the Saco River is linked to the lumber industry and the demand for wood products domestically and abroad. Successful European settlements in the area developed after the French and Indian War in the mid-eighteenth century. Towns further inland developed more slowly than those near the coast due to the lack of accessible transportation routes. The towns of Buxton, Saco, and Biddeford were established as the textile manufacturing industry expanded along the lower portion of the Saco River. During the late nineteenth century, towns in the upper reach of the Saco River developed into vacation resorts.

3.1.2 Land Use

The dominate land uses in the region are forestry and agriculture. Eighty-five percent of the Saco River Basin's land is forested with about 10 percent of the remaining land used for agriculture. The most productive agricultural land is located in the basin's central region.

Principal agricultural activities are dairy, poultry, crops, and forest products. Unlike most of the river basins in Maine, the Saco River Basin produces only a small amount of pulpwood. Industrial centers in the basin are located in Biddeford and Saco, Maine, with cotton textiles, textile machinery, and shoes as the major products.

Recreation use is the primary land and water use in the upper portion of the basin due to the river's high scenic value, good water depths during the summer, clear water, and extensive sand bars along the river. The Saco River from the New Hampshire border to East Limington, Maine, is a Maine State outstanding river segment due to its natural and recreational resource values (MDEP, 1988).

About 95 percent of the river corridor is in private ownership, excluding those lands within the White Mountain National Forest (Southern Maine Regional Planning Commission, 1983). In Maine, the Saco River shoreline is protected by municipal shoreland zoning ordinances mandated by the State through the Mandatory Shoreland Zoning Act and the Natural Resources Protection Act. The Saco River Corridor Commission (SRCC) regulates the use of land in Maine abutting the Saco, Ossipee, and Little Ossipee Rivers. Lands under the SRCC's jurisdiction include all land within 500 feet of each side of the river or the 100-year flood plain, whichever is greater, up to a maximum of 1,000 feet.

The MSPO Coastal Program is responsible for reviewing Swans Falls, Hiram, Bonny Eagle, West Buxton, Bar Mills, and Skelton for consistency with the state's Coastal Management Program. These projects are located outside of Maine's coastal zone boundary. Further, MSPO's Coastal Program has not defined a geographic area for federally licensed activities located outside of the coastal zone but likely to affect coastal zone resources (MSPO, 1994). Following the notice of the license, exemption, and amendment applications, MSPO provided no specific comments regarding the projects' potential effects on coastal resources in the state of Maine. In section 4 we address how Swan Falls and CMP's hydroelectric projects affect coastal resources, i.e., Atlantic salmon.

3.1.3 Water quality and quantity

Unlike many of the major river basins in Maine and in New England, the Saco River Basin largely escaped the industrial revolution and its associated adverse effects on water quality. Thus, at present, the basin's water quality is generally excellent, primarily due to limited economic development in its middle and upper portions. MDEP (1990) classified 99 percent of the 82 Saco River miles in Maine as "fishable and swimmable", interim goals of the Clean Water Act. Local problems do exist, however, particularly in coastal and urban areas (USFWS *et al.*, 1987).

Table 3-1 Class A water quality standards for Maine waters.

A. Class A waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection; fishing; recreation in and on the water; industrial process and cooling water supply; hydroelectric power generation, except as prohibited under Title 12, section 403; and navigation; and as habitat for fish and other aquatic life. The habitat shall be characterized as natural.

B. The dissolved oxygen content of Class A waters shall be not less than 7 parts per million or 75% of saturation, whichever is higher. The aquatic life and bacteria content of Class A waters shall be as naturally occurs.

C. Direct discharges to these waters licensed after January 1, 1986, shall be permitted only if, in addition to satisfying all the requirements of this article, the discharged effluent will be equal to or better than the existing water quality of the receiving waters. Prior to issuing a discharge license, the department shall require the applicant to objectively demonstrate to the department's satisfaction that the discharge is necessary and that there are no other reasonable alternatives available. Discharges into waters of this classification which were licensed prior to January 1, 1986, shall be allowed to continue only until practical alternatives exist. There shall be no deposits of any material on the banks of these waters in any manner so that transfer of pollutants into the waters is likely.

The primary source of pollutants in the basin is point source discharges from municipal treatment plants (NERBC, 1980). These discharges, concentrated near the mouth of the river in Saco and Biddeford, contain both domestic and industrial waste. New England River Basin Commission (1980) estimated that 5.2 million gallons per day (mgd) are discharged from these point sources. There are no significant discharges further up the basin (CMP, 1991).

Nonpoint sources are generally short-lived, localized problems that are generally not a major influence on continuing water quality problems (New Hampshire Water Supply and Pollution Control Commission, 1982). Typical nonpoint sources include urban run-off, agricultural run-off, road salt, and sediment inputs due to silvicultural activities.

Water quality in the Saco River is monitored at about 180 stations in New Hampshire (New Hampshire Water Supply and Pollution Control Commission, 1979) and by the U.S. Geological Survey (USGS) at the Cornish, Maine gage station (29 miles upstream of Skelton). USGS publishes this data annually in its Water Resources Data report.

The USGS collects water quality samples at Cornish about six times per year and conducts tests for over 50 water quality parameters including pH, DO, turbidity, bacteria, nitrogen, and phosphorus, as well as metals. The results of the USGS water quality sampling at this station for the years 1986 through 1989 indicated low concentrations of nutrients, low turbidity, moderate pH and high DO concentrations. Furthermore, although chlorophyll data

Table 3-2 Class C aquatic life standards for Maine waters.

Discharges to Class C waters may cause some changes to aquatic life, provided that the receiving waters shall be of sufficient quality to support all species of fish indigenous to the receiving waters and maintain the structure and function of the resident biological community. 38 MRSA §465(4)(C).

was not collected, CMP (1991) concluded that the extremely low concentrations of nitrogen and phosphorus suggested that algal populations were also low, and thus, probably not a serious water quality problem.

Further downstream in the Saco and Biddeford area of the lower Saco River, the MDEP collected water quality samples on a monthly basis from 1975 to 1978. CMP (1991) concluded that DO concentrations suggested no eutrophication problems, but that coliform concentrations were moderately high and were indicative of a notable water quality problem. CMP (1991) further concluded, however, that these concentrations were likely a local phenomenon resulting from the combined sewer overflows in the Saco/Biddeford region. It is estimated, however, that about 4 million gallons of effluent loading into the tidewater area downstream of Cataract occurs each day (FERC, 1989). During low tides, the majority of water present in the Saco River estuary is flows from Cataract.

Water quality standards for Maine waters are determined by the Maine Legislature. The Saco River is classified by the Maine Legislature, 38 MRSA §467, as follows:

(1) From the Maine-New Hampshire border to a point 1,000 feet below the Swans Falls dam - Class A;

(2) From a point located 1,000 feet below the Swans Falls dam to its confluence with the impoundment of the Hiram dam - Class AA;

Table 3-3 Class GPA water quality standards for Maine waters.

A. Class GPA waters shall be of such quality that they are suitable for the designated uses of drinking water after disinfection, recreation in and on the water, fishing, industrial process and cooling water supply, hydroelectric power generation and navigation and as habitat for fish and other aquatic life. The habitat shall be characterized as natural.

B. Class GPA waters shall be described by their trophic state based on measures of the chlorophyll "a" content, Secchi disk transparency, total phosphorus content and other appropriate criteria. Class GPA waters shall have a stable or decreasing trophic state, subject only to natural fluctuations and shall be free of culturally induced algal blooms which impair their use and enjoyment. The number of Escherichia coli bacteria of human origin in these waters may not exceed a geometric mean of 29 per 100 milliliters or an instantaneous level of 194 per 100 milliliters.

C. There shall be no new direct discharge of pollutants into class GPA waters. Aquatic pesticide treatments or chemical treatments for the purpose of restoring water quality approved by the department shall be exempt from the no-discharge provision. Discharges into these waters which were licensed prior to January 1, 1986, shall be allowed to continue only until practical alternatives exist. No materials may be placed on or removed form the shores or banks of a Class GPA waterbody in such a manner that materials may fall or be washed into the water or that contaminated drainage therefrom may flow or leach into those waters, except as permitted pursuant to section 391. No change of land use in the watershed of a Class GPA waterbody may, by itself or in combination with other activities, cause water quality degradation users of downstream GPA waters or cause an increase in the trophic state of those GPA waters.

(3) From its confluence with the Hiram impoundment to a point 1,000 feet below the Hiram dam - Class A;

(4) From a point 1,000 feet below Hiram dam to its confluence with the Little Ossipee River - Class AA;

(5) From its confluence with the Little Ossipee River to the West Buxton dam, including all impoundments - Class A;

(6) From the West Buxton dam to its confluence with the Bar Mills impoundment - Class A;

(7) From its confluence with the impoundment formed by the Bar Mills dam to the confluence with the impoundment formed by the Skelton dam - Class A;

(8) From Skelton dam to its confluence with the impoundment formed by the Cataract dams - Swan Pond Stream, including all impoundments - Class A;

(9) From the confluence with the impoundment formed by the Cataract dams to its confluence with Swan Pond Stream, including all impoundments - Class A; and

(10) From its confluence with Swan Pond Stream to tidewater - Class B.

Furthermore, pursuant to 38 MRSA §464, the waters immediately downstream of and measurably affected by Bonny Eagle and Skelton (i.e., the tailwaters) are not subject to the Habitat and Aquatic Life Standards of Class A waters, but instead, are subject to Class C Habitat and Aquatic Life Standards. In enacting this legislation, the Maine Legislature decided to apply Class A habitat characteristics and Aquatic Life Criteria only to unaffected, free-flowing waters. Under the provisions contained in this section, the habitat characteristics and aquatic life criteria of Class A are deemed to have been met in these sections if Class C criteria are met.

Criteria for Class A waters, the second highest classification, are shown in Table 3-1. Criteria for the Class C Habitat and Aquatic Life Standards are shown in Table 3-2.

The Skelton impoundment is classified as Class GPA (Great Pond A). Class GPA standards are also specified in 38 MRSA §465 and are provided in Table 3-3.

Flows in the Saco River vary seasonally with changes in climatological conditions. Highest flows typically occur during the spring runoff period in March, April, and May when melting snows combine with spring rains. About fifty percent of the basin's annual runoff occurs during this time. Minimum flows in the Saco River generally occur in the months of September and October.

Table 3-4 Hydrologic characteristics of the Saco River (Source: NERBC, 1980; U.S. Army Corps of Engineers, 1989).

Location of Gage Station (Source)	Drainage Area (mi^2)	Discharge (cfs)			
		Maximum	Minimum	Mean	7Q10
Saco River Conway, NH (USGS 1909-1987)	386	43,900	105	935	89
Saco River Cornish, ME (USGS 1918-198)	1,293	45,000	244	2,710	340
Saco River West Buxton, ME (USGS 1908-1940)	1,572	58,200	-	3,057	-
Ossipee River Cornish, ME (USGS 1916-1987)	452	17,200	65	690	121
Little Ossipee S. Limington, ME (NERBC, 1980)	161	5,300	7	255	-
Ellis River Jackson, NH	11	4,500	3	34	-

The USGS operates stream flow gages at four locations on the Saco River, as well as on the major tributaries: the Swift, the Ossipee, and the Little Ossipee. The hydrologic characteristics of the Saco River and its tributaries, as measured at USGS gaging stations, are summarized in Table 3-4.

Monthly and average annual stream flows in the Saco River as measured at the USGS gage in Cornish, Maine (USGS gage #010066000) are provided in Table 3-5. The gage at Cornish represents 1,293 mi^2 of drainage, or over 76 percent of total basin drainage. Estimated annual flow at the mouth of the river is 3,550 cfs (Rizzo, 1983) and the estimated 7Q10 (the 7 day, 10 year low flow) is 478 cfs (MDEP, 1994).

In 1983, because the Saco River Basin was largely unspoiled by intensive or poorly planned commercial, industrial, and residential development and the existing water quality in the inland portions was extremely high, the Maine Legislature passed 38 MRSA §951 - *An Act Related to the Saco River Corridor*. The purpose of this Act was to create the Saco River Corridor and preserve the environmental resources that could potentially be threatened by the towns along the river and adjacent lands experiencing rapid population growth and

Table 3-5 Monthly and annual flow (cfs) of the Saco River at Cornish, Maine (1918 - 1987) (Source: U.S. Army Corps of Engineers, 1989).

Month	Maximum	Minimum	Mean	Median
January	5,791	528	2,010	1,670
February	12,772	615	2,064	1,506
March	16,220	805	3,244	2,592
April	12,744	3,292	7,345	7,055
May	11,717	1,707	5,663	5,638
June	8,741	860	2,680	2,409
July	6,802	591	1,429	1,170
August	2,591	424	1,034	864
September	5,073	399	1,047	942
October	6,887	406	1,436	1,125
November	5,689	608	2,306	1,761
December	8,630	560	2,534	2,050
AVERAGE	8,638	899	2,732	-

development.

3.1.4 Vegetation and wildlife resources

The Saco River Basin is located within the New England Section of the Hemlock-White Pine-Hardwoods Region as described by Braun (1950). The Hemlock-White Pine-Hardwoods Region (Region) is characterized by the pronounced alternation of deciduous, coniferous, and mixed forest communities.

The New England Section of the Region generally includes the New England states. Braun (1950) separates the New England Section into two principle forest types, hemlock-hardwoods and spruce-hardwoods. The Saco River Basin is situated primarily within the hemlock-hardwoods area.

According to Braun (1950), when the Pilgrims came to the continent, New England was covered by forest, interrupted only where lakes or bogs and river swamps made tree growth impossible; where sand deposits near the coast were unsuitable for closed forest stands; where fire or windfall had temporarily destroyed the forest; where Indians had burned the forest (especially near the coast); and where rock outcrops occurred in the more rugged sections. Clearing for settlement began at once. The first sawmill in New England was built in 1623 about 30 miles southwest of Saco.

By 1650, sawmills followed settlement throughout New England. Cutting and burning continued for 200 years in an effort at agricultural utilization and expansion. Then farm

abandonment commenced. The lumber industry, meanwhile, began to center farther north. This reached its peak about 1850, then rapidly declined. Additional forest clearing occurred with the introduction of portable sawmills, which allowed cutting in areas that were more selective. Also, the pulp and paper industry was even more destructive. In three centuries, the virgin forest of New England had been reduced from 95 to 5 percent of the total area. Today, only a few small virgin stands remain.

As in most of New England, the forests that presently occur within the Saco River Basin are mostly second-growth forests. Braun (1950) states that these areas have followed repeated cutting and burning of hardwood and mixed forest, and abandonment of farm and pasture land.

According to Shelford (1963), the wolf, mountain lion, and wapiti (elk) have been essentially extirpated from these forests. In areas that have become reforested because cultivation proved unprofitable, white-tailed deer, black bear, and turkey have returned.

3.1.5 Threatened and endangered species

There are no known federally listed or proposed threatened or endangered species in the project areas at Swans Falls, Bonny Eagle, or Skelton, other than occasional transient species (e.g., bald eagle and peregrine falcons) [letters from the USFWS dated June 24, 1991 for Swans Falls, and Interior, each dated October 1, 1993, for Bonny Eagle and Skelton].

3.1.6 Socioeconomic resources

Towns near Swans Falls include Hiram, Brownfield, Denmark, and Fryeburg with a combined population of about 5,000. Tourism is very important to the economy in the vicinity of Swans Falls while other industries that generate the area's economy include agriculture, wood products, and light manufacturing. According to the Southern Maine Regional Planning Commission's (SMRPC) (1981) recreation use study, about 1 million dollars per summer is spent in the Saco River Basin which is directly related to canoeing and camping. Most of this is spent near Swans Falls between Fryeburg and Hiram, Maine.

Bonny Eagle is located in both York and Cumberland Counties while Skelton is located solely within York County. York County's population increased 21 percent from 139,666 in 1980 to 169,091 in 1986 and Cumberland County's population increased 21 percent from 215,500 in 1980 to 260,799 in 1990. The major population centers near these projects include Buxton, Limington, Standish, Dayton, and Hollis with a combined population that was about 22,000 in 1986 (CMP, 1991). Large population centers within 100 miles of Bonny Eagle and Skelton include Portland, Augusta, and Boston.

Many individuals living near both Bonny Eagle and Skelton work in the cities of Portland, Saco-Biddeford, and Standford. South coastal Maine, which includes York and Cumberland Counties, is growing rapidly and its economy is the most robust of any region in

the state. Economic growth in the region is linked to a growing population, increased tourism, and expanding industries. Unlike other regions of Maine, natural resource and clothing industries do not dominate the manufacturing sector. Instead, manufacturing firms in the area produce textiles, plastic products, leather goods, and electronics as the principle products (CMP, 1989).

3.1.7 Air quality

In the industrialized coastal areas of New England, unhealthy air quality occurs periodically as a result of ozone emissions (PR New Wire Association, Inc., 1992). Air quality is considered unhealthful when it exceeds the National Ambient Air Quality Standard of 12 parts per million (ppm). Oxides of nitrogen (NO_x), emitted from cars, trucks, and stationary sources (such as industries), contribute to smog and ground-level ozone in the Northeast. About 24 percent of NO_x emissions come from electric utilities burning fossil fuels (Coal & Synfuels Technology, 1992).

Air quality in the Saco River Basin ranges from good in the sparsely inhabited regions of the upper basin to problematic in the lower, more industrialized areas. In the White Mountain National Forest (located in the basin's headwaters), the U.S. Forest Service (USFS) monitors the effects of air pollution on visibility, acid deposition, vegetation, and water quality. Results indicate that terrestrial resources have already been adversely impacted by sulfur deposition and that the aquatic resources have been adversely impacted by both sulfur and nitrogen emissions (Carlson and O'Brien, 1993).

3.2 CUMULATIVE EFFECTS ANALYSIS

3.2.1 Anadromous fisheries

Historically, anadromous alewife, American shad, and Atlantic salmon were common in the Saco River Basin (Foster and Atkins, 1868), but diminished in numbers from adverse impacts associated with dam construction and industrial development in the Saco-Biddeford area (USFWS *et al.*, 1987). Ongoing efforts, however, of federal and state resource agencies, NGOs, and CMP, to restore anadromous fish to the Saco River have greatly improved the potential for successful anadromous fisheries in the basin. Water quality in the river has been enhanced due to local improvements and new state-of-the-art fish passage facilities have recently been installed at the lowermost fish barrier, Cataract. Given this increased potential, the USFWS, MDIFW, ASRSC, and MDMR have targeted these species for restoration in the Saco River Basin (USFWS *et al.*, 1987).

There are many factors, and obstacles, involved in the successful restoration of anadromous fisheries including: adequate fish passage facilities, habitat availability, water quality, agency management, and funding availability. At present, fish passage facilities in the basin are insufficient for passage of these fishes. Only Cataract, the lowermost project on the river, has adequate fish passage facilities. Habitat availability, especially in the lower

portions of the river, is dependent on hydro-operations and river flows. While water quality throughout the basin has improved in recent years, local problem areas still exist. Agency management and funding availability is always an important concern since future funding priorities can not always be foreseen. Changes to funding priorities can force agency goals and management objectives to change.

Atlantic salmon

Historically, Atlantic salmon utilized most of the Saco River Basin. Salmon were able to negotiate the natural falls at the head-of-tide in Saco and more difficult falls upstream at Hiram and Swans Falls and migrate into portions of New Hampshire (Foster and Atkins, 1868). All other species were stopped by the natural barrier at Saco (Goode, 1887). However, like most basins in the northeastern United States, the Saco River's Atlantic salmon fishery was lost in the early 19th century (USFWS *et al.*, 1987).

The restoration of Atlantic salmon stocks has been an ongoing effort since the late 19th century. Recent stocking efforts in the 1970's and 1980's (Table 3-6) have had only limited success, although habitat assessments for the Saco River indicate that suitable habitat for Atlantic salmon currently exists (USFWS *et al.*, 1987). Returning adult Atlantic salmon have been observed as far upriver as the West Buxton dam as fish are apparently able to utilize the existing passage facilities at Skelton and negotiate the Bar Mills dam under some conditions of spill (CMP, 1991b). Recent fish passage counts by the ASRSC for Skelton and Cataract are listed in Table 3-7.

Currently, it is not known if any successful natural reproduction of Atlantic salmon occurs in the Saco River. In November of 1993, however, ten Atlantic salmon redds were observed in a riffle area in the vicinity of the Skelton tailrace carry-in boat access area (RMC Environmental Services, 1994). These redds were the first documented Atlantic salmon spawning activity in the Saco River in many years.

With the construction and operation of the Saco River Salmon Club's (SRSC) Atlantic salmon hatchery at Bar Mills in 1992, fry stockings in the Saco River Basin are expected to become more consistent in both numbers and regularity. SRSC expects annual fry stockings to increase to over 500,000 in 1995, with a projected hatchery capacity of about 1.2 million eggs and 1.1 million fry by 1997 (Callen, 1994).

The USFWS *et al.* (1987) estimated the potential for Atlantic salmon production in seven different reaches of the Saco River (Figure 3-1 and Table 3-8). In summary, it was estimated that the Maine segment of the Saco River drainage could produce 21,743 smolts and that the entire drainage could produce 42,335 smolts if all production areas in New Hampshire became available (USFWS *et al.*, 1987). Estimated runs returning to the Saco River for the Maine segment were 211-837 fish, while a run of 341-1556 fish were estimated for the entire drainage. To maintain a self-sustaining population in the entire drainage, USFWS *et al.* (1987) further concluded that a total of 1,492 spawners (with a 1:1 sex ratio)

would be required: 878 fish in Maine and 614 fish in New Hampshire.

The USFS supplemented the above results in 1988 with surveys of the upper Saco River Basin in the White Mountain National Forest in New Hampshire. An additional 39 miles of streams were surveyed and assessed for Atlantic salmon habitat. Results indicate that 175 units of spawning habitat and 9,029 units of nursery/rearing habitat (one unit = 100 square yards of habitat) were present (USFS, 1988). Based on a smolt production of two smolts per habitat unit (as per the USFWS *et al.*, 1987), we estimate the potential smolt production to be 18,058 smolts. The addition of these smolts to the 1987 estimate of 42,335 smolts translates to a 42 percent increase. Furthermore, the USFS (1988) estimates that the nursery habitat on the National Forest has the potential to support 135,000 salmon fry based on a stocking rate of 15 fry per unit.

Analysis of these projected production estimates for salmon shows that about 43 percent of the available spawning and nursery habitat in the basin is located in Maine (Table 3-8). The remaining 57 percent of the habitat is located above Swans Falls. Of the habitat located in Maine, 95 percent is located above Bonny Eagle with roughly 50 percent in the Little Ossipee River (581 habitat units) and the Ossipee River (5,816 habitat units) (USFWS *et al.*, 1987). The physical characteristics of the various Saco River reaches are summarized in Table 3-9.

Table 3-6 Atlantic salmon stocking history in the Saco River (Source: CMP, 1992; 1994c).

Year	Age Group	# Stocked
1974	spring yearlings	36,500
1975	smolts (1+)	9,500
1980	smolts (1+)	682,000[1]
1982	parr (0+)	47,096
1983	smolt (1+)	20,342
1984	smolts (1+)	5,131
1985	smolts (1+)	5,098
	parr (1+)	23,600
1986	smolts (1+)	35,192
	parr (1+)	10,004
1987	smolts (1+)	22,120
	parr (1+)	69,523
1988	fry (0+)	47,120
	smolts (1+)	25,138
1989	parr (0+)	37,755
	parr (1+)	49,550
	smolts (1+)	9,890
1990	parr (0+)	30,000
	parr (1+)	47,800
	smolts (1+)	10,600
1991	fry (0+)	111,000
	smolts (1+)	10,320
1992	fry (0+)	154,000
	parr (0+)	50,200
	parr (1+)	400
	smolt (1+)	19,800
1993	fry (0+)	167,000
	smolt (1+)	20,100
1994	fry (0+)	200,000
	smolt (1+)	20,000
Total[2]	fry (0+)	679,120
	parr (0+)	165,051
	parr (1+)	200,877
	smolts (1+)	213,231

[1]Total released throughout 8 river systems in ME
[2]Stockings in 1974 and 1980 not included.

To accomplish the goals of restoration, specific management objectives were outlined by the strategic plan (USFWS *et al.*, 1987). River reaches II through VI (from Cataract dam to the NH border) are to be managed as spawning/nursery habitat to produce

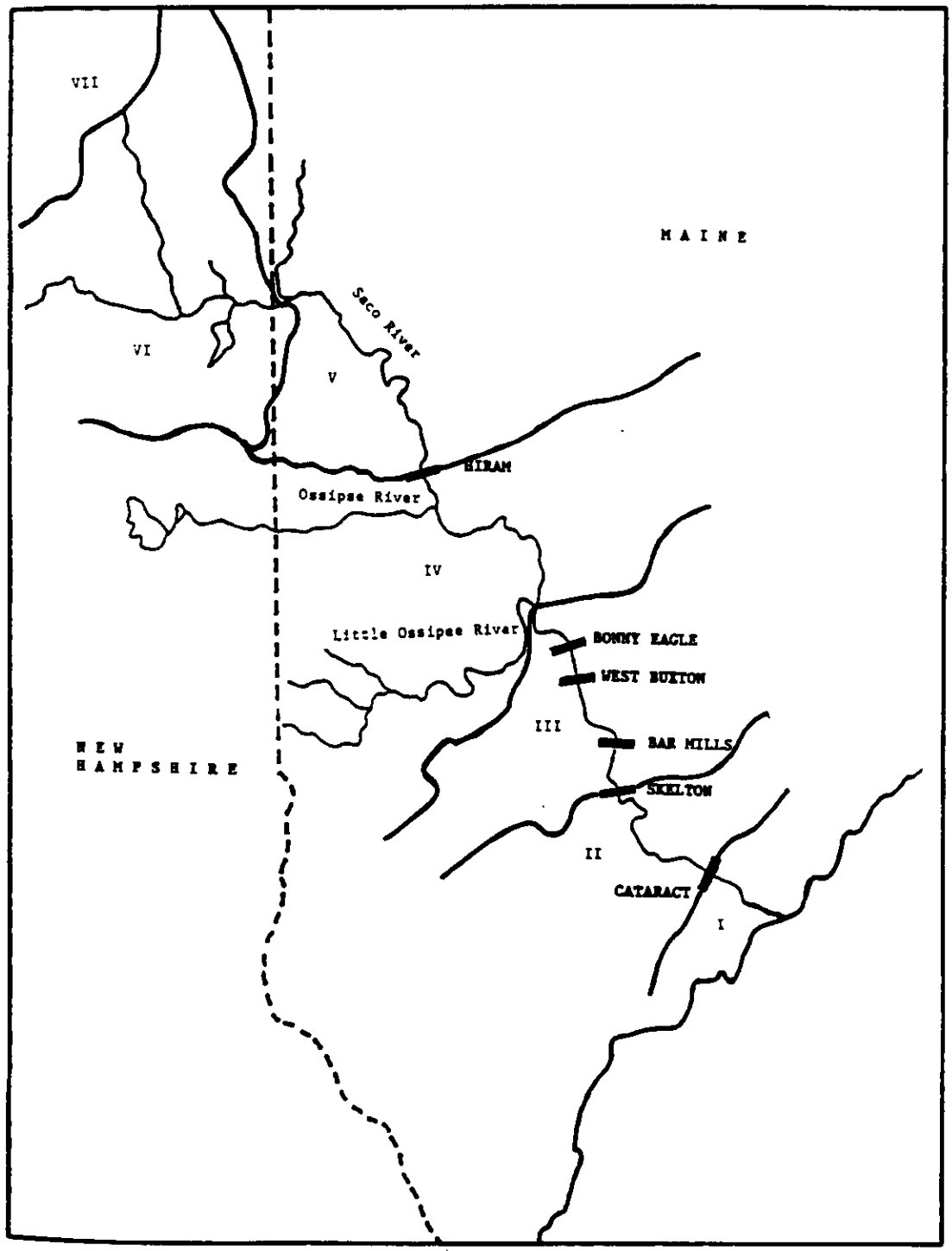

Figure 3-1 The Saco River Basin depicting the seven anadromous fish sections (Source: CMP, 1991b; USFWS *et al.*, 1987).

salmon smolts, for sustained production of salmon. The entire Saco River, from the Saco River estuary to the New Hampshire border, would be managed as a migratory pathway for salmon (particularly smolts) and be promoted as a recreational fishery.

Additionally, the USFWS has established a goal of a self-sustaining Saco River Atlantic salmon population of 1,180 adult spawners by the year 2012 (USFWS, 1989). USFWS projected the average annual run of returning salmon to be 290 fish for the period 1989-1996, and 550 fish for the period 1997-2001. These projected returns, however, were largely dependent upon the installation of adequate fish passage facilities at Cataract by 1991 and Skelton by 2005 and the annual stocking of up to 25,000 salmon smolts and 100,000 fry starting in 1990.

As stated above, spawning and nursery habitat for Atlantic salmon occurs in the Ossipee and Little Ossipee Rivers. These two tributaries which flow into the Saco River above Bonny Eagle have operating hydroelectric projects--the Kezar Falls Project (# 9340) is a licensed project on the Ossipee River and the Ledgemere Project (# 8788) is an exempted project on the Little Ossipee River. These two projects have blocked upstream passage of Atlantic salmon, and therefore contribute to cumulative impacts on this species in the Saco River basin. Stocking of Atlantic salmon in these tributaries occurred in the 1970's and 1980's but has been discontinued and presently there is little active management by the fishery agencies for Atlantic salmon in these tributaries. However, with signing of the Agreement, construction and operation of fish passage facilities at Cataract, and improvement of water quality in the lower Saco River, the resource agencies will likely resume efforts to restore Atlantic salmon to these tributaries. Conditions are included in the license and exemption that provide for run-of-river operation, minimum flow releases, and the construction and operation of upstream and downstream fish passage facilities when needed in the future. These measures would minimize any cumulative adverse impacts to the anadromous fishery by providing access to and above the projects during upstream and downstream migrations.

Another Saco River tributary having an operating hydroelectric project--the Goodrich Falls Project--is the Ellis River in New Hampshire. This unlicensed project in combination with an impassable falls blocks Atlantic salmon access to upstream habitat, and there are no current management plans for Atlantic salmon for the Ellis River. This stream is managed primarily for brook trout (USFWS et al., 1987).

American shad

Historically, American shad were abundant in all the major rivers of Maine with a commercial fishery occurring from colonial days until about 1920 (MDMR, 1982). In 1912, an estimated 3.2 million pounds of shad were commercially harvested. MDMR (1982) reports that due to dams and pollution, however, the suitable and accessible watershed area for shad in Maine has been reduced from over 12,000 mi^2 to less than 700 mi^2, or about 5 percent of

the former habitat. As a result, currently American shad in Maine are incapable of supporting a commercial fishery.

Shad were also historically important in the lower Saco River. Foster and Atkins (1869) reported a commercial gill net fishery for shad existed below Saco in the mid 1800's. By the 1860's, however, the number of shad had declined drastically due to pollution of the river with textile dyes from the cotton and woolen mills in the lower Saco River. As recently as 1950, Taylor (1951) reported no shad in fishery surveys of the Saco River.

Given water quality improvements, shad reestablished in the lower Saco River and now naturally reproduce below Cataract. Currently, however, shad are only taken as an incidental catch in the alewife fishery in the Cataract area and do not represent a significant resource at this time (USFWS *et al.*, 1987). In 1993, American shad returns collected at the Cataract facilities were 997 fish (RMC Environmental Services, 1994).

Table 3-7 Recent Atlantic salmon fishway counts and rod catches in the Saco River, Maine. (Source: CMP, 1992; 1994c; 1995b; RMC Environmental Services, 1994).

	Fishway Counts		
Year	Cataract	Skelton	Rod Catch
1985	2	-	79
1986	19	19	1
1987	29	11	13
1988	28	9	3
1989	14	7	5
1990	28	39	19
1991	4	0	0
1992[1]	0	0	0
1993	53	15	12
1994	21	8	-
Total	198	108	132

[1]Fishways at Cataract were shut down due to construction and no counts were taken at Skelton.

Hiram Falls is considered the historical upstream limit of American shad. Based on surveys conducted by USFWS *et al.* (1987) it is estimated that over 200,000 adult shad could potentially be produced in the Saco River Basin if habitat above Cataract were available to returning adults. Of the basin's total potential habitat, over 75 percent is located between Skelton and Hiram in reaches III and IV (Table 3-8). USFWS *et al.* (1987) estimates that 6.6 to 10.7 million juveniles could be produced resulting in a return run of 150,000 adults. Adult runs were based on a 90 percent downstream survival of juveniles and a 90 percent upstream fish passage efficiency at each dam.

Alewife

Alewives were historically common in the lower Saco River below the falls at Cataract (Foster and Atkins, 1868). Goode (1887) reported that an occasional dip-net fishery for alewives existed in the late 1800's. Much like shad, however, alewives were adversely affected by development and textile mill pollution. Presently, alewife are harvested locally in the Cataract area for use as lobster bait (USFWS *et al.*, 1987). MDMR (1982) reports that

Table 3-8 Summary of suitable habitat, spawning escapement, and production estimates for important anadromous fish species in the Saco River Basin by reach (Source: USFWS *et al.*, 1987)

Reach Description	Atlantic Salmon			American Shad			Alewives		
	Nursery Units (100 yd^2)	Spawning Escapement (males plus females)	Potential Smolt Production	Units (100 yd^2)	Spawning Escapement (males plus females)	Potential Adult Production	Units (100 yd^2)	Spawning Escapement (males plus females)	Potential Adult Production
I. Jetty to Cataract and Upper York Dams	None	–	–	Unknown	–	–	Unknown	–	–
II. Cataract and Upper York Dams to Skelton Dam	163	10	163	21,313	24,510	49,020	20,336	14,706	49,350 to 98,700
III. Skelton Dam to Little Ossipee River confluence	593	36	593	50,799	58,419	116,838	48,800	35,289	118,440 to 236,880
IV. Little Ossipee River confluence to Hiram Dam	12,654	754	19,051	18,756	21,570	43,139	227,722	164,675	552,840 to 1,105,680
V. Hiram Dam to Swans Falls Dam	1,162	72	1,843						
VI. Swans Falls Dam to ME-NH Border	93	6	93						
Total for Maine	14,665	878	21,743	90,868	104,499	208,997	296,858	214,670	720,630 to 1,441,260
ME-NH border to Ellis River confluence	10,296	614	20,592						
VII. Ellis River confluence to outlet of Saco Lake	No habitat has been quantified with Reach VII								
Grand Total	24,961	1,492	42,335	90,868	104,499	208,997	296,858	214,670	720,630 to 1,441,260

although the alewife has little recreational value, the major use of alewife is for lobster bait, trawl bait, and processing into fish protein. Statewide, over 90 percent of the current annual harvest is used a lobster bait (MDMR, 1982). In 1993, alewife returns collected at the Cataract facilities were 897 fish (RMC Environmental Services, 1994).

Also, like American shad, Hiram Falls is considered the upstream limit of alewives. USFWS *et al.* (1987), however, estimated that from 0.7 to 1.4 million adult alewives could potentially be produced in the Saco River Basin if habitat above Cataract were available to returning adults. The vast majority of the habitat is located above Skelton. Of the basin's total potential habitat, over 93 percent is located above Skelton and 76 percent is located above the confluence with the Little Ossipee River in reach IV (Table 3-8 and Figure 3-1).

3.2.2 Wetlands and wildlife resources

In the past, coastal and inland wetlands were seen as worthless wastelands that could only become "productive" through human intervention. Colonial Americans routinely drained marshes and swamps in order to transform these "marginal" lands into highly productive farmlands. This legacy of human-induced changes continues today with the alteration of

wetlands for agriculture, residences, transportation, industry, and recreation. In New Hampshire, wetlands adjacent to water bodies are particularly susceptible to developmental pressures due to the ever increasing demand for shore front property (New Hampshire Office of State Planning, 1989).

In New Hampshire and Maine, wetlands have been drained for timber cutting, and ditched and drained for hay, grain, forage, and vegetable crops. Moreover, inland wetlands have been lost to road and highway construction, building construction, and peat and mineral/gravel mining. On the other hand, beaver impoundments and those impoundments created by dams for water supply and hydroelectric power may have resulted in wetland development. Local changes in drainage patterns due to various terrain alterations may have also caused some sites to become wetter. Gravel excavations, abandoned when the water table was reached, are examples. Still, the consensus is that there has been a net loss of wetlands in New Hampshire and Maine, and that the quality of many existing wetlands has been reduced by adverse environmental impacts, development pressures, and improper land use management practices (New Hampshire Office of State Planning, 1989).

On a state-wide basis, wetlands occupy 3.4 percent of the total surface area of New Hampshire and 24.5 percent of the total surface area of Maine (Dahl, 1990). Of the 873 square miles (558,720 acres) of area occupied by the Saco River watershed in New Hampshire, about 9,593 acres (about 1.7 percent) are wetlands (New Hampshire Office of

Table 3-9 Selected physical characteristics of the Saco River Basin by reach. (Source: USFWS *et al.*, 1987).

Reach	Dominant Substrate Types	Average Gradient (ft/mile)
I	Unknown	Tidal
II	Almost entirely impounded. Unimpounded waters contain boulder, rubble, and gravel	1.6
III	Mostly impounded. Unimpounded waters contain ledge, boulder, rubble, and gravel	6.5
IV	Ledge, boulder, rubble, gravel, and sand	2.1
V	Predominantly sand, or gravel and sand	0.9
VI	Predominantly sand or gravel	4.6
VII	Predominantly rubble but contains ledge, boulder, gravel, and sand	63.3
Little Ossipee River	Ledge, boulder, rubble, gravel, and sand	11.0
Ossipee River	Gravel, boulder, rubble, and sand	7.8

State Planning, 1989). We estimate that of the remaining 816 square miles (522,240 acres) of the Saco River Basin within Maine, that about 127,950 acres are wetlands (applying the 24.5 wetland percentage for Maine).

The USFWS (1990) estimates that the states of Maine and New Hampshire have lost about 20 percent and 9 percent, respectively, of the total wetlands during the period 1780's to 1980's. Although we do not have an estimate for wetland losses in the Saco River Basin, applying these same percentage losses to the Saco River would yield losses of 959 acres for the portion of the Saco River in New Hampshire and at least 25,590 acres for the Saco River in Maine. However, these historic wetland losses for the Saco River assume that the losses have been at the same percentage as the entire state, which is likely not the case. We recognize that a variety of variables affect wetland losses and are not necessarily uniform across the state.

3.2.3 Recreation resources

One of Maine's most heavily used recreational rivers, the Saco River offers excellent opportunities for canoe touring and angling. Other recreational activities also occurring along the Saco River include swimming, camping, picnicking, power boating, and sightseeing. In general, recreational demand has increased along the Saco River in the past 20 years from population growth in southern Maine, increasing numbers of visitors to the state, the success of water cleanup efforts, and improvement in fisheries (Southern Maine Regional Planning Commission, 1983).

Canoe touring

The Maine Rivers Study indicates that the Saco River is Maine's most heavily used canoe touring river due to its easy navigation, clean water, variety of scenery, and easy access (MSPO, 1987). Most of the canoe touring participation on the Saco River occurs above Hiram because this section of the river is relatively free-flowing and offers an abundance of sandbars which canoeists use for campsites. The 25-mile-long stretch of the Saco River from Swans Falls to Hiram receives over 60,000 visitor days of use per year and is the most heavily used river segment in Maine (Southern Maine Regional Planning Commission, 1983). Within this stretch, SFC provides a canoe portage around the Swans Falls dam and AMC maintains a canoe put-in area below the dam.

Historically, participation in canoeing as a recreation experience has primarily evolved in the past century, and nationwide participation in canoeing increased 400 percent between 1960 to 1990 (CMP, 1989). On the Saco River, canoeing experienced the greatest increase in use during this time period (Southern Maine Regional Planning Commission, 1983).

While canoe touring is currently less prominent below Hiram, occasional groups travel though this stretch as they tour from the Saco River's headwaters in New Hampshire to the Atlantic Ocean. The SMRPC suggest that the difficulty of portage sites below Hiram (i.e.,

steep stairways and slopes) is likely one of the reasons the lower Saco River receives lower usage by canoeists. The SMRPC (1983) also suggest that the impoundments in the lower portion of the Saco River are responsible for the smaller and more infrequent sandbars which limit camping areas along the river.

Six of the seven hydroelectric projects on the mainstem Saco River are located along the lower section of the Saco River (below Hiram, Maine). Within the Saco River's lower section, CMP provides canoe portage facilities at Skelton, Bar Mills, West Buxton, Bonny Eagle, and Hiram. There are currently no canoe portages at Cataract due to the major urban development adjacent to the project which limit portage opportunities. CMP's comprehensive recreation plan (1989) indicates that CMP plans to explore means for portaging the Cataract dams. Currently, CMP is required to periodically review the need for additional recreation needs at Cataract in consultation with the resource agencies. Recreation monitoring provides the opportunity to evaluate the need for canoe portage facilities at Cataract.

The Commission's 1990 Form 80 recreational use assessment indicates that the canoe portages at Bar Mills, West Buxton, Bonny Eagle, and Hiram were only used to nine percent of their capacity. Further, the Form 80 for Skelton indicates that the canoe portage was only used four percent of its capacity.

By the year 2000, CMP plans to enhance canoe touring on the Saco River by providing water access campsites at four to five locations (CMP, 1989). Currently, CMP provides a primitive camping area below Hiram Dam, and CMP proposes to evaluate the need for water access camp sites at both Bonny Eagle and Skelton. Additional camping along the lower Saco River is provided at two commercial campsites; Libby's Campground on the Bonny Eagle impoundment and the Homestead Campground on the Cataract impoundment.

CMP's comprehensive recreation plan (1989) shows that CMP also planned to enhance canoe touring on the Saco River by improving canoe portages at dam sites. CMP recently enhanced the canoe portage at Skelton and renovated the downstream portion of the canoe portage at West Buxton. The recreation plan shows that CMP intends to improve the upstream canoe landing at West Buxton by providing a guard rail, installing steps, placing a barrier at turbine intake area, and installing a directional sign. At Bonny Eagle, CMP proposes to investigate the need to modify the existing canoe portage trail based on increased use of the facility. Finally, CMP's planned canoe touring enhancements on the Saco River include preparing a public information brochure that identifies safety hazards, campsites, locations to obtain potable water, and describes canoe portages.

Future canoe touring use of the lower Saco River could increase due to CMP's efforts to improve canoe touring, population increases in southeastern Maine, and as a result of perceived crowding along the heavily used upper reaches of the river. Continuing to maintain the existing canoe portages at dam sites along the Saco River would cumulatively protect canoe touring opportunities. Future improvements to canoe portage sites could also cumulatively enhance canoe touring opportunities along the lower Saco River.

Major Saco River tributaries that afford canoeing opportunities include the Swift River, the Ossipee River, and the Little Ossipee River. Whitewater canoeing is popular during the spring flows on these tributaries; however, low flows generally preclude canoeing opportunities on these tributaries during the summer. Hydroelectric development that effect canoeing on these rivers include the Ledgemere Project on the Little Ossipee and the Kezar Falls Projects on the Ossipee River. These projects inhibit canoeing opportunities by obstructing continuous float trips and therefore contribute to the basin-wide cumulative effects of hydroelectric development on recreational resources. These effects are minimized, however, by the canoe portage facilities provided at these projects.

Sport Fishing

The Saco River supports a variety of important recreational resident fishes, including trout, largemouth bass, and smallmouth bass. The Maine Rivers Study lists the Saco River as a significant native and stocked fishery with brown trout, brook trout, rainbow trout, and black bass (MSPO, 1987). The study also indicates that the Saco River is a high priority to Maine fishing interests and is popular among anglers due to its proximity to population centers.

Historically, dam construction along the Saco River has adversely affected angling use opportunities by diminishing the existing anadromous fishery. The Saco River's Atlantic salmon fishery was essentially eliminated from the river as a result of dam development in the early 19th century.

The *Saco River Strategic Plan for Fisheries Management* (USFWS, *et al.*, 1987) includes a fishery management objective to establish recreational fisheries for trout and Atlantic salmon. The plan also includes an objective to increase recreational uses of all warmwater fish populations. Future efforts to restore anadromous fish habitat by installing upstream and downstream fish passage facilities at the dams along the mainstem Saco River could cumulatively benefit angling opportunities. Atlantic salmon are an important recreation fish in the New England region and efforts to restore an Atlantic salmon fishery on the mainstem Saco River could lead to a substantial increase in angling pressure. In addition, future efforts to improve fish habitat below the mainstem dams at Swans Falls, Bonny Eagle, West Buxton, Bar Mills, Skelton, and Cataract could also cumulatively benefit angling opportunities.

Along the Saco River tributaries, hydroelectric development that further contributes in a cumulative manner to effects on angling opportunities by impacting the sport fishery include the Ledgemere Project on the Little Ossipee River and Kezar Falls Project on the Ossipee River. To minimize these effects, these projects operate in a run-of-river mode, provide minimum flow releases, and include conditions for fish passage facilities when needed in the future.

3.2.4 Hydroelectric generation

Beginning largely as a result of the lumber industry, the historical development of the Saco River and its water power started in the early 1700's. By 1750, there were at least four saw mills located near the falls in Saco and Biddeford. Later, in the 1800's, the excellent water power available at Buxton, Saco, and Biddeford encouraged the establishment of large textile manufacturers.

At Skelton, located at a site known as Union Falls, the first recorded development was made in 1856 when a stone dam with a 15 foot fall was built to store water for use by downstream mills. By 1917, the first small hydroelectric unit had been installed at the site. Skelton was constructed by CMP during the late 1940's and was put in service on December 30, 1948.

At Bonny Eagle, several industries using water power were located near the project site by 1869. By 1902, all of these industries had ceased operations. The present development was constructed in 1910-1911 and the station became operational about November 1911.

Today, in the Saco River Basin, there are 12 hydroelectric projects generating 56.6 MW of capacity (FERC, 1994) (Table 1-2). Within the mainstem of the Saco River, there are six licensed hydroelectric projects representing about 54 MW of capacity. All six of these projects are owned by CMP.

While the Saco River contains no true storage projects, there is a total of 92,700 AF of existing usable reservoir storage in the basin. Forty-four percent (40,400 AF) of the storage is located above Hiram, while 25 percent (23,000 AF) is located above Effingham Falls, New Hampshire. Section 2.1 contains a detailed discussion of current project operations in the lower Saco River.

3.3 SITE SPECIFIC RESOURCES

3.3.1 Bonny Eagle (Source: CMP, 1991; 1992, unless otherwise indicated).

3.3.1.1 Water quantity and quality

CMP operates Bonny Eagle as a daily peaking facility in conjunction with the lower Saco River Projects. As such, flows up to 4,932 cfs are used for generation with excess spilled over the dam into the New River Channel. Bonny Eagle has no current minimum flow requirement, but instead acts as the flow regulation point for the lower Saco River with flows released on a variable discharge schedule depending on system electrical demand, available storage and total river flow (*see section 2.1*). Normal peaking operations can result in daily pond level fluctuations of up to 4 feet, depending on inflow. Typical project flows range between leakage and 4,500 cfs.

Currently, there are no water quality monitoring stations located in the immediate vicinity of Bonny Eagle. Available data from water quality studies conducted in 1987 and 1991, however, generally indicates good water quality in the Saco River both above and below Bonny Eagle.

The 1987 study consisted of samples taken on two consecutive days in August. The impoundment was sampled in two locations in the main river channel. The tailrace was sampled immediately downstream of the powerhouse.

Review of the 1987 data indicated no water quality problems in either the impoundment or the tailwater (CMP, 1991). DO concentrations in the impoundment were nearly homogeneous from top to bottom and ranged between 8.2 ppm and 8.4 ppm. In the tailrace, DO levels were also homogeneous from top to bottom, and ranged between 7.8 and 8.0 ppm with percent saturation levels above 94 percent. Water temperatures ranged from 23.8°C near the bottom (10 meters) to 25.7°C at the surface in the impoundment and between 25 and 25.5°C in the tailrace.

Water quality studies in 1991 were from July to October in both the impoundment and tailrace. Vertical profiles of temperature and DO were measured, and in the impoundment, Secchi disk transparency was recorded and water samples from epilimnetic cores were taken for analyses of total phosphorous, and chlorophyll "a" on a biweekly basis.

Results for DO levels and water temperatures were similar to those observed in 1987, with no observed water quality problems. Additionally, CMP (1991) found that chlorophyll-a and total phosphorus data indicated no eutrophication problems. Chlorophyll-a concentrations collected in the Bonny Eagle impoundment ranged from 1.44 parts per billion (ppb) to 1.97 ppb. Similarly, with the exception of one recorded value of 0.016 ppm, total phosphorus concentrations in the Bonny Eagle impoundment ranged between 0.008 and 0.016 ppm. The MDEP considers total phosphorus concentrations of 0.015 ppm or greater high enough to support excess algal growth and chlorophyll-a concentrations in excess of 8 ppb indicative of an algal bloom. CMP (1991) concluded that the 1991 data suggested that the Bonny Eagle impoundment meets the Class A standard of a stable or decreasing trophic level.

In response to agencies' concerns about the benthic macroinvertebrate populations below Bonny Eagle, CMP conducted studies below West Buxton in August of 1991 and 1992. The area below West Buxton was chosen because of Bonny Eagle's direct influence on flows below West Buxton (West Buxton is operated run-of-the-river). Benthic macroinvertebrates were sampled in the free-flowing river below West Buxton following MDEP's standard protocol (MDEP, 1987). Three standard rock baskets were placed in two locations with similar depth, velocity and substrate characteristics; one within 1,000 feet of the dam, and one beyond 1,000 feet from the dam. The baskets were allowed to remain in the river for 1 month.

Analysis of the 1991 samples indicated that waters downstream of West Buxton may not be in attainment with Maine's Class C Aquatic Life Standards (CMP, 1992e). The macroinvertebrate community was dominated by stress tolerant organisms, such as snails and aquatic worms. Stress sensitive organisms, such as mayflies and stoneflies were either absent or severely reduced in numbers. Possible factors contributing to these results include project operation, water quality impacts from unknown sources, sampling methods, or extreme weather events (Eco-Analysts, Inc., 1992). Excess river flows and current velocity fluctuations due to power generation could cause substrate scouring, resulting in invertebrates being washed downstream (Cushman, 1985).

Table 3-10 Common and scientific names of fish species found in the lower Saco River. (Source: CMP, 1991).

COMMON NAME	SCIENTIFIC NAME
Brown trout	*Salmo trutta*
Atlantic salmon	*Salmo salar*
Brook trout	*Salvelinus fontinalis*
Chain pickerel	*Esox niger*
Blacknose dace	*Rhinichthys atratulus*
Lake chub	*Couesius plumbeus*
Golden shiner	*Notemigonus crysoleucas*
Creek chub	*Semotilus atramaculatus*
Fallfish	*Semotilus corporalis*
Pearl dace	*Semotilus margarita*
White sucker	*Catostomus commersoni*
Brown bullhead	*Ictalurus nebulous*
American eel	*Anguilla rostrata*
Banded killifish	*Fundulus diaphanus*
Burbot	*Lota lota*
White perch	*Morone americana*
Pumpkinseed	*Lepomis gibbossus*
Black crappie	*Pomoxis nigromaculatus*
Smallmouth bass	*Micropterus dolomieu*
Largemouth bass	*Micropterus salmoides*
Yellow perch	*Perca flavescens*

As a result of the 1991 studies, CMP instituted studies in 1992 of the entire free-flowing river stretch between the West Buxton dam and the Bar Mills impoundment (about 1,000 feet) using rapid bioassessment techniques. Based on the results of this study, Eco-Analysts (1993) concluded that the benthic macroinvertebrate community below West Buxton was exhibiting some stress and may not retain the requisite community structure and function to attain Maine's Class A, B, or C Aquatic Life Standards. Further, the report concluded that flow fluctuations from the hydropower generation, particularly low flow periods, could be a contributing factor to the results.

3.3.1.2 Fisheries resources

Located at river mile 27.1, the approximate 6-mile-long Bonny Eagle impoundment contains both coldwater and warmwater resident species (Table 3-10). Warmwater species, such as smallmouth bass, are found in both the tailwaters and the impoundment. Coldwater species, such as trout, are found primarily in the upper reaches of the impoundment where suitable salmonid habitat is available in the Limington Rips and the Chases Mills Rapids (CMP, 1991).

The primary game species of the warmwater fish community in the Bonny Eagle impoundment are smallmouth bass and largemouth bass. Chain pickerel, white perch, and black crappie are also fairly common game species. Brown trout and brook trout are the primary salmonid species encountered in the upper reaches of the impoundment.

Additionally, a seasonal fishery for salmonids occurs in the New River Channel, the 4,000-foot-long bypassed reach on the east side of Bonny Eagle Island (see Figure 2-3). The seasonal fishery is largely a result of fish moving into the channel from tributaries, or from upriver locations. CMP (1991) states that it is unlikely any natural reproduction of salmonids occurs in the New River Channel due to unsuitable spawning substrate and fluctuating flow conditions. Presently, during most of the year, the channel receives only leakage flows from the dam, estimated to be about 5 cfs. During high flow periods, however, flows in excess of the station's capacity (4,932 cfs) are spilled into the channel either by the overtopping or the loss of the flashboards at the New River Channel dam. Depending on the level of spill, habitat conditions can range from pool-riffle-run to heavy rapids.

Fisheries Management and Habitat Assessments

Bonny Eagle is located in river reach III in the Saco River's 1987 strategic fisheries plan (Figure 3-1). Although no anadromous fish presently utilize the Bonny Eagle area, one of the primary resource management objective of the plan is to manage the reach as a migratory pathway for Atlantic salmon, American shad, alewives, and American eels. The other resource management objectives for the reach are to increase the recreational utilization of all warmwater sport fish and to establish recreational sport fisheries for trout and salmon. Additionally, the reach is to be managed for the sustained production of trout, salmon, shad, alewives, and eels consistent with the habitat capabilities (USFWS *et al.*, 1987).

Based on the 1990 *Saco River Operational Plan for Inland Fisheries Management* (MDIFW, 1990), the MDIFW plans to partially support these objectives at Bonny Eagle through proposed fish stocking plans, special fishing regulations, and increased minimum flows. Specifically, the MDIFW proposes to stock 1,400 spring yearling brown trout, 1,100 spring yearling brook trout, and 1,000 yearling rainbow trout annually in the New River channel at Bonny Eagle. A special management section would be established in the reach and continuous year-round minimum flows would be required to accommodate trout. Additional yearling trout would also be stocked at Skelton, Bar Mills, and West Buxton.

To determine habitat capabilities, USFWS *et al.* (1987) estimated the available anadromous fish and resident fish habitat in the Bonny Eagle area. Habitat for Atlantic salmon, American shad, alewives, brown trout, brook trout, and general warmwater species was assessed and quantified.

Results of the habitat assessments indicated that both existing and potential Atlantic salmon spawning habitat is limited in the Bonny Eagle area. USFWS *et al.* (1987) estimated that the 3,000-foot-long channel on the west side of Bonny Eagle Island between the

powerhouse and the head of West Buxton's reservoir (including the Bonny Eagle tailwater) contained 62 habitat units and could potentially support 4 spawning salmon, with a total potential production of 62 smolts. Additionally, it was further estimated that the New River Channel, with adequate flows, contained 594 habitat units and could potentially support 36 spawning salmon, with a total potential production of 594 smolts.

Habitat substrate in the west side channel ranges from bedrock to sand. Close to the powerhouse, bedrock, boulder, and cobble predominate, with a gradation to gravel and sand downstream toward the West Buxton head pond. Under normal operating conditions, West Buxton exerts a backwater effect up to the Bonny Eagle powerhouse. When Bonny Eagle releases flows, however, the overall character of the reach is that of a deep run with discernible velocities through most of the reach (CMP, 1991). Habitat in the New River Channel is composed almost entirely of fractured bedrock overlain in places by boulders [Acres International Corporation (Acres), 1989].

For American shad and alewife, suitable potential habitat was indicated by USFWS *et al.* (1987) at several locations in the project area. Both the flowing water reaches below the Bonny Eagle powerhouse and the upstream end of the Bonny Eagle impoundment in the vicinity of the confluence with the Little Ossipee River could be utilized for spawning by American shad. Spawning alewife would primarily utilize the Bonny Eagle impoundment (CMP, 1991).

In total, the potential habitat available within the 7.5-mile-long reach of river from the confluence with the Little Ossipee River downstream to the West Buxton dam was estimated to have the potential to produce 1.4 to 2.2 million juvenile shad and about 44,000 to 89,000 adult alewife (USFWS *et al.*, 1987). For the reach from the Bonny Eagle dam to the West Buxton dam, an estimated 6,632 habitat units for American shad (including the New River Channel) and 6,050 habitat units for alewife were assessed to be suitable. For the 6.6-mile reach from the confluence of the Saco River with the Little Ossipee River (at the headwaters of the Bonny Eagle impoundment) to the Bonny Eagle dam, an estimated 12,198 habitat units for both American shad and alewife were deemed suitable.

For resident salmonids, or trout, suitable habitat at Bonny Eagle varies considerably between species. While the entire reach between the Little Ossipee River and West Buxton dam, including the impounded portions, contains suitable habitat for brown trout and warmwater species, only the Bonny Eagle tailwater and the New River Channel were considered to be suitable habitat for brook trout because of temperature limitations. For brook trout, potential habitat consisted of 62 habitat units in the tailrace and 828 habitat units in the New River Channel. Potential brown trout and warmwater species habitat was 6,632 units below Bonny Eagle and 12,198 units between the dam and Little Ossipee River confluence (USFWS *et al.*, 1987). Since unimpounded waters in reach III are very limited, the agencies consider the unimpounded waters at Bonny Eagle (the tailrace and the New River Channel) to be critical to fish species within the reach (USFWS *et al.*, 1987).

Bonny Eagle Impoundment

The Bonny Eagle reservoir has a surface area of 347 acres at full pool. Currently, impoundment water levels fluctuate daily about 2 to 3 feet from full pond. Drawdowns of up to 4.3 feet have occasionally occurred, however, primarily during flashboard loss during high flow events. Flashboard replacement at Bonny Eagle requires pool drawdown after high flows subside. Following flashboard replacement, the reservoir is returned to normal levels. Typically, 10 to 14 hours is required to lower the reservoir 2 to 3 feet (CMP, 1991).

The reservoir is characterized by a maximum depth of 40 feet near the dam and a morphometry of relatively steep shorelines and littoral zones along the main channel portions, and relatively shallow-sloping shorelines and littoral zones in the backwater areas. The main channel portion is further characterized with little or no vegetation in the drawdown zone, a substrate of primarily sand and clay, and a usually observable water velocity. The backwater areas are further characterized by a substrate of silt, clay, or highly-organic "muck", a usually heavy submerged aquatic vegetation (SAV) growth, little discernible currents, and often being located at the mouths of major and minor tributaries to the reservoir. Based on the habitat mapping and area calculations, there are an estimated 116 acres of backwater areas (33 percent of the total reservoir area) at the full reservoir level (216.3 feet) and these areas range in size from less than 1 acre to over 19 acres (CMP, 1991).

At a reservoir drawdown of 4 feet, about 21 acres of substrate was exposed in the main channel areas (Acres, 1990). About 80 percent of the substrate was comprised of sand and clay with a band of between 8 and 20 feet of substrate dewatered on each bank of the mainstem river (representing about 2 to 4 percent of the total river channel). SAV was generally not present in the drawdown zone and water depths at drawdown, about 2 feet from the water's edge, ranged from 2 to 6 feet. At the juncture of the Little Ossipee River and the Saco River, a 20 and 60 feet wide shoreline band consisting of coarse sand and gravel was dewatered. In Killick Brook, a 10 to 15 feet wide band of clay substrate was exposed, while near Limington Rips a 3,200-foot-long portion basically reverted to a riverine stretch. Acres (1990) reported that little suitable fish habitat was lost during the drawdown in the main channel areas except for a small area downstream of a mid-channel island near Limington Rips.

In the backwater areas, the amount of dewatered substrate was visually estimated to range from 20 to 75 percent of the total area within most backwater areas, with some small backwaters totally dewatered at the 4-foot drawdown level. Overall, the mapping and area calculations indicated that about 27 acres (23 percent) of the substrate in the backwater areas were exposed (Acres, 1990). Where water remained, depths were generally less than 2 feet, with the exception of the mouth of Josie's Brook where depths remained in excess of 6 feet. Additionally, the stranding of small numbers of adult and juvenile largemouth bass and pickerel was observed in isolated pools formed by the drawdown. While the pools appeared to be large enough to sustain fish for the 12 hours or less that would be required for the reservoir to refill during normal operations, fish would be exposed to predators such as great

blue herons (observed feeding in the pools). Stranding pools, however, were observed in only a few backwater areas, and did not appear to be a reservoir-wide impact (CMP, 1991).

In summary, CMP (1991) reports that, with several exceptions, the main channel areas of the reservoir provided only small quantities of suitable fish spawning or nursery habitat for the primary game species in the reservoir. The upper end of the reservoir immediately below Limington Rips provides quality smallmouth bass habitat, with its coarse substrate, more riverine character, and abundant velocity refuges. The lower Little Ossipee River has suitable spawning habitat for smallmouth bass, but little escape cover. Killick Brook and Josie's Brook provide some suitable spawning, rearing, and foraging habitat for several species.

The backwater areas, however, provide excellent rearing and foraging habitat for several species of fish. Portions of the backwater areas with sand or clay substrate provide spawning habitat for nest-builders (centrarchids) as large numbers of young-of-year largemouth bass, chain pickerel, and yellow perch were observed (CMP, 1991).

Thus, the total area of habitat dewatered within the reservoir during a 4-foot drawdown was about 15.8 percent of the total reservoir area. While much of the dewatered habitat was considered clay and sand habitat (20.2 acres), generally not regarded as quality fish habitat, and only minimal amounts of gravel, cobble, and boulder substrate (<1 acre total) were dewatered, the 27.2 acres of silt/vegetation substrate dewatered (7.8 percent of the total reservoir area) occurred primarily within the backwater areas and was generally considered higher quality habitat (CMP, 1991).

3.3.1.3 Vegetation and wildlife resources

The total vegetated area within Bonny Eagle's project boundary is about 383 acres. The shoreline of the 347 acre reservoir generally supports both mixed forest and wet meadow/scrub-shrub vegetative communities. Downstream of the Bonny Eagle dams the shoreline is generally dominated by mixed forest and old field vegetation. Field investigations in 1988 identified four wetland and six upland cover types within the project boundary.

Upland vegetation

Upland vegetation occupies 207 acres or 54 percent of the vegetated area within the project boundary. The six non-wetland cover types identified were mixed forest, agricultural, commercial, shrubland, old field, and bedrock outcrops. Vegetative sampling was conducted in the mixed forest, shrubland and old field areas to verify the species composition within these cover-types.

Over 184 acres of the 207 acres of upland vegetation, or 48 percent of the vegetated area within the project boundary, are mixed forests. The mixed forest stands are generally found along the banks of the main river channel and on Bonny Eagle Island. The mixed

forests are comprised of deciduous and coniferous trees and contain both wetland and upland species. The forested land adjacent to the reservoir can be classified as a northern riverine (floodplain) forest, and more inland areas can be classified as dry or upland forests. Riverine forests are generally not sharply separated from neighboring upland forests, and therefore, were combined under the mixed forest cover type.

Trees common to northern riverine forests include silver maple, red maple, white ash, quaking aspen, and American elm. Species common to upland forests include sugar maple, American beech, white pine, and white oak. These mixed forest species are generally distributed throughout the project area. Eastern hemlock is prevalent in some well defined areas including the shoreline of the tailrace below the Bonny Eagle powerhouse. Virginia creeper, speckled alder, and silky dogwood are common near the water's edge, while northern arrow-wood, virginia creeper, and maple-leaf viburnum are common in the uplands. Cardinal flower and various species of ferns are common herbaceous ground cover species.

Agricultural areas comprise 11.4 acres or 3 percent of the vegetated area within the project boundary. The agricultural lands are utilized primarily as grazing areas for livestock, and are located predominantly in the middle to upper reaches of the reservoir. Cattle were observed using the Saco River as a water source.

Developed land occupies 4.5 acres of the 207 acres of non-wetland areas within the project boundary. This land type includes project buildings, transformer stations and parking areas. Developed lands are confined to the area immediately adjacent to the Bonny Eagle powerhouse.

About 3.5 acres of shrubland are present within the project boundary. Shrubland is confined to transmission line corridors on Bonny Eagle Island, which are maintained at a shrub level to minimize encroachment of vegetation on the line. The only tree species observed was quaking aspen. The remaining vegetation is comprised of shrub and herbaceous species.

One 2.1-acre parcel of old field is present just downstream of the Bonny Eagle powerhouse. Wild carrot, asters, common milkweed, grasses, goldenrod and ragweed are the most common species in this area. A few shrubs including raspberry and silky dogwood are also present but are too scattered for the area to be considered a shrubland.

Outcrops of bedrock occupy 0.8 acre of the upland cover types within the project boundary. The outcrops are confined to the area immediately below the Limington Rips near the upper extent of the reservoir, and a small area on the shoreline of Bonny Eagle Island. Some pioneer plants such as blueberry, sweet gale and grasses are present in the rock crevices.

Wetland vegetation

According to the 1992-93 wetlands study conducted for Bonny Eagle (Eco-Analysts Inc., 1993c), a total of 348 acres of wetlands are associated with the project impoundment. Six wetland vegetative cover types were identified: aquatic bed, lower drawdown zone, upper drawn down zone, wet meadow, shrub-scrub, and wetland hardwood forest[1].

Generally, the Bonny Eagle wetlands are situated in fringing, parallel bands of varying widths around the impoundment. The aquatic bed, and the upper and lower drawdown zones tend to occur around most of the entire reservoir between the upper and lower reservoir levels. The wet meadow, shrub-scrub, and wetland hardwood forest types are generally found above the upper reservoir levels, but only occur along certain portions of the reservoir. Beginning at the lowest elevation and moving inland, the following wetland types are found: aquatic bed, lower drawn down zone, upper drawn down zone, wet meadow, shrub-scrub, and wetland hardwood forest.

The aquatic bed type is always underwater, and is only visible when the water was at or near full drawdown. The aquatic bed extended to an average depth of at least four feet with an average width of at least 25 feet along each shoreline. Although it is essentially continuous along both shorelines, ten different aquatic beds were identified that occupy a total of 44 acres. Plant species include burreed, pondweed, goldenpert, arrowhead, white buttons, and coontail.

The lower drawdown zone abuts the aquatic bed up gradient. Varying greatly in width dependent upon the topography, it is very prevalent in the wider stretches of the impoundment, as well as the backwater areas. Forty-two different areas, totaling 99 acres, are identified. Vegetation is dominated by goldenpert and arrowhead, but white buttons, horsetail, and pickerel weed also occur.

The upper drawdown zone encompasses an about 10-foot-wide band extending from upper portion of the drawdown zone to higher, non-inundated wetlands. Thirty-four different sections of this type, totaling 34 acres, are identified. The upper drawn down zone is dominated by three-way sedge. Other species include three square, cattail, great bulrush, bluejoint, swamp milkweed, sedges, Canada rush, woolgrass, soft rush, blueflag, spikerush, and sweetflag.

Wet meadows are found as a narrow fringe or as wider expanses in backwater areas located up gradient of inundated areas. Fifteen areas of wet meadows, totaling 23 acres, were

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[1] These correspond to palustrine aquatic bed (aquatic bed), palustrine emergent nonpersistent (lower drawn down zone), palustrine emergent persistent (upper drawn down zone & wet meadow), palustrine scrub/shrub (shrub-scrub), palustrine forested wetland (wetland hardwood forest) classifications used by Cowardin *et al.* (1979).

identified. Vegetation is herbaceous and diversity is high. Grasses, sedges, and rushes were dominant. Typical species include mannagrass, woolgrass, soft rush, blueflag, sweetflag, and spikerush.

The shrub-scrub type occurs often as a narrow band along the reservoir between the wet meadow and sixth wetland type, the wetland hardwood forest. Twenty-one different areas of shrub-scrub, totaling 10 acres, are identified. Unlike the previous four wetland types, where herbaceous wetland plants predominate, the shrub-scrub type is characterized primarily by a predominance of woody shrubs. Shrubs include speckled alder, willows, winterberry, sweet gale, grey birch, red osier dogwood, silky dogwood, arrowwood, steeplebush, meadowsweet, and maleberry. Common ground cover species include sensitive fern, royal fern, goldenrod, tall meadow rue, and grasses.

Stands of wetland hardwood forest are found in 21 locations along the reservoir shoreline, and extend back for a considerable distance in areas with little topography. In areas where no wet meadow or shrub-scrub wetland exist, this type directly abuts the upper drawn down zone wetlands. Also, several examples of wetland hardwoods occur on islands within the reservoir. The wetland hardwood forest encompasses the greatest acreage at Bonny Eagle, totaling 135 acres (39 percent) of the total wetland acreage. Red maple is the dominant overstory species, while silver maple and green ash are common associates. The understory and shrub layers are sparse but includes young overstory species, balsam fir, speckled alder, winterberry, maleberry, and honeysuckle. The ground cover is very dense and dominated by ferns. The most common are sensitive fern, cinnamon fern, and royal fern.

The Eco-Analysts' (1993c) study led to a number of distinct conclusions about the status of the wetlands at the Bonny Eagle impoundment. First, it is clear that, from a strict acreage perspective, the historic impounding of the Saco River by the Bonny Eagle dam resulted in a net gain of wetlands to the impoundment area. Eco-Analysts (1993c) conclude the existing wetland acres are nearly twice what could have existed before the dam was constructed. This conclusion is further evidenced by the results of soils analysis which demonstrated that present wetlands, particularly those in non-inundated areas, were not wetland prior to construction of the dam. Also, given the sandy conditions of the Saco River valley, it is unlikely that significant wetland existed outside the 190 acres of what today is open water prior to flooding.

Soils analysis also indicated that the soils around the Bonny Eagle impoundment are highly permeable, which results in groundwater levels which follow the impoundment level. Thus, Eco-Analysts (1993c) concludes that the current extent of Bonny Eagle wetlands is controlled primarily by the water levels of the impoundment.

The existing wetlands are very high quality and provide wildlife diversity and abundance; sediment retention; and nutrient removal, retention, and transformation. The primary reasons for the quantity and quality of the wetlands in the project area are the daily drawdown cycle and sandy porous soils. According to Eco-Analysts (1993c), these factors

combine to create a system which is controlled primarily by impoundment water levels and which is essentially a freshwater tidal marsh as described by Odum (1984).

Wildlife resources

The various vegetative habitats in the project area support a diversity of wildlife species, including songbirds, waterfowl, mammals, furbearers, reptiles and amphibians, as well as, invertebrates.

CMP noted seven species of birds and two species of reptiles during field investigations (summer of 1988) within the project boundaries. These included the black crowned night heron, great blue heron, belted kingfisher, spotted sandpiper, American bittern, black duck, and wood duck in the reservoir area. The snapping turtle and painted turtle were also observed within the reservoir.

The mixed forest habitat surrounding the reservoir provides habitat for a variety of mammals including moose, raccoon, white-tailed deer, eastern chipmunk, and grey squirrel. Muskrat was the only furbearer observed in the project area, but habitat is available within the impoundment to support beaver. Signs of deer, raccoon, and muskrat were observed in several of the backwater areas.

3.3.1.4 Recreation resources

The primary recreation activities occurring at Bonny Eagle include sightseeing, picnicking, swimming, and fishing. Other recreational uses include boating, camping, and tubing. Total recreational use at Bonny Eagle in 1991 was about 50,000 user-days/nights[2] and is projected to increase to 61,265 - 65,250 user-days/nights by the year 2002.

The most heavily used recreational area at Bonny Eagle is the Limington Rips Recreation Area, located at the project's upper boundary off Route 25. This property is owned by CMP but managed by the Maine Department of Transportation (MDOT) and offers fishing, swimming, tubing, whitewater boating (canoeing and kayaking), and picnicking opportunities. Facilities at the site include 20 picnic tables, covered grills, parking for about 32 vehicles, and two portable toilets. The estimated carrying capacity of the Limington Rips Recreation Area is about 240 persons and existing use levels on peak weekends is about 130 persons (Land and Water Associates, 1992).

Whitewater boating opportunities are provided in three locations at Bonny Eagle which includes the Limington Rips, Chases Mills, and New River Channel rapids. Along the Saco River at the Limington Rips Recreation Area, whitewater boating opportunities include a

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[2] Recreation user day/night - each visit by a person to a development for recreational purposes during any portion of a 24-hour period.

2,500-foot-long whitewater stretch. The stretch provides Class I and II rapids[1] at 1,000 cfs and some Class III rapids at 3,000 to 4,000 cfs. Boatable flows (> 500 cfs) are available essentially year round and flows necessary to produce Class III rapids (> 3,000 cfs) are available primarily in the spring.

Whitewater boaters use the Limington Rips rapids mainly during the spring and the existing annual whitewater boating use is estimated at 1,062 user-days (Land and Water Associates, 1992). During the summer the Limington Rips stretch is used primarily by tubers. Informal carry-in boat access is provided on the west shore of the river just north of the Route 25 bridge and most boaters/tubers take-out at the Limington Rips Recreation Area.

The Chases Mills whitewater rapids are located within the project boundary on the Little Ossipee River near its confluence with the Saco River. Both the Limington Rips and Chases Mills rapids are included in the 38 significant whitewater rapids in Maine (MSPO, 1987). The Chases Mills rapids begins 50 feet downstream of the Chases Mills Road bridge and extends downstream about 750 feet. The Chases Mills rapids contains Class IV and Class V rapids and are included in the 28-mile segment of the Little Ossipee listed on American Whitewater Affiliates' (AWA) Nationwide Whitewater Inventory (AWA, 1990).

Whitewater boating opportunities are also provided at the New River Channel bypassed reach during the spring and fall when river flows are spilled over the diversion dam. Whitewater rapids within the channel include a 2,000-foot-stretch where rapids range from Class II to Class IV depending on flow conditions. Flows in the New River Channel currently occur when river flows exceed the maximum project turbine capacity (4,932 cfs) and are spilled at the diversion dam at the upper end of Bonny Eagle Island. CMP conducted a whitewater boating assessment of the New River Channel and found that the minimum boatable flow in the channel is about 1,000 cfs and the optimum boating flow is about 2,800 cfs (CMP, 1992).

Access to the New River Channel is currently provided from roadside points along Warren Road on the east side of the channel. Based on CMP's assessment, boatable flows (> 1,000 cfs) are available during 12 weekend days and 30 weekdays during the spring and fall. The channel currently receives a small amount of boating use which CMP estimated at about 48 user days. CMP further indicated that the New River Channel is suitable for intermediate and advanced paddlers at the optimum flow (2,800 cfs) and suitable for intermediate paddlers at 1,000 cfs.

CMP manages a canoe portage trail near the Bonny Eagle dam which is located on the river's western shore. The portage trail is about 300 yards long and includes a set of stairs

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[1] Based on the international scale of river difficulty, which defines six difficulty classes of whitewater: Class I-easy; Class II-novice; Class III-intermediate; Class IV-advanced; Class V-expert; and Class VI-extreme.

below the dam near the put-in area. Parking and informal picnicking opportunities are currently provided near the canoe portage trail put-in area. Additional informal carry-in boat launching areas are provided off the Sand Pond Road on the west side of the impoundment and at a site south of Route 25 near the confluence of the Little Ossipee River and the Saco River.

Camping opportunities in the project area are provided on the southern end of Bonny Eagle Island, on an island near Limington Rips, and at a commercial campground on the east side of the River. CMP manages the Bonny Eagle Island camping site as a primitive site accessible by water, and restricts use of this site to organized groups. Camping on the island near Limington Rips is also a primitive site and accessible only by boat. Commercial camping is provided at Libby's Campground which provides 12 camp sites and the only trailer boat ramp to the impoundment. Libby's Campground is located about 2 miles north of the Bonny Eagle dam off of River Road.

In the past, CMP offered a day use site at the northern end of the Bonny Eagle Island providing access to the Saco River and the New River Channel. CMP closed the vehicular access to this site (a 200 yard gravel road) because of persistent vandalism and loitering. Currently, parking for three to five vehicles is offered outside of the gated access road off Route 35, providing walk-in access to the day use area.

There are no existing recreation areas at Bonny Eagle providing access for disabled populations that fully comply with the national standards established by the Architectural and Transportation Barriers Compliance Board[4].

3.3.1.5 Geology and soils

Bonny Eagle's northern boundary is part of the New England uplands physiographic region and the southern area is located in the Seaboard Lowlands region. The topography in the project area is characterized by rolling hills and broad valleys.

The bedrock geology consists of metamorphosed sedimentary rocks and granite overlain by post-glacial alluvial deposits and glacial deposits. The surficial deposits in the northern portion of the project consists of glacial stream deposits which are an intermix of sand and gravel. In the project area's southern portion the surficial deposits consists primarily of glacial-marine sediments. Glacial till is present at Bonny Eagle's dam site and along the east bank of the river in the project's central portion. The glacial till consists of an unsorted mixture of sands, silts, clays, and boulders deposited beneath glacial ice (Beck, 1990).

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[4] Pursuant to the Americans with Disabilities Act of 1990, Public Law 101-336, July 26, 1990. 104 Stat. 327.

3.3.1.6 Aesthetic resources

The principal aesthetic resources in the project area include scenic views of whitewater stretches along the Saco River, the bypassed reach, and near the Little Ossipee River's confluence with the Saco River. Views of the 2,500-foot-long whitewater stretch at Limington Rips are provided from the Route 25 bridge crossing of the Saco River. The Route 35 bridge crossing of the bypassed reach provides scenic views of the New River Channel, particularly when river flows are spilled at the diversion dam. Scenic views of the Chases Mills whitewater rapids are provided at the Chases Mills Road crossing of the Little Ossipee River.

Bonny Eagle's boundary generally follows the perimeter of the impoundment at the 218.0-foot contour elevation (normal full pond elevation is 216.3 feet). Most of the property outside of this boundary is privately owned and generally secluded, offering limited areas were the impoundment is visible from roadways. The shoreline is a mixture of wooded, agricultural, and rural residential areas. The southern portion of the project is heavily wooded and undeveloped, and numerous wetland areas in the central portion of the impoundment provide a buffer to development. Agricultural and residential areas are also visible from the river in the central portion of the impoundment. Toward the northern portion of the impoundment several seasonal camps and year round residential developments are visible along both shores.

3.3.1.7 Archeological and Historic resources

By 1869, several industries used the Saco River near the project dam site for power; however, these industries had ceased operations by 1902. The existing project facilities were constructed in 1910-1911, and CMP acquired the project facilities by merger with Cumberland County Power and Light Company in 1942. Since its original construction the power companies made only minor alterations to the project facilities.

In a letter dated May 10, 1990, the State Historic Preservation Office (SHPO) indicated that Bonny Eagle's powerhouse and dam are eligible for listing in the National Register of Historic Places (National Register). The powerhouse's notable historic features include: multi-pane wooden tilt-out sash windows, decorative brick corbelled cornice, round-arched brick openings framing the penstocks, and an unaltered interior containing a significant collection of early twentieth century hydro power generating machinery (letter from Kirk Mohney, Architectural Historian, Maine Historic Preservation Commission, Augusta, Maine, February 5, 1991).

CMP contracted the University of Maine at Farmington to conduct Phase I and Phase II surveys designed to locate prehistoric archaeological sites at Bonny Eagle. Prior to conducting these archaeological surveys there were no known archaeological sites in the project area. During the survey field work 21 aboriginal sites were identified (Cowie and Petersen, 1990). After reviewing the archaeological survey report, the SHPO indicated that

ten archaeological sites are eligible for inclusion in the National Register (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, November 21, 1989).

The aboriginal artifacts recovered during the surveys suggest that a continuous sequence of historic periods are represented at Bonny Eagle. These historic periods range over 9,000 years from the Early Archaic period and continuing into the Contact period (about 7000 B.C. to 1750 A.D.).

3.3.1.8 Land use

Bonny Eagle's dam impounds the Saco River in the towns of Hollis, Standish, Buxton, and Limington. Dominant land uses in the region include forestry and agriculture. Bottomland soils along the Saco River near Bonny Eagle's central portion are used for row crops. Current development along the shoreline includes private year-round and summer homes. Tourism is important to the region and the principal attractions include Sebago Lake and the Saco River above Hiram, Maine.

3.3.2 Skelton (Source: CMP, 1991; 1992, unless otherwise indicated).

3.3.2.1 Water quality and quantity

CMP operates Skelton as a daily peaking facility in conjunction with the other Saco River Projects. As such, flows up to 3,800 cfs are used for generation with excess spilled through the gates. In addition, a flow of about 15 cfs is provided on a seasonal basis (May-November) to operate the existing fishway. Skelton has no current minimum flow requirement.

Although there are currently no water quality monitoring stations located in the immediate vicinity of Skelton, available data from water quality studies conducted in 1987 and 1991 generally indicates good water quality in the Saco River both above and below Skelton. These studies were conducted as a result of specific requests by MDEP and EPA.

MDEP requested monitoring the deepest portion of the impoundment located just in front of the dam and the tailrace area under summer low flow and high temperature conditions and a macroinvertebrate study below the Skelton dam. EPA's concerns included possible eutrophication acceleration in the impounded area, the role of the impoundment as a sediment and/or toxic substance sink and the potential for subsequent nutrient and/or toxic substance recycling, and the potential for the impoundment to affect any existing or proposed sewer lines.

Impoundment sampling locations in 1987 were in a deep area off the boat launch in the vicinity of the dam, and in the deepest part of the impoundment located directly in front

of the powerhouse intakes. The tailrace was sampled about 20 feet downstream of the powerhouse.

Review of the 1987 data indicated occasional excursions of DO concentrations in the deepest portions of the impoundment below 7 ppm due to stratification during the summer months. DO concentrations at the deep hole station ranged between 8.2 ppm at the surface to 4.3 ppm at the bottom (24 meters). Water temperatures also stratified ranging from 22.5°C near the bottom (24 meters) to between 24.8 and 26.1°C at the surface.

CMP concluded (1991b) that the tailwater DO and temperature data suggested no water quality problems associated with the Saco River below the Skelton dam and powerhouse. Water temperatures were relatively constant during the 3-day study ranging between 21 and 24°C in the tailwater. Thus, tailwater temperatures were somewhat lower than water temperatures in the impoundment's epilimnion. DO concentrations in the tailrace were homogeneous from top to bottom, and ranged between 6.5 and 8.1 ppm with percent saturation levels ranging from 77 to 95 percent.

Water quality studies in 1991 were conducted weekly from June through September at six impoundment stations, and one tailrace station. Vertical profiles of temperature and DO concentrations were measured, and in the impoundment, Secchi disk transparency was recorded and water samples from epilimnetic cores were taken for analyses of total phosphorous, and chlorophyll "a" on a biweekly basis.

Results of the 1991 study were similar to those in 1987. Weak thermal stratification was noted at all impoundment stations, with surface to bottom differences in water temperature of between 3-5°C. Additionally, vertical profiles collected in the morning (before turbine start-up) and afternoon (during generation) indicated no identifiable change in the surface to bottom temperature and DO gradient. Therefore, CMP (1991b) concluded that project operation does little to improve circulation, despite the deep location of the Skelton powerhouse intakes (about 60 feet below the normal full pond surface).

CMP (1991b) found that chlorophyll-a and total phosphorus data collected indicated no eutrophication problems. Chlorophyll-a concentrations collected in the Skelton impoundment during the summer ranged from less than 1.0 ppb to 2.08 ppb. Similarly, with the exception of one recorded value of 0.023 ppm (collected during a very high flow period following Hurricane "Bob"), total phosphorus concentrations in the Skelton impoundment ranged between 0.007 and 0.015 ppm. The MDEP considers total phosphorus concentrations of 0.015 ppm or greater high enough to support excess algal growth and chlorophyll-a concentrations in excess of 8 ppb indicative of an algal bloom. CMP (1991b) concluded that the 1991 data suggested that the Skelton impoundment meets the Class GPA standard of a stable or decreasing trophic level.

In the tailrace, however, data collected during 1991 indicated a recognizable difference in tailrace DO conditions between periods of reduced flows (i.e., leakage) and generation

flows. CMP (1991b) noted that tailrace conditions under leakage flow were generally poorer, with a notable difference in surface to bottom DO concentrations and periodic bottom DO levels below 7 ppm. Conversely, during periods of project operation, tailrace waters were well mixed and above 7 ppm Class A standard. CMP (1991b) states that the duration of these occurrences would generally be short due to the daily cycling operation of the project.

In response to agencies' concerns about the benthic macroinvertebrate populations below Skelton, CMP conducted studies at Skelton in August of 1991 and 1992. Benthic macroinvertebrates were sampled in the free-flowing river below the project following MDEP's standard protocol (MDEP, 1987). Three standard rock filled baskets were each placed in two locations with similar depth, velocity and substrate characteristics; a location within 1,000 feet of the dam, and a location beyond 1,000 feet from the dam. The baskets were allowed to remain in place for 1 month.

Analysis of the 1991 samples indicated that waters downstream of Skelton may not be in attainment with Maine's Class C Aquatic Life Standards (CMP, 1992f). The macroinvertebrate community was dominated by stress tolerant organisms, such as snails and aquatic worms. Stress sensitive organisms, such as mayflies and stoneflies were either absent or severely reduced. Possible factors contributing to these results includes project operation, water quality impacts from unknown sources, sampling methods, or extreme weather events (Eco-Analysts, Inc., 1992e). Excess river flows and current velocity fluctuations due to power generation could cause substrate scouring, resulting in invertebrates being washed downstream (Cushman, 1985).

As a result of the 1991 studies, CMP instituted studies in 1992 of the entire free-flowing river stretch between the Skelton dam and the Cataract impoundment (about 4,000 feet) utilizing rapid bioassessment techniques. Based on the results of this study, Eco-Analysts (1993b) concluded that the benthic macroinvertebrate community below Skelton was exhibiting some stress and may not retain the requisite community structure and function to attain Maine's Class A, B, or C Aquatic Life Standards. Further, the report concluded that flow fluctuations from the hydropower generation, particularly low flow periods, could be a contributing factor to the non-attainment results.

3.3.2.2 Fisheries resources

Like the Bonny Eagle area, both coldwater and warmwater resident species are present at Skelton. The coldwater species, primarily brown trout and brook trout, are most common in the tailwater area, while the warmwater species are found in both the tailwater and the impoundment. Fish common to the lower Saco River are listed in Table 3-10.

Located at river mile 17.1, the approximate 3-mile-long Skelton impoundment supports primarily a warmwater fish community. Smallmouth bass are the major game species, with other warmwater species, such as chain pickerel, white perch, and black crappie, also being sought by fishermen.

A seasonal fishery for salmonids occurs in the 4,000-foot-long free-flowing tailwater reach immediately below Skelton dam. The seasonal fishery is largely a result of fish moving into the tailwater from tributaries, or from upriver locations. CMP (1991b) reports that it is not known if any natural reproduction of salmonids occurs in the Skelton tailrace. Smallmouth bass are also common in the tailrace, and reproduce in the mainstem Saco River in the project area.

Fisheries Management and Habitat Assessments

Skelton is located on the boundary of river reaches II and III in the Saco River's 1987 strategic fisheries plan (Figure 3-1). Currently, anadromous fish have access to the Skelton area. The resource management objectives (USFWS *et al.*, 1987) for the reaches are:

Reaches II and III

1. Manage as a migratory pathway for Atlantic salmon, American shad, sea-run alewives, and American eels.

2. Manage for the sustained production of trout, salmon, shad, alewives, and eels consistent with the habitat capabilities.

3. Establish a recreational fishery for salmon and trout consistent with habitat capabilities.

4. Increase recreational utilization of all warmwater fish populations and commercial utilization of American eels.

Based on the 1990 *Saco River Operational Plan for Inland Fisheries Management* (MDIFW, 1990), the MDIFW plans to partially support these objectives at Skelton through proposed fish stocking plans, special fishing regulations, and increased minimum flows. Specifically, the MDIFW proposes to stock at least 4,300 spring yearling brown trout and 750 spring yearling brook trout annually below Skelton dam. At least 4,300 spring yearling brown trout would also be stocked in the Skelton impoundment. Special management sections would be established and continuous year-round minimum flows below Skelton would be required to accommodate trout.

To determine habitat capabilities, USFWS *et al.* (1987) estimated the available anadromous fish and resident fish habitat in the Skelton area. Habitat for Atlantic salmon, American shad, alewives, brown trout, brook trout, and general warmwater species was assessed and quantified.

Results of the habitat assessments indicated that both existing and potential Atlantic salmon spawning habitat is limited in the Skelton area. USFWS *et al.* (1987) estimated that the 4,000-foot-long free-flowing Skelton tailwaters contained 163 habitat units and could potentially support 10 spawning salmon, with a total potential production of 163 smolts. The 163 habitat units represent less than 1 percent of the total Atlantic salmon spawning and production habitat available in the drainage.

Habitat substrate in the tailwaters is composed of bedrock and boulders, with cobble and gravel being the dominant substrate types. Stream gradient is constant throughout the reach and is less than 1 percent (CMP, 1991b). However, ten Atlantic salmon redds were observed in a riffle area in the vicinity of the Skelton tailrace carry-in boat access area in 1993 (RMC Environmental Services, 1994). These redds were the first documented Atlantic salmon spawning activity in the Saco River in many years.

For American shad and alewife, suitable potential habitat was indicated by USFWS *et al.* (1987) and represents a much more significant portion of available habitat in the basin. American shad would likely spawn in the free-flowing reach below Skelton dam and in the upstream end of Skelton impoundment immediately downstream of Bar Mills. Spawning alewife would primarily utilize the Skelton impoundment (CMP, 1991b).

In total, the potential habitat available within the 14-mile reach of river from Cataract to the Bar Mills dam (of which about 3.5 miles is within Skelton's boundary) was estimated to have the potential to produce 3.0 to 5.0 million juvenile shad and about 98,000 to 196,000 adult alewife (USFWS *et al.*, 1987). For the reach from the Skelton dam to Cataract, an estimated 21,313 habitat units for American shad and 20,336 habitat units for alewife were assessed to be suitable. This represents 23 percent and 7 percent of the total available habitat in the Saco River for these species, respectively. For the 3-mile reach from Bar Mills dam to the Skelton dam (2.8 miles of which is the Skelton impoundment), an estimated 20,732 habitat units for American shad and 20,159 habitat units for alewife were deemed suitable. This reach also represents 23 percent and 7 percent of the total available habitat in the Saco River for these species, respectively.

For resident salmonids, or trout, suitable habitat at Skelton varies considerably between species. While the entire reach between Cataract and the Bar Mills dam, including the impounded portions, contains suitable habitat for brown trout and warmwater species, only the Skelton tailwater was considered to be suitable habitat for brook trout. For brook trout, potential habitat in the tailwater consisted of 600 habitat units (USFWS *et al.*, 1987). Since unimpounded waters in reaches II and III are very limited, the agencies consider the unimpounded waters at Skelton to be critical to fish species within the reach (USFWS *et al.*, 1987).

Skelton Impoundment

The Skelton impoundment is characterized by relatively steep-sided shorelines (greater than a 30-degree slope). Slopes reaching 45 to 60 degrees are present in some parts of the impoundment, particularly the upstream portions downstream of Bar Mills, where areas of bedrock outcrops occur. Areas of more gradual slopes (less than 30 degrees) are also scattered throughout the impoundment, but most are found in the Cook's Brook arm of the impoundment. These areas represent about 5 percent of the total impoundment shoreline.

Currently, the Skelton impoundment fluctuates less than 2 feet daily, although fluctuations of up to 2.5 feet occur occasionally. The drawdown from maximum to minimum water elevations is not abrupt and typically requires 10 to 14 hours to lower the impoundment level. Consequently, a dewatered zone is exposed during the 2 foot drawdown of the impoundment.

To characterize the drawdown zone, studies were performed at a typical drawdown of 2 feet. Results of the studies indicated a narrow band along the margin of the impoundment, estimated to average about 5 feet in width and range from 2 to 10 feet (CMP, 1991b). The amount of substrate exposed during the drawdown was estimated to be 12.2 acres, or about 2.5 percent of the total impoundment area (at full pool el. 127.5') of 488 acres. About 3.3 acres of the exposed substrate consisted of gravel, cobbles and occasional boulders, about 1.3 acres was ledge, and the remaining 7.5 acres consisted of finer substrates (clay, silt and sand). Less than 1 acre of the drawdown zone was classified as SAV, as aquatic vegetation growth was limited in the drawdown zone (CMP, 1991b).

CMP (1991b) concluded that the total amount of fisheries habitat dewatered by the 2 foot drawdown was relatively minor, compared to the total habitat available within the impoundment. The total acreage of dewatered aquatic habitat with fine substrates, coarse substrates, and vegetation was 2.5 percent of the total available fisheries habitat. Areas observed within the impoundment capable of supporting spawning, rearing, and foraging by warmwater fishes were not affected by the drawdown. Areas of cobble and gravel substrate, potentially important as spawning habitat, were often too steep to be successfully utilized by fish (CMP, 1991b). In areas where the littoral zone was more gradually sloped, however, potential utilization by some nest builders (centrarchids) as spawning and rearing sites could be affected.

3.3.2.3 Vegetation and wildlife resources

The total vegetated area within Skelton's boundary is 181.7 acres. Field investigations in 1988 identified three wetland and six non-wetland cover types within the project boundary.

The shoreline of the Skelton impoundment is dominated by mixed forest cover type, with small interspersed beds of SAV along the shoreline. Downstream of the dam, the river shoreline is dominated by mixed forest and scrub/shrub vegetation.

Over 160 acres or 88 percent of the vegetated area within Skelton's boundary is upland. The upland cover types are mixed forest, shrubland, old field, agricultural, bedrock outcrops, and developed (residential/commercial) areas.

Upland Vegetation

The predominant vegetative cover type in the project area is mixed forest, which occupies 123 acres or 68 percent of the vegetated area within the project boundary. Shrubs,

old field, and bedrock outcrops occupy 18 acres (10 percent), 14 acres (8 percent), and 2.3 acres (about 1 percent), respectively. Developed lands occupy 2 acres (about 1 percent), and less than 1 acre (<1 percent) is agricultural.

Mixed forest borders the entire reservoir except for a few agricultural areas and a small wet meadow. Sizeable tracts of mixed forest are also present below the dam on either side of the river. The mixed forests are comprised of deciduous and coniferous trees and contain both wetland and upland species. The low-lying forested land adjacent to the impoundment can be classified as a northern riverine (floodplain) forest, and higher and more inland areas can be classified as dry or upland forest. Riverine forests are generally not sharply separated from neighboring upland forests, however, and are subject to invasion by facultative upland species. Thus, these habitat types are combined under the mixed forest cover type.

American beech, silver maple, white oak, black cherry, white pine, and white birch are most common trees of the mixed forest. Shrubs are largely confined to the river bank and habitat edges. Speckled alder, Virginia creeper and northern arrow-wood are most common. As with shrubs, herbaceous vegetation is generally restricted to the river's edge. Asters, Christmas fern, bracken fern and sensitive fern are most common.

Shrubs are confined to disturbed areas below Skelton dam. Typical shrub species include raspberry, staghorn sumac, and smooth sumac. Beggar-ticks, goldenrods, asters and wild carrots are prevalent ground cover species.

One tract of old field is present near the Skelton dam, and is actually the embankment that forms the right abutment of the dam. Common mullein, asters, goldenrod, common St. John's wort, and common yarrow are the dominant vegetative types in this area.

Bedrock outcrops occur below Skelton dam and on the island in the western arm of the impoundment. Pioneer species such as lichens, mosses, water willow and willows are found in crevices and on the rock surface.

Developed lands include the permanent project structures (powerhouse, roadway, etc.) and their associated maintained land.

Agricultural land is located on the Cook's Brook arm of the reservoir and is part of a larger farming operation.

Wetland Vegetation

Only 21.6 acres or 12 percent of the vegetative cover within Skelton's boundaries were classified as wetlands. The three wetland cover types identified are scrub-shrub, SAV, and wet meadow. Scrub-shrub is the dominant wetland type within Skelton's boundary and

occupies 10.6 acres (6 percent) of the vegetated area within the project boundary. A total of 10.4 acres of SAV beds are present, and a small (0.6 acre) wet meadow was identified.

Scrub-shrub wetlands are confined to areas below the Skelton dam within the Saco River floodplain. These areas are seasonally inundated during high spring flows or other high-flow events, which may preclude the growth of larger trees in the area. Quaking aspen, red maple, silver maple, and American elm are the common trees. Willows and speckled alder dominate the shrub layer. Rushes, sedges and water hemlock are common herbaceous species.

SAV beds are usually found within totally wetted areas at depths generally less than 6 feet. Species occupying SAV beds include both submergents and immature life stages of some emergents. The largest SAV bed (6 acres) is located below the dam in an area of slower water velocity between the tailrace and the head of Cataract reservoir. Thirteen smaller beds are found scattered along the impoundment shoreline. Five species of submergent vegetation were identified. Common pipewort and coontail are dominant in the SAV beds in the reservoir, while water bulrush dominates the bed below the dam.

Wet meadows are generally found along the margins of lakes or reservoirs, often grading into a scrub-shrub or forested wetland. Wet meadows may have small pockets of standing water, and are usually dominated by emergent species such as rushes, sedges, and grasses. A small wet meadow is located in a cove in the lower end of the project reservoir. Eight species of herbaceous vegetation are present within this wet meadow, with arrowhead and pickerel weed dominant.

Wildlife Resources

The variety of vegetative habitats within Skelton's boundary support a diversity of wildlife species, including song birds, waterfowl, mammals, furbearers, reptiles, amphibians, and invertebrates.

CMP noted six species of birds and two species of reptiles during field investigations (August 1988) at Skelton. These included the black crowned night heron, great blue heron, belted kingfisher, and spotted sandpiper in the impoundment area, and double-crested cormorant and herring gull on a structure near the Skelton dam. Snapping turtle and painted turtle were present below the dam. The common loon has been reported to utilize the impoundment on an irregular basis, but none were seen during the 1988 field investigations. Also, CMP noted black ducks and ospreys during 1991, in addition to double-crested cormorants and herring gulls.

The mixed forest habitat surrounding the reservoir provides suitable habitat for a variety of mammals including moose, raccoon, white-tailed deer, eastern chipmunk, and grey squirrel. Project waters provide habitat for furbearers, such as beaver and muskrat.

3.3.2.4 Recreation resources

The primary recreation activities occurring at Skelton include swimming, motor boating, fishing, and sightseeing. Other recreational uses include picnicking, snowmobiling, and cross country skiing. Total recreational use at Skelton in 1991 was about 60,000 user-day/nights and is projected to increase to 64,700 - 70,500 user-days/nights by the year 2002.

CMP developed a comprehensive recreation plan that addressed the recreational needs at their 32 hydropower and water storage projects (CMP, 1989). CMP designed the plan in consultation with state and regional agencies, environmental interest groups, and the general public, to evaluate the extent to which their existing recreation facilities met the current and anticipated public recreation needs. CMP's plan outlined future recreation improvements to enhance public recreation opportunities before the year 2000, and included numerous enhancements for their projects along the Saco River.

CMP's comprehensive recreation plan identified several site-specific facilities needed at Skelton, including upgraded boat launches above and below the dam and an improved canoe portage trail. CMP subsequently developed these facilities at Skelton in 1990 and 1991.

Boating access to Skelton's impoundment is provided at CMP's newly constructed hard-surface boat ramp. The ramp is located at the west end of the dam and provides parking for 20 vehicles and opportunities for picnicking and bank fishing. Additional access to the impoundment is provided by the towns of Hollis and Buxton at the Route 117 bridge crossing in Salmon Falls. This area affords swimming, picnicking, and bank fishing opportunities. The town of Buxton also manages an undeveloped day-use site on the east shore of the impoundment that provides picnicking, swimming, and informal camping opportunities.

Canoe touring in the lower Saco River is not currently popular, but occasional groups tour through the project area traveling from the headwaters in New Hampshire to the ocean. To improve canoeing opportunities in the lower Saco River, CMP relocated a much longer portage trail to the center of Skelton's dam earthen portion.

Fishing in the 4,000-foot-long free-flowing river stretch below Skelton's dam is popular among anglers fishing for trout, smallmouth bass, and occasional sea-run Atlantic salmon. CMP estimated that the angling capacity along the tailrace is about 30 shoreline and wading anglers. Tailrace access includes CMP's recently improved carry-in boat launch site on the west side of the river. This site provides a gravel-surfaced ramp for launching canoes and small skiffs, parking area for 15 vehicles, and bank fishing access. Power boating in this stretch and in the upper 5 miles of the Spring Island and Bradbury impoundment is restricted by natural underwater hazards such as rocks, shoals, and ledges.

CMP's impoundment boat launch, tailrace boat launch, and canoe portage are not currently accessible to the disabled population due to the rough terrain and steep slopes at the access sites.

3.3.2.5 Geology and soils

Skelton is located in the Seaboard Lowlands physiographic region of Maine. Glaciers and marine deposits formed the topography of the region which is characterized by rolling hills and broad flat valleys. The bedrock in the project area consists of metamorphic rocks derived from sedimentary rocks and granite. Glacio-marine deposits, comprised of clay, silt, and fine sand, overlie the project area's lowlands. Glacial till comprised of an unsorted mixture of sands, silts, clays, and boulders overlay the bedrock in the upland areas (Beck, 1990). About 95 percent of the impoundment shoreline banks are steeply sloped (greater than a 30-degree slope).

3.3.2.6 Aesthetic resources

Aesthetic resources at Skelton include scenic views of the impoundment which is generally secluded and has a densely wooded, undeveloped shoreline. CMP's project boundary generally follows the perimeter of the impoundment at the 134-foot contour elevation (normal full pond elevation is 127 feet). Most of the property outside of Skelton's boundary is privately owned. Few structures are visible from the river and there are limited areas where the impoundment is visible from roadways. Scenic views from roadways are provided at CMP's access road and the Route 117 bridge crossing in Salmon Falls.

3.3.2.7 Archeological and Historic resources

The Saco Water Power Company, the first known developers to use the Skelton site, built a stone dam with a 15-foot fall in 1856 to store water for use by downstream mills. The first hydroelectric power at the site was developed between 1912 and 1917. CMP acquired the project in 1942 by merger with Cumberland County Power and Light Company, and the present Skelton facilities were constructed between 1947 and 1949. There are no structures in the project vicinity, including the project facilities, that qualify as historic properties (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, July 15, 1986).

CMP contracted the University of Maine at Farmington to conduct Phase I and Phase II surveys designed to locate prehistoric archaeological sites in the project area. Prior to conducting these archaeological surveys there were no known archaeological sites at Skelton. During the survey field work eight aboriginal sites were identified at Skelton (Paquin, *et al.*, 1990). After reviewing the resulting archaeological survey report, the SHPO indicated that four archaeological sites are eligible for inclusion in the National Register (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, December 6, 1989).

The aboriginal artifacts recovered during the surveys suggest that the following historic periods are represented at the sites: the Early Archaic period or Middle Archaic period (about 7000 to 4000 B.C.), a portion of the late Archaic period (about 1800 to 1000 B.C.), and the Contact period (about 1500 to 1750 A.D.).

3.3.2.8 Land use

Skelton's dam impounds the Saco River in the towns of Standish, Buxton, Dayton, and Hollis. The land surrounding the project is generally undeveloped and a mixture of forest and farmland in a rural setting.

3.3.3 Swans Falls (Source: SFC, 1992; 1993, unless otherwise indicated).

3.3.3.1 Water quantity and quality

Located at river mile 85.2 in Fryeburg, Maine, Swans Falls is operated as a run-of-river facility. Flows up to the station unit's capacity of 390 cfs are directed through the powerhouse. Streamflows exceeding the station's combined capacity of 2,850 cfs (unit and sluice gates) are discharged over the dam. Station capacity is exceeded about 9 percent of the time.

Drainage area at Swans Falls is 446 mi^2 and the project is located 10.1 miles downstream of the USGS's gage (No. 01064500) at Conway, New Hampshire. Flow characteristics for the gage are discussed in section 3.1.3. Adjusting the Conway gage's records to Swans Falls (446 mi^2/385 mi^2), the average annual flow for Swans Falls is 1,080 cfs. Monthly average flows at Swans Falls are shown in Table 3-11.

As discussed in section 3.1.3, the Saco River in the vicinity of Swans Falls is classified by MDEP as Class A. Currently, there are two discharges in the project vicinity. The town of North Conway, New Hampshire, discharges an average daily flow of 0.36 mgd of primary treated wastewater upstream of the project. Public Service of New Hampshire (PSNH) discharges 1.73 mgd of uncontaminated cooling waters from their diesel plant into the Saco River just below the Swans Falls dam (SFC, 1992). North Conway, however, is currently planning a secondary wastewater treatment plant.

SFC conducted water quality studies in the summers of 1991 and 1992, and a benthic macroinvertebrate study in 1991. Results of the water quality studies indicate that Class A standard are

Table 3-11 Saco River average monthly flows at Swans Falls, Maine. Source: (Swans Falls Corporation, 1992).

Month	Flow (cfs)
January	636
February	595
March	1,000
April	3,053
May	2,684
June	967
July	493
August	408
September	447
October	710
November	1,076
December	872

currently being met. DO levels in the headpond ranged from 7.5 to 10.9 ppm and from 8.5 to 10.6 ppm in the tailrace. DO levels did not appear to stratify in either the headpond or the tailrace.

Macroinvertebrate samples were collected both above the Swans Falls impoundment and downstream of the Swans Falls dam. Based on the study results, Lotic (1992) concluded that the benthic community downstream of Swans Falls meets the narrative criteria for a Class A stream and reflects a well-balanced community with a predominance of organisms that are indicators of good water quality.

3.3.3.2 Fisheries resources

Swans Falls is located on the boundary of river reaches V and VI in the Saco River's 1987 strategic fisheries plan (Figure 3-1). Although no anadromous fish presently utilize the Swans Falls area, the resource management objectives for the reaches are:

Reach V

1. Establish a recreational fishery for trout in the Fryeburg area.
2. Increase recreational utilization of all warmwater fish populations and commercial utilization of American eels.
3. Manage as a migratory pathway for Atlantic salmon.

Reach VI

1. Consult with NHDFG and USFS to participate in interagency compacts to develop an interstate Atlantic salmon restoration program.
2. Continue interstate agency cooperation to prevent introductions of undesirable species.

Resident fishes inhabiting the Saco River in the Swans Falls vicinity include both coldwater fish, mainly brown trout and brook trout, and warmwater fish, such as smallmouth bass, perch and pickerel. Although habitat for coldwater fish is limited in the project vicinity, based on habitat evaluations from USFWS *et al.* (1987), 200 brook trout habitat units are located immediately below the Swans Falls dam. The habitat, however, is seasonal in nature because of inadequate temperatures. Currently, the USFWS *et al.* (1987) plans to stock 300 fall brook trout fingerlings annually into the habitat for a seasonal fishery. Brown trout habitat is also limited and no stockings are scheduled under current management plans.

The Swans Falls impoundment is about 150 acres at the normal pond elevation of 395.9 feet. The impoundment extends about 4.1 miles upstream of the dam.

To characterize the aquatic habitat in the bypassed reach, SFC performed a habitat and flow study of the affected area in 1992. The study found that the bypass consisted of three areas: the main bypassed channel, the old powerhouse channel, and the north channel (Figure

3-2). Each channel was characterized for length, cross-section, depth, and substrate (SFC, 1992).

The main channel was composed largely of ledge at the upper end, rock (> 18 inches) and boulder (10 - 18 inches) in the middle portion, and boulder and cobble (2.5 - 10 inches) at the lower portion near the tailwater. The wetted area under leakage and 20 cfs was calculated to be 9,400 square feet (ft^2) and 17,900 ft^2, respectively.

The old powerhouse channel, about 300 feet long, was a well shaded, steep, narrow channel composed largely of boulders. The north channel is a 600-foot-long steeper channel consisting of primarily rock, boulder, and cobble with some isolated areas of sand and gravel. No flows exist in these channels under leakage flow conditions. Flows of about 22 cfs in the old powerhouse channel and 30 cfs in the north channel resulted in wetted areas of about 3,200 ft^2 and 25,725 ft^2, respectively. These flows approximate the portion of river flows that would be present under Aquatic Base Flow (ABF) conditions.

Based on the study results, SFC (1992) concluded that the habitat present in the bypassed reach under ABF conditions would primarily be juvenile salmonid habitat with some adult salmonid habitat in the main channel and north channel. Total square footage would be about 46,825 ft^2 under an ABF flow of roughly 72 cfs.

3.3.3.3 Vegetation and wildlife resources

Vegetation within the project area at Swans Falls is typical of riverine areas in southwestern Maine. Most of the land adjacent to the project's 150-acre impoundment and the Saco River downstream of the project dam is covered by a mixture of upland and wetland forest. Vegetation and wildlife surveys conducted in the project area during 1991 identified seven vegetative communities, three upland communities, and four wetlands.

Upland vegetation

The three upland vegetation types are mixed hardwood-conifer forest community, early successional forest community, and the river beach community.

The mixed hardwood-conifer forest community occurs along the west bank of the Saco River, just above the dam and just downstream of the Route 113 bridge. This community is characterized by a full canopy of large white pine, red oak, and American beech. Eastern hemlock, paper birch, and red maple are usually co-dominants in the canopy and sub-canopy. The shrub layer near the river contained northern arrow-wood, shadbush, black cherry, and chokeberry. The herbaceous layer is diverse with rough goldenrod, flat-topped aster, bellwort, and cinnamon fern being most common.

The river beach communities are found along the inside river bends upstream of the project dam. These areas are primarily open sand with vegetated islands. False heather,

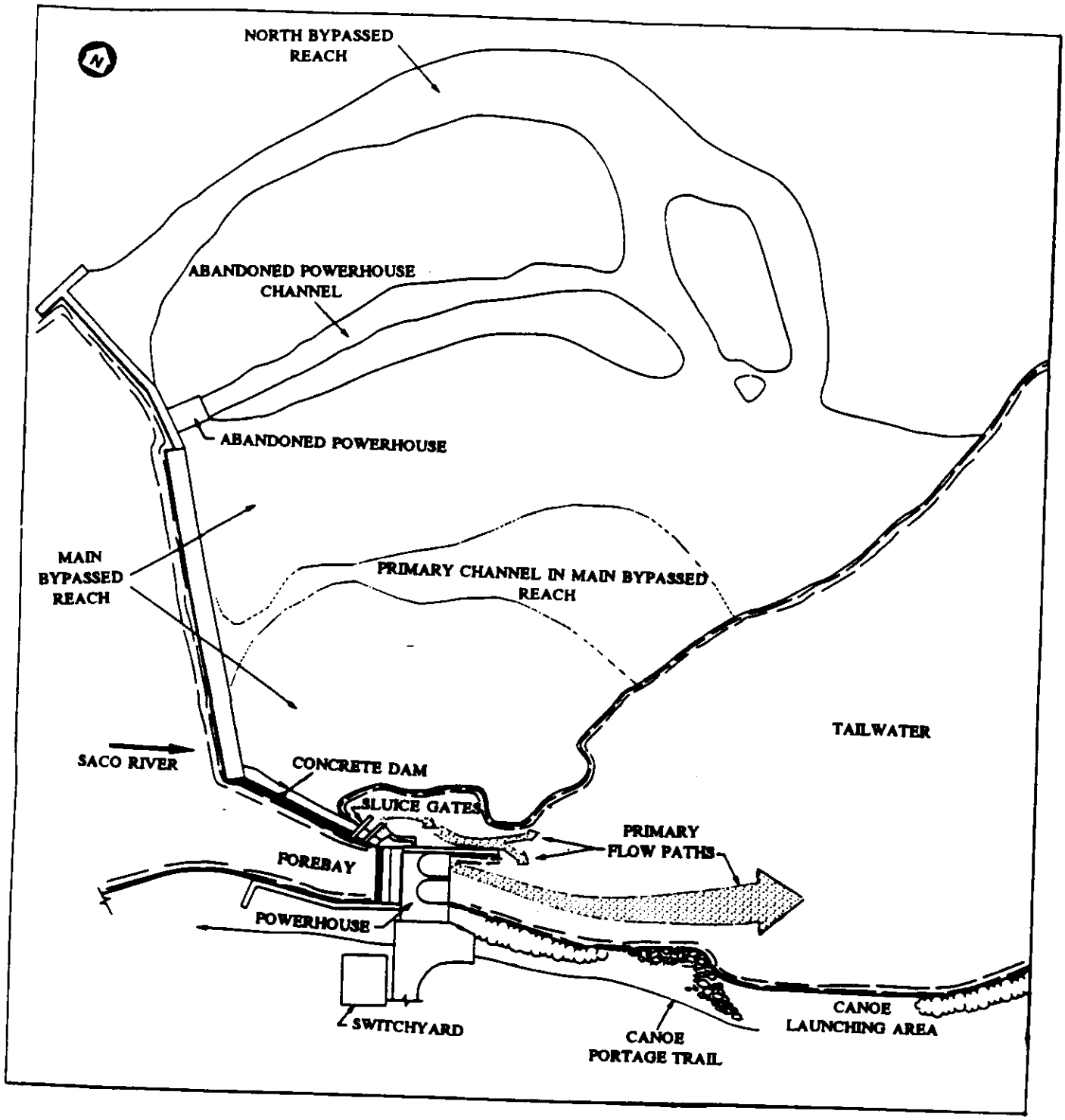

Figure 3-2 Swans Falls bypassed reach, Saco River, Maine (Source: SFC, 1992).

downy goldenrod, and little and big bluestem grasses are common herbaceous species. Shrubs become established in small thickets and near the forest edge. Typical shrubs include silky willow, scrub oak, meadow sweet, and staghorn sumac. Some trees such as pitch pine, gray birch, black locust, white pine, and red oak are present.

Early successional forest communities occur along the edges of the sand beach communities, on abandoned agricultural land. Gray birch, white pine, and young red oaks form open young forests. Ground cover species include dense raspberry, bracken fern, and teaberry.

Wetland vegetation

The four wetland communities are the backwater slough community, acidic shoreline shrub thicket community, hardwood floodplain community, and acidic shoreline outcrop community[5].

There are backwater sloughs on both sides of the river just upstream from Swans Falls and at several other locations further upstream. These sloughs are dominated by emergent vegetation, such as spatterdock, pond weeds, and occasionally cattail. The edges contain a dense growth of sedges, rushes, St. Johns wort, and swamp candle. Often willows invade these areas from the sides.

The acidic shoreline shrub thicket community is found commonly along the sides of the backwater channels and on lower river banks. It tends to persist in areas where frequent flooding prevents the full floodplain forest from developing and exhibits several vegetative variations. It is characterized by a sparse silver maple canopy. Dense shrub thickets comprised of red-osier dogwood, meadow sweet, and speckled alder line the river banks and lower floodplain bars. A variation of this community occurs on point bars and lateral bars that are frequently washed by flood water, where dense meadow sweet, mild water piper, and swamp candle occur. In several low banks, blue joint-grass forms dense meadows between the shrub patches. These predominantly grassed areas are classified as graminoid swale communities. In areas more frequently inundated by slow moving water, wool bulrush along with blue joint-grass extent into the backwater slough community.

The hardwood floodplain forest community occurs in several areas along the project impoundment that were less accessible to farming. This community is dominated by silver maple. In areas flooded less frequently, sub-dominants of basswood, white pine, and American elm are found. The dense over story trees create an open under story and shrub

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[5] These correspond to palustrine emergent, palustrine scrub-shrub deciduous acid, palustrine forested broad-leaved deciduous, and palustrine scrub-shrub deciduous acid classifications, respectively, used by Cowardin *et al.* (1979).

layer of northern arrow-wood, red-osier dogwood, and winterberry. The herbaceous layer is also sparse with patches of sensitive fern, New York fern, and northern bugle weed.

The acidic shoreline outcrop community occurs below Swans Falls and along the immediate lands and islands near the falls, small amounts of alluvial soils have accumulated in crevices. Willows and red-osier dogwood along with grasses, goldenrods and asters have become established in these crevices.

Wildlife resources

The river and adjacent natural communities are inhabited by a number of wildlife species drawn to water bodies and the adjacent riparian edge. Many species are dependent on open water and abundant fish populations, such as the beaver, river otter, muskrat, and various mustelids (e.g., mink, weasel). Black ducks, mallards, and wood ducks were commonly observed in the backwater areas. Great blue herons were frequently encountered during field activities. The swifter, and more open water areas probably support common mergansers, double-crested cormorants, and belted kingfisher.

The proximity of the floodplain forest to open farmland and overgrown field edges create habitat preferred by a number of common wildlife species, such as white-tailed deer, skunk, and raccoon. Other typical mammals are short-tailed shrew, snowshoe hare, red squirrel, gray squirrel, red fox, coyote, and moose.

Birds observed in the project area are the American woodcock, white-throated sparrow, dark-eyed junco, blue jay, black-capped chickadee, red-breasted nuthatch, and downy woodpecker.

Reptiles and amphibians that are expected to occur in the project area include the eastern painted turtle, northern water snake, eastern garter snake, spotted salamander, red-spotted newt, redback salamander, gray tree frog, and American toad.

3.3.3.4 Recreation resources

Flat-water canoeing is the principal recreational activity at Swans Falls. Other recreational uses in the area include camping, fishing, and swimming. The Saco River from the New Hampshire border to Hiram is listed as a unique recreational river due to its canoe touring resource value (MSPO, 1987). Swans Falls is located within this river stretch and SFC provides a canoe portage about 600 feet long around the project leading to a canoe launching area below the dam. SFC maintains the portage by annually grading the trail with fine gravel.

The SMRPC's recreational survey (1983) indicated that the most frequently canoed stretch of the Saco River is between Saco Bound (6.4 miles above Swans Falls) and Lovewell Pond (15.5 miles below Swans Falls). Within this 22 mile stretch, the Saco River

Recreational Council estimated that about 9,000 canoes are portaged at Swans Falls from May to October (letter to Swans Falls Power Corporation from Ned McSherry, Saco River Recreational Council, Fryeburg, Maine, May 3, 1993).

The 1983 recreational survey report indicated that 78 percent of those individuals canoeing the river were also camping along the river. Camping is permitted on non-posted sandbars from the New Hampshire border to the Oxford County line in Hiram. Adjacent to Swans Falls, the AMC operates a state-owned campground which provides 20 campsites, parking, restrooms, and the canoe launching area below the dam.

Angling near Swans Falls is generally combined with canoeing; however, bank fishing is also popular along the shoreline just below the dam. The Saco River fishery includes both warm-water and cold-water fish, and MDIFW provides a seasonal stocked brook trout fishery below Swans Falls dam. Areas that provide swimming opportunities at Swans Falls include the Weston Beach located off the Route 113 bridge in the upper reaches of the impoundment and numerous sandbars along the river.

3.3.3.5 Geology and soils

Swans Falls is located in the Northern New England Upland physiographic region and the topography is characterized by steep rounded hills and broad flat valleys. The Saco River meanders through well-established floodplains and low terraces at Swans Falls, and the shoreline banks includes both steeply sloped banks and sandy point bars. The underlying bedrock in the project area is granite which is overlaid by post-glacial alluvium deposits, till, and swamp. Alluvial sediments along the river consist of sand, silt, and clay.

3.3.3.6 Aesthetic resources

The Saco River from Fryeburg to Hiram is listed as a state scenic river due to the river's undeveloped corridors (MSPO, 1987). Aesthetic resources at Swans Falls include scenic views at Swans Falls' impoundment and the bypassed reach. Scenic views of the impoundment are provided from the Route 113 bridge. The Swans Falls bypassed reach includes a 100-foot-long ledge area that is visible from AMC's canoe launch area. Flows over these cascades occur from leakage (about 25 gallons per minute) and spillage over the dam. Spillage over the dam currently occurs about 9 percent of the time when the combined discharge capacity of the project and the sluice gates is exceeded (about 2,850 cfs). Additional scenic views include areas where agricultural fields are visible from the river.

3.3.3.7 Archeological and Historic resources

Hydroelectricity was first produced at the Swans Falls site in 1903 when the Fryeburg Electric Light Company built the dam and a powerhouse near the river's western shore. Flood damage in 1936 destroyed most of the original powerhouse. The existing powerhouse was developed around 1923 and generated power until it was deactivated in 1965. SFC acquired

Swans Falls in 1966 and began generating power at the site in 1982. A man-made canal built in the early 1800's below Swans Falls became a section of the Saco River mainstem following an 1820 flood, bypassing a 30-mile-long section of the river.

The SHPO determined that the Swans Falls facilities are not eligible for listing in the National Register and that there are no above ground properties in the project area of historic significance (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, December 7, 1993). The SHPO's conclusion was partially based on the powerhouse's modest architectural design, it's loss of historic generating equipment, and the absence of any distinguishing engineering solution to problems posed by the site.

Steven L. Cox (1994) from the Maine State Museum conducted Phase I and II archaeological surveys at Swans Falls and identified three prehistoric sites along the impoundment. After reviewing the survey reports, the SHPO indicated that the archaeological sites are not eligible for listing in the National Register. Further, the SHPO indicated that Swans Falls would not adversely affect any site of archaeological significance (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, September 1, 1993).

3.3.3.8 Land use

The Swans Falls dam impounds the Saco River in the town of Fryeburg. Surrounding land in the Saco River valley is used primarily for agricultural purposes. While SFC owns about five acres within the project boundary, most of land area is near the project facilities and fenced-off due to safety requirements. Tourism is also important to the local area and the principal attractions include the Pleasant Mountain Ski Area, camping, lakeshore cottages, and the Saco River itself. Additionally, several organized summer camps for children are located both upstream and downstream of Swans Falls.

4. ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental effects of the proposed actions and alternatives regarding the Agreement and the license amendments, the issuance of new licenses for Bonny Eagle and Skelton, and the issuance of an exemption for the unlicensed Swans Falls.[1] Section 4.1 deals with the effects of implementing the Agreement's provisions including the effects of amending the licenses for Bar Mills, West Buxton, and Hiram. The environmental effects of issuing new licenses for Bonny Eagle and Skelton as proposed and under each alternative are discussed in Section 4.2. Section 4.3 discusses the environmental effects of issuing an exemption for Swans Falls. Finally, sections 4.4 to 4.7 address the relationship of the proposed actions to applicable laws and policies, the unavoidable adverse impacts and the irreversible and irretrievable commitment of resources from the proposed actions and alternatives, and the relationship between short-term uses and long-term productivity.

4.1 THE SACO RIVER FISH PASSAGE AGREEMENT

4.1.1 Agreement as proposed

The Saco River Fish Passage Agreement was negotiated to reach a consensus on the installation of fish passage facilities at dams on the mainstem of the Saco River.[2] The Agreement sets out an agreed upon sequence and time table upon which fish passage facilities are proposed to be developed along the Saco River. The Agreement also establishes a process and means by which the exact development dates can be determined (see Appendix A). Fish passage facilities at mainstem Saco River dams are anticipated to be needed to assist in the restoration of populations of anadromous Atlantic salmon, American shad, and river herring. If implemented, the Agreement would affect, either directly or indirectly, all projects on the mainstem of the Saco River and presents a comprehensive approach to the development and installation of fish passage facilities needed for the restoration of anadromous fish to the Saco River Basin. Agreement objectives and general principles are set forth in Table 4-1.

After review of a final draft of the Agreement, dated February 28, 1994, the State of Maine determined that the Agreement constituted a change to the existing *Strategic Fisheries Management Plan for the Saco River*. Under state law, MDMR noticed and held a public meeting on the proposed Agreement on April 25, 1994, and a public comment period through May 6, 1994. No significant concerns or objections were raised by the public (CMP, 1994a). On May 10, 1994, the MDMR's Advisory Council formally adopted the proposed Agreement.

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1 **Our final analysis and recommendations are made in section 5.4.**

2 The signatories to the Agreement include: CMP, USFWS, NMFS, ASRSC, MDMR, MDIFW, MSPO, NHDFG, the Coalition, SFC, and the Cities of Saco and Biddeford.

Table 4-1 Objectives and general principles set forth in the Agreement (Source: CMP, 1994e).

°	The objective of restoring Saco anadromous fish populations is the establishment of viable, self-sustaining runs of Atlantic salmon, shad, and river herring (alewives and blueback herring), with optimum utilization of suitable habitat, where possible. Passage of salmon above Swans Falls is a long term goal. For shad and river herring, the goal is to provide passage on the mainstem only above Bonny Eagle.
°	The fisheries agencies and the Coalition see trap-and-truck as a short term means to accommodate upstream fish passage, not as a viable long term management strategy. CMP believes that trap-and-truck may be the most biologically sound method of providing upstream fish passage at some dams.
°	Uncertainty surrounds shad's ability to pass multiple barriers which could affect the timing and design of facilities.
°	Downstream passage is needed at all dams above which anadromous fish have passed, been stocked, or been trucked. CMP agrees to provide necessary interim downstream fish passage until permanent facilities are installed and operational in accordance with the Agreement.
°	The comprehensive fish passage plan should be biologically defensible.
°	Because of uncertainties, periodic assessments will be conducted to determine the need for, design and schedule for implementing fish passage measures at Bar Mills, West Buxton, Bonny Eagle, Hiram, and Swans Falls. Assessment criteria will be established in advance and address spawning escapement, trap-and-truck capacity and mortality, habitat utilization, run size, fish fallback, population rate increases, stock origin, etc. Assessment criteria will be developed by state and federal fisheries agencies in consultation with the parties to the Agreement by January 1, 1995, using a consensus process.
°	Final fishway design must be approved by Interior and/or Commerce pursuant to Section 18 of the Act before construction is implemented. Additionally, CMP will consult with MDMR, ASRSC, MDIFW, and MDEP regarding the final design and will conduct effectiveness studies on all new facilities.
°	Complete restoration of salmon would require stocking of juvenile fish above Swans Falls and would be dependent on an inter-ageney agreement and adequate numbers of suitable salmon stocks.
°	The Agreement will be effective when signed by all signatories.
°	The Agreement will terminate, unless extended by the parties, on December 31, 2022, or upon the expiration of the new licenses for Skelton or Bonny Eagle, whichever occurs later.
°	The Agreement binds and inures to the benefit of the successors and assigns of the signatories.
°	Disputes arising during the carrying out of the Agreement will be resolved in good faith using a consensus approach.

On June 28, 1994, the Agreement was signed by all signatories except the NHDFG. The NHDFG signed the Agreement on October 6, 1994, and CMP formally submitted the Agreement to the Commission as an offer of settlement on November 23, 1994.

4.1.1.1 Cataract

Located at river mile 5.0, the first obstacle to returning anadromous fish on the Saco River is the four-dam complex composed of Cataract (East Channel), West Channel, Bradbury, and Spring Island dams (Figure 4-1). At the East Channel Dam, upstream fish passage facilities consisting of a fish lift were constructed in 1991 and 1992, and became operational in 1993. Downstream facilities consisting of a bypass outlet and flume were constructed in 1992 and were first operated in 1993. At the West Channel Dam, upstream fish passage facilities consisting of a denil fishway were constructed in 1992 and 1993, and downstream facilities consisting of a bypass were constructed in 1992. Both facilities were first operated in 1993. Currently, there are no upstream fish passage facilities at either Spring Island Dam or Bradbury Dam. Downstream fish passage is accomplished by fish swimming through open gates. As discussed in section 2.1.3, the installation of fish passage facilities is currently required at both Bradbury and Spring Island Dams.

The Agreement would require that construction of upstream fish passage facilities at either Spring Island or Bradbury Dam begin in 1995 and that the facilities be operational by May 1, 1996. Construction of the upstream passage facility at the remaining dam would be scheduled for completion by May 1, 1997, or sooner. These dates are intended to be transposable depending on the outcome of fish behavior, telemetry, engineering, and flow studies in 1994. CMP subsequently requested an extension of time, by letter dated April 28, 1995, to have operational upstream fish passage at both Springs and Bradbury dams by May 1, 1997. The Commission approved CMP's requested extension of time by order issued May 30, 1995.

The proposed upstream fish passage facilities at Spring Island and Bradbury would consist of a fish lift/lock concept, assuming the concept proves to be feasible and less expensive than Denil fishways. Based on quantity estimates from the functional design drawings for the facilities, CMP (1994b) estimates that fish lift/locks at Spring Island and Bradbury would cost $910,000 and $800,000 (1993 dollars), respectively. CMP further estimates that operation and maintenance costs for the facilities would be $11,000 annually for each facility. Fishway effectiveness studies would add an additional $50,000 per year per facility for three years.

Because there are no power facilities at either Springs or Bradbury, the Agreement does not require downstream fish passage facilities at either dam. Downstream fish passage would be accomplished by passing fish over the gates, over the flashboards, or through notches in the flashboards. There would be no possibility of fish entrainment at Springs and Bradbury.

The Agreement also specifies that CMP would trap-and-truck Atlantic salmon, shad, and river herring from the East Channel fish lift. Operations would be done in accordance with the fisheries agencies and depending on the numbers of returning fish, salmon could be trucked around Bonny Eagle as early as 1994.

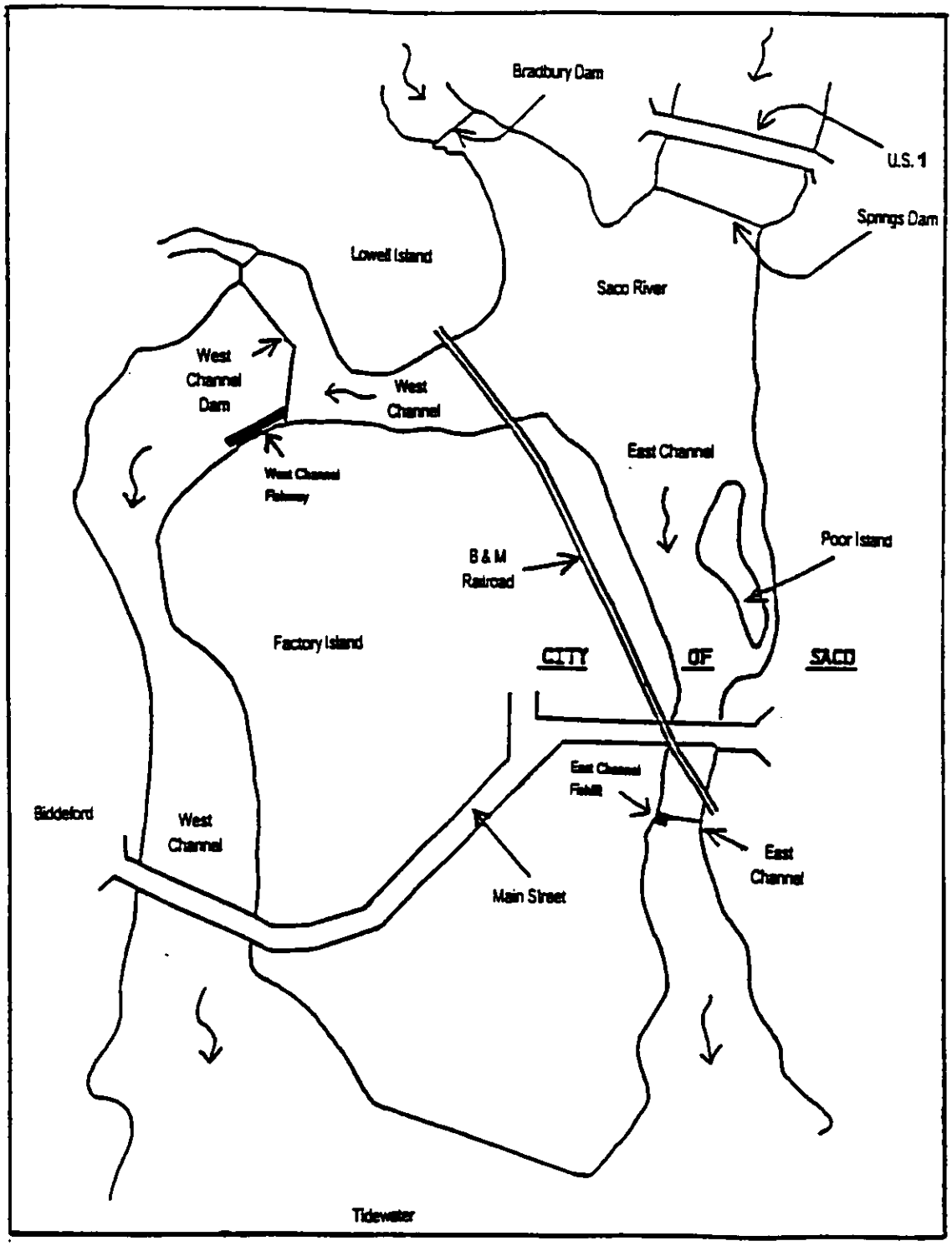

Figure 4-1 Map of the Cataract Project area, Saco River, Maine (Source: RMC Environmental Services, 1994).

We have previously analyzed and discussed the need for fish passage facilities at Cataract, including the need for adequate upstream fish passage facilities at Spring Island and Bradbury.[3] The approach to fish passage adopted in the Agreement would fulfill our current license requirement for the installation of these facilities at Cataract by providing adequate upstream fish passage for Atlantic salmon, shad, and river herring consistent with the goals and objectives of the *Strategic Fisheries Management Plan for the Saco River*. However, as part of any public interest review of the Agreement, the Commission cannot approve parts of the Agreement that would abrogate the Commission's statutory responsibilities and authority over licensed projects.[4]

Under the FPA, the Commission has statutory responsibilities over such matters as schedules for construction of project works and approval of fish passage facility designs at licensed and exempted projects. The license for Cataract, therefore, requires that any proposed plans and schedules for installation of fish passage facilities be submitted to the Commission prior to their implementation. Currently, the project license for Cataract already contains the requirement to provide fish passage facilities at Spring Island and Bradbury, and the Commission's order dated May 30, 1995, extended the date by which fish passage facilities must be operational at Spring Island and Bradbury dams (*for further discussion on fish passage alternatives at Cataract see section 4.1.2*).

Approval of the extension of time for making fish passage facilities operational at the Spring Island and Bradbury dams would not diminish the current anadromous fish restoration efforts. Presently, CMP traps Atlantic salmon, American shad, and river herring at the East Channel dam and transports the fish upstream of Springs and Bradbury dams. CMP would continue with the trap-and-truck program until permanent fish passage in some form is available at Springs and Bradbury dams.

4.1.1.2 Skelton

Skelton, located at river mile 17.0, has a developed head of 76 feet and is the third upstream obstacle for returning anadromous fish. Currently, CMP operates an existing upstream fishway (May to November) consisting of a pool and weir fishway constructed in 1950 and a fish trap. The fish trap is operated by CMP with assistance from personnel of the University of New England. For downstream fish passage, CMP opens the Skelton trash sluice gate 1.5 feet during the spring to coincide with the outmigration of Atlantic salmon smolts (April to November) and utilizes the upstream fishway.

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[3] See 47 FERC ¶ 62,296 (1989).

[4] See, e.g., Virginia Electric and Power Company, 19 FERC ¶ 61,333 at p. 61,142 and n. 6 (1982); Cajun Electric Power Cooperative, Inc., 55 FERC ¶ 61,272 n. 31 (1991); and Northern Wasco County People's Utility District, 60 FERC ¶ 61,087 n. 3 (1992).

The Agreement would require that permanent upstream and downstream fish passage facilities be operational by May 1, 1998, or within 3 years of the receipt of a new license, whichever occurs later. The facilities would be designed to pass salmon, shad, and river herring.

The proposed upstream fish passage facilities at Skelton would likely consist of a fish lift with trap-and-truck facilities. The Agreement specifies that once Skelton's facilities are operational and sufficient numbers of fish are present, Cataract's trap-and-truck program at the East Channel Dam would be moved upstream to Skelton. The program would be paid for by CMP, but the operational decisions on passage of fish to areas upstream of Skelton would be made by the appropriate fisheries agencies.

Based on the costs of facilities installed in the East Channel at Cataract, CMP (1994b) estimates that the proposed fish lift at Skelton would cost about $4.7 million (1993 dollars) to construct. The cost of the trap-and-truck facility is estimated at $500,000 to construct and $110,000 annually to operate. CMP further estimates that the downstream fish passage facilities consisting of a surface bypass would cost about $250,000 for construction. The cost of operation and maintenance of the facilities is estimated to be about $70,000 annually. Fishway effectiveness studies are estimated to add an additional $150,000 per year for three years.

The installation of adequate upstream fish passage at Skelton would enable anadromous fish to utilize the 3-mile reach from Skelton dam to the Bar Mills dam (2.8 miles of which is the Skelton impoundment). In particular, contained in this reach is an estimated 20,732 habitat units (23 percent of the basin total) for American shad and 20,159 habitat units (7 percent of the basin total) for alewife. For shad, this represents a significant portion of available habitat in the basin. American shad would likely spawn in the free-flowing reach below Skelton dam and in the upstream end of Skelton impoundment immediately downstream of Bar Mills. Spawning alewife would primarily utilize the Skelton impoundment (CMP, 1991b) (*for further discussion of shad and alewife habitat at Skelton see section 3.3.2.2*).

For Atlantic salmon, however, both existing and potential spawning habitat is limited in the Skelton area. USFWS *et al.* (1987) estimated that the 4,000-foot-long free-flowing Skelton tailwaters contained 163 habitat units and could potentially support 10 spawning salmon, with a total potential production of 163 smolts. The 163 habitat units represent less than 1% of the total Atlantic salmon spawning and production habitat available in the Saco River drainage (*for further discussion of Atlantic salmon habitat at Skelton see section 3.3.2.2*).

As we discussed in section 3.2.1, the 1987 inter-agency *Strategic Fisheries Management Plan for the Saco River* outlines efforts already underway to restore anadromous fish to the Saco River basin. The stocking of juvenile salmon above Skelton has been ongoing for at least several years. As such, downstream fish passage facilities are an

immediate need at Skelton for the safe passage of downstream migrating smolts. Additionally, since the existing upstream fishway at Skelton was constructed in 1950, the USFWS states that there are serious design deficiencies with the existing fishway (*see discussion in section 4.2.1.2.2)*. With the installation of new upstream fish passage facilities at Spring Island Dam and Bradbury Dam at Cataract (*see discussion in section 4.1.1.1 above)*, we envision upstream fish passage facilities being utilized in the immediate future.

As stated above, the Agreement would require that the fish passage facilities be operational by May 1, 1998, or within 3 years of the receipt of a new license, whichever occurs later. This 3-year period would be utilized for the formation, through agency consultation, of the conceptual fishway design, final fishway design, and monitoring and evaluation plans and for the actual construction of the facilities.

Therefore, we conclude that the need for these fish passage facilities has been demonstrated by the past, present and future planned stockings of anadromous fish above Skelton and the installation of upstream passage facilities at the uppermost Cataract dams (Springs and Bradbury) located downstream of Skelton. Implementing the provisions contained in the Agreement and in any new license issued for Skelton would provide these necessary measures. Additionally, the installation of adequate fish passage facilities at Skelton would further the goals and objectives established by the agencies for the restoration of anadromous fish to the Saco River (*for further discussion on the detailed specifics of the proposed fish passage facilities at Skelton, see section 4.2.1.2.2*).

As noted above, in light of the Commission's statutory responsibilities (*see section 4.1.1.1*), any Commission order issuing a new license for Skelton would require CMP to submit to the Commission, for approval, any plans and schedules for installing fish passage facilities prior to their implementation.

4.1.1.3 Bar Mills, West Buxton, and Bonny Eagle

Located at river miles 20, 24, and 26, Bar Mills, West Buxton, and Bonny Eagle, respectively, form the fourth, fifth, and sixth barriers to returning anadromous fish. None of the three projects have either permanent upstream or downstream fish passage facilities. Interim downstream passage from April to November is accomplished, however, at each project by the removal of flashboards or the use of the trash sluice.

For upstream passage, the Agreement would require that Bar Mills, West Buxton, and Bonny Eagle (additionally, Hiram would also be included, *see section 4.1.1.4 for discussion*) be treated as a group with passage to be recommended by state/federal fisheries agencies based on the progress of fish restoration in the basin. Progress would be measured by the criteria developed by the parties to the Agreement. Assessments would be conducted every 4

years beginning in 1996 and progressing through 2011, to determine the identity of, the need for, and the design and timing of the first upstream fish passage facility to be constructed[5].

During each of the four-year cycles, the parties to the Agreement would participate in reviewing the management goals for the Saco River (agencies only), defining criteria to examine progress in meeting those goals, developing a study plan for the current four-year cycle, conducting studies, collecting and evaluating data, preparing a draft assessment report (agencies only), and preparing a final assessment report representing consensus among all parties. The final assessment reports may include recommendations for the installation of upstream fish passage facilities at Bar Mills, West Buxton, Bonny Eagle, and/or Hiram. In the event that a consensus with the parties on the assessment is not reached, the fisheries agencies would file their conclusions and recommendations with the Commission.

Passage at the first of the dams would be required to be operational no earlier than May 1, 2005, and could be later if an assessment determines that the facility is not needed until a later date. Under the Agreement, subsequent construction of passage facilities at the remaining dams would be spaced at intervals of at least 2 years. The identity of, the need for, and the design and timing of the subsequent facilities to be constructed would be determined by the assessments. Until passage is provided at the dams, trap-and-truck would continue from Skelton under the supervision of the fisheries agencies.

For downstream fish passage, the Agreement would require that permanent downstream fish passage facilities at Bonny Eagle be constructed within 2 years of receipt of the new license, and within 2 years of the receipt of the license amendment for the installation of fishways at Bar Mills and West Buxton. In order to implement installation of proposed fish passage facilities the Agreement required CMP to apply for the amendments of its licenses for Bar Mills, West Buxton, and Hiram within 12 months of signing of the Agreement. CMP filed amendment applications for these three projects on May 18, 1995, to include conditions and requirements of the Agreement.

The developed head at the three projects ranges from 19.5 feet at Bar Mills to 36 feet at Bonny Eagle. Given the relatively low heads, it is likely that the proposed upstream fish passage facilities at each of the three dams would consist of a denil ladder or ladders. Because of the various complexities of each project, however, it is conceivable that more than one ladder could be necessary at each project. For example, at Bonny Eagle, a ladder could be required at both the powerhouse and the New River Channel because fish would most likely be migrating upstream during the spring high flow season when significant spill is occurring at the New River Channel dam. In this instance, two ladders could be required to increase the effectiveness of the overall upstream fish passage at the project if studies indicated that fish were using both channels.

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[5] The "criteria" were filed with the Commission on April 15, 1996, and became an Annex to the Agreement.

The proposed downstream facilities at the three projects would likely consist of a surface bypass located at the powerhouse and, where necessary, a downstream passage gate located on the dam. Final downstream fishway designs, including spillage and/or transport flows during operation, would be developed in consultation with the agencies and based on actual site conditions (*for further discussion on the detailed specifics of the proposed downstream fish passage facilities at Bonny Eagle, see section 4.2.1.1.2*).

Table 4-2 Estimated costs (in 1993 dollars) of fish passage facilities at Bar Mills, West Buxton, and Bonny Eagle. (Source: CMP, 1994b).

Project	Upstream Passage Case #1[1]	Upstream Passage Case #2[2]	Downstream Passage	O & M (annual for one ladder)	Studies (annual)
Bar Mills	$1.4 million	$2.8 million	$250,000	$17,000	$170,000
West Buxton	$1.8 million	$3.5 million	$250,000	$17,000	$170,000
Bonny Eagle	$2.3 million	$3.3 million	$250,000	$17,000	$170,000

[1]Case #1 is for 1 ladder at each project.
[2]Case #2 is for 2 ladders at each project.

CMP's estimated costs of the various fish passage scenarios are shown in Table 4-2. In total, the construction of fish passage facilities at these three projects would cost from $6.25 million to $10.15 million with operation and maintenance costs an additional $51,000 per year. Fishways effectiveness studies are estimated to add an additional $170,000 per year for up to 9 years.

The installation of adequate upstream fish passage at all three of these projects would eventually enable anadromous fish to utilize significant portions of the Saco River, including access to both the Ossipee River and the Little Ossipee River. Habitat, however, would vary for each species within the various reaches. In particular, while only 2 percent of the basin's Atlantic salmon spawning habitat and only 10 percent of the basin's alewife spawning habitat are contained in the reaches from Bar Mills to Bonny Eagle, these reaches contain about 33 percent of the basin's American shad spawning habitat. In contrast, over 51 percent of the potential Atlantic salmon spawning habitat is located between Bonny Eagle and Hiram (*for further discussion of habitat in the basin see section 3.2.1*).

As we discussed in section 3.2.1 and above in section 4.1.1.2, the 1987 inter-agency *Strategic Fisheries Management Plan for the Saco River* outlines efforts already underway to restore anadromous fish to the Saco River Basin. Although upstream passage of adult fish is not currently needed at these projects, the stocking of juvenile salmon throughout the basin is an ongoing fishery management practice. As such, downstream fish passage facilities are

needed at all mainstem Saco River Projects for the safe passage of downstream migrating smolts. Upstream fish passage facilities, when deemed necessary, would be required by the Agreement.

Thus, we conclude that the need for downstream fish passage facilities at Bar Mills, West Buxton, and Bonny Eagle, and the future installation of upstream facilities, has been demonstrated by the past, present and future planned stockings of anadromous fish above the projects. While no Commission action is required at this point, implementation of the provisions contained in the Agreement would provide the means for these necessary measures. At Bar Mills and West Buxton, CMP applied for the required amendments to license for the installation of fish passage facilities for each of the affected projects. At Bonny Eagle, provisions of the Agreement would be included in any new license issued for the project.

Additionally, the installation of adequate fish passage facilities at these projects would further the goals and objectives established by the agencies for the restoration of anadromous fish to the Saco River. Since the Agreement, in essence, allows up to 3 years for the installation of the downstream facilities at Bar Mills and West Buxton and 2 years at Bonny Eagle, this period should be utilized for the formation, through agency consultation, of the conceptual fishway design, final fishway design, and monitoring and evaluation plans and for the actual construction of the facilities.

As noted above, in light of the Commission's statutory responsibilities (*see section 4.1.1.1*), any Commission order issuing a new license for Bonny Eagle or orders amending the licenses for Bar Mills and West Buxton would require CMP to submit to the Commission, for approval, any plans for installing fish passage facilities prior to their implementation.

4.1.1.4 Hiram and Swans Falls

Located at river mile 46, Hiram is the seventh barrier to returning Atlantic salmon. With a developed head of 76 feet, the project currently has neither upstream nor downstream fish passage facilities.

For upstream passage, the Agreement would require that Hiram be included in the same group as Bar Mills, West Buxton, and Bonny Eagle with passage to be recommended by state/federal fisheries agencies based on the progress of fish restoration in the basin (*see section 4.1.1.3 for discussion*). At Hiram, however, upstream passage would be used only for Atlantic salmon.

The schedule for installation of upstream fish passage facilities at Swans Falls is tied to conditions outlined in the Agreement. Specifically, the installation of passage facilities at Swans Falls is dependent upon the periodic fisheries assessments delineated in the Agreement. Under the Agreement and Swans Falls' exemption terms and conditions, upstream passage would be scheduled to be completed no later than 2011. However, the schedule could be

modified so that construction was concurrent with the construction of facilities at Hiram (*see sections 4.3.1.2 and 4.3.2.2 for further discussion of fish passage at Swans Falls*).

For downstream fish passage at Hiram and Swans Falls, the need for permanent downstream fish passage for salmon would be dependent on the presence of juvenile or adult fish resulting from either the annual production stocking (*defined in section 2.1.1*) of juvenile salmon or the trap-and-trucking of adults and their subsequent natural production. Both events would be dependent upon the participation of appropriate state and federal fisheries agencies in Maine and New Hampshire. The Agreement would require that permanent downstream fish passage facilities be provided at each dam no more than 2 years from the commencement of annual production stocking of salmon above the dams.

CMP (1994b) states that the upstream fish passage facilities at Hiram would likely consist of a denil fish ladder. Based on the costs of facilities installed in the West Channel at Cataract, CMP (1994b) estimates that a fish ladder at Hiram would cost about $4.7 million (1993 dollars) to construct and $34,000 annually to operate. CMP further estimates that the downstream fish passage facilities consisting of a surface bypass would cost about $300,000 for construction. Fishway effectiveness studies are estimated to add an additional $170,000 per year for three years.

The installation of adequate upstream fish passage at Hiram and Swans Falls would enable Atlantic salmon to utilize the upper reaches of the basin. In particular, about 46 percent of the total Atlantic salmon potential spawning habitat is located above Hiram. USFWS *et al.* (1987) estimated that the river above Hiram could potentially support about 700 spawning salmon, with a total potential production of over 22,500 smolts (*for further discussion of Atlantic salmon habitat in the basin see section 3.2.1*).

The proposed downstream facilities at Hiram would likely consist of a surface bypass. Final downstream fishway designs, including spillage and/or transport flows during operation, would be developed in consultation with the agencies and based on actual site conditions.

As we discussed in section 3.2.1 and above in sections 4.1.1.2 and 4.1.1.3, the 1987 inter-agency *Strategic Fisheries Management Plan for the Saco River* outlines efforts already underway to restore anadromous fish to the Saco River Basin. Although upstream passage of adult salmon is not currently needed at these projects, the stocking of juvenile salmon throughout the basin is an ongoing fishery management practice. As such, downstream fish passage facilities would likely be needed at all mainstem Saco River Projects for the safe passage of downstream migrating smolts. Upstream fish passage facilities, when deemed necessary, would be required by the Agreement.

Thus, we conclude that the need for the timely installation of the downstream fish passage facilities at Hiram and Swans Falls, and the future installation of upstream facilities, has been demonstrated by the goals and objectives established by the resource agencies. The Agreement would provide for the timely installation of the needed facilities through CMP's

submitted amendment application for the current Hiram license. Additionally, the installation of adequate fish passage facilities at these projects would further the goals and objectives established by the agencies for the restoration of anadromous fish to the Saco River.

As noted above, in light of the Commission's statutory responsibilities (*see section 4.1.1.1*), any Commission order amending the license for Hiram or order granting exemption from licensing for Swans Falls would require CMP and SFC to submit to the Commission, for approval, any plans for installing fish passage facilities prior to their implementation.

4.1.2 Modifications to the proposed Agreement

Cataract. Previously, Denil fish ladders were approved for installation at both Springs and Bradbury dams. Following the completion of studies, however, CMP proposed to lower the Springs and Bradbury dams 4 feet from 49 feet to 45 feet and raise the height of the downstream East and West Channel dams 2 feet from 44 feet to 46 feet. The expected result of lowering the two upstream dams and raising the two downstream dams would be a permanent drop in the full pool level above Springs and Bradbury dams of three feet. This water level manipulation would allow upstream migrating anadromous fish to swim over Springs and Bradbury dams or through open gates and eliminate the need for the construction of fish ladders at both Springs and Bradbury dams.

Based on costs expended for the construction of the West Channel Denil fishway and projected costs at Springs and Bradbury, Denil fishways would be more expensive (for CMP) to construct than the raising and lowering of the four dams. The West Channel fishway cost $2.2 million and CMP estimates that Denil fishways at Springs and Bradbury would be about $3.1 million. In contrast, CMP estimates that lowering the two upstream dams and raising the two downstream dams would cost $1.3 million. The Agreement's proposed fish lift/lock would cost about $1.7 million.

While lowering the two upstream dams and raising the two downstream dams would be the most cost effective scenario for CMP, Saco and Biddeford (Cities) believe that this option would not serve the general public interest and that considerable costs would be passed onto the general public (letter from Roger F. Normand, Mayor, city of Biddeford, Maine, August 12, 1993). Overall, the Cities estimate that over $6.0 million in impact and mitigation costs would be passed onto the Cities. Given the political difficulties and the mitigation uncertainties surrounding the dam lowering and raising scenario, the Cities and CMP believe that the removal, lowering, or raising of the dams is not an acceptable option and that the proposed fish lift/lock is the preferred alternative.

We agree. Given the relatively small overall difference in the costs of the fish lift/lock proposal and the lowering/raising dams proposal to CMP, the political opposition of the Cities to the latter proposal, and the uncertain additional impacts and mitigation costs that would be passed onto the Cities, we conclude that the Agreement's proposed fish lift/lock would be the preferred alternative for the installation of fish passage facilities. Therefore, we

conclude that the Agreement provides a reasonable and practical approach for the development and installation of the needed fish passage facilities at Springs and Bradbury dams.

Skelton. Given the large percentage (23 percent) of the basin's American shad habitat located in the 3-mile reach between Skelton and Bar Mills and the large percentage (23 percent) located between Cataract and Skelton, options to the proposed Agreement and the installation of upstream fish passage facilities at Skelton are limited. Adequate upstream passage of shad at Skelton, coupled with successful upstream passage at Spring Island and Bradbury, would conceptually result in the utilization of almost 50 percent of the basin's American shad habitat.

Further, the proposed fish lift design has been demonstrated to be an effective means of providing upstream passage for shad. Denil ladders have been used and are currently utilized at a number of hydroelectric projects in the northeastern United States; however, CMP states that, based on their experience with both ladders and fish lifts, American shad are a difficult species to pass using ladders. On the lower Androscoggin River, the Brunswick (Project No. 2284) vertical slot fish ladder has passed less than 5 shad in 10 years of operation (letter from Gerald C. Poulin, Vice President, Engineering, CMP, Augusta, Maine, August 13, 1993).

Alternately, shad and other anadromous species could be trapped-and-trucked from the Cataract East Channel fish lift to above Skelton dam, as is currently done. The fisheries agencies have, however, expressed serious reservations about the use of permanent trap-and-truck. Additionally, with the required installation of upstream fish passage facilities at Springs and Bradbury and the large amount of shad habitat potentially available in the area, we see no reason not to follow the logical progression of installing upstream fish passage facilities at Skelton. Upstream migrating American shad would then be afforded utilization of the free-flowing habitat below Skelton or would be able to continue further upstream to spawning areas below Bar Mills. Interim trap-and-truck from Cataract should continue, however, until the permanent facilities are installed.

Bar Mills, West Buxton, Bonny Eagle, and Hiram. For these projects, we evaluated two primary alternatives to the approach to fish passage installation approved in the Agreement. While our analysis is not intended to be inclusive of all possible alternatives to the proposed Agreement nor of all the various iterations of the principal alternatives analyzed, we believe that any likely alternative would fall within the range of these two scenarios.

The first alternative to the Agreement would be to require the installation of the fish passage facilities on a predetermined schedule. Permanent upstream passage facilities at the projects would likely be installed in a natural upstream progression starting with the most downstream dam, Bar Mills. Conceptually, the numbers of returning fish would serve as trigger mechanisms for the required installation of facilities at the next upstream barrier. Upon a determination from fishery managers that returning fish have reached the capacity of

the available fishery habitat within an area or reach of the river, upstream passage facilities at the next dam would be required.

The main advantages to this alternative would be that the requirements for the installation of fish passage facilities would be known and pre-set. Uncertainties surrounding when, and if, facilities would actually be required would be minimized. Given the different times that licenses expire, we have, in the past, required this type of installation scenario.

There are several problems with this alternative. First, as discussed in sections 3.2.1 and 4.1.1.3, potential habitat is not equally distributed among fish species or river reaches. As an example, only 2 percent of the potential Atlantic salmon spawning habitat is located between Bonny Eagle and Skelton, while in the same reach potential spawning habitat for American shad and alewife is estimated to be 33 percent and 10 percent, respectively. Thus, while one species may need to be passed above the current obstruction in order to meet additional habitat requirements, other species may never reach their full habitat capacity.

Second, requiring the installation of fish passage facilities on predetermined trigger levels would vary significantly between species. However, in order to effectively evaluate fish passage needs, both fish species and numbers of returning fish would have to somehow be prioritized and weighted so that a conclusion on whether upstream fish passage facilities were warranted could be realistically, logically, and economically made. We see this scenario as an impractical and convoluted solution to the problem. Assigning management priorities to fish species is, in theory, a common management technique. In practice, however, fish are inherently uncooperative. It is not uncommon to see the recovery of the primary management species be less than anticipated while secondary management species do much better than expected. If trigger levels or management priorities are tied mainly to the species of primary interest or priority, passage requirements may never be met. Further, attempting to change management priorities or strategies can be a difficult and arduous task for both fisheries agencies and licensees. Thus, we see this alternative as a more complex solution, with more unanswered questions, than the approach approved in the Agreement.

The other main alternative to the Agreement, which circumvents many of the problems discussed above, would be to implement trap-and-truck operations. Trap-and-truck programs would be utilized until anadromous fish populations were sufficiently rebuilt to numbers, or levels, requiring the installation of permanent upstream fish passage facilities. In this scenario, funds for more expensive permanent upstream passage facilities would typically not need to be expended until fish populations had built to sufficient numbers. Further, because the multiple barriers posed by these dams would be bypassed, passing inefficiencies and passage mortalities would be minimized and fish would be placed directly in locations identified by fishery managers to contain the majority of spawning habitat.

There are several advantages to trap-and-truck operations. First, trap-and-truck is inherently the most cost effective passage alternative because permanent facilities are not built at each barrier. Second, trap-and-truck eliminates upstream fishway inefficiencies at multiple

projects, thereby increasing the likelihood of establishment of populations when dealing with small numbers of fish. Simply put, more fish reaching the spawning area translates into more potential returning fish in the future. Third, trap-and-truck has been demonstrated on other rivers to be an effective means of moving large numbers of anadromous fish. Trap-and-truck has been used for a number of years on the Kennebec, the Androscoggin, and the Penobscot Rivers in Maine. Fourth, trap-and-truck assures that a known number of spawners reach a selected spawning area.

In situations where fish are faced with multiple barriers blocking access to historic habitat in the upper reaches of a basin, trap-and-truck could be the most effective means of restoring the population or enabling the fish to reach these spawning areas. Typically, upstream fish passage is inherently ineffective. It is not uncommon to see upstream fish passage efficiencies around 40 to 50 percent. When taken into the context of both multiple barriers and a small returning population, these upstream efficiencies can often mean the difference between success and failure of a restoration program. Trap-and-truck, as a management alternative, should be seriously considered.

There are limitations to a trap-and-truck program, however. Insufficient capacity, immediate and delayed fish mortality, fish fallback after stocking, and the likelihood that homing fish would not be stocked at the appropriate location relative to their natal habitat are major factors to consider when implementing a trap-and-truck program. Additionally, trap-and-truck programs are generally considered as a short-term solution to the overall problem of basin fish passage.

The Agreement does, however, have a trap-and-truck component to the overall restoration approach. On an interim basis, fish would be trapped at Skelton, once those facilities are completed, and trucked to various locations within the basin. The installation of permanent upstream facilities at these projects would be based on periodic fisheries assessments and on the progress of fish restoration in this basin. We see this as a well-balanced compromise of the approaches. Permanent upstream fish passage facilities would not be required until necessary and returning fish would still be afforded access to identified spawning areas. Outmigrating fish would be provided adequate downstream passage protection since the Agreement calls for the installation of downstream fish passage facilities at Bar Mills, West Buxton, Bonny Eagle, and Hiram (based on the presence of fish above Hiram).

The Agreement would also take into consideration the fact that the installation of upstream passage facilities in a natural upstream progression, starting with Bar Mills, may not be the most effective, both biologically and economically, means of restoring anadromous fish to the Saco River Basin. It is conceivable that future fisheries assessments could indicate that the installation of upstream facilities should start with Hiram since the majority of Atlantic salmon habitat is located above Bonny Eagle. Fish trapped and stocked above Bonny Eagle would then have access to over 97 percent of the available spawning habitat in the basin.

Based on the above, we conclude that the Agreement offers the most effective approach for installing fish passage facilities at dams on the mainstem Saco River. The general sequence, time table, and process and means by which future facilities would be installed provides a comprehensive approach to the development and installation of fish passage facilities needed for the restoration of anadromous fish to the Saco River Basin.

4.1.3 Cumulative effects on sport fishing

Installing fish passage facilities at the dams along the mainstem Saco River would result in a cumulative beneficial effect on recreational resources within the Saco River Basin. Specifically, the success of restoring an Atlantic salmon and American shad fishery in the Saco River Basin would provide additional sport fishing resources and could lead to increased angling pressure at CMP's hydroelectric projects and at Swans Falls. Increased angling pressure is particularly expected in the tailrace areas below any fish passage facilities constructed at these projects.

Cataract. The Cataract tailrace is the beginning of the Saco River's tidewater portion, and tailrace fishing at Cataract is popular among anglers pursuing both striped bass and Atlantic salmon. Tailrace angling access is currently provided by CMP below the fish lift at the Cataract East Channel dam. The Commission's 1990 Form 80 recreational use assessment indicates that the tailwater fishing facility was used to 50 percent of its capacity. Industrial buildings along the banks of Cataract's West Channel limit opportunities to improve angling access below the dam. Additional angling access to Saco River's tidewater portion below Cataract is provided at three non-project boat access sites (CMP, 1989).

Angling opportunities for anadromous fishes are also provided above the Cataract dams, and CMP's management focus for the Cataract impoundment includes boat fishing. CMP currently enables anadromous fish movement above Cataract through their trap-and-truck program; CMP transports Atlantic salmon, American shad, and river herring from the East Channel dam fish lift to the impoundment above the Springs and Bradbury dams. Permanent fish passage at the Springs and Bradbury dams would not affect angling opportunities between Cataract's dams due to the existing angling access constraints. Angling opportunities between the East Channel dam and the Springs and Bradbury dams are limited because of the short distance between the dams and the lack of shoreline access.

Boat fishing access above the Springs and Bradbury dams is provided at two hard-surface boat launch facilities on the impoundment; one at Diamond Park in the city of Saco and the second at Rotary Park in the city of Biddeford. Additional boat fishing access to the upper reaches of Cataract's impoundment is provided at the unimproved boating access facility below the Skelton dam.

The level of future angling use at Cataract is partially dependent on the success of anadromous fish restoration. The existing angling access at Cataract is not used to capacity, could withstand increased fishing pressure, and adequately provides angling opportunities

above and below the Cataract dams. CMP is required to periodically review the need for additional recreational facilities at Cataract in consultation with the resource agencies. Recreation access monitoring provides the opportunity for CMP to periodically evaluate the need for additional angling facilities at Cataract if the need arises.[6]

Skelton. CMP estimated Skelton's fishing use in 1990-1991 at 7,460 user-days/nights and projected a growth rate of 2 to 4 percent annually over 10 years. Angling opportunities in the Skelton tailwaters includes occasional sea-run Atlantic salmon, and angling access is provided at CMP's tailrace carry-in boat launch (*for further discussion on tailwater access at Skelton see section 3.3.2.4*). CMP also estimated the angling capacity along the tailrace at about 30 shoreline and wading anglers. The Commission's 1990 Form 80 recreational use assessment indicates that the tailwater fishing access area was used to 25 percent of its capacity. Additional angling access at Skelton is provided above the dam at CMP's recently improved hard-surface boat launch.

CMP's proposed fish passage facilities at Skelton would improve the existing opportunity for Atlantic salmon angling above and below the dam and potentially provide American shad angling above Skelton. Anticipating potential increased fishing pressure at Skelton due to the anadromous fish restoration efforts, CMP proposes to monitor the need for tailrace fishing facilities (i.e., sanitation facilities). CMP plans to periodically consult with the resources agencies on the need to add facilities at the tailwater area if future demands warrant such facilities (*for further discussion on potential angling access improvements at Skelton see section 4.2.1.2.4 and section 4.2.2.2.4*).

Bar Mills and West Buxton. Tailwater fishing access areas and carry-in boat access are currently provided at both Bar Mills and West Buxton. The Commission's 1990 Form 80 recreational use assessment indicates that the tailwater fishing facilities at Bar Mills and West Buxton were only used to 25 percent of their capacity. While salmon can currently pass above the Bar Mills dam under some flow conditions, adequate fishways at and below Bar Mills would result in a cumulative beneficial effect for salmon angling at the Bar Mills tailrace and impoundment. Adequate fishways at and below Bar Mills would also provide potential American shad angling opportunities above the dam.

Although it is not clear when CMP would construct upstream fishways at both Bar Mills and West Buxton, the Agreement does specify when CMP would construct downstream passage at these projects. Downstream fishways, upstream salmon stocking, and any anadromous fish transported above these projects via the potential trap-and-truck operation at Skelton would provide additional sport fishing opportunities at Bar Mills and West Buxton.

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[6] CMP filed an assessment of the recreational use at Cataract on April 12, 1995, concluding that the existing recreational facilities at Cataract are adequately meeting the recreational needs.

In the past, CMP has voluntarily provided access opportunities at Bar Mills and has evaluated the need for recreational improvements at the project (CMP, 1989). It is likely that CMP would continue to maintain the existing recreational facilities at Bar Mills and cooperate with the resource agencies if future angling access facilities are needed at the project. CMP's license for Bar Mills expires in 2005, which would also provide the opportunity for CMP, the resource agencies, and the Commission to assess the adequacy of the angling access facilities at the project as the anadromous fish restoration progresses.

Under the existing license for West Buxton, CMP is required to maintain the recreational facilities at the project which ensures angling access above and below the project dam. While angling pressure at West Buxton could significantly increase due to anadromous fish restoration, the existing angling access is not used to capacity and could withstand increased fishing pressure. Further, to ensure adequate access at West Buxton, CMP's license includes a standard article which enables the Commission to require CMP to provide additional recreational facilities. This article provides the opportunity for additional angling access facilities at West Buxton if angling demand exceeds the existing use capacity.

Bonny Eagle. The resource agencies management objectives for the Saco River at Bonny Eagle include increasing the recreational use of all warmwater sport fish and establishing recreational sport fisheries for trout and salmon (USFWS *et al.*, 1987). CMP estimated Bonny Eagle's fishing use in 1990-1991 at 2,585 user-days and nights and projected a growth rate of between 1 and 1.5 percent annually over 10 years. Establishing an anadromous fishery at Bonny Eagle would benefit boat fishing opportunities within the tailrace, though shoreline angling would remain limited due to the steep sloping banks along the tailrace.

Angling opportunities within Bonny Eagle's bypassed reach could improve, however, due to both minimum flow increases and the success of Atlantic salmon restoration. The bypassed reach currently provides seasonal angling opportunities and minimum flow requirements at the bypassed reach would provide habitat for Atlantic salmon. Current angling access to the bypassed reach is provided at unimproved roadside points along Warren Road.

Since no anadromous fish presently use the Bonny Eagle area, salmon stocking and adequate fish passage at Bonny Eagle could increase fishing pressure on the impoundment. Impoundment access at Bonny Eagle includes both shoreline fishing access areas, carry-in boat access, and trailered boat access (*for further discussion on the impoundment access areas at Bonny Eagle see section 3.3.1.4*). Adequate fish passage at Bonny Eagle would also enable anadromous fish to move up the Little Ossipee River. CMP's informal access near the confluence of the Saco River and the Little Ossipee River would provide anglers shoreline access for salmon fishing at the Little Ossipee.

CMP proposes to periodically monitor recreation use at Bonny Eagle, and based on use levels, CMP would determine if additional recreation facilities are needed. The existing access facilities along Bonny Eagle's impoundment and at the New River Channel provides

both shoreline and boat angling opportunities. CMP's recreation monitoring studies provides the opportunity to review the need for additional angling facilities as anadromous fish restoration progresses (*for further discussion on potential angling access improvements at Bonny Eagle see section 4.2.1.2.4 and section 4.2.2.2.4*).

Hiram and Swans Falls. CMP currently provides tailrace fishing access at Hiram, and the Commission's 1990 Form 80 recreational use assessment indicates that the facility was only used to 25 percent of its capacity. Adequate fishways constructed at the projects below Hiram could provide both salmon and shad angling opportunities in the tailwaters at Hiram. Above Hiram, however, anadromous angling opportunities would only include Atlantic salmon because fish passage construction at Hiram would limit the upstream passage of anadromous fish to Atlantic salmon.

CMP's license for Hiram requires them to maintain the recreational facilities at the project, ensuring angling access to Hiram's tailwaters. In addition, a standard article included in Hiram's license provides for the opportunity to require additional recreational facilities, upon the motion of the Commission or upon the recommendation of the resource agencies.

Above Hiram the most popular use of the Saco River is canoeing, and angling use is primarily combined with canoeing. At Swans Falls, anglers fish from canoes or from the shoreline just below the dam at the AMC campground. SFC proposes to construct upstream fish passage facilities at Swans Falls following the installation and successful operation of fish passage facilities at Hiram. Adequate upstream fish passage at Swans Falls would enable Atlantic salmon angling at the upper reaches of the basin. Atlantic salmon stocking above Swans Falls and downstream passage facilities at Swans Falls could provide salmon angling opportunities at Swans Falls in the near future. Once these measures are initiated, salmon angling pressure is expected at the Swans Falls tailrace along the shoreline at AMC's campground.

4.1.4 No Agreement alternative

The no Agreement alternative would result in the continuation of the existing license conditions at Cataract, Bar Mills, West Buxton, and Hiram. In the case of Cataract and West Buxton, current project licenses require fish passage measures that have yet to be fully implemented. Thus, in lieu of the Agreement, these requirements would be carried out and some environmental enhancement would still occur.

In the case of Skelton and Bonny Eagle, the no Agreement alternative would be the proposals for fish passage facilities contained in CMP's applications for new license. There would, however, likely be no specific provision for the future installation of upstream facilities at Bonny Eagle other than the usual reservation of Interior's authority to prescribe fishways pursuant to Section 18 of the FPA.

At Bar Mills, the no Agreement alternative would result in the continued inclusion of Article 21 of the project license which states that the licensee shall construct, operate, and maintain protective devices, including fish passage facilities as may be prescribed by the Commission upon the recommendation of the Secretary of the Interior and the MDIFW. We assume that under the no Agreement alternative, when fish passage facilities became necessary, Interior would exercise its appropriate authority.

At Hiram, since the existing license contains no provisions for the future installation of fish passage facilities, the no Agreement alternative would result in no immediate future provisions to add fish passage facilities. Fish would continue to be blocked by the project and no downstream passage would be provided.

4.2 NEW LICENSES

4.2.1 Projects as proposed

4.2.1.1 Bonny Eagle

4.2.1.1.1 Water quality and quantity

The continued operation of Bonny Eagle would affect water quality and quantity in the Saco River. The specific impacts in each affected resource area are discussed below.

Project operation and minimum flows. As discussed in section 3.3.1.1, CMP currently operates Bonny Eagle as a peaking facility in conjunction with the lower Saco River Projects.

CMP proposes to provide a continuous minimum flow (zone-of-passage flow) of 400 cfs or inflow from May 1 to October 31, including a minimum flow of 50 cfs in the New River Channel from May 1 to September 30, a continuous minimum flow of 250 cfs or inflow from November 1 to April 30, and a downstream fishway flow of 100 cfs from May 1 to October 31. The primary purpose of the minimum flow is to provide a "zone-of-passage" for anadromous fish and to enhance downstream resident fisheries habitat. While we will mainly discuss the impacts and effects of the proposed flows in the fisheries section of this document, the proposed flows would also affect water quality.

Although unquantified, increasing the flows at Bonny Eagle from leakage to 400 cfs in the low flow summer months would have a beneficial effect on water quality in the free-flowing reaches of the river below Bonny Eagle, West Buxton, and Bar Mills. Water velocities in these areas would increase and the resulting turbulence would likely increase DO levels to some extent. In the Bonny Eagle reservoir and the reservoirs downstream of Bonny Eagle, water retention times would decrease. By decreasing the "unnatural and artificial" periodicity of the flows, experienced when flows range from leakage to maximum generation, Saco River flows would more naturally resemble an unaltered temporal spacing of flow.

While the 250 cfs flow release is less than the 7Q10[7], CMP would release this flow during the time of the year (winter and early spring) when temperatures are low and DO levels are at or above saturation. Furthermore, due to the absence of pollution inputs to this section of the Saco River, demands on DO resulting from waste assimilation would not occur.

Likewise, in the New River Channel, increasing flows from leakage and periodic spill events to a continuous flow of 50 cfs would also have a beneficial effect on water quality and aquatic habitat in the reach. Areas normally only periodically wetted during spill events would be continuously inundated. Water velocities would increase and stagnation and retention times would decrease. Macroinvertebrate species, especially those of limited mobility, would benefit from the increased flows. Additionally, given the substrate in the bypassed reach (*see section 3.3.1.2*), it is likely that DO levels would be improved, to what extent, however, is unknown.

Water quality and macroinvertebrates. Eco-Analysts (1993) concluded that the benthic community below West Buxton, which is directly influenced by flows from Bonny Eagle, was exhibiting some signs of stress and may not retain the requisite community structure and function to attain Maine's Class A, B, or C Aquatic Life Standards. The study further concluded that flow fluctuations from Bonny Eagle's generation, particularly low flow periods of leakage, could be a contributing factor to the results.

Eco-Analysts (1993) described the free-flowing area below West Buxton as a "mixed" habitat. Specifically, during periods of low to no flow from Bonny Eagle, the substrate resembled a lotic, riverine habitat, while the current velocities, attached algae, and other plant growth more closely resembled a lentic pond-like habitat. Thus, benthic macroinvertebrate populations were very low with some stress sensitive species absent.

CMP's proposed implementation of a 400 cfs minimum flow would, in Eco-Analysts (1993) opinion, reduce the lentic character of the reach and increase the lotic character of the habitat. Given that water velocities would increase to between 1.0 and 2.4 feet per second (fps) (Charles Ritzi Associates, 1992), stress on the macroinvertebrates would decrease and a healthier, more abundant community would likely develop.

We agree. Eco-Analysts (1993) found the greatest number of organisms in a small riffle area where current velocities appeared to be near 1.0 fps. Unlike the riffle, most other areas studied had velocities less than 0.5 fps. Additionally, filamentous algae, typical of lentic habitats, did not exhibit the same lavish growth in the riffle as that observed in other areas with less velocities.

To confirm this hypothesis, CMP proposes to conduct benthic macroinvertebrate sampling below West Buxton for 2 years following the implementation of the new minimum

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[7] The 7-consecutive-day average low flow expected to occur once every 10 years.

flow requirement at Bonny Eagle. Interior and the Coalition both generically recommend that the aquatic invertebrate populations in downstream areas affected by the operation of Bonny Eagle be evaluated and monitored to determine the response of the communities to changes in the flow regime. Although CMP did not provide costs for this proposal, we estimate that the study would cost about $3,200 annually.

We agree that CMP should conduct benthic macroinvertebrate sampling downstream of West Buxton. Benthic macroinvertebrates respond quickly to change in habitat conditions, especially to flow alterations in terms of species diversity and abundance. Therefore, monitoring these organisms would provide a quick measure of any improved habitat conditions brought about by increased flows.

Water quality and quantity summary

CMP's proposed project operations would enhance water quality in the Saco River. CMP would eliminate periods of only leakage flows from the project by providing the proposed seasonal minimum flow of 400 cfs from May 1 to October 31 and 250 cfs from November 1 to April 30. Water quality below both Bonny Eagle and West Buxton would be enhanced by the flow releases. More specifically, at West Buxton increased flows in the summer months would likely reduce the lentic character of the tailwater reach and increase the lotic character of the habitat. Flow related stress on the macroinvertebrates would decrease and a healthier (diverse), more abundant community would likely develop. Further, water quality in the New River Channel would be enhanced by the implementation of a 50 cfs seasonal minimum flow.

4.2.1.1.2 Fisheries resources

Fish Passage Facilities. In section 4.1.1.3, we discussed the need for fish passage facilities at Bonny Eagle and the requirements for the immediate installation of downstream fish passage facilities contemplated in the Agreement. As such, CMP (1992m) has developed conceptual design drawings for the proposed downstream fish passage facilities.

CMP proposes to install the downstream fishways at two locations: a surface bypass at the powerhouse and a downstream gate on the New River Dam. Final fishway design specifics, including spillage and/or transport flows during operation, is proposed to be determined during the final design phase in consultation with the fishery agencies. Following fishway installation, CMP proposes to monitor the effectiveness of the facilities for 3 years.

The proposed downstream fish passage facility at the powerhouse would consist of a surface bypass arrangement utilizing the existing logway flume located on the western edge of the powerhouse adjacent to the embankment. Up to 2 percent of the maximum generational flow, or about 100 cfs, would be utilized for attraction and conveyance. To provide safe and adequate fish passage, several modifications to the logway would be required. The existing sill would be lowered to provide appropriate entrance conditions under all normal headpond

elevations. Further, the transition zone from the entrance to the flume would be modified and the existing stoplog gate would be replaced with a hinged overflow gate.

The proposed conceptual design does not contain plans for any changes to the existing Bonny Eagle trashracks. Presently, Bonny Eagle's trashracks are constructed of 3 1/2-inch by 3/8-inch bars with a 3-inch clear spacing. Sloped at a rate of 1:4, horizontal to vertical, average velocities across the racks were calculated to be 1.5 fps at full capacity. Intakes at Bonny Eagle are located about 7 feet below the normal reservoir water levels.

The proposed downstream fish passage facility at the New River Channel dam would consist of new hinged drop gate located at the existing stoplog gate on the western edge of the dam. The proposed gate would also serve as the minimum flow gate for the New River Channel and would be designed to pass a minimum flow of at least 50 cfs at all normal headpond elevations (*see minimum flow discussion in this section and in section 4.2.2.1*). Additionally, the drop gate would be operated during the fish migration season (April - November) so as to provide a minimum water depth of 1 foot over the gate under all headpond elevations and flow conditions.

While the final fishway design has not been developed and would be subject to further consultation with the agencies, the proposed design has been shown to be an effective means of passing smolts at other similar projects. We foresee no reasons why, conceptually, the proposed facilities would not provide adequate downstream fish passage. Thus, we believe that CMP's proposed facilities would provide significantly improved downstream fish passage and would further the goals and objectives of the Saco River's anadromous fish restoration efforts.

Additionally, Interior filed mandatory conditions pursuant to Section 18 of the FPA. Interior requests that the licensee ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS. Furthermore, Interior requests that the Secretary of Interior's authority to prescribe the construction, operation and maintenance of fishways be reserved.

Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways. While USFWS is a signatory of the Agreement, we recognize that future fish passage needs and management objectives cannot always be predicted at the time of license issuance. Although we find that the Agreement would provide the means and procedural structure for the future installation of any necessary fish passage facilities, we recommend that the Commission reserve Interior's authority to prescribe fishways.[8]

Project operation and powerhouse minimum flows. CMP operates Bonny Eagle as a peaking facility in conjunction with the other Saco River Projects located downstream. All river flows

[8] Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

less than 4,932 cfs are passed through the powerhouse on the west side of Bonny Eagle Island (*see Figure 2-3*). Since there are no gates at the powerhouse, any excess flows are spilled over the dam into the New River Channel on the east side of Bonny Eagle Island. Currently, Bonny Eagle has no minimum flow requirement.

To provide a "zone-of-passage" for anadromous fish and to enhance downstream resident fisheries habitat, CMP proposes to provide a continuous minimum flow of 400 cfs or inflow, whichever is less, May 1 to October 31 and 250 cfs or inflow, whichever is less, from November 1 to April 30. Included in their proposed 400 cfs flow would be a minimum flow of 50 cfs in the New River Channel. Thus, continuous minimum flows of 350 cfs would be provided on the west side of Bonny Eagle Island and 50 cfs on the east side in the New River Channel.

To determine the effects of the existing and proposed minimum flows and the effects of fluctuating flow releases on aquatic habitat at Bonny Eagle and West Buxton, CMP conducted instream flow studies of the Bonny Eagle tailwater reach and the free-flowing river below West Buxton utilizing the USFWS's Instream Flow Incremental Methodology (IFIM) (Acres, 1989). The IFIM is a flow assessment technique developed primarily to assess the impacts of water development projects (Bovee, 1982; Bovee and Milhous, 1978; and Milhous *et al.*, 1981).

Bonny Eagle IFIM Results

At Bonny Eagle, the IFIM study examined the 3,000 ft reach of the Saco River immediately below the powerhouse. However, as we previously discussed in section 3.3.1.2, under normal operating conditions, West Buxton exerts a backwater effect on this section of the river up to the Bonny Eagle powerhouse. As a result, minimal changes (about 0.5 ft) in water surface elevation or wetted area occur even with large changes in discharge from the powerhouse (Acres, 1989). Thus, during study scoping it was determined that since velocity would be the only physical parameter significantly changing during operation of the project, a modified flow study was proposed for the reach using the no-velocity option of the IFG-4 hydraulic simulation model (Acres, 1989).

After the collection of field data, habitat values were simulated with the IFIM model over a range of flows from 100 cfs to 5,000 cfs for adult brook, brown, and rainbow trout; American shad inmigration, outmigration, spawning, and larval/juvenile rearing; alewife outmigration; and Atlantic salmon inmigration. Wade fishing and non-power boat fishing were also modeled and are discussed in section 4.2.1.1.4.

Results of the habitat simulation for the Bonny Eagle tailwaters are shown in Figures 4-2, 4-3, and 4-4. For adult trout, weighted usable area (WUA) varied between species. Peak WUA occurs at a flow of 100 cfs for brook trout, at 700 cfs for brown trout, and at 1,250 cfs for rainbow trout. At CMP's proposed 350 cfs minimum flow in the tailrace, the percentage of maximum WUA available would be about 99 percent for brook trout and 90 percent for

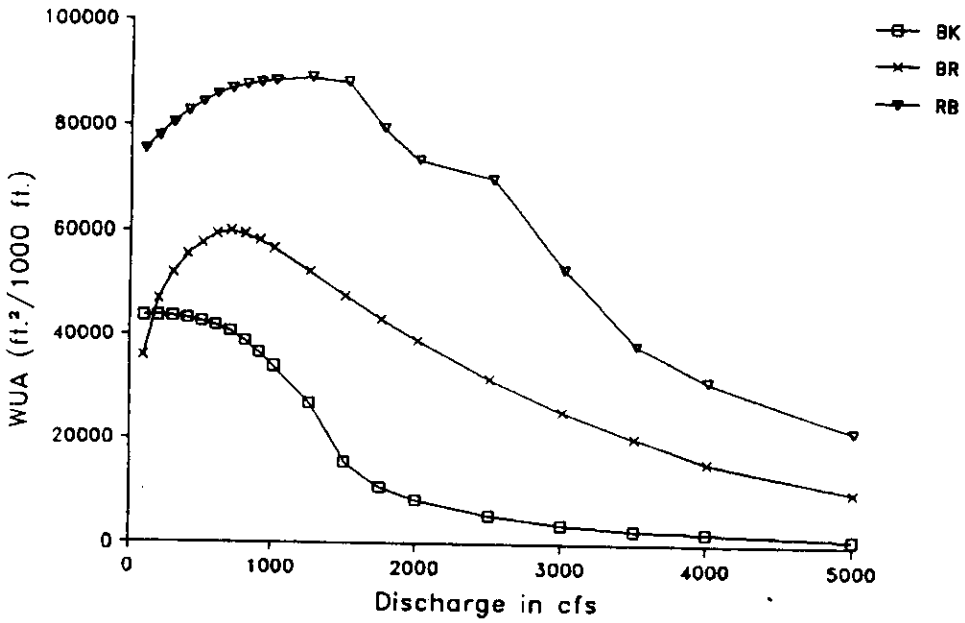

Figure 4-2 Adult brook (BK), brown (BR), and rainbow (RB) trout weighted usable area (WUA) vs. discharge for Bonny Eagle tailwaters (Source: Acres, 1989).

both brown trout and rainbow trout. At 200 cfs, the percent of maximum WUA available would be about 99 percent for brook trout, 79 percent for brown trout, and 88 percent for rainbow trout. Higher flows reduced the WUA for all trout species. At typical peaking flows of about 5,000 cfs, WUA for brook trout was only 3 percent of the maximum WUA available. For brown trout and rainbow trout, WUA at 5,000 cfs was 17 percent and 25 percent of maximum WUA, respectively.

The American shad inmigration, spawning, and outmigration (including alewife) WUA curves increase strongly from the lowest flows simulated up to the maximum WUA at 2,000 cfs (Figure 4-3). Acres (1989) attributes this effect to the narrow channel in this section of the river, which results in velocities reaching 3.0 fps at about 2,000 cfs. Habitat suitability declines as velocities reach and exceed 3.0 fps. The maximum WUA for larval/juvenile American shad occurs at about 700 cfs. At CMP's proposed flow of 350 cfs, the percent of maximum WUA available ranges from above 90 percent for inmigration and larval/juveniles to less than 50 percent for outmigration and less than 15 percent for spawning. At typical peaking flows, WUA's range from 26 percent for larval/juveniles to 41 percent for migration.

WUA curves for Atlantic salmon upstream migration in the study area (Figure 4-4) are similar to the American shad WUA curves. Maximum WUA occurs at a relatively high flow of 3,500 cfs. At 5,000 cfs, 94 percent of the maximum WUA is still available, while at 350 only about 10 percent of the maximum WUA occurs.

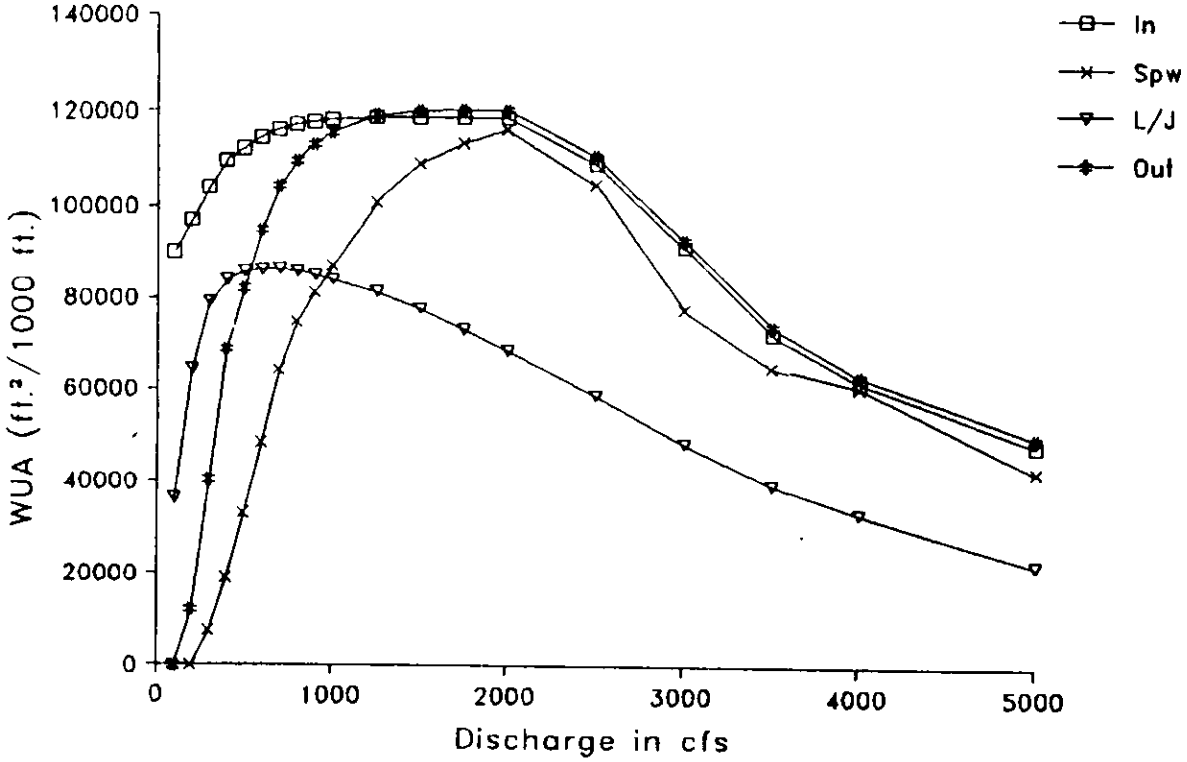

Figure 4-3 American shad inmigrating (In), spawning (Spw), larval/juvenile (L/J), and outmigrating (Out) weighted usable area (WUA) vs. discharge for Bonny Eagle tailwaters (Source: Acres, 1989).

West Buxton IFIM Results

At West Buxton, the IFIM study examined the aquatic habitat in the approximately 950 ft reach of the Saco River directly below the West Buxton dam. In general, the West Buxton tailwater area is broad and flat with a substrate composed primarily of cobble and boulders (CMP, 1991). At the extreme upper end of the reach, just downstream of the dam and adjacent to the upper powerhouse, is a large pool area.

Given the high complexities of the reach with difficult features to model, it was determined during study scoping that standard IFIM modeling procedures could not be used (Stetson-Harza, 1991). In summary, it was instead agreed that (1) the pool would be surveyed, videotaped and photographed during the collection of the low and high flow data sets, and (2) the remaining portion of the study reach would be modeled with two different flow conditions to allow development of both low and high flow hydraulic simulation models. The low and high flow simulation models were then combined into a final hydraulic model for the West Buxton reach allowing for model predictions of depth and cellular velocity under a range of flows from 370 to 4,960 cfs. The results of the high flow and low flow model habitat simulations were combined to create a composite flow versus habitat (WUA) curve for each species/lifestage. The target fish species were the same as those indicated in the above mentioned Bonny Eagle IFIM study. Details of the West Buxton IFIM model formation,

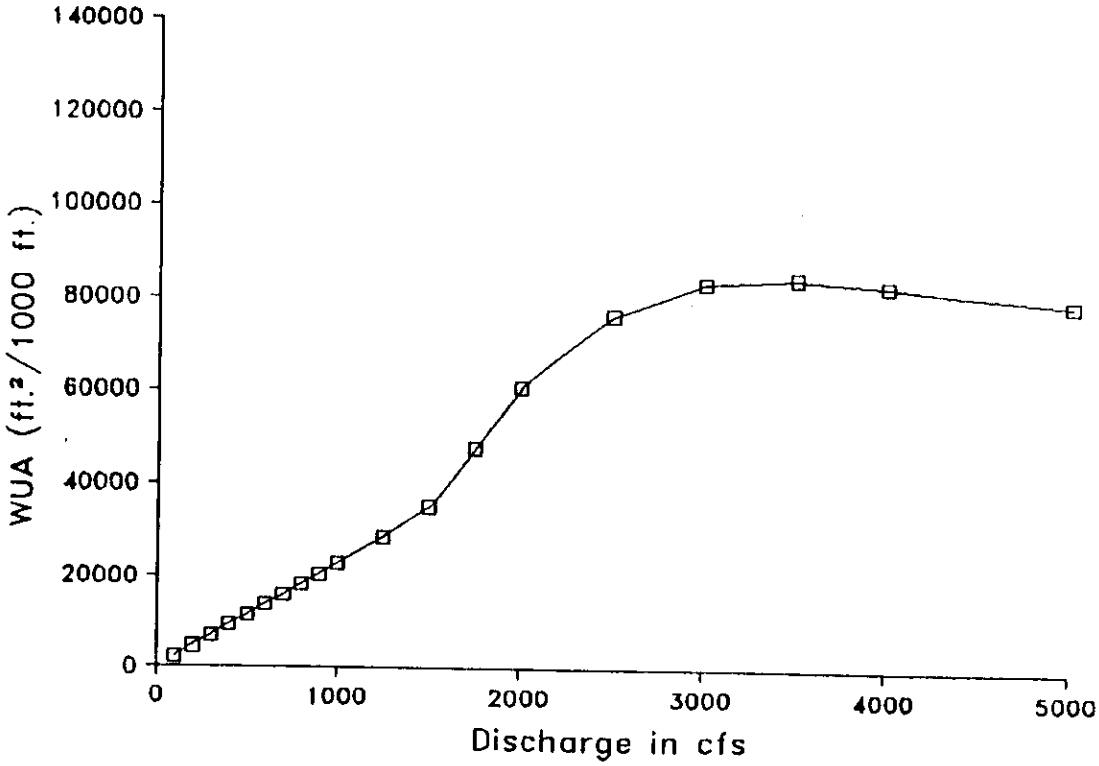

Figure 4-4 Atlantic salmon inmigrating weighted usable area (WUA) vs. discharge for Bonny Eagle tailwaters (Source: Acres, 1989).

methodology, and calibration are contained in Stetson-Harza (1991).

The results of the habitat simulations at West Buxton indicate that for all species modeled, WUA increases or remains nearly constant over the full range of flows modeled. With the exception of brook trout, none of the species/lifestages modeled showed a distinctive habitat peak within the range of flows examined. Adult brook trout habitat in the tailwater was maximized at about 2,900 cfs (Figure 4-5). Flows greater than 3,000 cfs resulted in slight declines to brook trout habitat. At CMP's proposed minimum flow of 400 cfs and typical peaking flow of almost 5,000 cfs, the percent of brook trout maximum WUA available would be about 36 percent and 88 percent, respectively. At 250 cfs about 34 percent of the maximum WUA would be available for brook trout.

Adult rainbow trout and brown trout habitat at West Buxton was shown to increase over the full range of modeled flows (Figures 4-6 and 4-7). Maximum WUA occurred at about 3,400 cfs for rainbow trout and about 4,400 cfs for brown trout. At 400 cfs, the percentage of maximum WUA available would be about 41 percent for rainbow trout and 33 percent for brown trout. The percentage of maximum WUA available at 250 cfs would be about 33 percent for rainbow trout and about 21 percent for brown trout. At typical peaking flows, WUA for both brown trout and rainbow trout were nearly 100 percent of maximum estimated WUA.

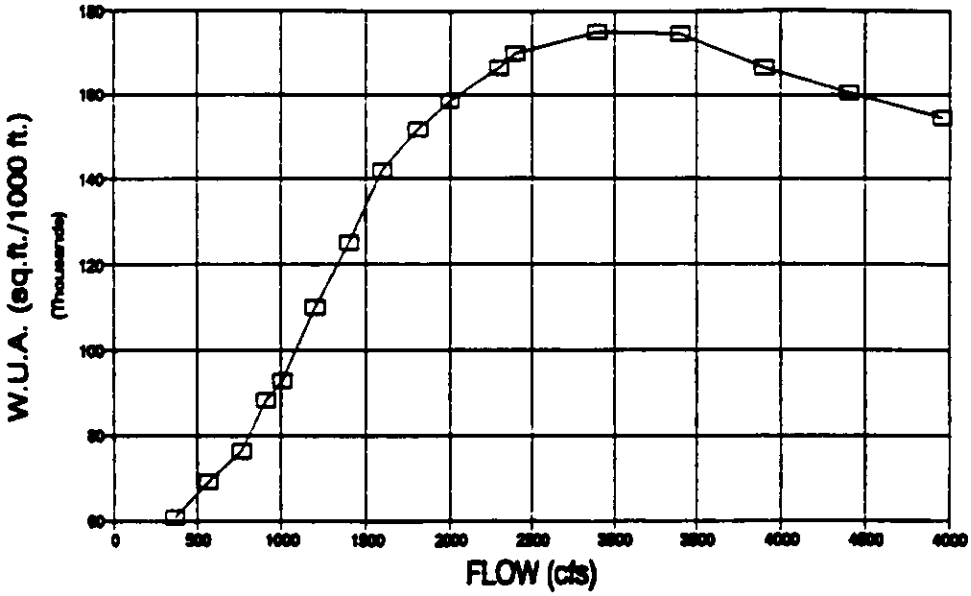

Figure 4-5 Adult brook weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

All lifestages of American shad (inmigrating, spawning, larval/juvenile) and outmigrating shad and alewife modeled showed an increase in habitat over the full range of flows (Figures 4-8 and 4-9). Stetson-Harza (1991) attributes the increases in habitat for these species/lifestages largely to the depth criteria since all of these species/lifestages show preference for waters deeper than that typically found within the West Buxton reach. Additionally, due to the broad shallow nature of the reach, the hydraulic modeling and cross sectional data indicates that considerable flow is required before there is any appreciable gain in depth. This characteristic is readily apparent at all flows less than 1,000 cfs where the available percentage of maximum WUA for all species/lifestages modeled averages less than about 10 percent.

Habitat for upstream migrating Atlantic salmon also showed an increase in availability below West Buxton over the full range of flows modeled (Figure 4-10). Specifically, inmigrating salmon habitat was shown to increase to the highest flow modeled, 5,000 cfs. At 400 cfs, only about 25 percent of the maximum WUA was still available to salmon.

Total WUA and Habitat Duration Analysis

In order to evaluate the total effect of flows from Bonny Eagle on habitat availability at both Bonny Eagle and West Buxton, the two IFIM results were combined into a single set of flow versus WUA curves. More specifically, the WUA results for each species/lifestage/reach were weighted based on the length of the study reach and then

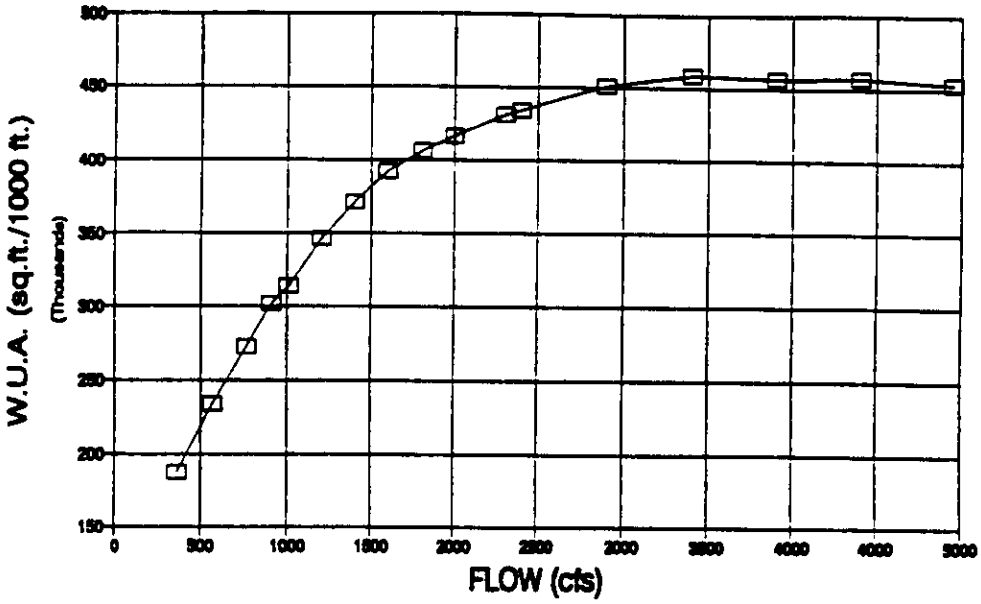

Figure 4-6 Adult rainbow trout weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

combined to determine a relationship that encompassed both project reaches (Stetson-Harza, 1991).

The resulting combined Bonny Eagle/West Buxton flow versus WUA curves for each species/lifestage are provided in Figures 4-11 to 4-16. In general, the combined Bonny Eagle/West Buxton habitat curves indicate two trends. First, optimum habitat for all species, with the exception of brook trout, occurs at flows above 1,500 cfs. Brook trout habitat is maximized at a flow of about 600 cfs. Second, for species other than adult resident trout, habitat continues to increase with increasing flows. Maximum WUA for American shad life stages, outmigrating alewives and shad, and inmigrating Atlantic salmon all occurred at the highest modeled flows. Conversely, adult brown and rainbow trout habitat generally peaked at about 1,500 to 2,500 cfs before declining to significantly lower levels at the higher modeled flows.

Utilizing the composite curves, at CMP's proposed minimum flow of 400 cfs, the percentage of the maximum WUA available within both reaches would be 98 percent for brook trout, 69 percent for rainbow trout, and 79 percent for brown trout. For American shad these same percentages would be 11 percent for spawning, 51 percent for larval/juvenile, 46 percent for inmigration, and 32 percent for outmigration (which would include outmigrating alewives). For Atlantic salmon, the percentage of maximum WUA available at both Bonny Eagle and West Buxton would be about 17 percent.

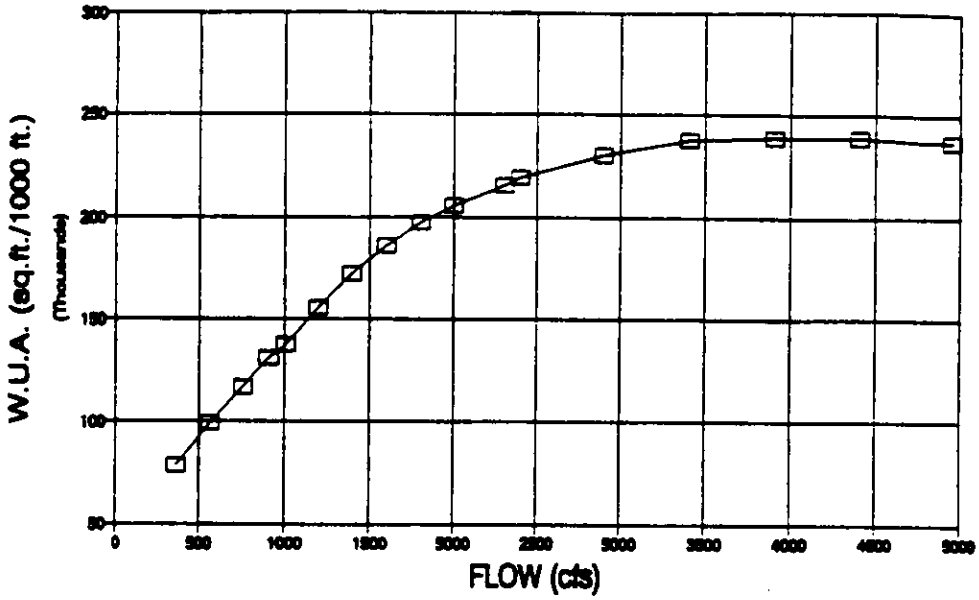

Figure 4-7 Adult brown trout weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

Typical Bonny Eagle peaking flows of about 5,000 cfs would result in 78 percent for brook trout, 79 percent for rainbow trout, and 81 percent for brown trout of the maximum WUA being available.

Taken separately, the two IFIM studies actually provide relatively conflicting data. For example, the maximum WUA for brook trout occurred at 100 cfs at Bonny Eagle and 2,900 cfs at West Buxton. Results for brown trout and rainbow trout were similar. CMP (1991) states that a partial explanation for this result lies in the unusual nature of the reaches of river modeled. As discussed earlier, the Bonny Eagle reach is influenced greatly by the West Buxton headpond, and as such, changes in flow from Bonny Eagle result in little change in water surface elevation or wetted area even with large changes in discharge. At West Buxton, the river is so broad and shallow that large changes in flow produced only minor changes in depth and wetted area.

To determine the duration of fishery habitat associated with the existing and proposed project operations, CMP conducted a habitat duration analysis. Specifically, CMP analyzed the duration of habitat for adult brook and brown trout at West Buxton using the representative months of January, May, August, and October. Given the backwatering effects of West Buxton discussed above, habitat at Bonny Eagle was not analyzed.

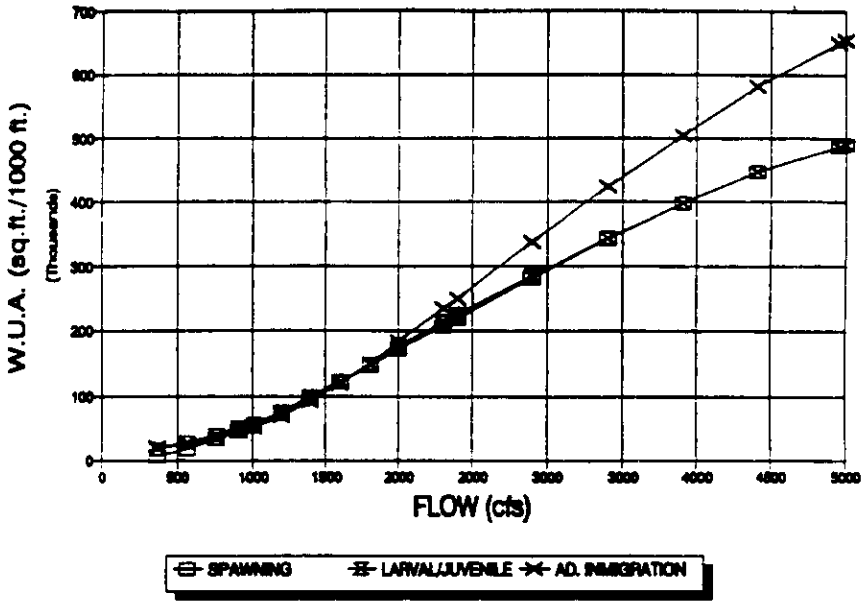

Figure 4-8 American shad inmigrating, spawning, and larval/juvenile weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

Habitat duration results are normally provided in terms of a habitat exceedence curve. Bovee (1982) recommends that the area under the curve in the 50 to 90 percent exceedence range is the most important portion for determining biological effects. The median value (50 percent exceedence) is of significance because it represents a measure of central tendency, while the 90 percent exceedence value represents extreme conditions.

For the West Buxton tailwaters, the percentage of maximum WUA for median and extreme flow conditions under the existing and proposed operations are shown in Table 4-3. For example, under the existing Bonny Eagle operation, brook trout have 49 percent of the maximum WUA (85,000 ft^2 out of a possible 175,000 ft^2) available about 50 percent of the time in August. The extreme condition value for brook trout in August would be 26 percent of the maximum WUA (or 45,000 ft^2) available 90 percent of the time. Under CMP's proposed 400 cfs minimum flow, the percentage of maximum WUA under the extreme habitat condition would increase to 43 percent. In general, the results indicate that under CMP's proposed 400 cfs minimum flow, the availability of habitat under extreme habitat conditions would be significantly improved during the critical summer months.

Zone-of-Passage at Bonny Eagle, West Buxton, and Bar Mills

Given the contrasting nature of the IFIM results (*see section 4.2.2.1.2 for further discussion of the IFIM results*), CMP elected to conduct additional instream flow assessments based on habitat conditions and fish passage considerations. In summary, CMP assessed the

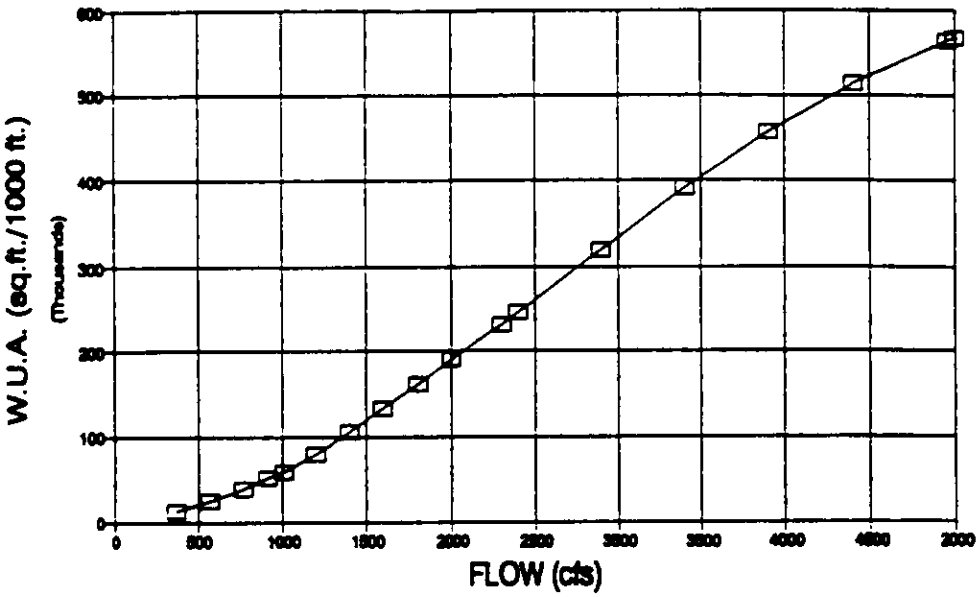

Figure 4-9 American shad and alewife outmigrating weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

available habitat in context with applicable fishery management plans for the river and determined that the free-flowing reaches below West Buxton and Bonny Eagle would be most important as resident species habitat and as a migratory pathway for outmigrating anadromous fish (CMP, 1991). As such, CMP conducted zone-of-passage studies of the Bonny Eagle, West Buxton, and Bar Mills free-flowing reaches.

At Bonny Eagle, results of the zone-of-passage analysis suggest that passage is available to all species/lifestages at all flows due to the backwater effects of the West Buxton impoundment (CMP, 1991).

At West Buxton, passage suitability was assessed for inmigrating American shad and Atlantic salmon and outmigrating alewife. Specific suitability criteria for depth and velocity are described in Stetson-Harza (1991b). In summary, suitability was determined on a scale of 0 to 1.0 with 1.0 being the maximum suitability. At CMP's proposed 400 cfs flow, study results indicated suitability ranged from 0.0 to 1.0 for American shad, 0.07 to 1.0 for alewife, and 0.12 to 0.51 for Atlantic salmon. Stetson-Harza (1991b) attributes the low suitability (0.0) for alewife and shad to one transect located at the head of a riffle habitat area. A suitable zone-of-passage for all both alewife and shad was identified, however, on the left side of the river facing downstream. Two zone-of-passages were identified for Atlantic salmon.

At Bar Mills, passage suitability was assessed for inmigrating and outmigrating adult salmon and outmigrating salmon smolts, shad, and alewives. Study results indicated that at

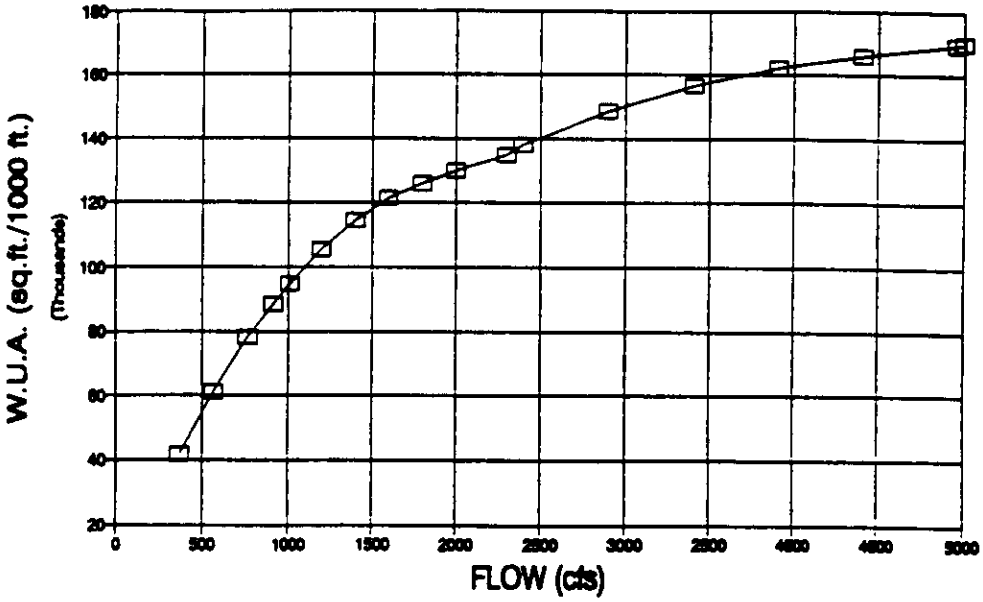

Figure 4-10 Atlantic salmon inmigrating weighted usable area (WUA) vs. discharge for West Buxton tailwaters (Source: Stetson-Harza, 1991).

all flows evaluated (leakage, 400 cfs and 2,250 cfs) there was a continuous and adequate zone-of-passage through the entire assessment reach (Charles Ritzi Associates, 1992). Additionally, it was concluded that the zone-of-passage would be maintained under all typical Skelton impoundment levels.

New River Channel minimum flows. Since there are no gates at the Bonny Eagle powerhouse, excess flows are spilled into the New River Channel on the east side of Bonny Eagle Island. Typically, Saco River flows would have to be in excess of about 5,000 cfs before spill occurred.

MDIFW plans to manage the New River Channel as a stocked brook and rainbow trout fishery (MDIFW, 1990). As such, CMP proposes to release a seasonal minimum flow in the New River Channel of 50 cfs during the fishing season May 1 through September 30.

To determine the effects of the existing and proposed minimum flow in the reach, CMP assessed aquatic habitat and flow utilizing the Incremental Flow Index (IFI). A composite rating of scores for several components of aquatic habitat and angling quality, IFI is an empirical flow demonstration technique that subjectively rates the relative suitability of specific flow levels for various aquatic habitat, recreational, and aesthetic attributes with the objective of describing the incremental differences between flows (Acres, 1989b). Aquatic habitat components rated include velocity, depth, percent instream cover, and percent pools. Criteria values used in the habitat quality rating were mostly derived from published literature

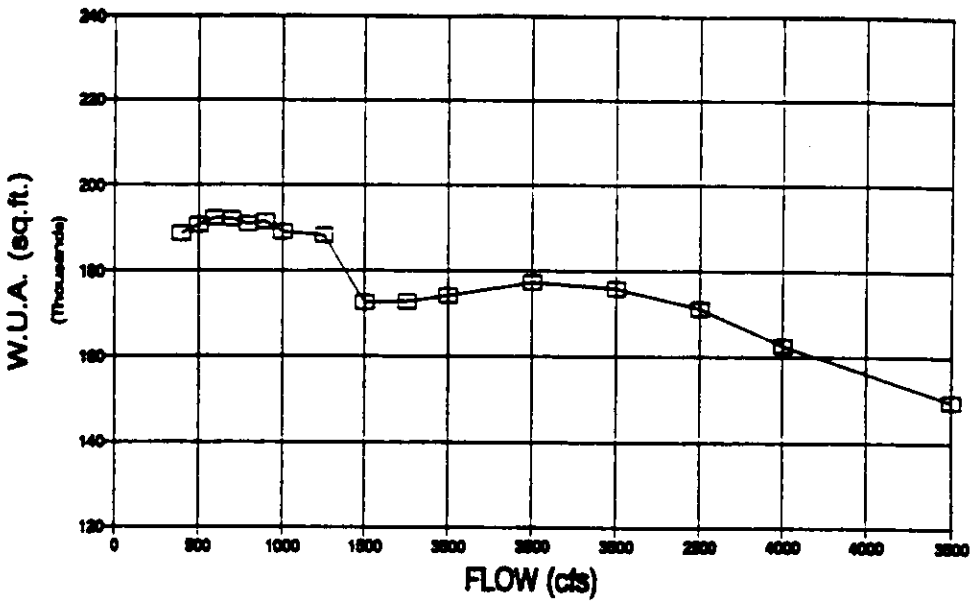

Figure 4-11 Adult brook composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

and are contained in Acres (1989b). Habitat quality and angling quality were equally rated.

Assessments were conducted at four flows: leakage (about 5 cfs), 50 cfs, 100 cfs, and 150 cfs. Results of the flow assessment indicate that the optimum flow for a stocked fishery would be 100 cfs, but that a flow of 50 cfs provides considerable enhancement over the existing leakage flow. The greatest increase in habitat value was shown to occur when flows increased from 5 cfs to 50 cfs with a slight decrease in quality at flows above 100 cfs.

Fluctuating flow releases and ramping. CMP currently operates Bonny Eagle as a peaking facility and proposes to continue this mode of operation with the implementation of a seasonal 400/250 cfs minimum flow (*see project operation and minimum flows in this section*). Fluctuating flows releases have the potential to impact downstream habitats. Fluctuating water levels and changes in flows can reduce fish spawning success and strand fish and invertebrates, subjecting them to desiccation and predation from terrestrial predators (Cushman, 1985; Orth, 1987; Bain and Boltz, 1989).

Instream flow studies have indicated that downramping (reduction in flow releases) results in minimal effects immediately downstream of Bonny Eagle powerhouse due to the backwater effect of the downstream West Buxton. Thus, CMP is proposing no specific enhancement measures. However, with implementation of CMP's proposed minimum flow at Bonny Eagle, any existing ramping impacts should be reduced as downramping would occur

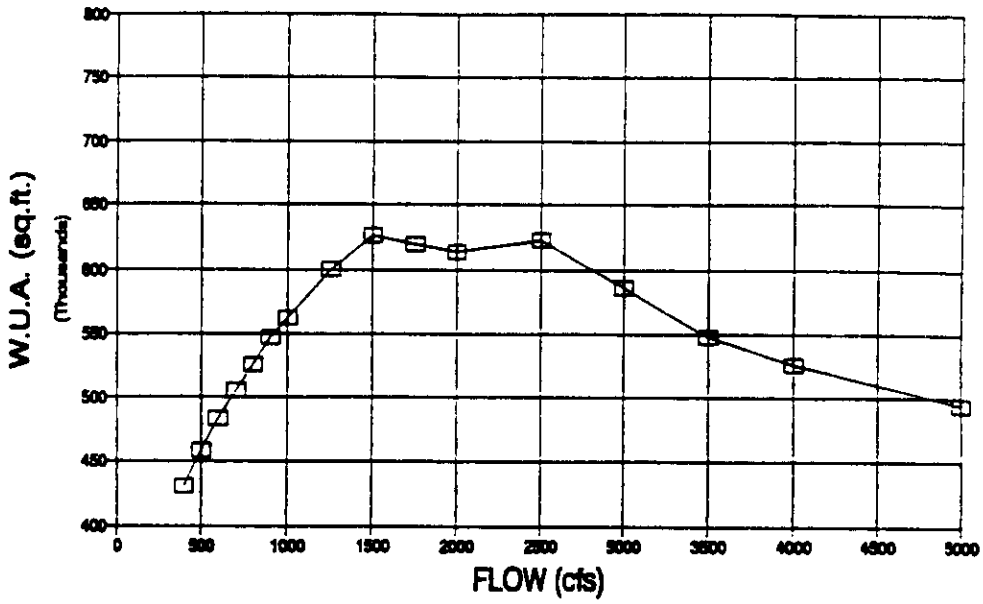

Figure 4-12 Adult rainbow trout composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

only to the proposed minimum flow of 400 cfs, and not to the current leakage flow release level.

Impoundment levels. CMP proposes to continue operating the project in a peaking mode but to limit fluctuations of the impoundment to 4.3 feet. Currently, typical daily drawdowns are 2 to 3 feet with no restrictions on the total drawdown.

Fluctuating water levels have been shown to affect eggs and larvae of smallmouth bass and other aquatic resources. Smallmouth bass are spring spawners, typically spawning in May, June, or early July in the northern climates (Carlander, 1977). Most bass spawn at depths of 2 to 4.5 feet (Edwards et al., 1983). Watson (1965) reports that fluctuations of water levels by 3 feet or more could adversely impact reproductive success. Fluctuation of water elevations may lead to lowered nest success, either directly due to egg desiccation, or indirectly due to susceptibility to predation of the young after nest abandonment by the male guardian (Carlander, 1977).

Acres (1990) reported stranding of largemouth bass and pickerel at Bonny Eagle with a 4 foot drawdown. Additionally, great blue herons were observed feeding in the stranding pools. Acres (1990) also reported that drawdowns and water level fluctuations could limit potential spawning sites for nest builders such as largemouth bass and other centrarchids. A flashboard failure in the spring prior to spawning would reduce available spawning habitat by as much as 23 percent and a flashboard failure after spawning would subject eggs and fry to

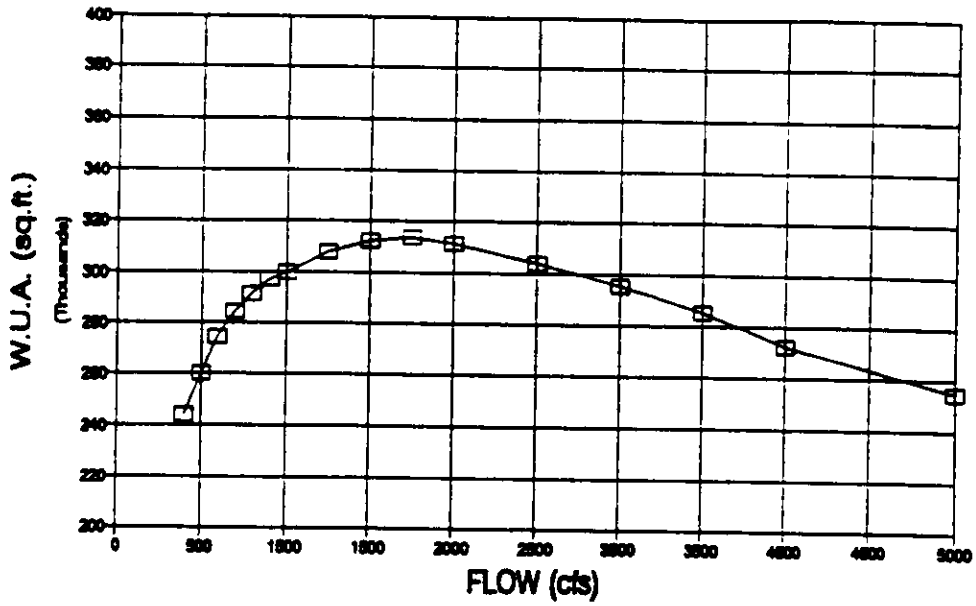

Figure 4-13 Adult brown trout composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

desiccation. Thus, the report concluded that a 4 foot drawdown could be adversely affecting the backwater nursery areas (*for further discussion of the areas affected by reservoir fluctuations see section 3.3.1.2 and 3.3.1.3*).

Although large numbers of young-of-year largemouth bass and pickerel were observed in the 1989 field study, we find that CMP's proposed fluctuations in water elevations would continue to adversely impact fishery resources in the Bonny Eagle impoundment. While CMP's proposed 4.3 foot drawdown limit would provide an added restriction to the current maximum drawdown, CMP now rarely draws the impoundment below this limit. Thus, the proposed 4.3 foot drawdown limit would provide little overall enhancement to impoundment fisheries. A further evaluation of impoundment water levels and drawdowns is provided in sections 4.2.1.1.3, and 4.2.2.1.2, and 4.2.2.1.3.

Fisheries resources summary

CMP's proposals for the installation of downstream fish passage facilities and a 400 cfs minimum flow from May 1 to October 31, of which 50 cfs would be provided in the New River Channel, and 250 cfs from November 1 to April 30, would enhance the existing fisheries in the Bonny Eagle area and the Saco River. Downstream migrating fish would be provided safe passage through the Bonny Eagle hydro station and an adequate zone-of-passage would be provided below West Buxton and Bar Mills for migrating Atlantic salmon, American shad, and alewives. Thus, any contributions of Bonny Eagle to cumulative effects

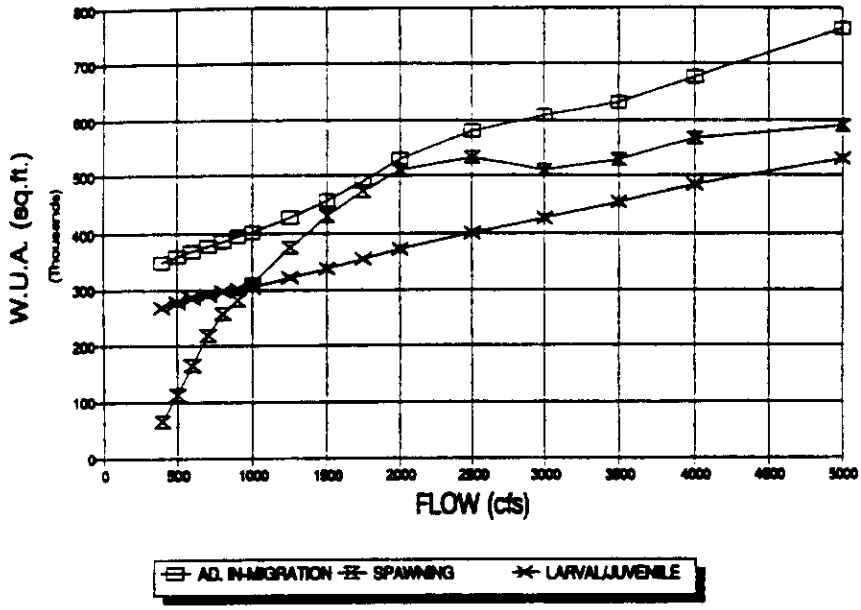

Figure 4-14 American shad inmigrating, spawning, and larval/juvenile composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

on anadromous fish passage mortality would be significantly reduced. In the New River Channel, CMP's proposed 50 cfs flow would provide significantly enhanced fisheries habitat for a seasonal trout fishery and increased recreational opportunities. Additionally, the availability of resident trout habitat at Bonny Eagle and West Buxton under extreme conditions (90 percent exceedence) in the critical summer months would be increased with implementation of CMP's 400 cfs minimum flow.

4.2.1.1.3 Vegetation and wildlife resources

CMP proposes to maintain the same operation of the Bonny Eagle reservoir (i.e., 2- to 4-foot fluctuation) but proposes to release 50 cfs through the New River channel from May through September as part of the proposed 400 cfs downstream of the dam from May through October. CMP proposes to limit the reservoir drawdown to 4.3 feet. While upland vegetation and associated wildlife resources would not be affected by the proposed operation of the project, CMP's proposed relocation of a picnic area on Bonny Eagle Island would require disturbance and removal of upland understory and ground cover vegetation on a less than 1-acre site. CMP's proposed operation, however, would affect wetlands and wetland-associated wildlife resources as discussed below.

Reservoir wetlands. CMP's proposal to continue the existing operation of the Bonny Eagle reservoir would maintain the current wetlands condition. CMP's wetlands study (Eco-

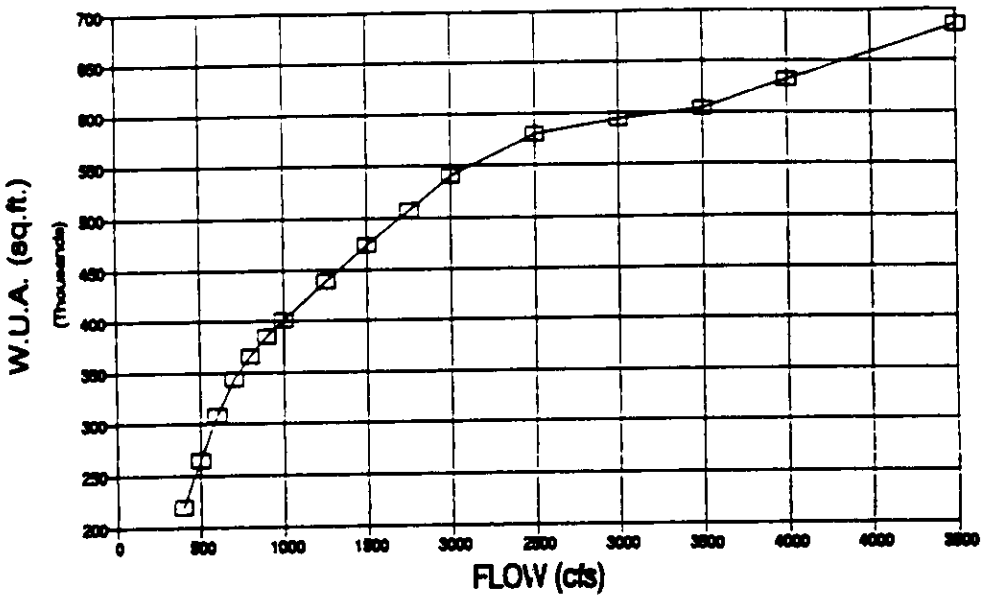

Figure 4-15 American shad and alewife outmigrating composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

Analysts, Inc., 1993c), conducted in October 1992 and May 1993, showed that the 348 acres of wetlands that fringe the Bonny Eagle reservoir are enhanced by the typical daily impoundment drawdown of 2 to 4 feet. The study concludes that this operation has facilitated the growth of the aquatic bed vegetation at depths greater than would normally occur, as well as greatly expanding the forested wetlands at full pool.

The Eco-Analysts' (1993c) reservoir study showed that the extent of wetlands is greater under the present operation than it would be at a stable water level (i.e., project operation in a run-of-river mode). If the project were operated in a run-of-river mode, Eco-Analysts predicts that a minimum of 15 percent (about 52 acres) of the existing wetlands would be lost. Most of the loss would affect the aquatic bed vegetation type as a result of less light penetration because of deeper water.

We agree that continued project operation under the current reservoir drawdown of 2 to 4 feet would maintain the existing 348 acres of wetlands.

Reservoir wildlife. CMP maintains that continued operation of the project with the 2 to 4 foot reservoir drawdown would not have significant adverse effects on existing wildlife resources.

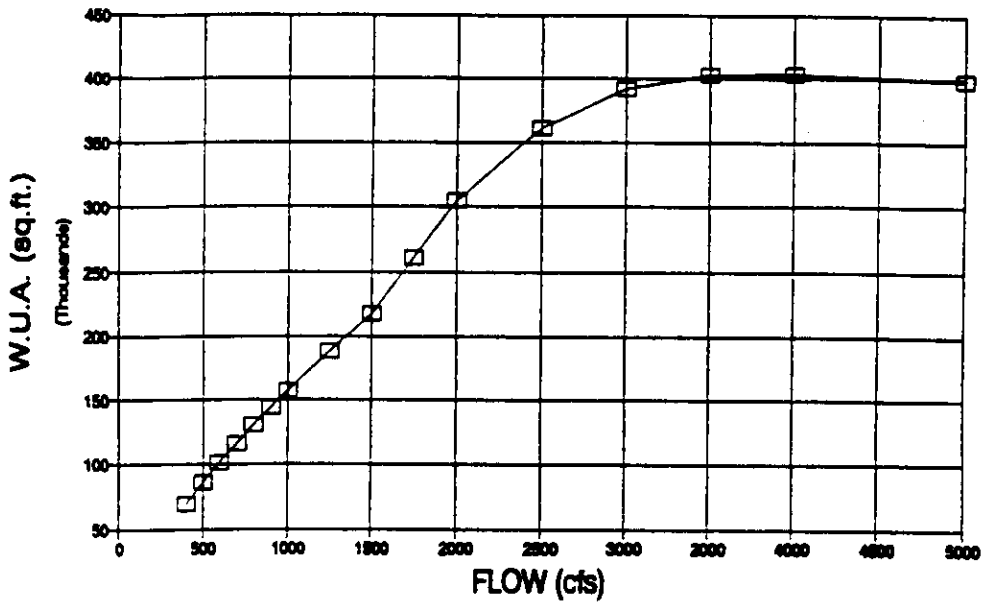

Figure 4-16 Atlantic salmon inmigrating composite weighted usable area (WUA) vs. discharge for Bonny Eagle and West Buxton tailwaters (Source: Stetson-Harza, 1991).

The Eco-Analysts' (1993c) study found the wetlands on Bonny Eagle reservoir to be highly valued for wildlife diversity/abundance based on the wide diversity of habitats and the many species observed. Earlier wildlife studies on the reservoir by Normandeau Associates, Inc. (Normandeau) in 1991 showed a number of wildlife species utilizing the reservoir wetlands including muskrat, beaver, and numerous waterfowl species. Broods of both mallards and hooded mergansers were also observed. Loon studies also conducted during 1991 showed that in general the Bonny Eagle reservoir does not contain optimal or even good habitat for common loons. Specifically, Normandeau noted that the Bonny Eagle reservoir is narrow and riverine in nature and lacks coves and bays preferred by loons.

We conclude that CMP's current and proposed operation of Bonny Eagle reservoir would maintain the present high value for wildlife diversity and abundance as shown in the studies conducted.

Downstream minimum flows. CMP's proposed 50 cfs minimum flow releases for the New River channel from May through September, and the 400 cfs release for the main channel from May through October (minus the 50 cfs New River release, when released) theoretically could have a minor, long-term beneficial effect on downstream riparian wetlands. Also, because of the minimum flow releases, the reservoir drawdown may have to be modified from current operations. For example, at lower instream flow conditions, the reservoir drawdown level may have to be reduced from current levels to allow for daily refill and the minimum flow release.

Under current operations, when Bonny Eagle ceases peaking operation and begins to refill the reservoir only leakage flows of 5 cfs from the New River channel are released downstream of the project. The 400 cfs flow would provide downstream flow during the refilling period, which would be available to potentially enhance existing wetlands and perhaps provide hydrologic conditions suitable for the development of new wetlands below, Bonny Eagle, West Buxton, and Bar Mills. Both West Buxton and Bar Mills operate in a run-of-river mode and, therefore, the flow regime from Bonny Eagle directly effect wetlands below these projects. However, the peak daily discharges of up to about 4,500 cfs, may limit or preclude wetland development below these projects, primarily because of the scouring effects produced by such flows.

Table 4-3 Percent of maximum weighted usable area (WUA) at West Buxton under median (50 percent exceedence) and extreme (90 percent exceedence) conditions for existing and proposed operations (Source: CMP, 1992n).

	Existing		CMP Proposed	
Species/Month	50%	90%	50%	90%
Brook Trout				
May	66	66	66	66
August	49	26	43	43
October	86	27	85	43
January	86	27	86	27
Brown Trout				
May	99	99	99	99
August	48	20	40	40
October	92	20	84	40
January	92	20	92	20

We conclude that the effect of a 400-cfs minimum flow release from May through October on wetlands and associated wildlife in the free-flowing section of the Saco River below Bonny Eagle is likely to be beneficial.

Vegetation and wildlife resources summary

CMP's proposal to continue operation of the Bonny Eagle reservoir with the 2- to 4-foot drawdown would maintain the current 348 acres of reservoir wetlands and the wildlife resources associated with these wetlands. The 400 cfs minimum flow release would likely have a beneficial effect on wetlands and associated wildlife resources downstream along the Saco River resulting in a cumulative beneficial effect for wetlands along the mainstem Saco River.

4.2.1.1.4 Recreation resources

Proposed recreation measures for Bonny Eagle are based on the needs identified in CMP's comprehensive recreation plan (CMP, 1989). CMP proposes to continue maintaining the existing recreation facilities at Bonny Eagle, and plans to continue the existing agreement with MDOT regarding the Limington Rips recreation facility.

Barrier-free access. To enhance access opportunities for disabled persons, CMP proposes to develop a barrier-free picnic area on the northwest end of Bonny Eagle Island.[9] This new picnic area would replace the existing informal picnic area located near the powerhouse and canoe portage put-in. The barrier-free picnic area facility would include parking, picnic tables, and an interpretive sign describing the historic hydropower structure. CMP would design the interpretive sign after consultation with the local historical society. CMP estimates the cost to provide the picnic area at about $20,000 and the cost to provide the interpretive sign at about $4,000.

CMP proposes to eliminate the existing informal picnic area near the powerhouse because its proximity to the powerhouse presents public safety concerns, the remoteness of the site limits the ability to prevent vandalism, and the slopes on the site are not suitable for disabled persons.

Currently there are no existing recreation facilities at Bonny Eagle which are accessible to disabled individuals. CMP's proposed picnic facility would significantly improve recreation opportunities at Bonny Eagle by affording access for disabled persons. Providing a barrier-free recreation facility is particularly beneficial due to Bonny Eagle's close proximity to large populations in southeastern Maine.

Minimum Flow Effects on Angling. CMP's instream flow study (Acres, 1989) indicated that the WUA for wade fishing is limited in Bonny Eagle's tailrace.[10] Further, the study results reveal that wade fishing is limited at flows ranging from 100 cfs to 5,000 cfs. Based on the study results, we conclude that CMP's proposed tailrace minimum flow (350 cfs between May 1 and October 31) would only result in marginal wade fishing improvements over the existing conditions.[11]

Tailrace flows ranging from 400 cfs to 2,000 cfs provide suitable WUA for non-power boat fishing; the most suitable flows are near 1,000 cfs (Acres, 1989).[12] There is currently no minimum flow requirement at Bonny Eagle, and during low flow periods tailrace flows are limited to leakage. CMP's proposed minimum flow (350 cfs) would slightly benefit non-

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[9] Facility which is accessible to disabled persons and fully complies with the national standards established by the Architectural and Transportation Barriers Compliance Board (Federal Register, Vol. 56, No. 144).

[10] Criteria standards that were considered suitable for wade fishing include velocities less than 3 fps and depths between 0.5 feet and 4 feet.

[11] CMP's proposed 400 cfs minimum flow between May 1 and October 31 includes a 50 cfs release in the bypassed reach.

[12] Criteria standards that were considered suitable for non-power boat fishing include velocities less than 4 fps and depths between greater than 0.5 feet.

power boat fishing at low flow periods during non-generation hours by providing some suitable WUA for non-power boat fishing.

CMP also conducted an instream flow assessment of the bypassed reach or New River Channel, which included an angling quality evaluation (Acres, 1989).[13] Flows in the New River channel, in excess of leakage (about 5 cfs), currently occur when river flows exceed the maximum project turbine capacity (4,932 cfs). Based on the instream flow assessment, CMP's proposed 50 cfs bypassed reach minimum flow (between May 1 through September 30) would significantly improve angling quality in the New River Channel over the existing condition. Providing a minimum flow of 50 cfs improved the angling quality rating by 100 percent over the angling quality rating for the leakage flow of 5 cfs.

Recreation Monitoring Studies. CMP also proposes to investigate the potential need to modify the existing canoe portage trail, develop boat or vehicle access primitive camp sites on an island or along the impoundment shore, and develop an additional hard surface boat launch on the west side of the impoundment. CMP indicates that they would determine the need to develop these facilities based upon increased use of existing facilities, the adequacy of the existing facilities to serve identified needs, and the effect new sites may have on existing sites. CMP estimates the cost to conduct these recreation studies at about $25,000.

Every six years CMP proposes to submit copies of the Commission's Form 80 recreational use assessment to the appropriate resource agencies. CMP would initiate consultation with the agencies through this process to facilitate a review of the recreation facilities at Bonny Eagle. Based on the review, CMP would determine if additional recreation facilities are needed to meet the recreational demand at Bonny Eagle.

Interior agrees with CMP's proposal to periodically review the adequacy of Bonny Eagle's recreation facilities.[14] Interior recommends that CMP periodically conduct the recreational monitoring studies at Bonny Eagle in consultation with the USFWS, NPS, ASRSC, MDMR, MDIFW, and Maine Department of Conservation (MDOC). They further recommend that recreation monitoring studies include: (1) annual recreation use data; (2) a discussion of the adequacy of CMP's recreation facilities; (3) a discussion of the need for

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[13] Angling quality was determined by rating the following components: wading safety, fishability, required experience level, attractiveness to anglers, and aesthetic quality. A quality rating ranging from least desirable to most desirable was used to measure angling quality for brook and rainbow trout.

[14] CMP's proposal to conduct the recreation monitoring studies every six years coincides with the Commission's Form 80 recreation use assessment process. While Interior recommends conducting the monitoring studies every 5 years, Interior agreed to conducting the studies according to the Commission's Form 80 process provided that the fish and wildlife agencies are consulted.

additional recreation facilities at Bonny Eagle; (4) any recreation plans proposed by CMP to accommodate or control visitation in the project area; and (5) agency consulting documentation and comments on the report.

We agree with CMP's and Interior's measures to monitor the demand and need for future recreation facilities at Bonny Eagle. Monitoring studies are particularly important at Bonny Eagle due to the anadromous fishery restoration process, potential increases in canoe touring along the lower Saco River, and the heavy recreational use at the Limington Rips recreation area.

Recreation monitoring studies at Bonny Eagle would ensure the adequacy of recreation opportunities at the project throughout the term of the license. Monitoring studies would provide an opportunity to periodically evaluate the need for additional primitive camp sites or boat launch facilities at the project.

Recreation resources summary

CMP's proposal to continue maintaining the recreation facilities at Bonny Eagle would protect the current recreational opportunities offered at the project. These opportunities include a water access campsite at the south end of Bonny Eagle Island, as recommended by Interior (*see section 3.3.1.4 for further discussion*). CMP's proposed interpretive sign describing the historic hydropower structure would enhance the public's awareness of cultural resources at Bonny Eagle. Limington Rips recreation area is the prominent recreation facility at Bonny Eagle, and CMP's proposal to continue the existing agreement with MDOT would ensure the operation of this public resource. We agree with CMP's proposal to improve recreation opportunities for disabled populations by providing a barrier-free picnic facility on Bonny Eagle Island.

CMP's proposed minimum flow to the tailrace would result in some non-power boat fishing benefits, while the proposed bypassed reach minimum flow would provide additional angling opportunities in the New River Channel. Finally, recreation monitoring studies at Bonny Eagle, as proposed by CMP and recommended by Interior, would ensure the adequacy of recreation opportunities at the project throughout the term of the license.

4.2.1.1.5 Geology and soils

The cultural resource survey conducted at Bonny Eagle indicated that moderate to severe shoreline erosion, bank undercutting, and slumping trees occur in localized areas along the impoundment shoreline (Cowie and Peterson, 1988). These effects on geological resources result from recreational boating waves, wide tides (wind setup), and impoundment fluctuations. Also, periodic high flow events in the Saco River Basin occur almost annually and naturally cause shoreline erosion. During our site visit, the staff did not notice any significant erosion occurring along the Bonny Eagle impoundment.

Continued operation of Bonny Eagle would result in ongoing shoreline erosion, bank undercutting, and slumping trees along the impoundment. CMP's proposed 4.3 foot impoundment drawdown limit at Bonny Eagle would help protect the impoundment shoreline from excessive erosion resulting from extreme water level fluctuations. Geological resource effects are also minimized because CMP's impoundment drawdowns are not typically abrupt and 2-foot drawdowns occur over a 10 to 14 hour period. CMP proposes no land-disturbing or land-clearing activities that would affect the geological resources.

We conclude that continued project operation at Bonny Eagle would result in minor ongoing effects on the geological resources. Shorelands along the impoundment are primarily undeveloped and vegetation extending to the water's edge naturally protects the shoreland from erosion. Localized erosion resulting from flooding, recreational boating wakes, and wide tides (wind setup) would continue along Bonny Eagle's impoundment regardless of altering project operation and impoundment fluctuation.

4.2.1.1.6 Aesthetic resources

CMP proposes no land-disturbing or land-clearing activities that would affect the aesthetic resources at the project. CMP's proposed minimum flow of 50 cfs through the New River Channel between May 1 through September 30 would enhance scenic views at Bonny Eagle. The proposed minimum flow would ensure that flows in addition to leakage are provided within the bypassed channel during peak tourist and recreation seasons.

CMP proposes to continue operating Bonny Eagle as a daily cycle peaking project and would limit drawdowns to 4.3 feet below the normal full pond elevation (216.3 feet local datum). Impoundment drawdowns at Bonny Eagle currently affects aesthetic views by exposing substrate along the shoreline. Under the proposed operation the dewatered zone would expose substrate ranging in width between 8 to 20 feet. The drawdown zone represents about 2 to 4 percent of the 347 acre impoundment and the total amount of substrate exposed in the main channel's drawdown zone is about 21 acres (Acres, 1990).

Although CMP proposes a 4.3-foot drawdown limit, the daily drawdown would usually range from 2 to 3 feet which would minimize effects on aesthetic views along the impoundment. Steep banks along most of the impoundment also minimizes the shoreline areas exposed during drawdowns.

4.2.1.1.7 Archeological and Historic resources

While CMP's proposal to continue operating the historic Bonny Eagle facilities would generally ensure long-term protection of the properties, non-routine maintenance (i.e., the repair or replacement of significant structural fabric and mechanical systems) could involve adverse effects. Any future implementation of upstream fish passage could also adversely affect the eligible Bonny Eagle facilities.

CMP's proposed construction of downstream fish passage facilities at Bonny Eagle wouldn't adversely affect the historic Bonny Eagle facilities (letter from Earle Shettleworth, Jr., Maine State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, October 26, 1992).

Continuing to operate Bonny Eagle as proposed could adversely affect the 10 archaeological sites eligible for inclusion in the National Register. Potential adverse effects could also occur if CMP develops future recreation facilities near the eligible archaeological sites.

Of the 10 eligible archaeology sites identified, the SHPO classified five of the sites as emergency sites because of rapid erosion. The SHPO recommends that these sites should receive priority data recovery excavations upon issuance of the Bonny Eagle license. To protect the 10 archaeological sites the SHPO recommended long-term conservation easements and site monitoring (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, November 21, 1989). CMP conducted Phase III data recovery during the 1994 and 1995 field seasons at three of the sites that the SHPO classified as emergency sites (letters from F. Allen Wiley, P.E., Hydro Operations, Central Maine Power Company, Augusta, Maine, January 26, 1995 and January 2, 1996).

CMP proposes to protect Bonny Eagle's historic structures and conduct appropriate archaeological work at Bonny Eagle in accordance with the Programmatic Agreement executed among the Commission, the Council, and the SHPO (FERC *et al.*, 1993). CMP was a concurring party to the Programmatic Agreement which was executed on October 27, 1993. The Programmatic Agreement incorporates the management of cultural resources at 10 hydroelectric and storage projects in Maine, including Bonny Eagle. CMP estimated that the archaeological work at Bonny Eagle would cost about $521,000 (1993 dollars).

To avoid or mitigate adverse effects that could inadvertently occur to the historic Bonny Eagle facilities, the agreement requires CMP to conduct non-routine repair and upkeep of the historic structures according to the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation (48 Federal Register 444716 *et seq*). Adhering to these standards and guidelines would also ensure adequate protection of the historic structures if CMP constructs upstream fish passage facilities in the future.

The Programmatic Agreement also requires CMP to design and implement a monitoring and data recovery plan for the 10 archaeological sites at Bonny Eagle. Finally, this agreement requires CMP to first conduct archaeological surveys in areas which were not previously surveyed if CMP plans any future unscheduled ground-disturbing activities.

We conclude that the Programmatic Agreement would adequately protect the cultural resources at Bonny Eagle. Implementing this agreement would ensure adequate protection of

the historic Bonny Eagle facilities, the 10 archeological sites, and any unknown archaeological sites at Bonny Eagle.

4.2.1.1.8 Land use

CMP proposes no land-disturbing or land-clearing activities that would affect the existing land uses at the project.

4.2.1.1.9 Air quality

CMP's proposal for increased minimum flows and changes in the project's operation would reduce the annual energy production by abut 2,345,000 kWh (2.35 GWh). The resulting loss of hydropower energy would have to be replaced with energy available from alternative sources.

For the Maine service area, it is highly probable that the replacement energy would have to be generated by oil-fired facilities. This would result in increased consumption of fossil fuel; and the combustion of this increment of fossil fuel would result in increased production of atmospheric pollutants.

The replacement of one GWh of hydropower generation energy with one GWh of oil-fired generation would require the combustion of about 1,695 barrels (bbl) of oil. Using the above assumptions, we tabulated the quantities of atmospheric pollutants that would be produced by replacing the loss of one GWh of hydropower generation energy with one GWh of oil-fired electric generation, Table 4-4.

Using the above approximations and the estimated generated energy reductions resulting from CMP's proposals, we estimate that 3,984 bbl of oil would be required annually to produce 2.35 GWh of oil-fired electric generation. We then calculated the amount of pollutants that would likely be released into the atmosphere from the associated energy reductions at Bonny Eagle (Table 4-5).

Table 4-4 Approximate amounts of atmospheric pollutants that would be produced by replacing the loss of one GWh of hydroelectric generation with one GWh of oil-fired generation (Source: the Staff).

Oxides of sulfur	3.35 tons
Oxides of nitrogen	2.62 tons
Carbon monoxide	0.18 tons
Carbon dioxide	890.1 tons

Continued operation of the project would keep additional pollutants from being released into the air. Table 4-5 also shows the pollutants that would be released to the air annually if the project's estimated 41.28 GWh of electric power were generated by a oil-fired

plant (69,986 bbl of oil annually). These pollutants would adversely affect air quality in Maine and New England, although not necessarily in the immediate project area.

State-of-the-art pollution control technology is capable of removing about 95 percent of the oxides of sulfur and about 60 percent of the oxides of nitrogen from the above quantities of pollutants in uncontrolled flue gases before the gases are released into the atmosphere.

Published figures on the cost of removing a ton of the oxides of sulfur from the uncontrolled flue gases range from $300 to $700. The cost of removing a ton of the oxides of nitrogen ranges from $210 to $560. We use the mid-points of the ranges.

Using a removal cost of $500 per ton, the estimated cost of removing 95 percent of oxides of sulfur, or 131 tons, would be about $65,500 annually. Using a removal cost of $385 per ton, the estimated cost of removing 60 percent of the oxides of nitrogen, or 65 tons, would be about $25,025 annually.

Although pollution control technology is capable of removing some of the oxidized sulphur and nitrogen from flue gases, it can't remove carbon dioxide, which contributes to global warming. In addition to adverse effects on air quality, mining and transporting coal for a steam-fired electric facility could result in adverse impacts on aquatic, terrestrial, recreational, aesthetic, and cultural resources.

Table 4-5 Amounts of atmospheric pollutants that would be annually produced by generating 2.35 GWh and 41.28 GWh of electric power using oil-fired generation (Source: the Staff).

Pollutant	Amount produced by 3,984 bbl.	Amount produced by 69,986 bbl.
Oxides of sulfur	7.87 tons	138.3 tons
Oxides of nitrogen	6.18 tons	108 tons
Carbon monoxide	0.42 tons	7.4 tons
Carbon dioxide	2,091 tons	36,743 tons

4.2.1.2 Skelton

4.2.1.2.1 Water quality and quantity

The continued operation of Skelton would affect water quality and quantity in the Saco River. The specific impacts in each affected resource area are discussed below.

Project operation and minimum flows. As discussed in section 3.3.2.1, CMP currently operates Skelton as a peaking facility. As such, flows up to 3,800 cfs are used for generation with excess water spilled through the gates. Skelton has no current minimum flow requirement and normal peaking operations can result in daily pond level fluctuations of up to 2.5 feet.

CMP proposes to provide a continuous minimum flow of 400 cfs or inflow from May 1 to October 31, a continuous minimum flow of 250 cfs or inflow from November 1 to April 30, and an upstream and downstream fishway flow of 180 cfs. While the primary purpose of the minimum flow is to enhance downstream resident and anadromous fisheries habitat, which we would discuss in the fisheries section of this document, the proposed flows would also affect water quality downstream to the Saco River estuary.

During water quality studies in 1991, CMP (1991b) noted that tailrace DO concentrations were noticeably poorer under leakage conditions. Periodically, bottom DO levels fell below 7.0 ppm. However, during periods of generational flows, tailrace waters were found to be well mixed and above Class A standards (*for further information on tailrace DO levels see sections 3.3.3.1*).

Increasing flows from leakage to 400 cfs (less than the 7Q10 flow) at Skelton in the critical low flow summer months would have some beneficial effect on water quality and aquatic habitat in the free-flowing 4,000 ft reach immediately below Skelton. DO levels in the tailrace would be improved throughout the May 1 to October 31 period; however, periodic below standard levels would still occur. Areas normally only periodically wetted during project operation would be continuously inundated. Water velocities would increase and stagnation and retention times would decrease. Macroinvertebrate species, especially those of limited mobility, would also benefit from the increased flows.

Release of 400 cfs from Skelton during the low flow summer months could affect water quality below Cataract including the Saco River estuary. Currently, the Cataract Project is required to release 851 cfs, or inflow whichever is less. A 50 percent reduction in this flow release to the Saco River estuary would affect the established flushing and circulation patterns and nutrient inputs. While we have not attempted to quantify these effects, we conclude that the overall water quality in the river would not benefit greatly from these proposed flow increases and these increases are less than the 7Q10 flow of 478 cfs. There would, however, be an increase in wetted habitat below Skelton. A reduction in the flow regime below Cataract would affect the Saco River estuary.

Water quality and macroinvertebrates. Eco-Analysts (1993b) concluded that the benthic community below Skelton was exhibiting some signs of stress and may not retain the requisite community structure and function to attain Maine's Class A, B, or C Aquatic Life Standards. The study further concluded that flow fluctuations from Skelton, particularly low flow periods of leakage, could be a contributing factor to the results.

Eco-Analysts (1993b) described the free-flowing area below Skelton as a "mixed" habitat. Specifically, during periods of low to no flow from Skelton, the substrate resembled a lotic, riverine habitat, while the current velocities, attached algae, and other plant growth more closely resembled a lentic pond-like habitat. Thus, benthic macroinvertebrate populations were very low with some stress sensitive species absent.

At West Buxton, Eco-Analysts (1993) found the greatest number of organisms in a small riffle area where current velocities appeared to be near 1.0 fps. Unlike the riffle, most other areas studied had velocities less than 0.5 fps. Additionally, filamentous algae, typical of lentic habitats, did not exhibit the same lavish growth in the riffle as that observed in other areas with less velocities.

To confirm this hypothesis, CMP proposes to conduct benthic macroinvertebrate sampling below Skelton for 2 years following the implementation of the new minimum flow requirement at Skelton. Interior and the Coalition both generically recommend that the aquatic invertebrate populations in downstream areas affected by the operation of Skelton be evaluated and monitored to determine the response of the communities to changes in the flow regime. Although CMP did not provide costs for this proposal, we estimate the study would cost about $3,200 annually.

We agree that CMP should conduct benthic macroinvertebrate sampling downstream of Skelton. Benthic macroinvertebrates respond quickly to change in habitat conditions, especially to flow alterations, in terms of species diversity and abundance. Therefore, monitoring these organisms would provide a quick measure of any improved habitat conditions brought about by increased flows.

Water quality and quantity summary

CMP's proposed project operations and minimum flow releases would minimally enhance water quality in the Saco River below Skelton. A seasonal minimum flow of 400 cfs from May 1 to October 31 and 250 cfs from November 1 to April 30, would, however, eliminate periods of only leakage flows from the project. Water quality below Cataract and in the Saco River estuary would be diminished during the low flow summer months in comparison to the current flow regime from Cataract. At Skelton, implementation of a minimum flow would allow some mixing of tailwaters and to some degree minimize DO deficiencies present in the reach at leakage flows. Further, macroinvertebrates in the Skelton tailwaters would benefit from any increased water quality and the associated lotic habitat. Together with CMP's proposed flows from Bonny Eagle, flows from Skelton would have a limited cumulative beneficial effect on water quality in the Saco River.

4.2.1.2.2 Fisheries resources

Fish Passage Facilities. In section 4.1.1.2, we discussed the need for fish passage facilities at Skelton and the requirements for passage facilities contained in the Agreement. As such,

CMP (1992h) has developed conceptual design drawings for the proposed upstream and downstream fish passage facilities.

The proposed upstream fish passage facility would consist of a fish lift located adjacent to the powerhouse on the eastern shore of the river. Designed to transport Atlantic salmon, American shad, and river herring, the proposed facility would consist of a fish entrance, fish crowder and holding area, separation screen, fish hopper and lift, and transportation flume. The hopper would be sized according to the short and long term anadromous fish restoration goals of the Saco River and would raise the fish from the tailwater elevation of 52 feet to the headpond elevation of 126 feet. The entrance to the fish lift would be located downstream of the powerhouse in the approximate location of the existing fish ladder entrance. The fish hopper would discharge into a transportation flume allowing fish to swim into the headpond at about the location of the existing log sluice. To attract fish to the fish lift, the lift would utilize 3 percent of the maximum unit flow, or about 108 cfs.

The proposed downstream fish passage facility would consist of a surface bypass arrangement utilizing 2 percent of the maximum generational flow, or about 72 cfs. Fish would pass through the existing gates used for the present fishway flow regulation and be discharged into a plunge pool to be constructed at the upstream end of the existing fish ladder. A flume would then be used to transport from the pool to the tailwater. Fish would be discharged into the tailwater from a height of about 6 feet. The proposed conceptual design does not contain plans for any changes to the existing Skelton trashracks. However, intakes at Skelton are located 30 feet below the normal reservoir water level.

While the final fishway design has not been developed and would be subject to further consultation with the agencies, the proposed fish lift design has been shown to be an effective means of passing the primary species of interest - shad, river herring, and salmon - at downstream Cataract. We foresee no reasons why, conceptually, the proposed facilities would not provide adequate fish passage for these species. In addition to the successful passage shown at Cataract, passage of American shad, Atlantic salmon, and river herring (alewives and blueback herring) with fish lifts has been demonstrated at similar facilities on the Connecticut River and the Susquehanna River. Thus, we believe that CMP's proposed facilities would provide significantly improved upstream and downstream fish passage and would further the goals and objectives of the Saco River's anadromous fish restoration efforts.

Additionally, Interior filed mandatory conditions pursuant to Section 18 of the FPA. Interior requests that the licensee ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS. Furthermore, Interior requests that the Secretary of Interior's authority to prescribe the construction, operation and maintenance of fishways be reserved

Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways. While USFWS is a signatory of the Agreement, we recognize that future fish

passage needs and management objectives cannot always be predicted at the time of license issuance. Although we find that the Agreement would provide the means and procedural structure for the future installation of any necessary fish passage facilities, we recommend that the Commission reserve Interior's authority to prescribe fishways.

Project operation and minimum flows. As previously discussed, CMP operates Skelton as a peaking facility with no minimum flow requirement. Typically, flows range from generational flows of up to 3,800 cfs to leakage.

To provide enhanced downstream resident and anadromous fisheries habitat, CMP proposes to provide a continuous minimum flow of 400 cfs or inflow, whichever is less, from May 1 to October 31 and 250 cfs or inflow, whichever is less from November 1 to April 30.

To determine the effects of the existing and proposed minimum flows and the effects of fluctuating flow releases on aquatic habitat at Skelton, CMP conducted instream flow studies of the Skelton tailwater reach utilizing the USFWS's IFIM.

Skelton IFIM Results

The Skelton IFIM study examined the 4,000 ft reach of the Saco River immediately below the powerhouse. Habitat values were simulated with the IFIM model over a range of flows from 100 cfs to 5,000 cfs for adult brook, brown, and rainbow trout; American shad inmigration, outmigration, spawning, and larval/juvenile rearing; alewife outmigration; and Atlantic salmon inmigration. Wade fishing and non-power boat fishing were also modeled and are discussed in section 4.2.1.2.4.

Results of the habitat simulation for the Skelton tailwaters are shown in Figures 4-17, 4-18, and 4-19. In general, the study indicated that current operations result in fluctuating habitat conditions below Skelton during normal peaking operations. Anadromous species habitat is maximized at the highest modeled flows, while resident trout habitat is maximized at relatively low flows (Acres, 1989c).

For trout, WUA varied between species. Peak WUA occurs at a flow of 200 cfs for brook trout, at 300 cfs for brown trout, and at 900 cfs for rainbow trout. At CMP's proposed 250 cfs minimum flow in the tailrace, the percentage of maximum WUA available would be about 98 percent for brook trout, 96 percent for brown trout, and 86 percent for rainbow trout. At 400 cfs, the percentage of maximum WUA available would be about 82 percent for brook trout, 98 percent for brown trout, and 91 percent for rainbow trout. Higher flows reduced the WUA for all trout species. At typical peaking flows of about 3,800 cfs, WUA for brook trout was only 25 percent of the maximum WUA available. For brown trout and rainbow trout, WUA at 3,800 cfs was about 70 percent and 53 percent of maximum WUA, respectively.

The American shad inmigration, spawning, and outmigration (including alewife) WUA curves increase strongly from the lowest flows simulated up to the maximum flows modeled

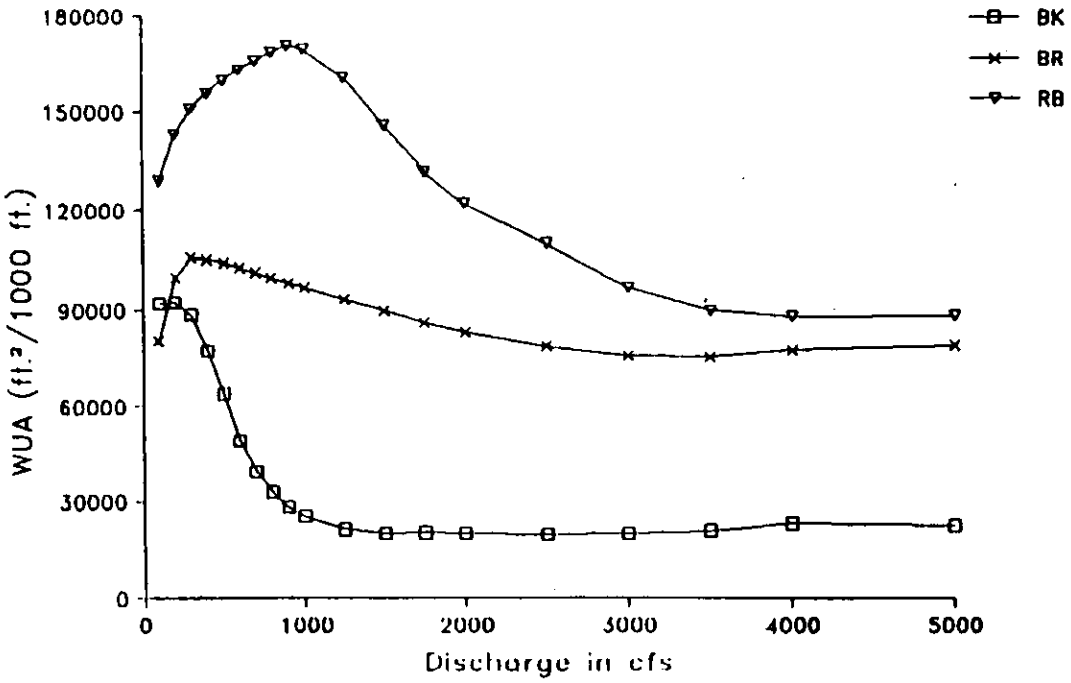

Figure 4-17 Adult brook (BK), brown (BR), and rainbow (RB) trout weighted usable area (WUA) vs. discharge for Skelton tailwaters (Source: Acres, 1989c).

at 5,000 cfs (Figure 4-18). WUA did not reach a peak in the simulation. At CMP's proposed minimum flow of 250 cfs, the percent of maximum WUA available was less than 15 percent for spawning, about 25 percent for both inmigration and outmigration, and more than 50 percent for larval/juveniles. At 400 cfs, the percent of maximum WUA available ranged from about 29 percent for inmigration and outmigration to more than 63 percent for larval/juveniles. At typical peaking flows, WUA's range near 100 percent for all lifestages.

WUA curves for Atlantic salmon upstream migration in the study area (Figure 4-19) are similar to the American shad WUA curves. Maximum WUA occurs at a highest modeled flows. At 250 cfs, only about 10 percent of the maximum WUA occurs, while at 400 cfs about 16 percent of the maximum WUA was available.

Zone-of-Passage at Skelton

CMP conducted zone-of-passage studies of the free-flowing reach below Skelton. Passage suitability was assessed for inmigrating and outmigrating American shad and alewives (adults and juveniles) and Atlantic salmon (adults and smolts). Study results indicated that at all flows evaluated (leakage/fishway flow of 50 cfs, 250 cfs, 400 cfs, and 800 cfs) there was a continuous and adequate zone-of-passage through the entire assessment reach (Charles Ritzi

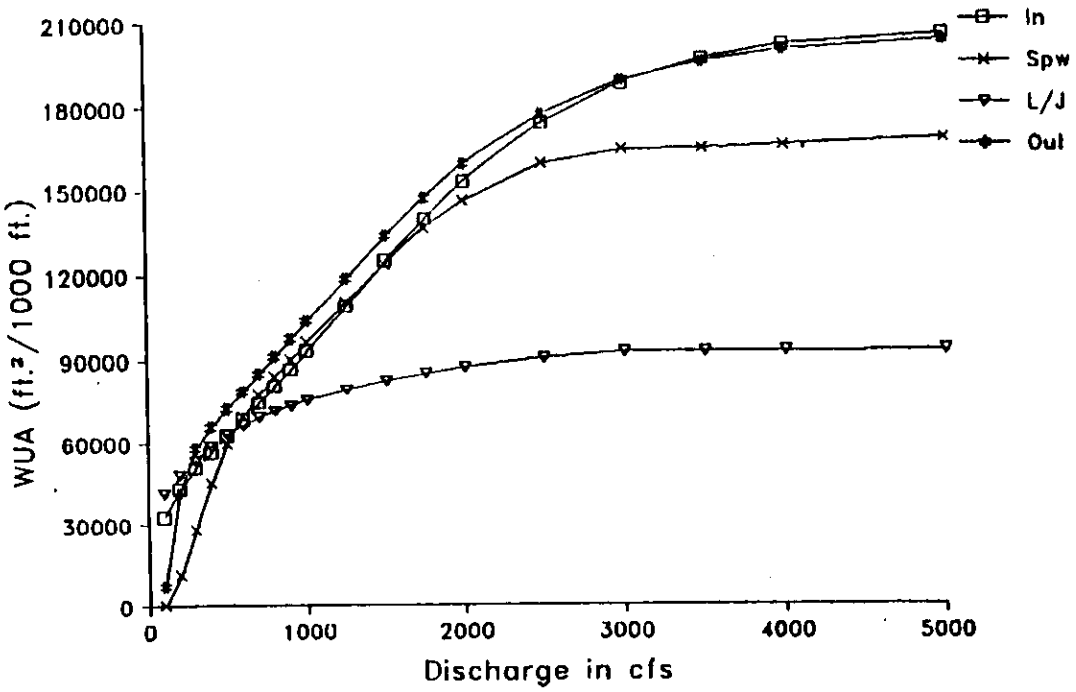

Figure 4-18 American shad inmigrating (In), spawning (Spw), larval/juvenile (L/J), and outmigrating (Out) weighted usable area (WUA) vs. discharge for Skelton tailwaters (Source: Acres, 1989c).

Associates, 1992b). Minimum passage depth was found to be 3.4 feet with most depths over 4.0 feet. Additionally, it was concluded that the zone-of-passage would be maintained under all typical Springs/Bradbury impoundment levels.

Fluctuating flow releases and ramping. CMP proposes to continue operation of Skelton as a peaking facility with the implementation of seasonal minimum flows (*see project operation and minimum flows in this section*). As discussed in section 4.2.1.1.2, fluctuating flows releases have the potential to impact downstream habitats.

To determine the effects of fluctuating flow releases on aquatic habitat at Skelton, CMP conducted a ramping study of the tailwaters which included hydraulic modeling and field investigations (Acres, 1989d). Downramping from 3,600 cfs to 1,300 cfs, 1,300 cfs to 0 cfs, and 3,600 cfs to 0 cfs were analyzed.

Results varied between downramping events. Downramping between 3,600 cfs and 1,300 was shown to have little effect except at Transect 5 located on a depositional gravel bar (Figure 4-20). At flows greater than 3,000 cfs, wetted area on the bar almost doubles in width. Downramping between 1,300 cfs and 0 cfs was more pronounced as wetted area decreased by over 30 percent at Transect 2 and almost 20 percent at Transect 7.

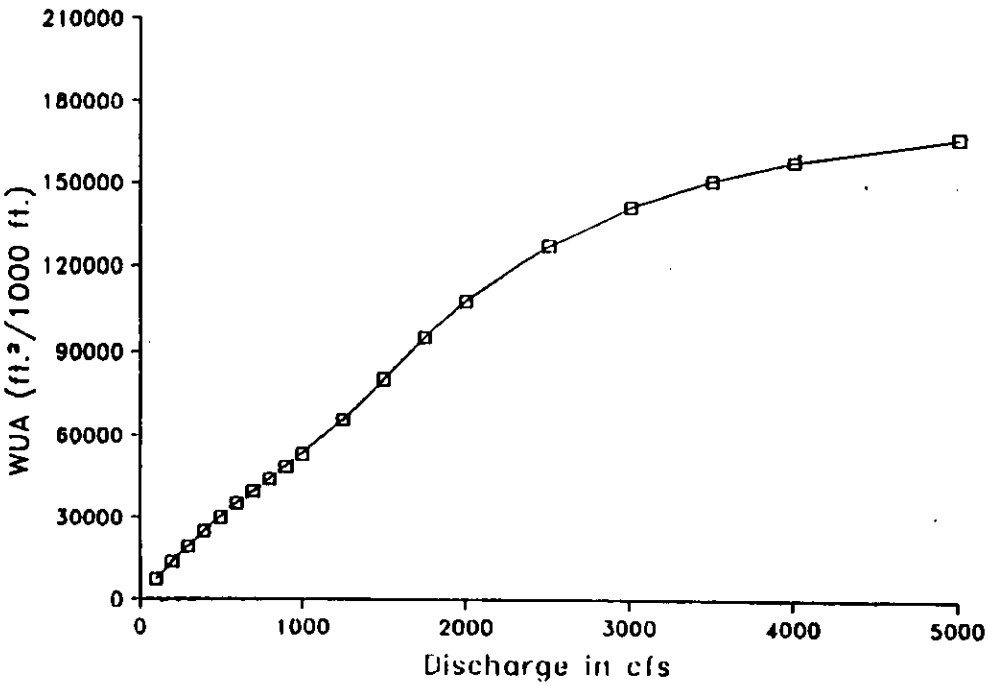

Figure 4-19 Atlantic salmon inmigrating weighted usable area (WUA) vs. discharge for Skelton tailwaters (Source: Acres, 1989).

Downramping between 3,600 cfs and 0 cfs resulted in some fish stranding below the dam with most stranding occurring in pools formed in the previously identified gravel depositional zone. Stranded fish were identified as fry and juvenile white perch and smallmouth bass.

The conclusion of the ramping study was that excavation of channels between the pools would eliminate the stranding potential by providing escape routes for fishes. We agree. As such, CMP proposes to implement channel modifications in the areas identified in Figure 4-20. CMP proposes that a final plan for the excavation and monitoring of gravel bar escape channels be developed following further consultation with the resource agencies. CMP estimates the proposed alterations would cost about $18,000 (1990 dollars).

Tailrace habitat enhancement. Based on agency concerns over the lack of holding lies for Atlantic salmon below Skelton compared with other areas, CMP proposes to place up to 20 boulder clusters along the west side of the river in the vicinity of the gravel depositional zone. Conceptually, the clusters would consist of two parallel rows of boulder clusters in line with the existing streambank. One line would be about 30 feet from shore with the second line about 30 feet farther into the main channel. Pairs would be separated by about 100 feet and would consist of either individual boulders 4 to 5 feet in diameter or smaller boulders anchored together. Acres (1989e) states that structures of this size and mass would be able to withstand movement by anticipated high flows and damage from ice.

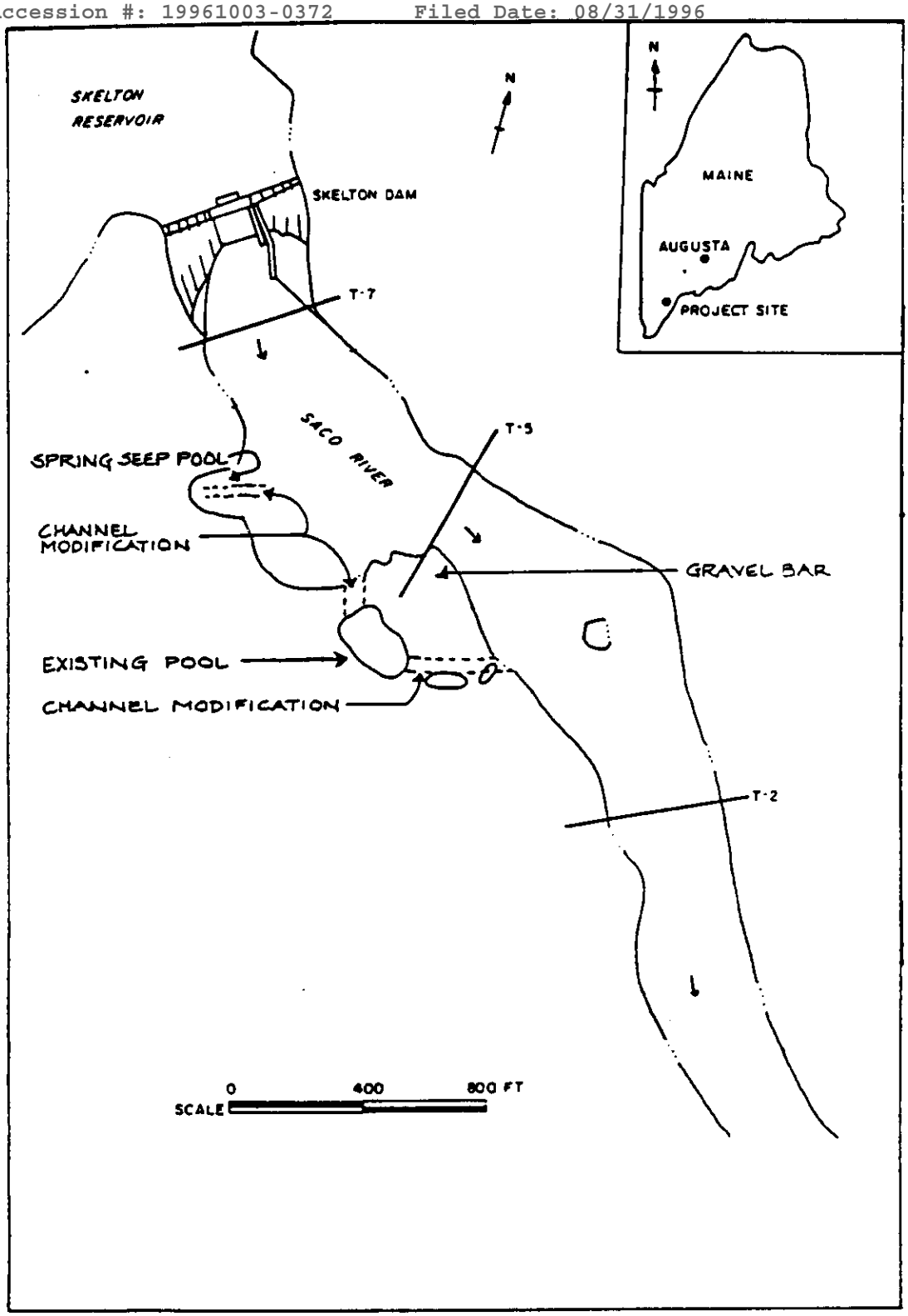

Figure 4-20 Map of the Skelton tailwater area with ramping transects and proposed channel modifications (Source: Acres, 1989d).

The boulders are designed to be most functional at a flow of about 1,500 cfs. Acres (1989e) concluded that at this flow the boulders would be submerged sufficiently to provide holding and feeding lies for adult salmonids and also be noticeable to boaters. During periods of high generation flows, the boulder clusters would also provide velocity refuges to resident trout. Additionally, the boulders would provide fishing opportunities to both bank and wading anglers (*see section 4.2.1.2.4*).

For the installation of the clusters, CMP proposes to use a phased approach where a smaller number of structures would first be installed and monitored. If the structures prove successful in their stated objectives of holding salmonids, the full program would then be implemented. CMP further proposes that a final habitat enhancement plan for phasing, installation, monitoring and possible modification of the boulder clusters be developed following further consultation with the resource agencies. CMP estimates the proposed boulder clusters would cost about $82,000 (1990 dollars).

Interior and the Coalition agree with CMP's proposed habitat enhancement. Interior believes that the clusters would be expected to hold resident and anadromous salmonids and bass during periods of high flow and that the boulders may improve upstream access to Skelton's fish passage facilities by preventing fish fallback during high flows.

We agree with Interior's analysis and CMP's proposed habitat improvements. Placing the boulder clusters in the Skelton tailwaters would significantly improve holding lies for salmonids and would likely improve upstream fish passage efficiency. Both of these anticipated enhancements would contribute to minimizing any continuing impacts of the project and would have a cumulative beneficial effect on anadromous salmonids in the basin.

Impoundment levels. CMP proposes to continue operating the project in a peaking mode but to limit fluctuations of the impoundment to 2.5 feet. Currently, typical daily drawdowns are 1.5 feet with occasional 2 foot drawdowns. There are no current restrictions on the total drawdown.

As discussed in section 4.2.1.1.2, fluctuating impoundment levels can impact reservoir fisheries. At Skelton, Acres (1990b) reported no fish stranding or stranding pools with a 2 foot drawdown. Thus, Acres (1990b) concluded that a typical 2 foot drawdown does not significantly impact Skelton's fisheries (*for further discussion of the areas affected by reservoir fluctuations see section 3.3.2.2 and 3.3.2.3*).

Based on the 1989 field study, we find that CMP's proposed fluctuations in water elevations would not significantly affect fishery resources in the Skelton impoundment. While CMP's proposed 2.5 foot drawdown limit would provide an added restriction to the current maximum drawdown, CMP now rarely draws the impoundment below this limit. Thus, the proposed 2.5 foot drawdown limit would provide little overall enhancement to

existing impoundment fisheries. A further evaluation of impoundment water levels and drawdowns is provided in sections 4.2.1.2.3, and 4.2.2.2.2, and 4.2.2.2.3.

Fisheries resources summary

With CMP's proposals, the continued operation of Skelton would lessen adverse impacts to existing fish resources of the Saco River. With CMP's proposed enhancements, however, both anadromous and resident fish would experience improved habitat conditions. CMP's proposal to provide upstream and downstream fish passage facilities would significantly improve fish passage at the Skelton dam. Downstream migrating fish would be provided safe passage through the Skelton hydro station and upstream migrating Atlantic salmon, American shad, and alewives would be provided with a state-of-the-art fish lift and trap-and-truck facilities.

Combined with CMP's proposed seasonal minimum flows of 400 cfs and 250 cfs and the proposed channel habitat alterations and enhancements, anadromous fish would be provided with an improved migratory pathway. These enhancements would contribute to minimizing any continued impacts of the project and would have a cumulative beneficial effect on anadromous fish in the Saco River Basin. Furthermore, any contributions of Skelton to cumulative effects on anadromous fish passage mortality would be significantly reduced. For resident trout, the availability of resident trout habitat at Skelton would be increased in the critical summer months with implementation of CMP's minimum flows and habitat enhancements.

4.2.1.2.3 Vegetation and wildlife resources

CMP's proposed operation for Skelton with a 400 cfs minimum flow from May 1 through October 31 and 250 cfs from November 1 through April 30 would result in a modified peaking mode of operation. Basically, the project would operate in a peaking mode as it currently does, with a daily drawdown of typically 2 feet to a maximum of 2.5 feet. CMP proposes to limit the reservoir drawdown to 2.5 feet. However, the reservoir drawdown may have to be modified from current conditions, particularly during periods of lower instream flows during the May through October 400-cfs minimum-flow-release period. For example, there would likely be times during certain low-flow events when the reservoir drawdown level may have to be reduced from current conditions to allow for daily refill and the 400 cfs minimum flow release. In fact, the project may have to operate in a run-of-river mode on some occasions to maintain the 400-cfs release. No change in reservoir operation is expected from November through April, when the 250-cfs minimum flow release would occur.

The following discussion on vegetation and wildlife resources is devoted to operation under a 400 cfs minimum flow. The greatest potential for impacts occurs under this flow release, which basically would occur during the majority of the wetland growing season (i.e.,

June through September). The 250 cfs flow release would occur generally during the wetland dormant season (i.e., from October through May).

Upland vegetation and wildlife resources. The continued operation of Skelton as proposed by CMP would have no effect on upland vegetation and associated wildlife species.

Wetlands vegetation and wildlife resources. The CMP reservoir management study (Acres, 1990b) indicated that little wetland vegetation was exposed as a result of a 2.0-foot reservoir drawdown. Of the estimated 12.2 acres of total substrate exposed, less than one acre (0.1) supported any vegetation, which was a mixture of submergent and emergent vegetation. Since proposed operation of the reservoir is about the same with the 400-cfs minimum flow release, little or no effect on the 4.4 acres of submerged aquatic vegetation and a 0.6 acre wet meadow of the reservoir is expected. In turn, little or no effect on reservoir dependent wildlife is expected.

The maintenance of an 400 cfs minimum flow from May through October in the Saco River downstream of the Skelton dam rather than the current minimum leakage flow of 20 cfs is expected to have a beneficial effect on the existing wetlands and possibly result in the development of additional wetlands. Since water would be available to the downstream 6 acres of SAV and 10.6 acre shrub-scrub wetland within the project area on a regular basis rather than the present intermittent basis, this may encourage expansion of these wetlands. The availability of water further up the river bank on a regular basis could encourage the establishment of new wetlands such as the wet meadow or shrub-scrub types. However, the peak daily discharges of up to 3,600 cfs may limit or preclude any wetland development, primarily because of the scouring effect produced by such flows.

Increased minimum flows from Skelton could also provide hydrologic conditions suitable for the development for new wetlands below Cataract including the estuary. Cataract currently includes conditions to release 851 cfs or inflow whichever is less; therefore, CMP's increased minimum flow proposal at Skelton would provide more continuous flow conditions and possibly enhance wetland development below Cataract.

We conclude that the effect of a 400-cfs minimum flow release from May through October on wetlands and associated wildlife in the free-flowing section of the Saco River below Skelton is likely to be beneficial.

Vegetation and wildlife resources summary

CMP's proposal to maintain the operation of the Skelton reservoir with a drawdown of typically 2 feet with a maximum of 2.5 feet would maintain the current 5 acres of reservoir wetlands and the wildlife resources associated with these wetlands. The 400 cfs minimum flow release from May through October has the potential to enhance the existing wetlands and associated wildlife resources downstream along the Saco River. Such a minimum flow may also provide suitable hydrologic conditions for the establishment of additional wetlands

resulting in a cumulative beneficial effect on wetlands and associated wildlife along the mainstem Saco River.

4.2.1.2.4 Recreation resources

CMP's proposed recreation measures for Skelton are based on the needs identified in their comprehensive recreation plan (CMP, 1989). CMP proposes to continue maintaining their existing recreational facilities at Skelton and the only recreational enhancement that is currently proposed is an interpretive sign at Skelton's powerhouse. Plans to develop the interpretive sign at the powerhouse are scheduled for 1996, and CMP would design the sign after consulting the local historical society. CMP estimates the cost to maintain the Skelton recreation facilities at about $8,000 annually and the cost to develop the interpretive sign at about $4,000.

While Interior recommended that CMP improve the canoe portage at Skelton to allow users to pass near or over the dam, CMP has recently incorporated these improvements at Skelton (*for further discussion see section 3.3.2.4*).

Anticipating the future recreational needs at Skelton, CMP proposes to monitor the potential need for several recreation improvements. Due to social behavior problems (late night rowdiness) at the recreation facilities near the dam, CMP proposes to monitor the need for a gate restricting access to this area from dusk to dawn. CMP is also investigating the need for tailrace fishing facilities (i.e., sanitation facilities, etc.). Finally, CMP proposes to conduct a feasibility study scheduled for 1996 to investigate the need for primitive campsites on an island at the north end of the Skelton impoundment. CMP estimated the cost to conduct the campsite feasibility study at about $3,000.

Minimum Flow Effects on Angling. CMP's instream flow study (Acres, 1989) indicated that the WUA for wade fishing at Skelton's tailrace was greatest at a flow of 500 cfs and gradually reduces as flows exceed 500 cfs.[15] CMP's proposed 400 cfs minimum flow in the tailrace between May 1 and October 31 would provide conditions near the optimum wade fishing WUA. Average instream flows at Skelton during the summer typically exceed the optimum wade fishing flow. Therefore, tailrace flows would generally exceed the optimum wade fishing flow under the proposed operation (*for further discussion on project operation see section 4.2.1.2.1*).

[15] Criteria standards that were considered suitable for wade fishing include velocities less than 3 fps and depths between 0.5 and 4 feet.

The WUA for non-power boat fishing is most suitable at flows between 1,000 and 2,000 cfs (Acres, 1989).[16] Under the current peaking operation, tailrace flows in the summer months are limited to leakage when CMP is refilling the impoundment water-level during non-peaking hours. CMP's proposed minimum flow would likely benefit non-power boat fishing by providing a minimum flow of 400 cfs to the tailrace. Although CMP's proposed minimum flow is not within the optimum flow range, their proposed minimum flows would improve the existing non-power boating conditions.

Recreation Monitoring Studies. Every six years CMP proposes to submit copies of the Commission's Form 80 recreational use assessment to the appropriate resource agencies. CMP would initiate consultation with the agencies through this process to facilitate a review of Skelton's recreation facilities. Based on the review, CMP would determine if the above mentioned additional facilities are needed to meet recreational demand.

Interior indicated that CMP's proposed recreation measures for Skelton adequately address public access related needs, and agrees with CMP's proposal to periodically review the adequacy of Skelton's recreation facilities.[17] Interior recommends that CMP periodically conduct the recreational monitoring studies at Skelton in consultation with the USFWS, NPS, ASRSC, MDMR, MDIFW, and MDOC. Interior further recommends that recreation monitoring studies include: (1) annual recreation use data; (2) a discussion of the adequacy of CMP's recreation facilities; (3) a discussion of the need for additional recreation facilities at Skelton; (4) any recreation plans proposed by CMP to accommodate or control visitation in the project area; and (5) agency consulting documentation and comments on the report.

We agree with CMP's and Interior's measures to monitor the demand and need for future recreation facilities at Skelton. Monitoring studies are particularly important at Skelton due to the anadromous fishery restoration process, potential increases in canoe touring along the lower Saco River, and Skelton's close proximity to growing population centers.

Recreation monitoring studies at Skelton would ensure the adequacy of recreation opportunities at the project throughout the term of the license. Specifically, the monitoring studies would provide an opportunity to evaluate the future need to gate-off the project recreation facilities after dusk, provide additional tailrace fishing facilities, and the need for primitive campsites to enhance canoe touring.

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[16] Criteria standards that were considered suitable for non-power boat fishing include velocities less than 4 fps and depths greater than 0.5 feet.

[17] CMP's proposal to conduct the recreation monitoring studies every six years coincides with the Commission's Form 80 recreation use assessment process. While Interior recommends conducting the monitoring studies every 5 years, Interior agreed to conducting the studies according to the Commission's Form 80 process provided that the fish and wildlife agencies are consulted.

Recreation Management. AMC, in a letter filed April 15, 1994, made no specific recreation recommendations for Skelton, but requested that we address several recreation issues that apply to Skelton. These issues included the long-term protection and maintenance of the canoe portage at Skelton and alternatives in addressing recreational management problems at their recreation facilities.

We agree that CMP should ensure the ongoing protection of the canoe portage facility. CMP's measures to relocate the canoe portage around the dam has enhanced canoe touring along the lower Saco River (*for further discussion see section 3.3.2.4*). CMP proposes to continue maintaining this facility, and relicensing Skelton would ensure the long-term protection and maintenance of the canoe portage as suggested by AMC.

AMC indicates that they are aware of CMP's efforts to control undesirable social behavior at CMP's recreation facilities along the Saco River. AMC suggests that CMP consider management alternatives (i.e., enforcement personnel and educating the public regarding river safety) to control disruptive behaviors without restricting public access.

CMP is currently proposing to monitor the need to gate-off the recreation facilities near the dam during the evening in order to deter social behavioral problems. Prohibiting vehicular access would not necessarily prevent evening angling opportunities at Skelton. Anglers could still walk-in to the tailrace and impoundment, while enabling CMP personnel and local enforcement to monitor use at the gated entrance.

We agree with CMP's proposal to consult with the resource agencies and determine the need to restrict vehicular access to the facilities near the Skelton dam. CMP's proposed actions to study the need for gates at the access road would adequately address AMC's management concerns at Skelton. CMP's periodic recreation monitoring studies would also afford the opportunity to investigate the need for additional recreation management measures.

Recreation resources summary

We conclude that CMP's recent recreation improvements and proposed interpretive sign adequately address the current recreation needs at Skelton. CMP's recent measures to upgrade the boat launches above and below the dam have significantly improved fishing and boating access at Skelton (*for further discussion see section 3.3.2.4*). Relocating the canoe portage around the dam has also enhanced canoe touring along the lower Saco River.

The proposed tailrace channel enhancements and fish passage facilities designed to provide additional fish habitat and restore the anadromous fishery would result in a cumulative beneficial effect on recreational angling opportunities at Skelton and within the Saco River Basin (*see fisheries resources, section 4.2.1.2.2*). CMP's proposed minimum flows to the tailrace would enhance fishing opportunities by providing some additional conditions for non-power boat fishing. Finally, recreation monitoring studies at Skelton, as proposed by

CMP and recommended by Interior, would ensure the adequacy of recreation opportunities at the project throughout the term of the license.

4.2.1.2.5 Geology and soils

The cultural resource survey conducted at Skelton indicated that shoreline erosion, bank undercutting, and slumping trees occur in isolated areas along the impoundment shoreline (Paquin, *et al.*, 1990). These effects on geological resources result from recreational boating waves, wide tides (wind setup), and impoundment fluctuations. Also, periodic high flow events in the Saco River Basin occur almost annually and naturally cause shoreline erosion. During our site visit, the staff did not notice any significant erosion occurring along the Skelton impoundment.

Shoreline erosion, bank undercutting, and slumping trees would continue to occur along the impoundment shoreline under CMP's proposed operation. CMP's proposal to limit Skelton's impoundment drawdowns to 2.5 feet below normal full pond elevation of 127.5 feet (local datum) would help protect the impoundment shoreline from excessive erosion resulting from water-level fluctuations. CMP proposes no land-disturbing or land-clearing activities that would affect the geological resources at Skelton.

We conclude that continued project operation at Skelton would result in minor, insignificant effects on the geological resources. Shorelands along the impoundment are primarily undeveloped and vegetation extending to the water's edge naturally protects the shoreland from erosion. Localized erosion resulting from flooding, recreational boating wakes, and wide tides (wind setup) would continue at isolated sites along Skelton's impoundment regardless of altering project operation and impoundment fluctuation.

4.2.1.2.6 Aesthetic resources

CMP proposes no land-disturbing or land-clearing activities that would affect the aesthetic resources at the project. CMP's proposed project operation would expose areas along the shoreline in the drawdown zone. The dewatered zone exposed during CMP's proposed project operation averages about 5 feet in width and the total amount of substrate exposed during the drawdown is about 12.2 acres. The drawdown zone represents only 2.5 percent of the 488 acre impoundment and almost 5 acres of the exposed substrate consists of gravel, cobbles, boulders, and bedrock (Acres, 1990).

We conclude that the 2.5-foot drawdowns at Skelton are not a aesthetic concern because the steeply sloped banks along most of the impoundment minimizes the exposed shoreline areas.

4.2.1.2.7 Archeological and Historic resources

Continued operation of the project and recreational activities along the impoundment could adversely affect the four archaeological sites at Skelton which are eligible for inclusion in the National Register. Adverse effects to archaeological sites could also occur if CMP develops primitive campsites on the island at the north end of Skelton's impoundment (*see recreation resources section 4.2.1.2.4*).[18] To protect the four archaeological sites at Skelton, the SHPO recommends long-term conservation easements and site monitoring, an erosion control structure, and posting (letter from Earle G. Shettleworth, Jr., State Historic Preservation Officer, Maine Historic Preservation Commission, Augusta, Maine, December 6, 1989).

CMP proposes to conduct appropriate archaeological work at Skelton in accordance with the Programmatic Agreement executed among the Commission, the Council, and the SHPO (Federal Energy Regulatory Commission, *et al.*, 1993). The Programmatic Agreement requires CMP to consult with the SHPO to design and implement a monitoring and data recovery plan for the four archaeological sites at Skelton. If CMP plans any future unscheduled ground-disturbing activities, the agreement also requires CMP to first conduct archaeological surveys in areas which were not previously surveyed.

We conclude that the Programmatic Agreement would adequately protect the cultural resources at Skelton. Implementing this agreement would ensure adequate protection of the four archeological sites and any unknown archaeological sites at Skelton.

4.2.1.2.8 Land use

CMP proposes no land-disturbing or land-clearing activities that would affect the existing land uses at the project.

4.2.1.2.9 Air quality

CMP's proposal for increased minimum flows and changes in the project's operation would reduce the annual energy production by about 6,111,000 kWh (6.11 GWh). The resulting loss of hydropower energy would have to be replaced with energy available from alternative sources.

As discussed in section 4.2.1.1.9, for the Maine service area, it is highly probable that the replacement energy would have to be generated by oil-fired facilities. This would result in increased consumption of fossil fuel; and the combustion of this increment of fossil fuel would result in increased production of atmospheric pollutants.

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[18] CMP's archaeological surveys at Skelton did not include the shoreland along this island (Paquin, *et al.*, 1990).

Using the approximations and the estimated generated energy reductions resulting from CMP's proposals, we estimate that 10,361 barrels of oil would be required annually to produce 6.11 GWh of oil-fired electric generation. We then calculated the amount of pollutants that would likely be released into the atmosphere from the associated energy reductions at Skelton (Table 4-6).

Table 4-6 Amounts of atmospheric pollutants that would be annually produced by generating 6.11 GWh and 96.9 GWh of electric power using oil-fired generation (Source: the Staff).

Pollutant	Amount produced by 10,361 bbl	Amount produced by 164,284 bbl
Oxides of sulfur	20.5 tons	324.6 tons
Oxides of nitrogen	16.0 tons	254 tons
Carbon monoxide	1.1 tons	17.4 tons
Carbon dioxide	5,439 tons	86,251 tons

Continued operation of the project, however, would keep additional pollutants from being released into the air. Table 4-6 also shows the pollutants that would be released to the air annually if the project's estimated 96.9 GWh of electric power were generated by a oil-fired plant (164,284 barrels of oil annually). These pollutants would adversely affect air quality in Maine and New England, although not necessarily in the immediate project area.

We further estimate that using a removal cost of $500 per ton, the estimated cost of removing 95 percent of oxides of sulfur, or 308 tons, would be about $154,000 annually. Using a removal cost of $385 per ton, the estimated cost of removing 60 percent of the oxides of nitrogen, or 152 tons, would be about $58,520 annually (*see section 4.2.1.1.9 for further information on pollution removal estimates methodology*).

Although pollution control technology is capable of removing some of the oxidized sulphur and nitrogen from flue gases, it can't remove carbon dioxide, which contributes to global warming. In addition to adverse effects on air quality, mining and transporting coal for a steam-fired electric facility could result in adverse impacts on aquatic, terrestrial, recreational, aesthetic, and cultural resources.

4.2.2 Modifications to the proposed projects

4.2.2.1 Bonny Eagle

In this section, we analyzed the environmental impacts associated with licensing Bonny Eagle with additional environmental enhancement measures. Proposed modifications to the proposed project operation and facilities to further protect, enhance, or mitigate adverse impacts to environmental resources and values were developed by various state and federal agencies, NGOs, and staff.

For flow related resources, we analyzed the effects of operating Bonny Eagle under four alternatives: the agencies' recommended flow scenario (*listed in section 2.3.2.1.1*), a year round run-of-river scenario, a year round minimum flow of 600 cfs, and a year round minimum flow of 800 cfs. For other resources, modifications were either resource or facility specific.

4.2.2.1.1 Water quality and quantity

Project operation and minimum flows. Interior and the Coalition recommend that Bonny Eagle be operated in the following manner:

May 1 - July 15	Run-of-river operation
July 16 - August 31	800 cfs minimum flow
September 1 - October 15	Run-of-river operation
October 16 - April 30	800 cfs minimum flow
New River Channel	100 cfs (April 1 - Sept. 30)

We interpret Interior's recommended project operations and minimum flows as primarily being for the enhancement of fisheries and aquatic habitat. However, the recommended flow scenario would also affect water quality in the Saco River.

Interior based their recommendations partly on the instream flow studies conducted by CMP and partly on the needs for sufficient fish passage and transport flows. Interior's recommendation for run-of-river operations during the early summer and the early fall are based on the need for sufficiently high flows during the peak of spring upstream migration by Atlantic salmon, American shad, and river herrings and during the peak of fall upstream Atlantic salmon migration (*for further discussion of the effects of flows on fisheries see section 4.2.2.1.2*).

While no specific data is available to quantify the effects of Interior's recommended flows on water quality, we believe that the effects would not be significantly different from those discussed in section 4.2.1.1.1 on CMP's proposal to increase the minimum project flows from leakage to 400 cfs. Based on our analysis of CMP's proposal, increasing the flows at Bonny Eagle from leakage to 800 cfs in the low flow summer months would have a

beneficial effect on water quality in the free-flowing reaches of the river below Bonny Eagle, West Buxton, and Bar Mills. Water velocities in these areas would increase and the resulting turbulence would likely increase DO levels to some extent. In the Bonny Eagle reservoir and the reservoirs downstream of Bonny Eagle, water retention times would decrease. By decreasing the "unnatural and artificial" periodicity of the flows, experienced when flows widely range from leakage to maximum generation, Saco River flows would more naturally resemble an unaltered temporal spacing of flow. Additionally, some of these benefits would be realized farther downstream at West Buxton, Bar Mills, Skelton, and Cataract resulting in cumulative beneficial effects.

The significant difference, however, between CMP's proposed flows and Interior's is flow periodicity. Interior's recommended project operation would result in year-round minimum flows from the project, while CMP's 400 cfs proposal would be from May 1 to October 31. Based on median river flows for December to April (ranging from 1,506 cfs to 2,592 cfs) and expected water temperatures, we don't anticipate that water quality at this time would be a problem.

Likewise, in the New River Channel, increasing flows from leakage to 100 cfs would also have a beneficial effect on water quality and aquatic habitat in the reach. As discussed in section 4.2.1.1 1, it is likely that DO levels and water quality would be improved, to what extent, however, is unknown.

We also agree with Interior that conditions for macroinvertebrates below the project would improve with increased minimum flows. Stress on the macroinvertebrates would decrease and community diversity and abundance would likely increase with increased minimum flows from the project. Implementation of either Interior's or CMP's minimum flow recommendation at Bonny Eagle should be adequate to create a more healthy and abundant macroinvertebrate community given the anticipated enhanced conditions.

For water quality purposes, the effects of staff's alternatives of operating the project with a year round minimum flow of either 600 cfs or 800 cfs would not be significantly different from Interior's recommended alternative.

Staff's alternative of operating the project in a run-of-river mode would also be beneficial to Saco River water quality. Run-of-river operation would minimize reservoir fluctuations and prevent fluctuations in flows downstream of the project that could reduce or alter available aquatic habitat and affect water quality. Operating Bonny Eagle in a run-of-river mode would protect aquatic resources and water quality in the project area by maintaining a constant flow regime below the project dam and by preventing the dewatering of aquatic habitat. In addition, operating in a run-of-river mode would minimize fluctuations in the impoundment's elevation, benefitting fish habitat in the impoundment. Wetlands at Bonny Eagle, however, would not benefit from a run-of-river mode of operation (*see section 4.2.2.1.3)*.

Monitoring and gaging. Interior recommends that CMP submit plans for monitoring the project operations (including run-of-river operation). Interior recommends that the plans include descriptions of all mechanisms and structures used for monitoring, the level of staffed or automatic facility operation, the methods for recording and maintaining data on project operations, and a plan for maintaining these data for inspection and for providing it to the Commission and resource agencies. Additionally, Interior recommends these plans be developed in consultation with the agencies.

We agree. Plans describing the methods for releasing minimum flows and maintaining project operation, and how flows would be maintained below the project when the impoundment is refilled after any maintenance and/or repairs would provide necessary information for the resource agencies and the Commission. Information included in the plans should be descriptions of all mechanisms and structures that would be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and providing it to the Commission and resource agencies for inspection. Plans should be required before any changes in project operation take place.

Water quality and quantity summary

Both Interior's recommended project operations and our alternative flow scenarios would enhance water quality in the Saco River over the existing baseline conditions. By operating the project in a run-of-river mode or releasing a relatively high minimum flow of 600 to 800 cfs year round, the temporal distribution of streamflow would more closely resemble the natural unaltered flow distribution. Periods of only leakage flows from the project would be eliminated. Further, flows in the New River Channel would be significantly enhanced by the implementation of a 100 cfs seasonal minimum flow. For the purposes of water quality, however, the extent of enhancements realized by either Interior's or staff's alternatives over CMP's proposals is unquantified and probably only significant in periodicity.

4.2.2.1.2 Fisheries resources

Project operation and powerhouse minimum flows. Interior and the Coalition's proposed project operation and minimum flow scenarios (*listed in section 4.2.2.1.1*) would affect the availability of fisheries habitat in the Saco River below Bonny Eagle and West Buxton, and to a lesser extent below Bar Mills. To analyze the effects of these flows, we utilized the results of the IFIM studies discussed in section 4.2.1.1.2.

IFIM Results and Habitat Duration

For Interior's recommendation of an 800 cfs minimum flow from July 16 to August 31 and from October 16 to April 30, the IFIM studies generally indicated that habitat availability varied widely between species. Below Bonny Eagle, adult trout habitat at 800 cfs was shown to range from 89 percent of the maximum available WUA for brook trout to 99 percent of the maximum WUA for brown trout (Figure 4-2). Below West Buxton, trout habitat availability

at 800 cfs ranged from 45 percent of the maximum WUA for brook trout to 60 percent of the maximum WUA for rainbow trout (Figures 4-5 to 4-7). Taken together, however, brook trout habitat is nearly maximized within the two reaches at 800 cfs (Figure 4-11), while rainbow trout and brown trout habitat availability was shown to be 84 percent (Figure 4-12) and 93 percent (Figure 4-13) of the maximum WUA, respectively.

For American shad, Interior's recommended 800 cfs minimum flow generally results in excellent habitat availability at Bonny Eagle, with the exception of spawning habitat, and poor habitat availability at West Buxton. Inmigration, larval/juvenile, and outmigration (including alewife) habitat availability were all near 100 percent at Bonny Eagle (Figure 4-3). Below West Buxton, however, habitat availability for all life stages remained poor (less than 10 percent) (Figures 4-8 and 4-9). Overall, the effects of an 800 cfs flow on the two reaches results in a composite WUA curve indicating that 51 percent of inmigrating, 44 percent of spawning, 56 percent of larval/juvenile, and 54 percent of outmigrating maximum WUA is available (Figures 4-14 and 4-15).

Atlantic salmon inmigrating habitat would remain relatively low at both Bonny Eagle and West Buxton as about 38 and 32 percent of the maximum WUA would be available at 800 cfs (Figures 4-4 and 4-10). Composite results showed similar habitat availability (Figure 4-16).

While the above habitat availability results indicate that significant enhancements over the existing conditions would occur with the implementation of Interior's 800 cfs minimum flow recommendation, Interior also recommends run-of-river operations from May 1 to July 15 and from September 1 to October 15. Interior states that run-of-river operation would ensure relatively natural flows during the peak of the spring upstream migration by Atlantic salmon, American shad, and river herring and the peak of the fall upstream Atlantic salmon migration while also providing sufficiently high flows to protect habitat. Furthermore, Interior states that CMP's flow proposal fails to consider the implications of seasonally reduced flows below West Buxton and Cataract which would severely undermine habitat protection efforts already established for the lower Saco River and estuary.

To analyze the effects of operating Bonny Eagle as run-of-river during these two time periods, CMP conducted habitat duration analysis (*a more complete discussion of the study methodology and analysis is contained in section 4.2.1.1.2*). Overall, results of habitat duration analysis indicate that Interior's flow recommendations would generally result in improved habitat duration compared to the existing project operation, CMP's proposed operation, and staff's alternatives of a year round minimum flow of 600 cfs and 800 cfs.

Below West Buxton in a typical May, habitat duration results indicate that no change in the existing habitat exceedence curves for adult trout would be expected under any of the flow scenarios analyzed, including run-of-river (Table 4-7) (CMP, 1992n). Given the median monthly Saco River flow in May is above 5,600 cfs and the hydraulic capacity of Bonny Eagle is about 5,000 cfs, we would expect, as the results indicated, that minimum flow and

project operation would have little effect on the overall availability and duration of habitat. In June and July, however, the median flow decreases to about 2,400 cfs and 1,200 cfs, respectively. While we do not believe resident trout habitat would be significantly affected (with the implementation of an adequate minimum flow during this time period), migrating anadromous fish habitat could be affected by significantly reduced flows resulting from peaking operations. Although zone-of-passage studies indicated an adequate zone-of-passage would be present below both West Buxton and Bar Mills with a minimum flow as low as 400 cfs from Bonny Eagle, habitat availability for inmigrating shad and river herring would be extremely poor (less than 10 percent). Thus, we agree with Interior that during this time period run-of-river operation, or a higher minimum flow than CMP's proposed 400 cfs, could be necessary to ensure adequate instream flows for migrating anadromous fish.

Habitat duration results for October were similar to those found in May in that very little change in the existing habitat exceedence curves for adult trout would be expected under any of the flow scenarios analyzed (Table 4-7) (CMP, 1992n). The only significant difference between CMP's proposal and Interior's recommendation would be an increase in the habitat availability under extreme flow conditions (90 percent exceedence) under Interior's recommendation (from about 40 percent to above 60 percent of the maximum WUA). Adult trout habitat availability under median flow conditions would remain virtually identical under both CMP's proposal and Interior's flow recommendation. Since the median October flow is about 1,100 cfs, we would expect resident trout habitat to not be significantly affected. The higher habitat availability seen under extreme flow conditions with Interior's recommendation is a result of CMP's proposed minimum flow and peaking operation. With an 800 cfs flow from Bonny Eagle, median habitat conditions would be slightly lower but extreme habitat availability would be increased. Anadromous fish habitat during this time period would remain poor due to the relatively low minimum flow.

Currently, upstream migrating anadromous fish do not have access to the West Buxton tailwaters. However, we agree with Interior that flows from Bonny Eagle establish, to a large extent, habitat conditions in the entire lower Saco River and estuary. Furthermore, with the provisions contained in the Agreement, anadromous fish would, conceptually at least, have future access to the project areas at West Buxton and Bonny Eagle.

Table 4-7 Percent of maximum weighted usable area (WUA) at West Buxton under median (50 % exceedence) and extreme (90 % exceedence) conditions for CMP and Interior's proposed Bonny Eagle operations (Source: CMP, 1992n).

	CMP's		Interior's	
Species/Month	50%	90%	50%	90%
Brook Trout				
May	66	66	66	66
August	43	43	51	46
October	85	43	86	63
January	86	27	91	57
Brown Trout				
May	99	99	99	99
August	40	40	54	42
October	84	40	84	63
January	92	20	92	93

Thus, during anadromous fish migration periods in the late spring/early summer and the early fall, run-of-river operations would have the most beneficial effect on the Saco River's fisheries. Implementation of a higher minimum flow than CMP's 400 cfs, however, would have a similar beneficial effect.

The effects of Interior's recommended 800 cfs minimum flow during all other periods of the year would vary seasonally. During the critical summer months (using August as a typical month), adult trout habitat duration would not be significantly different between Interior's recommendation and CMP's proposal (Table 4-7). Habitat availability would be slightly higher under Interior's recommended 800 cfs minimum flow during median conditions. Both flow scenarios, however, would result in significant enhancements over the existing habitat duration, especially during extreme flow conditions. Staff's alternatives of year round minimum flows of 600 cfs and 800 cfs, as well as run-of-river operation, yielded similar results to Interior's recommendation.

In the winter (using January as a typical month), differences in adult trout habitat duration between CMP's and Interior's scenarios would not be significantly different for median conditions. Under extreme conditions (90 percent exceedence), however, Interior's recommendation would result in a three-fold increase over CMP's proposal (Table 4-7). Neither staff alternative would be as beneficial as Interior's.

Fishery Management Objectives and Flows

Agencies' management objectives for the Saco River in the Bonny Eagle and West Buxton area are to manage the reach as a migratory pathway for anadromous fish, to increase the recreational utilization of all warmwater sport fish, to establish recreational sport fisheries for trout and salmon, and to manage for the sustained production of trout, salmon, shad, alewives, and eels consistent with the habitat capabilities (USFWS *et al.*, 1987). Based on our analysis, each of these objectives would be significantly enhanced by implementation of CMP's proposal, Interior's recommended flows, or staff's alternatives. However, as we discuss in section 4.2.1.1.2-and above, differences in the availability of fish habitat exist between the various flow scenarios. To further analyze the total effects of the flows, we also looked at how the various flow scenarios would affect the agencies' management objectives.

We have already discussed the importance of adequate instream flows during anadromous fish migration periods (*see above discussion*). We believe that given the importance placed on the restoration of anadromous fisheries in the basin (i.e., the Agreement), flows for anadromous fish should be given priority. While CMP's proposal would meet minimum zone-of-passage requirements, implementation of Interior's run-of-river recommendation or a higher minimum flow during this time would fully accomplish the agencies' objective of managing the reaches below West Buxton and Bar Mills as migratory pathways.

The agencies' objective of increasing the recreational utilization of warmwater sport fish and establishing recreational sport fisheries for salmonids would be significantly enhanced in two ways. First, with implementation of a minimum flow (either 50 cfs or 100 cfs) in the New River Channel, a seasonal sport fishery for both salmonids and warmwater species (smallmouth bass) would be established (*for further discussion on flows in the New River Channel see next section*). Second, IFIM results show that any implementation of a minimum flow from Bonny Eagle would enhance the existing fish habitat below Bonny Eagle and West Buxton. Thus, we believe increased flows would most likely result in enhanced sport fisheries below Bonny Eagle, West Buxton, and Bar Mills.

Attainment of agency habitat objectives and sustained production objectives, however, varies between species and is directly related to both the amount and capabilities of the available habitat. As discussed in sections 3.2.1 and 3.3.2.2, Atlantic salmon available spawning habitat is extremely limited in the project area at Bonny Eagle and West Buxton and represents only about 3 percent of the available salmon spawning habitat in the entire Saco River basin. In excess of 90 percent of the available salmon spawning habitat in the basin lies above Bonny Eagle. Thus, we find that adequate flows for Atlantic salmon migration would be of higher priority than flows for salmon spawning habitat.

While migration is also a management concern for American shad and alewife, areas of suitable potential habitat are present in the Bonny Eagle area. Primarily, spawning shad would be expected to utilize the flowing water reaches below Bonny Eagle (CMP, 1991). Overall, the potential habitat available within the 7.5-mile-long reach of river from the confluence with the Little Ossipee River downstream to the West Buxton dam was estimated to have the potential to produce 1.4 to 2.2 million juvenile shad and about 44,000 to 89,000 adult alewife (USFWS *et al.*, 1987). Currently, however, proposed plans for the upstream movement of these fish would be accomplished via trap/truck operations from either Skelton or Cataract. Thus, while upstream migration of these species through the West Buxton and Bonny Eagle tailwater areas would not be an immediate management concern, adequate flows for downstream migration would be necessary. Generally, MDMR (1982) indicates that juvenile American shad and alewife downstream migration takes place from July to December, with spawning taking place from May to July.

CMP (1991) states that, even under optimum (WUA maximizing) flow conditions, only 580,000 ft^2 of shad spawning habitat would be available in the two IFIM study reaches (Figure 4-14). Further, CMP states that this amounts to only 3.1 percent of MDMR's estimated shad spawning habitat between the Bar Mills and Bonny Eagle dams (18,500,000 ft^2). Thus, CMP (1991) concludes that optimization of shad spawning habitat should not be a major concern in determining an appropriate minimum flow for Bonny Eagle.

We agree that, based on MDMR's habitat assessment, habitat within the actual tailwater reaches is probably not a major portion of the potential spawning and juvenile habitat in the area. However, since anadromous fish upstream migration periods and shad and alewife spawning periods generally overlap (May to July), if flows were to be provided

primarily for the major migration period, it would be appropriate to include a small percentage of additional time or flows for adequate spawning and incubation flows.

For resident trout species, habitat and the attainment of management objectives would significantly vary between species. While the entire reach between the Little Ossipee River and West Buxton dam, including the impounded portions, contains suitable habitat for brown trout, only the Bonny Eagle tailwater and the New River Channel are considered to be suitable habitat for brook trout because of temperature limitations. Overall, brook trout potential habitat consisted of 62 habitat units in the Bonny Eagle tailrace and 828 habitat units in the New River Channel while potential brown trout habitat was 6,632 units below Bonny Eagle (USFWS *et al.*, 1987).

Based on the IFIM results, there is about 320,000 ft^2 of habitat available in the two study reaches combined (under WUA maximizing flow conditions for each reach) (Figure 4-13). CMP (1991) states that this habitat represents about 2.5 percent of the 6,632 potential habitat units. Thus, for brown trout, CMP (1991) states that given the abundance of brown trout habitat available throughout this stretch of the Saco River, minimum flow requirements from Bonny Eagle for optimization of brown trout habitat seems unnecessary.

Habitat for brook trout and rainbow trout, however, is much more limited, and the Bonny Eagle and West Buxton tailwaters represent significant portions of the total available habitat. CMP (1991) notes, however, that factors other than flow conditions, most notably temperature, could be limiting to both brook trout and rainbow trout in this stretch of the Saco River. Water quality data collected at the USGS gage at Cornish indicate summer water temperatures regularly exceeding 20°C, and often exceeding 25°C. CMP further cites literature reporting that brook trout do poorly in waters exceeding 20°C, and that temperatures of greater than 25°C are lethal. Similarly, CMP states that while rainbow trout are considered to have somewhat greater tolerance for warm water temperatures than brook trout, the optimum stream temperatures for adult rainbow trout ranges between 12 and 20°C, and literature indicates that impairment of growth occurs at a temperature of 23°C with 25°C being lethal. Thus, CMP (1991) concludes that the Bonny Eagle and West Buxton study reaches may represent poor brook trout and rainbow trout habitat, regardless of flow conditions.

Our review of available temperature literature basically supports CMP's assertions. Raleigh (1982) reports that the upper temperature limits for adult brook trout varies; probably reflecting local and regional population acclimation differences. However, based on a large number of sources, Raleigh (1982) lists the temperature range for brook trout at 0 to 24°C, with an optimal growth and survival range of 11 to 16°C. For rainbow trout, Raleigh *et al.* (1984) lists the temperature range for rainbow trout at 0 to 25°C, with an optimal range of 12 to 18°C.

We agree with CMP that temperature could be an important factor in establishing and maintaining resident trout habitat below Bonny Eagle. Further, the MDIFW (1990) has indicated that brook trout habitat in this reach is seasonal and temperature limited. Interior's

recommendation for flows in the New River Channel (*see section below*) are seasonal flow releases concurrent with the fishing season. Thus, given the potential temperature limitations, the low amount of brook and rainbow trout potential habitat in the tailwaters of Bonny Eagle and West Buxton, and the relatively large amount of potential habitat in the New River Channel, we find that increasing flows from Bonny Eagle solely for the enhancement of brook and rainbow trout habitat in the tailwaters would probably not be in the best interest of all resources concerned. Conversely, we find habitat enhancements for brook and rainbow trout would be better served by providing flows in the New River Channel rather than providing significantly increased minimum flows from the Bonny Eagle powerhouse (*see discussion below on New River Channel flows*).

New River Channel minimum flows and fish studies. Interior and the Coalition recommend that an instantaneous flow of 100 cfs, or inflow, whichever is less, be released from the New River Channel Dam into the New River Channel from April 1 to September 30. Interior further states that this recommended flow can be a portion of the overall required flow at Bonny Eagle.

The April to September timing of Interior's recommended flow is based on the fishing season in Maine. In their comments, Interior states that while current fishery management objectives for the reach would be met with only a seasonal flow release, additional discharges may be needed in the future if Atlantic salmon utilize the area for juvenile rearing. Current MDIFW fishery management plans propose the New River Channel to be managed as a stocked brook and rainbow trout fishery (MDIFW, 1990).

As discussed in section 4.2.1.1.2, CMP assessed aquatic habitat and flow in the reach utilizing the IFI to determine the effects of the existing and proposed minimum flows in the reach. Results of the flow assessment indicate that the optimum flow for a stocked brook and rainbow trout fishery would be 100 cfs with a slight decrease in quality at flows above 100 cfs.

The study indicated that while Interior's recommended seasonal minimum flow of 100 cfs would be optimum, the differences between 100 cfs and 50 cfs are minor. For brook trout, the habitat component (velocity, depth, percent cover, and percent pool) was rated identical at both the upper and lower reaches for 50 and 100 cfs (Acres, 1989b). For rainbow trout, the habitat component at 50 cfs was rated at 80 percent of the maximum quality.

To properly determine appropriate minimum flow enhancements in the New River Channel, several other important factors should be considered. Currently, there are no spillway gates located on the powerhouse side of Bonny Eagle Island. Since the minimum hydraulic capacity range at Bonny Eagle is about 50 to 300 cfs[19], any required minimum flow

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[19] Bonny Eagle has 2 exciters with a maximum capacity of 150 cfs each. We estimate that the minimum hydraulic capacity of the exciters is about 50 cfs each.

slightly greater than this amount would have to be passed either through a non-operating turbine or at the New River Dam. Furthermore, the tailrace at Bonny Eagle is backwatered to the base of the powerhouse from the West Buxton impoundment. Thus, given that any minimum flow would have to be passed through the project turbines at a non-operating speed, that minimum flow within the tailrace is not a significant concern (minimum flow is a concern below West Buxton), and that any minimum flow required in the New River Channel would be a part of the overall project minimum flow, we see no reason why 100 cfs could not be released into the New River Channel as easily as 50 cfs. While we realize that the differences in the habitat quality at 50 and 100 cfs are relatively insignificant, the 50 cfs higher minimum flow would be more beneficial in the New River Channel where habitat enhancement potential is greater than as a small portion of a much higher flow in the Bonny Eagle tailwaters.

Interior and the Coalition further recommend that CMP develop a plan for monitoring fish populations and the adequacy of instream flow releases in the New River Channel. We estimate that the study would cost about $4,800 annually.

We agree that CMP should conduct a monitoring study of the fish population in the New River Channel. Results of this study would be useful in determining whether or not MDIFW's fishery management objectives are being met and if any modifications to the 100 cfs flow release is warranted in order to meet any fishery management objectives.

Impoundment levels. Interior recommends that fluctuations of the Bonny Eagle impoundment be limited to 1 foot or less from May 1 to July 15 and from September 1 through iceout (about late April). Interior states that CMP's regular drawdowns may be affecting use of shallow water habitats by fish and other aquatic resources and that maintenance of a stable reservoir level would help protect sensitive shoreline habitats during critical spawning and early life history periods. The Coalition supports Interior's recommendation.

Maintaining a stable impoundment elevation from May 1 to July 15 of each year would provide protection for eggs and larvae of smallmouth bass and other aquatic resources. As discussed in section 4.2.1.1.2, smallmouth bass are spring spawners and fluctuation of water elevations can lead to lowered nest success. Fluctuating water levels can also impact aquatic invertebrates by stranding and reductions in habitat that subject them to desiccation and predation from terrestrial predators. At Bonny Eagle, Acres (1990) reported stranding of fish and concluded that a typical 4 foot drawdown could be adversely affecting backwater nursery areas.

We agree with Interior that a May 1 to July 15 impoundment fluctuation limit of 1 foot would result in a significant beneficial effect on Bonny Eagle's fishery resources. Limiting reservoir fluctuations during this time period would improve habitat conditions for smallmouth bass and other centrarchids and enhance aquatic invertebrate habitat. Interior's recommendation for limiting the impoundment fluctuation from September 1 through iceout is

based on concerns for wetlands and wildlife and is further evaluated and discussed in section 4.2.2.1.3.

Fisheries resources summary

Interior and the Coalitions's recommended minimum flows and project operations would significantly enhance the existing and anticipated fisheries both in the immediate Bonny Eagle area and in the Saco River downstream of the project. Significantly improved zone-of-passage would be provided below West Buxton and Bar Mills during the peak migration periods for migrating Atlantic salmon, American shad, and alewives and during the spawning and larval/juvenile periods for shad and alewives with the implementation of either run-of-river operations or a higher minimum flow than CMP's proposed 400 cfs. In the New River Channel, Interior's recommended 100 cfs flow would provide significantly enhanced fisheries habitat for a seasonal trout fishery and increased recreational opportunities.

Overall, agencies' management objectives for the Saco River in the Bonny Eagle and West Buxton area would be significantly enhanced by any of the alternatives. Increased flows in the spring and summer would fully accomplish the agencies' objective of managing the reaches below West Buxton and Bar Mills as migratory pathways. The agencies' objective of increasing the recreational utilization of warmwater sport fish and establishing recreational sport fisheries for salmonids would be significantly enhanced with implementation of a minimum flow in the New River Channel. Increased minimum flows would further enable the agencies to achieve their habitat objectives and sustained production objectives for all fish species.

4.2.2.1.3 Vegetation and wildlife resources

Among Interior's recommendations for the operation of Bonny Eagle are a run-of-river mode from May 1 through July 15 and September I through October 15 and the maintenance of relatively stable reservoir levels (plus or minus 1 foot). Interior also recommends that the reservoir drawdown be limited to 1 foot from October 15 through iceout. The Coalition concurs with Interior's flow recommendations (*for a complete list of Interior's project operation recommendation see section 4.2.2.1.1*).

None of the agency recommended flow modifications would have an adverse effect on upland vegetation and associated wildlife species. Potential effects are restricted to the wetland areas of the Bonny Eagle reservoir and downstream Saco River.

Reservoir levels. Run-of-river operation would maintain the project reservoir at full pool. Interior believes that the full-pool operation from May 1 through July 15 would benefit nesting waterfowl and loons. Further, Interior believes that eliminating the drawdown zone in the reservoir would benefit non-mobile invertebrates and other organisms.

CMP disagrees with Interior's alternative for project operation based on the results of past wetland studies. CMP states that Interior provides no support for its recommendations and disregards the results of CMP's wetland studies.

As discussed in Section 4.2.1.1.3, the Eco-Analysts study showed that wetlands on Bonny Eagle reservoir were high in wildlife diversity/abundance and aquatic diversity/abundance. Earlier studies by Normandeau Associates showed a number of waterfowl species and broods of mallards and hooded mergansers present on the reservoir.

The Eco-Analysts (1993c) study predicted that operating the project in a year-round run-of-river mode would result in a minimum loss of 15 percent or about 52 acres of the existing wetlands. We believe that operating Bonny Eagle in a run-of-river mode and the reservoir at full pool for the period May 1 through July 15 and September 1 through October 15, a major portion of the wetland's growing season, would cause a similar loss of wetlands.

Alternatively, operating the project with a year-round minimum flow release of either 600 cfs or 800 cfs would still allow CMP to operate in a peaking mode, although modified from the current peaking operation. The Bonny Eagle reservoir would still be drawn down in a similar manner as current operations, which would maintain the existing reservoir wetlands.

In conclusion, we believe that operating the project as recommended by Interior would likely have a beneficial effect on habitat components of nesting waterfowl, possibly loons, and on invertebrates and other organisms that occur in the reservoir drawdown zone. Any such benefits, however, would be offset by the potential loss of 52 acres of reservoir wetlands. We, therefore, conclude that CMP's current and proposed operation of Bonny Eagle would maintain the existing reservoir wetlands as shown in past CMP studies. However, run-of-river operation from May 1 through July 15 and from September 1 through October 15 as recommended by Interior would benefit numerous resources with the exception of wetlands. Also, peaking operation with a minimum flow release of either 600 or 800 cfs and a similar reservoir drawdown (as currently exists) would maintain the existing reservoir wetlands.

Fall and winter reservoir drawdown limit. Interior's recommendation to limit drawdowns in the Bonny Eagle reservoir to no more than 1 foot during the period October through iceout is intended to protect overwintering furbearers and other wildlife. Interior, however, did not explain the need to provide protection for these species.

We do not believe that reservoir fluctuations have had a significant adverse effect on overwintering furbearers and other wildlife. The Eco-Analysts (1993c) study documented furbearer and other wildlife use on the reservoir, and rates the reservoir wetlands as high value for wildlife diversity/abundance. Basically, furbearers (e.g., beaver and muskrat) have established on the reservoir with a daily 2 to 4 feet water level fluctuation. This condition has apparently not precluded the presence of viable populations on the reservoir.

Value of wetlands plants as wildlife food. USFWS, in its April 13, 1994 letter, stated that the wetlands assessment should examine the effects of impoundment drawdowns on vegetative diversity and density, and should evaluate the value of plant types as wildlife food. The USFWS cites studies conducted at other hydroelectric projects in Maine (e.g., the Penobscot Mills Project, FERC No. 2458) where it was found that reservoir drawdowns have created relatively monotypic stands of wetland vegetation containing few plant species considered to be valuable as wildlife food.

Eco-Analysts, Inc. (1993c) found that the wetlands at Bonny Eagle were highly valued for wildlife diversity/abundance, and aquatic diversity/abundance of both invertebrates and fish was high in the reservoir wetlands due to the abundance of habitats and diversity of plant forms providing food and cover. These wetlands are clearly not comprised of monotypic stands of wetland vegetation containing few plant species considered to be valuable as wildlife food as USFWS notes for the Penobscot Mills Project.

A general comparison of Bonny Eagle with the Penobscot Mills Project reservoirs (i.e., North Twin Impoundment and Millinocket Lake), shows that six different wetlands occur at Bonny Eagle while three types occur at the Penobscot Mills, with wet meadow being a common component of each Penobscot Mills wetland type. One basic explanation of the apparent difference in wetland types between the two projects relates to water level fluctuation differences. The Bonny Eagle reservoir levels fluctuate from 2 to 4 feet on a daily basis, while the reservoir levels for the Penobscot Mills impoundments vary on a weekly and monthly basis. For example, on the Penobscot Mills' North Twin Impoundment, water levels rise about 5.5 feet from the beginning of the growing season in May to late June and then drop about 2.5 feet from June to the end of September, the end of the growing season (Great Northern Nekoosa Corporation, 1991). The wetlands at Bonny Eagle have established with almost the same daily water levels (± 2 feet) for the entire growing season, while the wetlands on the North Twin Impoundment have established under a different weekly and monthly water level over a 5.5-foot range on weekly-monthly basis for the entire growing season. Therefore, the different hydrologic conditions at the two projects may explain the apparent differences in wetlands diversity between the two.

We conclude that the current hydrologic conditions on the Bonny Eagle reservoir are responsible for the abundance of habitats and diversity of plant forms providing food and cover to support the high wildlife and aquatic diversity and abundance.

Wetlands enhancement. Interior states that wetlands enhancement measures are warranted, and should be required along with buffer strips and conservation easements. The AMC, in a letter filed April 15, 1994, notes that the Saco River EIS should examine the expansion of project boundaries and incorporate adjacent CMP properties within project boundaries on all of its reservoirs. Further, AMC states that CMP should be required to place conservation easements on these properties.

Because of a Commission additional information request for a description of wetland areas that could be enhanced at Bonny Eagle, CMP arranged for appropriate wetland investigations. Eco-Analysts (1993c) investigated various wetland enhancement opportunities as part of its Bonny Eagle wetlands studies. Eco-Analysts identified seven sites where creation of a buffer zone to existing agricultural practices and restoration of vegetation in wetlands and riparian upland would enhance the functions of wildlife habitat, sediment and toxicant retention, and nutrient transformation. All seven sites were areas which had experienced degradation from non-project related agricultural and forestry activities. The sites were prioritized according to severity of degradation and CMP identified three of these sites where restoration of riparian habitat would be appropriate enhancement measures within the project area.

Two of the sites are essentially one grazing area for dairy cattle, totaling 13.5 acres. At the first site, cows wade into the drawdown zones, causing erosion and sediment suspension. Excessive nutrients from manure, as well as from exposed soil particles, are directly entering the impoundment. All the understory vegetation has been killed and only a few trees and overgrazed grasses remain, which makes the banks more susceptible to erosion, especially during spring flooding. The second site is similar to the first, both in character and in types of activity. It is considered less impacting since the pasture is well into a backwater area and therefore nutrients and sediment are trapped to some degree within the wetland drawdown zone and aquatic bed zones. The third site, a 1.5-acre area, is situated along a very large corn field which in some cases directly abuts the impoundment. Nutrients, soil particles, and pesticides can easily enter the impoundment from this area.

CMP's enhancement proposal at the first two sites calls for creation of a 100-foot-wide buffer along 6,600 feet of impoundment shoreline by keeping livestock away from the water via fencing and/or lease restrictions. CMP also proposes reseeding areas of disturbed and eroded shoreline, and allowing natural succession of undisturbed riparian vegetation. At the third site, CMP proposes to discontinue agricultural activity along 1,000 feet of shoreline to create a 100-foot-wide buffer between the corn field and the impoundment. Also proposed are reseeding and the allowance for natural succession, as for the first two sites.

Although CMP has not independently recommended such enhancement, it has offered this enhancement proposal if the Commission requires it. CMP does not believe that additional wetland enhancement measures should be required because of the enhancement of wetlands that has historically occurred at the project reservoir, and because of additional enhancement measures being proposed, such as minimum flow releases, archaeological site protection, and recreational facility construction.

We conclude that, although CMP's past project operations on the reservoir have brought about the development and enhancement of much of the 348 acres of reservoir wetlands, and CMP has proposed other mitigative measures, additional wetland enhancement on the three sites would have a beneficial effect on project area resources. In addition to restoring 15 acres of degraded wetlands, the wetlands enhancements would improve water

quality of the reservoir and downstream Saco River by reducing nutrient, sediment, and pesticide runoff into the reservoir; and increase the buffer strip and potentially the conservation easements which would maintain and improve the natural aesthetics of the reservoir area.

Downstream flows. Interior's flow recommendations would provide natural river flows in the Saco River below Bonny Eagle from May 1 through July 15 and September 1 through October 15, and 800 cfs from July 16 through August 31 and October 16 through April 30. These flows would likely have a beneficial effect on downstream wetlands and associated wildlife below Bonny Eagle. Since West Buxton and Bar Mills operate in a run-of-river mode, Interior's recommended flow scenario at Bonny Eagle could also benefit downstream wetlands and associated wildlife below these two projects.

Natural flows would occur below these projects during the majority of the wetland growing season (May through September), which is likely to enhance existing wetlands and possibly promote the development of additional wetlands. Any wetlands enhancement that may develop during the run-of-river periods, however, may be adversely affected by peaking releases during the remaining times of the year (i.e., July 16 to August 31 and October 16 to April 30). During the peaking periods, discharges up to 4,500 cfs may damage or remove any new wetland growth that may have developed during prior run-of-river operation periods, because of the scouring effect produced by such flows.

In comparison, operating the project in a run-of-river mode year-round would maximize the potential for downstream wetlands enhancement, but this would be at the expense of a loss of up to 52 acres of reservoir wetlands because of stabilized reservoir levels (*see discussion in section 4.2.1.1.3*).

Also, operation of the project at year-round minimum flow releases of either 800 cfs or 600 cfs would offer some potential for wetland enhancement. However, this would likely be minimized or precluded by daily peaking discharge flows of up to 4,500 cfs, primarily because of the scouring produced by such flows.

Under the four operational scenarios (i.e., mixed run-of-river/800 cfs minimum flow, year-round run-of-river, year-round 800 cfs minimum flow, and year-round 600 cfs minimum flow), no effect on the upland and associated wildlife resources would occur.

In conclusion, of the four operational scenarios, either the 800 cfs or the 600 cfs year-round minimum flow scenarios offers the greatest potential for downstream wetlands enhancement. Of the two, we conclude that the year-round 800 cfs scenario would be beneficial.

Other Project developments. In addition to the project's operational effects (discussed above), the development of recommended recreational facilities would have an effect on vegetation and wildlife resources. These include an Interior-recommended boat launch on Bonny Eagle

reservoir, and staff's picnic area alternative on Bonny Eagle Island and the redevelopment of a canoe portage (*these proposed facilities are described in section 4.2.2.1.4*). The development of these facilities would require the disturbance and removal of primarily upland understory and ground cover vegetation on a 3-acre site for the boat launch, and less than 1 acre for both the picnic area and canoe portage.

Vegetation and wildlife resources summary

Both Interior's alternative and the year-round run-of-river operational alternative would stabilize the reservoir water levels such that several wildlife benefits would accrue, but at the expense of losing about 52 acres (15 percent) of the existing wetlands. Flow releases resulting from either of these alternatives would likely have beneficial effects on downstream wetlands, but would not off-set the loss of reservoir wetlands. The year-round 600 and 800 cfs minimum flow alternatives would likely maintain the reservoir wetlands; consequently, a cumulative beneficial effect in the Saco River Basin would occur.

Interior's recommendation for a 1-foot reservoir drawdown limit from October through iceout to protect furbearers is probably not needed because furbearers are established on the reservoir under the current daily reservoir fluctuations. We disagree with Interior's concern about the reservoir fluctuations affecting vegetative diversity and density and the value as wildlife food. CMP's studies have shown that the wetlands on Bonny Eagle reservoir are highly valued for wildlife diversity/abundance.

If CMP restores 15 acres of degraded wetlands, this would not only benefit wetlands, but would also benefit the water quality of the reservoir and downstream Saco River and provide an additional buffer for the reservoir. This would contribute in a positive manner toward cumulative effects on wetlands in the Saco River Basin.

4.2.2.1.4 Recreation resources

Canoe Portage Improvements. AMC, in a letter filed April 15, 1994, stated that CMP's canoe portage at Bonny Eagle is a hazard for individuals portaging boats due to the steepness of the stairs near the put-in area. AMC suggests that a solution is needed, and further suggests the long-term protection and maintenance of the canoe portage.

CMP indicates that canoe portage trail improvements are not necessary at this time due to the limited use of the portage.
CMP did, however, examine two potential canoe portage enhancements which they would implement if demand warranted. CMP's comprehensive plan (1989) suggested constructing a trough along the stairs near the canoe put-in to enhance the canoe portage. The trough would eliminate the hazard of carrying canoes down the stairs and enable canoeist to walk the canoes down the adjacent trough.

CMP's second alternative was relocating the canoe portage trail to avoid the steep stairway. Under this alternative, CMP would construct a new canoe portage trail about 100 feet downstream of the existing trail. The new trail would include a series of wood ramps and landings gradually leading down to the put-in area.[20] CMP estimated that developing a new canoe portage trail would cost about $4,000.

CMP subsequently filed an additional canoe portage alternative at this site in their response to the DEIS (CMP, 1995). CMP's plan, which included conceptual drawings, calls for constructing gravel-filled crib stairs that cross the slope of the embankment on a long diagonal. MDOC agreed that this design is the most suitable solution for the trail's severe gradient conditions (letter from George Hannum, Hydro Coordinator, Maine Department of Conservation, Augusta, Maine, February 15, 1995).

We agree with AMC that improvements are needed at Bonny Eagle's canoe portage trail. During our site visit at Bonny Eagle we realized the potential hazards of portaging a canoe down the steep stairway leading to the canoe put-in. Although the portage is not frequently used, we conclude that improvements are needed to ensure safe portaging around the dam. The current difficulty of portaging canoes at this site is likely one of the reasons for the low use level among canoeists. Also, the popularity of canoe touring on the lower Saco River could likely increase as canoeists are displaced from the heavily used upper reaches of the Saco River.

We conclude that CMP could significantly enhance the existing canoe portage by constructing a gravel-filled crib stairway at the canoe put-in site, based on CMP's conceptional plans (CMP, 1995). We estimate that constructing the canoe portage trail would cost about $4,000. Due to the steep grade at the stairway we conclude that constructing a canoe trough along the stairway is inappropriate. Guiding a canoe down a trough while descending the steep stairway would still present public safety concerns at the existing portage.

Relocating the canoe portage trail at Bonny Eagle to ensure a gradual descent down to the put-in area would significantly improve the safety to individuals portaging around the dam. The canoe portage enhancements would cumulatively improve canoe touring opportunities along the lower Saco River by ensuring an uninterrupted route down the river. Relicensing Bonny Eagle would also ensure the long-term protection and maintenance of the canoe portage, as suggested by AMC.

Impoundment Boat Launch. Interior recommends that CMP provide a new boat launching facility at Bonny Eagle since the existing boat launch at Libby's Campground (or Libby's) is not owned by CMP and requires a user fee. Interior further recommends that CMP design the

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[20] CMP (1992j) developed a conceptual design of the canoe portage trail relocation which included estimated costs.

facility in consultation with the USFWS, MDIFW, and MDOC. The Coalition agrees with Interior's recommended boat launch facility.

CMP disagrees with Interior's boat launch facility recommendation and states that the existing commercial boat launch is meeting the current demand for boating on the impoundment. CMP proposes to monitor the need for an additional boat launch facility in conjunction with the Commission's Form 80 recreation assessment evaluations (*see section 4.2.1.1.4*). Based on the periodic recreation assessments, CMP indicates that they would consult with the appropriate resource agencies to develop a new boat launch if the existing facility becomes unavailable for public use or its capacity is exceeded by demand.

CMP did, however, develop conceptual plans for three potential boat launch sites on the impoundment; two sites on the east side of the impoundment and one site on the impoundment's west side. CMP's cost estimates to develop a impoundment boat launch facility at one of these sites ranged from $60,000 to $95,000.

CMP estimated that existing use at Libby Campground in 1990-1991 was about 875 user-days and primarily consisted of boating and swimming. CMP indicates that boating trends are likely to remain stable and projected increase at Libby's by the year 2000 is estimated at 1,050 to 1,175 user-days. Most of the boating which occurs on the Bonny Eagle impoundment includes either canoes or small skiffs, and CMP estimated the use of these crafts at 2,080 in 1990-1991.

In addition to Libby's commercial launch, CMP provides three locations along the impoundment to launch small carry-in boats: near the confluence of the Little Ossipee and the Saco Rivers, off Sand Pond Road, and above the Route 25 bridge.

We agree with CMP that an additional boat launching facility is not currently needed at Bonny Eagle based on the limited amount of boating on the impoundment requiring a hard-surface launch. Libby's commercial launch adequately provides boat launching opportunities for boaters that need a hard-surface launch. Bonny Eagle's impoundment is a relatively narrow riverine impoundment (maximum width of 1/4 mile) and more suitable to small crafts than larger powerboats. Improving power boating opportunities at Bonny Eagle could result in conflicting uses between small craft boaters and power boating.

MDEP cautioned the haphazard development of recreation access areas at Bonny Eagle which could encourage vandalism and other inappropriate social behaviors.[21] Requiring CMP to provide facilities when the demand doesn't warrant the need for its development would likely result in inappropriate uses requiring excessive monitoring. Advantages of commercial facilities similar to Libby's is the on-site monitoring that prevents any facility misuse. Also,

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[21] MDEP's comments on March 24, 1994, at the Saco River Scoping Meeting in Augusta, Maine, in response to recreation recommendations for Bonny Eagle.

due to the limited power boating use at Bonny Eagle, any additional hard-surface boating facility would adversely affect Libby's commercial business.

For these reasons we don't agree that an additional boat launching facility at Bonny Eagle is needed at this time. CMP's proposal to routinely monitor the need for additional recreation facilities, as part of the Commission's Form 80 recreation use assessment, would provide the opportunity to periodically evaluate the need for boating facilities at Bonny Eagle (*see further discussion in section 4.2.1.1.4*). In summary, Libby's hard-surface boat launch and CMP's informal carry-in boat launches adequately provide for the boating opportunities at Bonny Eagle's impoundment.

Tailrace and Bypassed Reach Access. The Coalition generally recommends that CMP provide free public access to the impoundment and tailrace on both sides of the river, and they recommend that CMP should ensure that the access areas are accessible to disabled persons where possible. Interior recommends that CMP accommodate fishing opportunities and whitewater boating at the New River Channel.

Access to the tailrace at Bonny Eagle is limited by the steep slopes along the river below the dam which hinders the opportunity to improve access to this area. CMP's instream flow study (Acres, 1989) indicated that the WUA for wade fishing is low and rarely available.

Currently, the only access to the tailrace is provided on the west side of the tailrace at the canoe portage put-in area. Canoe portage trail improvements, as discussed above, would enhance angling access to the tailrace. The steeply sloped shoreline below the canoe put-in area would still limit bank fishing opportunities in the tailrace. Steep slopes and rough terrain also prevent the opportunity to enhance angling access to the east side of the tailrace.

Slopes along the tailrace range from 5 to 20 percent grades and limit the opportunity to provide disabled angling access to the tailrace at the canoe portage put-in. Barrier-free facility design standards under the Americans with Disabilities Act (ADA) require a 1:12 slope for general ramps and would require CMP to modify existing facilities if such modification are readily achievable.[22] Because of the steeply sloped banks along the tailrace it is impractical to meet the barrier-free standard requirements and provide access for disabled persons to the tailrace.

Providing improved access to the bypassed reach is an alternative to the limited opportunities to enhance tailrace access below the dam. Angling opportunities along the New River Channel bypassed reach would likely improve as a result of the minimum flow requirements intended to enhance salmonid habitat (*see section 4.2.2.1.2*). Further, MDIFW

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[22] Established by the Architectural and Transportation Barriers Compliance Board on July 26, 1990 (Federal Register, Volume 56, No. 144). "Readily achievable" is defined as easily accomplishable and able to be carried out without much difficulty or expense.

indicated that they intend on establishing a stocked trout fishery in the New River Channel which they believe has the potential to become a high quality recreational salmonid fishery (letter from William J. Vail, Commissioner, Department of Inland Fisheries and Wildlife, Augusta, Maine, July 18, 1991).

Current access to the New River Channel (bypassed reach) consists of roadside points along the west side of Warren Road. Most of the shoulder parking that occurs along this stretch is either near the intersection of Warren Road and Route 35 or near the lower whitewater section of the New River Channel. CMP investigated the potential of improving the parking along the New River Channel and identified six potential access and parking areas which CMP could potentially improve (CMP, 1992k).

During our site visit to Bonny Eagle we observed these potential sites and concluded that there is limited opportunities to enhance parking along Warren Road. Specifically, the narrow strip and rough terrain between the west side of the New River Channel and Warren Road restrict potential parking enhancements.

Potential access enhancements do exist, however, on the west side of the bypassed reach off Route 35 on Bonny Eagle Island. This area is owned by CMP and would provide angling and whitewater boating access to the upper reach of the New River Channel. Developing an improved parking area near the Route 35 bridge on Bonny Eagle Island would provide whitewater boaters and anglers access to the upper section of the bypassed reach.

We note that CMP discourages boating use in the New River Channel in their whitewater boating assessment of the New River Channel due to the public safety concerns below the diversion dam (CMP, 1992k). Despite CMP's public safety concerns, seasonal whitewater boating use continues in the bypassed reach. Providing an improved access point on Bonny Eagle Island would improve the public safety at the bypassed reach by providing an alternative to the existing shoulder parking areas along Warren Road. Also, angling in the bypassed reach is likely to increase when CMP provides downstream fish passage and minimum flows to the bypassed reach.

To enhance bypassed reach access, we considered an alternative site location for CMP's proposed barrier-free picnic area on Bonny Eagle Island. CMP's proposed picnic area site on the northwest side of the Island could encourage swimming and fishing access to an area that is not particularly safe due to steep sloping banks and the site's close proximity to the Bonny Eagle dam. Under our alternative, CMP could develop the proposed interpretive sign describing the historic hydropower structure near the canoe portage turnaround access road rather than their proposed picnic site location.

Providing barrier-free parking, picnic tables, grills, and seasonally providing portable toilets on Bonny Eagle Island near the bypassed reach would significantly improve recreational opportunities at Bonny Eagle. Specifically, improved access on Bonny Eagle Island would provide an alternative to the heavily used Limington Rips recreation area.

Further, constructing a path from the Bonny Eagle Island access facility that gradually leads to the New River Channel would improve the safety for boaters and anglers descending down to the bypassed reach. The steep sloping banks and fluctuating flows in the bypassed reach makes design of the access trail to meet the barrier-free standards infeasible. To improve safety at the bypassed reach, CMP could also provide signs cautioning novice whitewater boaters and anglers about the hazards associated with this area (i.e., fluctuating flows, potential flashboard failure, dangerous hydraulics). Ensuring that the access facility is highly visible from Route 35 would enable CMP to properly monitor the use of the site and prevent vandalism and loitering. We estimate that a picnic area on Bonny Eagle Island near the bypassed reach would cost CMP about $34,500.[23]

Providing a New River Channel access facility would improve recreational opportunities at Bonny Eagle by providing an alternative to the heavily used Limington Rips recreation area. The Bonny Eagle Island access would enhance whitewater boating opportunities by providing a put-in area near the upper reach of the bypassed area. Boaters would likely continue to park vehicles at the unimproved parking area along Warren Road; this parking area is below the whitewater section and provides a take-out point. Parking vehicles at both the unimproved parking area near the lower section of bypassed reach and at an access facility on Bonny Eagle Island would provide a shuttle system from take-out to put-in sites.

The Bonny Eagle Island facility would further enhance angling access in areas below the New River Channel dam, provide the only project facility accessible to disabled persons, and provide access for scenic views of the bypassed reach.

New River Channel Whitewater Opportunities. AMC, in a letter filed April 15, 1994, suggests that CMP conduct New River Channel flow studies designed to determine the possibility of providing summer whitewater boating flows. CMP's whitewater boating assessment conducted in 1990-1991 addressed the potential opportunities for providing summer flows for boating. CMP concluded that providing summer boatable flows in the New River Channel is not warranted due to the limited existing whitewater boating use, the cost of providing scheduled releases, potential conflicts with the fishery agencies' goals for the bypassed reach, and the availability of suitable whitewater boating at Limington Rips.

We agree with CMP's conclusion. The New River Channel currently receives limited whitewater boating use (an estimated 48 user days). The proposed minimum flow gate at the New River Channel dam would not adequately pass boatable flows to the bypassed reach. In

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[23] Our estimate includes the cost for an asphalt parking lot for 10 vehicles at $16,500; a 300-foot-long hardened path to the bypassed reach at $3,000; five picnic tables at $2,500; signs at $2,500; portable toilets at $5,000; and permitting at $5,000. Our estimates were based on the cost for similar recreation facilities constructed at hydroprojects within the region.

order to provide suitable flow releases (>1,000 cfs) to the New River Channel, CMP would need to provide a gate structure for high flow releases. High flow release gates are costly and requiring summer flow releases would reduce the projects generation capabilities.[24]

Requiring summer boatable flows in excess of 1,000 cfs could also disrupt MDIFW's and USFWS's management plans to improve the recreational fishery in the bypassed reach. CMP's New River instream flow assessment (Acres, 1989) concluded that fishery quality began to decrease as flows increased from 100 cfs to 150 cfs. Further, the nearby Limington Rips whitewater stretch is a more attractive site for whitewater boaters because it's more predictable. Limington Rips naturally provides suitable whitewater boating conditions more frequently than those available in the New River Channel.

Therefore, we conclude that it's not appropriate to provide scheduled releases to the New River Channel for the purpose of enhancing whitewater boating opportunities. CMP could, however, periodically monitor the whitewater boating use at the New River Channel. The bypassed reach is within close proximity of Maine's most populated region and could receive increased use in the future, especially with the increase popularity of whitewater boating.[25] Opportunities exist to potentially upgrade parking at the take-out point near the lower stretch of the bypassed reach, and increased whitewater boating could warrant further development in this area. Routinely monitoring the need for additional facilities, as part of the Commission's Form 80 recreation use assessment, would provide the opportunity to evaluate the need for whitewater boating enhancements at Bonny Eagle's bypassed reach (*see further discussion in section 4.2.1.1.4*).

Minimum Flow Effects on Angling. Interior's recommended 100 cfs minimum flow in the New River Channel would result in minor angling improvements over CMP's proposed minimum flow of 50 cfs. The New River instream flow assessment (Acres, 1989) concluded that there is a minor increase in angling quality in the upper reach of the bypassed reach when flows are increased from 50 cfs to 100 cfs. In the lower section of the bypassed reach,

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[24] CMP estimated that an appropriate gate for providing boatable flows would cost about $311,000 with the annual maintenance of the gate structure costing about $42,000 levelized over a licensed term. CMP also estimated the cost of lost generation at Bonny Eagle, assuming a summer release flow of 1,500 cfs provided for a four hour period, 30 times per year, to be about $162,000 over a 30 year license term.

[25] For example, CMP's recreation comprehensive plan (1989) indicated: that whitewater rafting on some river stretches in Maine had grown by 54% in a three year period between 1986-1989 and whitewater canoeing in Maine is increasing in popularity.

angling quality resulted in the same rated value at both the 50 cfs and 100 cfs instream flows.[26]

Interior's recommended tailrace minimum flows would provide some additional non-power boat fishing opportunities (*Interior's minimum flow recommendations are defined in section 4.2.2.1.1*). Based on the Bonny Eagle instream flow study (Acres, 1989), the most suitable tailrace flow for non-power boat fishing is near 1,000 cfs. Interior's recommended flows would enhance non-power boat fishing by providing more suitable flows in the tailrace that exceed CMP's proposed 350 cfs minimum flow.

Interior's recommended flow regimes would generally enhance non-power boat fishing during the low flow periods during the summer months. Minimum flows of 800 cfs between July 16 and August 31 would enhance non-power boat fishing by providing a flow near the optimum flow (1,000 cfs) during periods when CMP is not generating. Under CMP's proposal, they would release a proposed tailrace minimum flow of 350 cfs during non-generating hours.

Interior's recommended tailrace minimum flows would not benefit wade fishing over CMP's proposed conditions (*see section 4.2.1.1.4*). The instream flow study results (Acres, 1989) indicate that wade fishing in the tailrace remains limited at flows ranging from 100 cfs to 5,000 cfs.

Recreation Access Information. AMC, in a letter filed April 15, 1994, suggests that CMP provide better information to the public regarding river access and recreational opportunities on the lower Saco River.

We agree. During our site visit at Bonny Eagle we noted that some of the access areas identified on CMP's recreation map for Bonny Eagle were obscure and often not marked with signs.[27] For example, the informal carry-in boat access areas and the informal access area on Bonny Eagle Island were not identified with signs as access areas for public use. We also observed that there are no signs identifying the location and availability of the commercial boat launch at Bonny Eagle.

CMP currently provides a public brochure which describes the recreation opportunities at CMP's hydropower and water storage projects.[28] CMP's comprehensive recreation plan

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[26] The upper section of the bypassed reach was delineated as the reach extending from the Route 35 bridge crossing to about 100 yards downstream. The lower section was located between the area about 500 yards upstream from the West Buxton Reservoir to an area extending upstream about 100 yards.

[27] CMP, 1991, Recreation Map for the Bonny Eagle Project, Appendix E5-1.

[28] CMP, (undated), Recreational Opportunities.

(1989) also indicates that CMP plans to prepare a canoe touring public information brochure that identifies safety hazards, campsites, locations to obtain potable water, and describes the means for portaging each dam on the Saco River

Section 8.2 of the Commission's regulations requires licensees to install signs that inform the public of recreational access opportunities. Additional signs identifying recreational access areas at Bonny Eagle would improve the public's awareness of the recreation resources at the project. At a minimum, public access signs are needed at the informal carry-in boat access areas along the west side of the impoundment and at the canoe portage turnaround access road off of Route 35.

Although Libby's trailered boat launch is not a project facility, it's the only hard-surfaced boat launch on the impoundment. CMP could ensure that the public is aware of this access area by providing directional signs that identify the location of the boat launch. Directional signs to the boat launch at Route 25 near the Limington Rips recreation area and at Route 35 at its crossing of the Saco River would enhance the public's awareness of the boat launch. Our estimated cost for CMP to provide directional signs to the boat launch and access signs at the informal carry-in boat access areas and the canoe portage is $10,000.

Providing signs at the recreation access areas at Bonny Eagle would ensure that the public is aware of the recreational resources and is able to find and use the recreation facilities at the project. CMP's plans to develop a canoe touring brochure would enhance canoe touring opportunities on the lower Saco River. The brochure would ensure that canoeists are aware of safety hazards, campsites, locations to obtain potable water, and portages around project dams.

Recreation Management. AMC, in a letter filed April 15, 1994, suggests that CMP consider alternatives in addressing recreational management problems at their recreation facilities. AMC specifically refers to CMP's efforts to control undesirable activities at the Bonny Eagle Island informal access area by prohibiting vehicular access. AMC suggests that CMP identify the times when undesirable behavior at sites is most prevalent and provide enforcement personnel at these specific times.

In addition to the social behavior problems CMP has experienced at the Bonny Eagle Island access area, we are aware of similar problems at the informal access area near the Little Ossipee River's confluence with the Saco River. Homeowners near this site indicated that the access area is overused by camping groups resulting in sanitation problems and destruction of vegetation for fires (letters to Central Maine Power Company from Lorraine Libby, Limington, Maine, dated June 23, 1993 and July 15, 1993). In 1994, CMP subsequently restricted access to this area to alleviate the inappropriate activities occurring at this access site.

CMP has controlled loitering and vandalism at the Bonny Eagle Island site by prohibiting vehicular access to the area, while still providing walk-in access. Prohibiting

vehicular access to the informal access site near the Little Ossipee's confluence with the Saco River would likely improve both the current disruptive social problems and CMP's ability to monitor use at the site. Providing walk-in access to this site would primarily discourage the extended and over use of this site by car campers. Nearby informal boat launches north of Route 25 and at Limington Rips recreation area would still afford put-in access for boaters.

The heavily used Limington Rips recreation area, which is maintained by MDOT, is in close proximity to Route 25 and inhibits disruptive social behavior because it's convenient to monitor. Disruptive behavioral problems are not prevalent at Libby's boat launch due to it's commercial operation and monitoring.

Bonny Eagle's remote location provides opportunities for loitering, vandalism, and other disruptive social behaviors at areas that are not highly visible from the road. These problems would likely continue at remote access areas even if CMP periodically patrolled the areas. CMP's efforts to prevent vehicular access to the Bonny Eagle Island informal access site and at the informal access near the Little Ossipee River would continue to discourage disruptive social behaviors at these site.

We conclude that CMP's efforts to restricted access near the Little Ossipee's confluence with the Saco River would enable CMP's staff and local enforcement to easily monitor this site. Improving CMP's ability to monitor use at this site would likely curtail the disruptive social problems. Ensuring that the access parking area is highly visible from the road should alleviate the need for CMP to provide additional enforcement personnel at Bonny Eagle's recreation sites.

Recreation resources summary

CMP's comprehensive recreation plan (1989) and their proposed recreation enhancements generally address the recreational needs at Bonny Eagle. Additional measures that would enhance the recreational opportunities at Bonny Eagle include improvements to the existing canoe portage, improved access to the bypassed reach, and signs identifying the public access areas.

AMC made no specific recreation recommendations, but requested that we address several recreation issues at Bonny Eagle: (1) canoe portage enhancements, (2) long-term protection and maintenance of canoe portages, (3) New River Channel flow studies design to examine summer boating opportunities, (4) providing public information regarding river access and recreational opportunities, and (5) alternatives in addressing recreational management problems. We addressed these issues and agreed that CMP should improve the canoe portage and provide additional public information about the recreational resources at Bonny Eagle.

We disagree with Interior's boat launching facility recommendation, and conclude that the existing commercial boat launch at Bonny Eagle adequately meets the existing demand.

CMP could, however, improve the public's awareness of this boat launch through additional directional signs. We conclude that Interior's recommended minimum flows for Bonny Eagle would not benefit wade angling in the tailrace and would only result in minor benefits to non-power boat fishing in tailrace in comparison to CMP's proposed minimum flows. Interior's recommended minimum flows in the bypassed reach would also result in minor angling benefits in comparison to CMP's proposed flows.

We disagree with the Coalition's barrier-free access recommendation, and conclude that there is limited opportunity to enhance tailrace access at Bonny Eagle. We conclude that opportunities to enhance angling access to the bypassed reach are more reasonable than tailrace access enhancements. Providing an improved barrier-free parking and picnic area on the northeast side of Bonny Eagle Island would provide recreation opportunities for disabled persons, while enhancing both angling and whitewater boating opportunities.

4.2.2.1.5 Other resources

Geology and soils. Both Interior's project operation alternative and the year-round run-of-river operational alternative would stabilize the reservoir water level and result in some geological resource benefits. Specifically, reducing impoundment fluctuations at Bonny Eagle would help to reduce the existing shoreline erosion, bank undercutting, and slumping trees at localized sites (*see section 4.2.1.1.5*).

Our year-round 600 and 800 cfs minimum flow alternatives would still enable CMP to operate in a peaking mode, although modified from the current peaking operation. Under these two alternatives, erosion effects resulting from impoundment fluctuations would continue as discussed under CMP's proposed operation scenario.

Overall, we conclude that the project operation alternatives that consequently stabilize the impoundment would help to minimize the existing erosion effects along the shoreline. Implementing wetlands enhancement measures, as discussed in section 4.2.2.1.3, would also help to reduce localized erosion effects along the impoundment shoreline. Shoreline erosion resulting from flooding, recreational boating wakes, and wide tides (wind setup) would, however, continue along Bonny Eagle's impoundment under all the project operation flow scenarios.

Land Use. AMC, in a letter filed April 15, 1994, requests examining the expansion of the project boundaries at Bonny Eagle to a minimum of 500 feet along the impoundment and incorporating adjacent CMP properties within project boundaries for the protection of aesthetic resources.

CMP (1991) analyzed their ability to provide a buffer zone around the impoundment for the purpose of protecting recreational and aesthetic resources, as required under the Commission's regulations, Section 4.51(f)(6)(iv). CMP concluded that the existing municipal shoreland zoning ordinances mandated by the State of Maine adequately protect recreational

and aesthetic values at both Bonny Eagle and Skelton. They further conclude that the cost of establishing a buffer zone around the entire project periphery is not justified due to the existing shoreland regulations.

Eco-Analysts, Inc. (1992) investigated the potential of providing buffer zones at existing agricultural sites along the Bonny Eagle impoundment for the purpose of enhancing wetlands. They identified potential areas where CMP could enhance wetlands by creating a 100-foot-wide buffer along three sites which includes almost 8,000 feet of shoreline. To enhance these wetland areas at Bonny Eagle CMP could provide buffer zones along these three sites (*for further discussion regarding wetlands enhancement see section 4.2.2.2.3*). Providing buffer strips to enhance wetlands would protect about 1.5 miles of the impoundment shoreland.

Section 2.7 of the Commission's regulations states, in part, that the Commission "expects licensees to acquire in fee and include within the project boundary enough land to assure optimum development of the recreational resources afforded by the project". The Bonny Eagle impoundment is about 6.6 miles long and we estimate that the total shoreline length along the impoundment is about 18 miles.

Lands surrounding the impoundment between the normal full pond elevation (216.3 feet local datum) and the 218-foot-elevation contour are included within the project boundary. In addition to the Bonny Eagle recreational areas, the MSPO's Natural Heritage Program listed the Chases Mills Rapids area and the Limington Rips whitewater stretch as state-listed critical areas. CMP owns the lands bordering these critical areas and has voluntarily designated these lands for informal public access. Total land area within the project boundary currently includes about 500 acres and CMP owns the rights to an additional 221 acres of non-project property adjacent to Bonny Eagle.

Most of the land surrounding Bonny Eagle and outside of the project boundary is privately owned and sparsely developed. In order for CMP to provide a 500 foot buffer around the impoundment, we estimate that they would need to acquire the rights to at least 1,104 acres surrounding the impoundment.[29] Undeveloped property along the impoundment is worth about $21,818 an acre.[30]

CMP proposes no land-disturbing or land-clearing activities that would adversely affect the aesthetic resources along the impoundment. CMP indicates that there is considerable undeveloped shoreline located along the west side of the impoundment which has limited development potential (CMP, 1992j). Reservoir wetlands include about 348 acres which

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[29] Assumes 18 miles of shoreline.

[30] Land value is based on CMP's cost estimate to purchase private land for the development of an impoundment boat launch at Bonny Eagle (CMP, 1992j).

naturally provide a buffer to development in areas along both sides of the impoundment (*for further discussion regarding wetlands see section 4.2.2.2.3*).

Continued operation of Bonny Eagle as proposed is in accordance with Maine's shoreland zoning ordinances. Existing municipal shoreland zoning ordinances protect recreational and aesthetic values at Bonny Eagle (*see land use section 3.1.2*). The State of Maine has designated the SRCC to oversee shoreline development activities along the Saco River for the purpose of protecting natural resources from poorly planned development. SRCC regulates land use within 500 feet on each side of the Saco River.

Further, the Saco River from the Little Ossipee River to the upper limit of Bonny Eagle's impoundment is also within a river segment classified under the Natural Resources Protection Act as an outstanding river. Outstanding rivers are protected by Maine's legislation from further development (MDEP, 1988).

We conclude that the existing project boundary at Bonny Eagle ensures adequate protection of the public's access to the impoundment and the optimum development of recreation resources. The SRCC and the State of Maine's shoreland zoning laws would continue to protect natural resources along the Saco River from excessive or inappropriate development. The Bonny Eagle impoundment is naturally buffered in areas where wetlands and land topography prevent development. Additional buffer zones around the impoundment beyond measures to provide buffer strips for wetlands protection are not necessary at Bonny Eagle.

Air quality. Implementation of Interior's operational recommendations for increased minimum flows and changes in the project's operation would increase the annual energy production by about 11,000 kWh (0.01 GWh) over CMP's proposal. The resulting increase of hydropower energy would likely replace energy available from alternative sources.

For the Maine service area, it is highly probable that the energy replaced would be generated by oil-fired facilities. This would result in decreased consumption of fossil fuel over CMP's proposal, resulting in decreased production of atmospheric pollutants.

Using the assumptions outlined in section 4.2.1.1.9, we estimate that generated energy increases resulting from Interior's recommendations would displace about 19 barrels of oil annually compared to CMP's proposal.

4.2.2.2 Skelton

In this section, we analyze the environmental effects associated with licensing Skelton with additional environmental enhancement measures. Proposed modifications to the proposed project operation and facilities to further protect, enhance, or mitigate adverse impacts to environmental resources and values were developed by various state and federal agencies, NGOs, and staff.

For flow related resources, we analyzed the effects of operating Skelton under four alternatives: the agencies' recommended flow scenario (*listed in section 2.3.2.2.1*), a year round run-of-river scenario, a year round minimum flow of 600 cfs, and a year round minimum flow of 800 cfs. For other resources, proposed modifications were either resource or facility specific.

4.2.2.2.1 Water quality and quantity

Project operation and minimum flows. Interior and the Coalition recommend that Skelton be operated in the following manner:

May 1 - July 15	Run-of-river operation
July 16 - August 31	811 cfs minimum flow
September 1 - October 15	Run-of-river operation
October 16 - April 30	811 cfs minimum flow

Based on Interior's comments, we interpreted Interior's recommended project operations and minimum flows as primarily for the enhancement of fisheries and aquatic habitat. However, the recommended flow scenarios would also affect water quality in the lower Saco River.

Interior based their recommendations partly on the USFWS's New England Method for calculating instream flow requirements (USFWS, 1981) and partly on the needs for sufficient fish passage and transport flows. The ABF method of setting minimum instream flows is based on the premise that aquatic biota in a given stream has evolved to survive adverse conditions associated with the most stressful month(s) of the year. In New England, the critical low-flow months are August (summer flows) and February (salmonid spawning and incubation flows), or in the absence of flow data, the standard substitution is 0.5 cfs per square mile of drainage area. By using a default value of 0.5 cfs per square mile multiplied by 1622 mi^2 (the Skelton drainage area), the resulting flow recommendation is 811 cfs. At other projects on the Saco River, we have recommended the ABF flow to protect aquatic resources (Cataract and West Buxton). Interior's recommendation for run-of-river operations during the early summer and the early fall are based on the need for sufficiently high flows during the peak of spring upstream migration by Atlantic salmon, American shad, and river herrings and during the peak of fall upstream Atlantic salmon migration (*for further discussion of the effects of flows on fisheries see section 4.2.2.2.2*).

While no specific data is available to quantify the effects of Interior's recommended flows on water quality, we believe that the effects would be more beneficial than CMP's proposal to seasonally increase the minimum project flows from leakage to 400 cfs and 250 cfs. Increasing the flows at Skelton from leakage to 800 cfs in the low flow summer months would have a beneficial effect on water quality in the free-flowing reaches of the river below Skelton and Cataract. Water velocities in these areas would increase and the resulting turbulence would increase DO levels to some extent. In the Skelton reservoir and the reservoirs downstream of Skelton, water retention times would decrease. By decreasing the

"unnatural and artificial" periodicity of the flows, experienced when flows range from leakage to maximum generation, Saco River flows would more naturally resemble an unaltered temporal spacing of flow. Additionally, these benefits would potentially be realized farther downstream at Cataract impoundment and in tidal areas below Cataract.

Given the higher flows, we believe stress on the macroinvertebrates would decrease and a healthier more abundant community would likely develop. Thus, implementation of a minimum flow requirement at Skelton should be adequate to create a more healthy and abundant macroinvertebrate community given the anticipated enhanced habitat and water quality conditions.

The water quality effects of staff's alternatives of operating the project with a year round minimum flow of either 600 cfs or 800 cfs would not be significantly different from Interior's recommended alternative, but should be an improvement over CMP's proposal.

Staff's alternative of operating the project in a run-of-river mode, however, would most likely provide the most beneficial effects of all the alternatives on water quality in the downstream Saco River and estuary. Run-of-river operation would minimize reservoir fluctuations and prevent fluctuations in flows downstream of the project. Aquatic resources and water quality in the project area would be protected by maintaining a constant flow regime below the project dam and by preventing the dewatering of aquatic habitat. Additionally, flushing and circulation patterns in the tidal areas downstream of Cataract would be maintained with the natural flow regime.

Monitoring and gaging. Interior recommends that CMP submit plans for monitoring the project operations (including run-of-river operation). Interior recommends that the plans include descriptions of all mechanisms and structures that would be used, the level of staffed or automatic facility operation, the methods for recording and maintaining data on project operations and a plan for maintaining these data for inspection and for providing it to the Commission and resource agencies. Additionally, Interior recommends these plans be developed in consultation with the agencies.

We agree. Plans describing the methods for releasing required minimum flows and maintaining project operation, and how flows would be maintained below the project when the impoundment is refilled after any maintenance and/or repairs would provide necessary information for the resource agencies and the Commission. Information included in the plans should be descriptions of all mechanisms and structures that would be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and providing it to the Commission and resource agencies for inspection. Plans should be required before any changes in project operation take place.

Water quality and quantity summary

Both Interior's recommended project operations and our alternative flow scenarios would significantly enhance water quality in the Saco River compared to the baseline conditions. By operating the project in a run-of-river mode or releasing a minimum flow of 600 to 800 cfs year round, the temporal distribution of streamflow would more closely resemble the natural unaltered flow distribution. Periods of only leakage flows from the project would be eliminated and adequate mixing of tailwaters would likely eliminate any DO deficiencies present in the reach at leakage flows. Further, macroinvertebrates in the Skelton tailwaters would benefit from the increased water quality and the associated more natural lotic habitat. We expect that either Interior's or staff's minimum flow alternatives would result in greater water quality enhancement than CMP's minimum flow proposal.

4.2.2.2.2 Fisheries resources

Project operation and powerhouse minimum flows. Interior and the Coalition's proposed project operation and minimum flow scenarios (*listed in section 4.2.2.2.1*) would affect the availability of fisheries habitat in the Saco River below Skelton and, to a lesser extent, below Cataract. To analyze the effects of these flows, we utilized the results of the IFIM studies discussed in section 4.2.1.2.2.

IFIM Results

For Interior's recommendation of an 811 cfs minimum flow from July 16 to August 31 and from October 16 to April 30, the IFIM studies generally indicated that habitat varies widely between species. Below Skelton, adult trout habitat at 800 cfs was shown to range from 36 percent of the maximum available WUA for brook trout to 99 percent of the maximum WUA for rainbow trout (Figure 4-17).

For American shad, Interior's recommended 811 cfs minimum flow generally results in poor to mediocre habitat availability at Skelton, with the exception of larval/juvenile habitat which was about 77 percent of the maximum WUA. For CMP's 400 cfs minimum flow, larval/juvenile habitat was about 60 percent of maximum WUA. Inmigration, spawning, and outmigration (including alewife) habitat availability were all less than 50 percent of the maximum habitat available (Figure 4-18). Habitat for these life stages was less than 30 percent of maximum WUA at CMP's 400 cfs.

Atlantic salmon inmigrating habitat remained relatively low at Skelton as about 26 percent of the maximum WUA would be available at 800 cfs (Figure 4-19).

While the above habitat availability results indicate that significant enhancements over the existing conditions would occur with the implementation of Interior's 811 cfs minimum flow recommendation, Interior also recommended run-of-river operations from May 1 to July 15 and from September 1 to October 15. Like Bonny Eagle's recommendations, Interior

states that run-of-river operation would ensure relatively natural flows during the peak of the spring upstream migration by Atlantic salmon, American shad, and river herring and the peak of the fall upstream Atlantic salmon migration while also providing sufficiently high flows to protect habitat. Furthermore, Interior states that CMP's flow proposal fails to consider the implications of seasonally reduced flows below Cataract which would severely undermine habitat protection efforts already established for the lower river and estuary.

Given the median monthly Saco River flow in May is above 5,600 cfs and the hydraulic capacity of Skelton is about 5,000 cfs, we would expect, as the results indicated, that minimum flow and project operation would have little effect on the overall availability and duration of habitat. In June and July, however, the median flow decreases to about 2,400 cfs and 1,200 cfs, respectively. As we discussed in section 4.2.2.1.2 at Bonny Eagle, we do not believe resident trout habitat would be significantly affected during this time period (with the implementation of an adequate minimum flow). However, migrating anadromous fish habitat could be affected by reduced flows resulting from the continuance of CMP's proposed peaking operations at Skelton in June.

Regarding Interior's recommended run-of-river operations on juvenile American shad habitat below Skelton, results for August indicate significant improvements over the existing conditions. Habitat enhancement would be greater than under minimum flows discussed herein.

Adult trout habitat in August and October would vary between species. While brown trout habitat availability would be virtually identical under both Interior's and CMP's flows, brook trout habitat would significantly decline during both time periods under Interior's recommendation. Based on our analysis, we believe that these results are indicative of brook trout's affinity for lower flows than those normally preferred by brown trout. IFIM results discussed in section 4.2.1.2.2 indicated that while brook trout habitat was maximized at 200 cfs, brown trout habitat was maximized at 300 cfs (Figure 4-17). Further, at a flow of 800 cfs, while brown trout habitat availability remained at 94 percent of the maximum, brook trout decreased to 36 percent of the maximum WUA available. In general, Interior's recommended run-of-river operation in October would result in much higher flows on average than CMP's peaking operation and 250 cfs minimum flow proposal.

For the non-summer seasons (January and October), CMP's proposed 250 cfs minimum flow would maintain excellent habitat availability. Both Interior's and CMP's flows, however, would roughly be equally beneficial.

Implementation of a minimum flow in the winter would provide year-round flows from the project and ultimately to the Saco River estuary. In the Cataract environmental assessment, we recommended that year-round flows be provided to maintain the biotic integrity of the Saco River estuary (FERC, 1989). Additionally, CMP's proposed 250 cfs minimum flow would be consistent with the need for a 250 cfs flowage through the Cataract headpond to ensure proper dilution and mixing of condenser cooling water from the Maine

Energy Recovery Company's refuse incinerator to meet MDEP regulations concerning thermal discharges (FERC, 1989).

Impoundment levels. Interior's definition of run-of-river operation would allow fluctuations of the Skelton impoundment to 1 foot or less from May 1 to July 15 and from September 1 through October 15. The Coalition supports Interior's operation regime.

Maintaining a stable impoundment elevation from May 1 to July 15 of each year would provide protection for eggs and larvae of smallmouth bass and other aquatic resources. As discussed in section 4.2.1.1.2, smallmouth bass are spring spawners and fluctuation of water elevations can lead to lowered nest success. Fluctuating water levels can also impact aquatic invertebrates by stranding and reductions in habitat that subject them to desiccation and predation from terrestrial predators. At Skelton, Acres (1990b) reported no stranding of fish and concluded that a typical 2 foot drawdown would not adversely affect Skelton's fisheries. This would occur only if there was no spawning within this 2-foot zone before drawdown.

We agree with Interior that a May 1 to July 15 impoundment fluctuation limit of 1 foot would likely be beneficial to Skelton's fishery resources, especially nest builders. This drawdown limitation should be readily obtainable as the project would operate run-of-river during this time, thereby minimizing reservoir fluctuations.

Interior's recommendation for limiting the impoundment fluctuation from September 1 to October 15 is based on concerns for wetlands and wildlife and is further evaluated and discussed in section 4.2.2.1.3.

Fisheries resources summary

With Interior and the Coalition's recommendations, the continued operation of Skelton would result in significant enhancements for fisheries. Increased minimum flows and more natural flow conditions would significantly improve anadromous and resident fish habitat and would enhance habitat conditions in the Saco River estuary. Habitat duration results below Skelton indicated that Interior's run-of-river operation in June would provide the most beneficial anadromous habitat conditions of any alternative analyzed.

The installation of upstream and downstream fish passage facilities would significantly improve fish passage at the Skelton dam. Downstream migrating fish would be provided safe passage through the Skelton hydro station and upstream migrating Atlantic salmon, American shad, and alewives would be provided with a state-of-the-art fish lift and trap-and-truck facilities. Combined with improved flow conditions and the channel habitat alterations and enhancements, anadromous fish would be provided with a significantly improved migratory pathway. Thus, any contributions of Skelton to adverse cumulative effects on anadromous fish passage mortality would be significantly reduced.

For resident trout, the availability of resident trout habitat at Skelton would be increased with implementation of any of the flow alternatives considered and tailrace habitat modifications. While habitat for brook and brown trout is maximized at flows of 200 to 300 cfs, Interior's recommended flows would provide improved WUA for both brook trout and brown trout and year-round flows from the project that would benefit the Saco River estuary.

4.2.2.2.3 Vegetation and wildlife resources

Interior's flow recommendations would not affect upland vegetation and associated wildlife resources but would affect wetlands and wetland-associated wildlife.

Operating the project in a run-of-river mode would maintain the reservoir at full pool year-round rather than its daily fluctuation of 2 to 2.5 feet. The reservoir management study (Acres, 1990b) concludes that operating the reservoir at full pool throughout the year would not likely produce significant benefits for existing botanical and wildlife resources. Acres (1990b) explains that the drawdown zone at the 2-foot level (the usual drawdown level resulting in about 12 acres dewatered or 2.5 percent of the reservoir) has minimal value as fish and wildlife habitat since the reservoir banks are generally steep sided with only a narrow band of exposed substrate dewatered. Further, this zone is comprised predominately of clay, cobble, and bedrock substrates, which limits the area suitable for substantial wetland plant growth. We conclude, therefore, that operating the project in a run-of-river mode during the agency-recommended periods would result in similar effects as year-round operation in a run-of-river mode (i.e., the existing reservoir wetlands would be maintained).

Project operation with an 811 cfs release would result in an operational mode whereby the reservoir would fluctuate similar to historical operation with a 2 to 2.5 foot reservoir drawdown. However, the reservoir drawdown may have to be modified over current conditions, particularly during periods of lower instream flows during July 16 to August and October 16 to April 30. As for the 400 cfs minimum flow recommended by CMP from October to May described in section 4.2.1.2.3, there would likely be times during certain low-flow events when the reservoir drawdown level may have to be reduced over current conditions to allow for daily refill and the 811 cfs minimum flow release. Also, the project may have to operate in a run-of-river mode on some occasions to maintain the 811 cfs release. Under such operation we anticipate little or no effect on reservoir wetlands and associated wildlife.

The release of run-of-river flows and 811 cfs flows in the Saco River below Skelton would likely have a beneficial effect on wetlands and associated wildlife below Skelton and below Cataract. As discussed in section 4.2.1.2.3, the availability of a greater amount of water for a longer, continuous period could in the long-term promote the accretion of the existing 6 acres of SAV and 10.6-acre shrub-scrub wetland, and potentially encourage the establishment of additional wetlands. However, the peaking operation discharges up to 3,600 cfs, may limit or preclude any wetland accretion or development, primarily because of the scouring effects produced by such flows. Since Cataract currently includes conditions to

release 851 cfs or inflow whichever is less. Interior's recommended flow scenario at Skelton would enhance flow conditions and possibly enhance wetland development below Cataract.

Alternatively, the release of run-of-river flows all year through the section of the Saco River below Skelton would provide near-natural flows below Skelton (assuming that Saco River waters would still be regulated upstream). Such an increased continuous flow is likely to cause the enhancement of existing and future wetlands. However, wetlands enhancement is likely to be more successful for run-of-river operation because of the absence of daily peaking releases up to 3,600 cfs and the resulting scouring effects.

A release of 811 cfs all year would still allow CMP to operate in a peaking mode with modification. The reservoir could be drawn down to the 2.5-foot limit, with the exception of those low flow periods when reservoir drawdown would have to be modified or operated in a run-of-river mode. A year-round 811-cfs minimum flow would likely have a beneficial effect on existing wetlands and promote the development of additional wetlands along the Saco River downstream of Skelton as described in section 4.2.1.2.3. Peaking flow releases, however, may limit or preclude any wetlands development.

4.2.2.2.4 Recreation resources

Tailrace Access. The Coalition recommends that CMP provide free public access to the impoundment and to the tailrace on both sides of the river. They indicate that CMP should ensure that the access areas are accessible to disabled persons where possible.

Current public access to the impoundment is provided at CMP's boat launch area, at the Route 117 bridge crossing in Salmon Falls, and at the town of Buxton's day-use area. CMP also provides public access to the west side of the tailrace, and informal access to the east side of the tailrace is provided at the end of Lord Road. These access facilities are not barrier-free and access for disabled persons is not currently provided at Skelton.

CMP examined the possibilities of providing barrier-free access at Skelton and concluded that the location is not suited or feasible for designing public access that fully complies with the ADA standards (CMP, 1992h). CMP concluded that rough terrain and steep slopes prevent them from providing barrier-free access at the canoe portage, impoundment boat launch, and tailrace access area. CMP indicated that they intend to design any new facilities or changes to existing facilities to comply with the ADA standards.

We believe there is potential for CMP to provide barrier-free angling access (i.e., fishing pier or platform) at CMP's tailrace facility. This facility currently provides parking but lacks designated disabled parking sites or accessible trails to the tailrace. CMP states that it's not feasible to provide access at this site to persons with mobility impairments because of the site terrain (characterized by uneven surfaces, loose cobble, and gravel) and slopes (a grade of at least 9 percent). We observed the tailrace access area during our site visit and

examined this area on video (CMP, 1992g). We conclude that there is potential to construct barrier-free trails to the tailrace area that meet the ADA standards.[31]

We note that CMP proposes to investigate the need for additional tailrace fishing facilities as anadromous fish restoration progresses at Skelton. They plan to consult with the agencies regarding the need to add facilities to this area if future demand warrants (CMP, 1991b). As part of these investigations CMP could reconsider the feasibility of providing barrier-free angling access (*see further discussion in section 4.2.1.1.4*).

Restoration of anadromous fisheries in the Saco River could lead to a substantial increase in angling pressure at Skelton. Providing barrier-free angling opportunities would significantly improve recreation opportunities at Skelton by affording access for disabled persons to the fishery resources. Investigating the ability to provide barrier-free recreation opportunities is particularly critical due to Skelton's close proximity to large populations in southeastern Maine.

Tailrace Use Conflicts. Interior recommends that CMP develop a mitigation plan for resolving conflicts between anglers and power boating below the Skelton dam. Interior suggests that these conflicts may exacerbate as a result of implementing CMP's proposed channel enhancements.

CMP addressed the conflicts between anglers and boaters below the Skelton dam (CMP, 1992g) and concluded that their ability to alleviate these conflicts is limited. CMP is, however, proposing to maintain the carry-in boat access located below the dam as an informal, unpaved launch which would restrict the launching of large power boats. Power boating in the Skelton tailwaters, and in the upper 5 miles of the Spring Island and Bradbury impoundment, is also restricted by natural underwater hazards (*for further discussion see section 3.3.2.4*). Despite the natural restrictions to power boating in the Skelton tailwaters, occasional power boats launched in the Spring Island and Bradbury impoundment access the Skelton tailwaters.

In addition to maintaining the Skelton tailwater boat launch for small boat use only, we conclude that CMP has limited ability to alleviate conflicts between anglers and boaters below the Skelton dam. Interior did not suggest any measures that would help alleviate these conflicts, and we conclude that a mitigation plan for resolving conflicts between anglers and boaters is not reasonable. We note that CMP proposes to finalize the proposed tailrace channel enhancements following further consultation with the resource agencies. During this consultation process Interior would be afforded an opportunity to comment on the tailrace fisheries enhancements and the potential influence on recreational use resulting from the enhancements.

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[31] Architectural and Transportation Barriers Compliance Board standards require a 1:12 slope for general ramps (Federal Register, Vol. 56, No. 144).

Recreation Access Information. AMC, in a letter filed April 15, 1994, generally requests that CMP provide better information to the public regarding river access and recreational opportunities on the lower Saco River.

CMP's recreation opportunities public brochure (undated) describes the recreation opportunities at Skelton and identifies the mapped location of these facilities. CMP's comprehensive recreation plan (1989) also indicates that CMP plans to prepare a canoe touring public information brochure by the year 2000 that identifies safety hazards, campsites, locations to obtain potable water, and describes the means for portaging each dam on the Saco River. CMP currently provides six signs along the canoe portage trail.

During our site visit at Skelton we observed the opportunity to improve public awareness of CMP's recreation facilities by providing additional recreation access signs. Signs that clearly identify the tailrace access area and the impoundment boat launch would enhance public awareness of the recreation opportunities at Skelton.

Section 8.2 of the Commission's regulations requires licensees to install signs that inform the public of recreational access opportunities. CMP should ensure that the public is aware of the recreational access areas at Skelton by providing additional signs at the entrance of the tailrace access area and near the impoundment boat launch. CMP should also ensure that the public is aware of these access areas by providing directional signs off Route 5 and Hollis Road identifying the location of the recreation facilities.

Providing signs at the recreation access areas at Skelton would ensure that the public is aware of the recreational resources and is able to find and use the recreation facilities. We also conclude that CMP's plans to develop a canoe touring brochure would enhance canoe touring opportunities on the lower Saco River. The brochure would ensure that canoeists are aware of safety hazards, campsites, locations to obtain potable water, and portages around project dams. These measures would improve the public's awareness regarding river access and recreational opportunities as requested by AMC.

Recreation resources summary

CMP's comprehensive recreation plan (1989) and the continued operation of their existing recreation facilities at Skelton adequately addresses the current recreation demand. Regarding the Coalition's barrier-free access recommendation, CMP should examine whether it's "readily achievable" to provide barrier-free access at the Skelton tailrace.[32] CMP's proposed recreation monitoring and investigation studies at Skelton provides the opportunity

32 "Readily achievable" is defined as easily accomplishable and able to be carried out without much difficulty or expense (Architectural and Transportation Barriers Compliance Board, Federal Register, Vol. 56, No. 144).

for CMP to consult with the resource agencies and determine whether barrier-free access to the tailrace is appropriate (*see section 4.2.1.2.4*).

CMP should improve the public's awareness of the recreation facilities provided at Skelton by providing additional directional signs to the tailrace facilities and the impoundment boat launch.

4.2.2.2.5 Other resources

Geology and soils. Both Interior's project operation alternative and the year-round run-of-river operational alternative would stabilize the reservoir water level and result in some geological resource benefits. Specifically, reducing impoundment fluctuations at Skelton would help to reduce the existing shoreline erosion, bank undercutting, and slumping trees at localized sites (*see section 4.2.1.2.5*).

Our year-round 600 and 800 cfs minimum flow alternatives would still enable CMP to operate in a peaking mode, although modified from the current peaking operation. Under these two alternatives, erosion effects resulting from impoundment fluctuations would continue as discussed under CMP's proposed operation scenario.

While CMP's proposed operation of Skelton would result in minor erosion effects (*see section 4.2.1.2.5*), any operation alternative that stabilizes the impoundment water level would further minimize erosion effects along the shoreline. Localized shoreline erosion resulting from flooding, recreational boating wakes, and wide tides (wind setup) would, however, continue along Skelton's impoundment under all the project operation flow scenarios.

Land Use. AMC, in a letter filed April 15, 1994, requests examining the expansion of the project boundaries at Skelton to a minimum of 500 feet along the impoundment and incorporating adjacent CMP properties within project boundaries for the protection of aesthetic resources.

CMP (1991) concluded that additional buffer zone measures at Skelton are not necessary (*CMP's justification is further discussed in section 4.2.2.1.5*).

The Skelton impoundment is about 2.8 miles long and we estimate that the total shoreline length along the impoundment is about 16 miles. Lands surrounding the impoundment between the normal full pond elevation (127.5 feet local datum) and the 134-foot-elevation contour are included within the project boundary. The project boundary along nearly one mile of shoreline at the lower end of the impoundment extends out about 600 feet. Total land area within this boundary currently includes about 630 acres and CMP owns an additional 21 acres of property adjacent to the project.

Most of the land surrounding Skelton is privately owned, generally secluded, and sparsely developed. In order for CMP to provide a 500 foot buffer around the impoundment,

we estimate that they would need to acquire the rights of at least 944 acres surrounding the impoundment.[33] Undeveloped property along the impoundment is worth about $21,818 an acre.[34]

CMP proposes no land-disturbing or land-clearing activities that would adversely affect the aesthetic resources along the impoundment. The heavy forest cover and natural topography of the project area naturally buffer the Skelton impoundment. AMC also owns property adjacent to the impoundment which stretches about one mile along the shoreline and provides a buffer to development. We conclude that additional buffer zones around the impoundment are not necessary at Skelton for the same reasons stated in section 4.2.2.1.5 regarding the need for additional buffer zones at Bonny Eagle.

Air quality. Interior's recommendation for increased minimum flows and changes in the project's operation would reduce the annual energy production by about 8,046,000 kWh (6.11 GWh) or about 1,935,000 kWh more than CMP's proposal. The resulting increased loss of hydropower energy would have to be replaced with energy available from alternative sources.

As discussed in section 4.2.1.1.9, for the Maine service area, it is highly probable that the replacement energy would have to be generated by oil-fired facilities. This would result in increased consumption of fossil fuel; and the combustion of this increment of fossil fuel would result in increased production of atmospheric pollutants.

Using the approximations and the estimated generated energy reductions resulting from Interior's recommendation, we estimate that 3,281 additional barrels of oil would be required annually to produce the 1.935 GWh of oil-fired electric generation. We further calculated that the additional amount of pollutants that would likely be released into the atmosphere from the 1.935 GWh associated energy reductions at Skelton would be 6.5 tons of sulfur oxides, 5 tons of nitrogen oxides, 0.35 tons of carbon monoxide, and 1,722 tons of carbon dioxide.

4.2.3 No Action Alternative (Bonny Eagle and Skelton)

The no action alternative would maintain the *status quo* and result in no change to the existing environments at Bonny Eagle and Skelton (described in section 3). The projects would continue to operate under the same terms and conditions of the previous licenses and there would be continued energy production. Furthermore, CMP wouldn't be required to provide any enhancement measures.

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[33] Assumes 16 miles of shoreline.

[34] We assumed that land value at Skelton is similar to the land value at Bonny Eagle. Land value is based on CMP's cost estimate to purchase private land for the development of an impoundment boat launch at Bonny Eagle (CMP, 1992j).

Fish passage facilities would not be required and upstream fish passage would continue to be blocked by the dams. Thus, access to potentially available anadromous fish habitat above the projects would be denied. Downstream fish passage from any upstream stockings would be accomplished via spillage over the dams. Additionally, the project would continue to operate as peaking facilities with flow fluctuations ranging from leakage to about 5,000 cfs at Bonny Eagle and 3,600 cfs at Skelton. Recreational improvements and cultural resource protection measures would not be required and the existing recreation facilities would remain as they presently exist. Habitat enhancements and channel modifications at Skelton would not be provided.

4.3 EXEMPTION

4.3.1 Exemption as proposed

4.3.1.1 Water quality and quantity

The continued operation and the proposed redevelopment of Swans Falls has the potential to affect water quality and quantity in the Saco River. The specific impacts in each affected resource area are discussed below.

Construction of fishery measures. Instream construction of fish enhancement measures downstream of the powerhouse would cause some short term increase in turbidity and sedimentation. SFC proposes to remove boulders and rock from the tailrace area and place this material in an area downstream of the bypass reach for fish habitat enhancement. Further, SFC proposes to construct a submerged deflection jetty in the project tailrace to direct generation flows to this improved habitat area. Construction of fish passage facilities when needed would also cause some increases in turbidity and sedimentation. These water quality impacts should be short term in duration and quickly subside once SFC completes the instream construction activities. SFC, however, should ensure that any impacts to water quality from the instream construction activities are minimized.

Project operation and flows. Swans Falls currently operates as a run-of-river facility with a normal pool elevation of 395.9 feet (local datum). SFC proposes to continue to operate the project in a run-of-river mode, so that outflow from the dam downstream into the river equals inflow to the project reservoir. Continued operation of the project would not, therefore, effect project operations at CMP's Hiram Project. Additionally, SFC proposes to increase the hydraulic capacity of the project by about 450 cfs, from 2,850 cfs to 3,300 cfs.

The MDEP, in the WQC, agrees with this mode of operation for Swans Falls. The WQC recommends SFC operate the project as run-of-river while providing a minimum flow of 223 cfs or inflow, whichever is less, below the project, except as temporarily modified by operating emergencies. MDEP defines operating emergencies beyond the Licensee's control to include, but not be limited to, equipment failure or other abnormal operating conditions, generating unit operation or interruption under power supply emergencies, and orders from

local, state, or federal law enforcement or public safety authorities. The WQC also recommends that SFC, in accordance with run-of-river operation, maintain water levels in the Swans Falls impoundment within one foot of 395.9 feet.

Interior and NHDFG also recommend this mode of operation for Swans Falls. As an alternative to this mode of operation, Interior recommends that a minimum flow of 270 cfs or inflow, whichever is less, be released from the project dam from June 1 through September 30, and 400 cfs or inflow to the project, whichever is less from October 1 through May 31.

Under current operations, Swans Falls passes flows up to 390 cfs through the powerhouse and an additional 2,460 cfs through the sluice gates. Flows in excess of 2,850 cfs (less than 9 percent of the time) are spilled into the bypassed channel. Increasing the capacity of the project would result in flows up to 880 cfs being passed through the powerhouse. The combined discharge of the two proposed units and the sluice gates would be about 3,300 cfs (exceeded less than 8 percent of the time). Thus, the frequency of flows into the bypassed channel would be reduced by about 1 percent (8 percent of the time versus 9 percent of the time on an annual basis).

Operating the project in a run-of-river mode would minimize reservoir fluctuations and prevent fluctuations in flows downstream of the project that could reduce or alter available aquatic habitat. Flow reductions could reduce spawning success and strand fish and invertebrates, subjecting them to desiccation and predation from terrestrial predators, and, if flows from the project fluctuated widely, benthic organisms, fish eggs, and larvae could be swept downstream (Rochester et al., 1984; Cushman 1985; Orth 1987; Bain and Boltz 1989).

SFC's water quality study indicated that Class A water standards both above and below the project were being attained during periods of spillage and no spillage. Additionally, SFC proposes to continue the current practice of continuous turbine venting, further enhancing DO levels below the project. Thus, SFC believes, and MDEP, Interior, and NHDFG concur, that even with the increased flows through the powerhouse, no adverse impacts would result to the Saco River's water quality.

The MDEP and Interior's recommended minimum flows or inflows, whichever are less, are based on the USFWS's New England Method for calculating instream flow requirements (USFWS, 1981). The ABF method of setting minimum instream flows (*described in section 4.2.2.1.1*) results in a flow recommendation of 223 cfs (the Swans Falls drainage area is 446 mi^2). Interior, however, based its recommendation on the August median flow of 270 cfs and the February median flow of 400 cfs. In the Swans Falls case, the recommendation for run-of-river operation would make a minimum flow unnecessary. By requiring run-of-river operation, MDEP and Interior's minimum flow recommendation would be satisfied.

We conclude that operating Swans Falls in a run-of-river mode would protect aquatic resources and water quality in the project area by maintaining a constant flow regime below

the project dam and by preventing the dewatering of aquatic habitat. In addition, operating the project in a run-of-river mode would minimize fluctuations in the impoundment's elevation and would also benefit fish and wildlife habitat in the impoundment created by the Swans Falls dam. Furthermore, we conclude that increasing the hydraulic capacity of the project by 450 cfs would not significantly affect water quality resources in the Saco River.

Water quality and quantity summary

No impacts on water quality or quantity are expected as a result of the proposed continued operation and redevelopment of Swans Falls. Specifically, SFC's proposals to operate the project in a run-of-river mode while providing a minimum flow of 223 cfs, or inflow, whichever is less, and to provide continuous turbine venting are sufficient to maintain compliance with Maine's Class A water quality standards. Further, SFC's proposed measures appear to be adequate for preventing, or contributing to, any degradation of the existing water quality in the Saco River.

4.3.1.2 Fisheries resources

The continued operation and the proposed redevelopment of Swans Falls has the potential to affect fisheries resources in the Saco River. The specific impacts in each affected resource area are discussed below.

Fish passage. Although anadromous fish do not currently have access to the project area, USFWS *et al.* (1987) has identified the project area as a historical and planned migration pathway for Atlantic salmon (*see sections 3.2.1 and 3.3.1.2 for further discussion*). As such, SFC proposes to construct upstream and downstream fish passage facilities for Atlantic salmon.

SFC proposes to provide upstream passage facilities for salmon following the installation and successful operation of fish passage facilities at Hiram. SFC's proposed facilities consist of a Denil-type fish ladder with an entrance in the tailrace and the exit in the forebay about 40 feet upstream of the trashracks. The fishway entrance, about 3 feet below the normal tailwater elevation, would face downstream and be positioned along the shoreline. An attraction flow of 6 cfs, or 3 percent of the powerhouse discharge, whichever is greater, would be diverted into the fishway entrance. The 3-foot-wide by 7-foot-deep ladder would have a slope of 6 horizontal to 1 vertical and utilize stoplogs for maintenance and ladder closure. SFC proposes to operate the ladder when one or more salmon are present in the Swans Falls tailwaters, as determined by the successful passage at Hiram.

SFC proposes to install downstream fish passage facilities following the successful passage of adult salmon above the project, or within 2 years of stocking juvenile salmon above the project. Downstream passage would be provided via a modified existing sluice gate structure located adjacent to the north end of the trash racks. A 5-foot-long by 3-foot-wide discharge channel would be added to the existing sluice gate structure with flow from

the channel discharging into a plunge pool of at least 3 feet deep. Flow rate would be dependant on powerhouse discharge, but would be a minimum of 2 percent of the discharge. SFC proposes to operate the downstream facility during the salmon downstream migration period.

The existing trashrack at Swans Falls has a clear spacing of 1.5 inches. During the downstream migration period for salmon smolts (spring), SFC proposes to overlay the racks with a 1 inch clear spacing screen to a depth of 5 feet. Existing maximum intake approach velocities are about 1.6 fps. SFC (1992) estimates maximum intake approach velocities with the proposed increase in capacity would be less than 2 fps.

Based on our review of SFC's conceptual fish passage plans, we believe that the Atlantic salmon would be provided adequate upstream and downstream passage at the project. Further, although current fishery management plans do not require fish passage facilities at Swans Falls for some time, we conclude that it is appropriate to include their planned development at this time (*for further discussion of the fish passage facilities and the agencies' requirements see section 4.3.2.2*).

Tailrace and bypassed reach fisheries habitat. Current operation of the project results in the bypassed reach receiving flows only about 9 percent of the time. Under the proposed operation and redevelopment of the project, the availability of these flows would be reduced to about 8 percent of the time.

Based on the study results, SFC (1992) concluded that the fisheries habitat present in the bypassed reach under ABF conditions would primarily be juvenile salmonid habitat with some adult salmonid habitat in the main channel and north channel. Total square footage would be about 46,825 ft^2 under an ABF flow of roughly 72 cfs. The maximum amount of salmonid habitat potentially available in the bypassed channels under an ABF flow was estimated to be 37,425 ft^2 (*for further discussion and description of the bypassed reach see section 3.3.3.2*).

In response to initial agency concerns, SFC proposes to construct a submerged deflection jetty in the project tailrace to direct the majority of generational flows into an enhanced area immediately downstream of the bypassed reach and to reduce velocities in the canoe launch area (Figure 4-21) (*for further discussion of the impacts on the canoe launch area see section 4.3.1.4*). The area immediately downstream of the bypassed reach would be enhanced for salmonids through the placement of boulders and rocks removed from the tailrace and bypassed reach. SFC (1992) estimates that 37,425 ft^2 of salmonid habitat would be created by the combination of increased cover (additional rocks and boulders) and suitable velocities from the redirected generational flows.

Interior and MDEP concur with SFC's proposal of alternative mitigation in lieu of establishing flows in the bypassed reach. Interior and MDEP state that permanent minimum flows in the bypassed reach could compromise fish passage efficiency at the project and likely

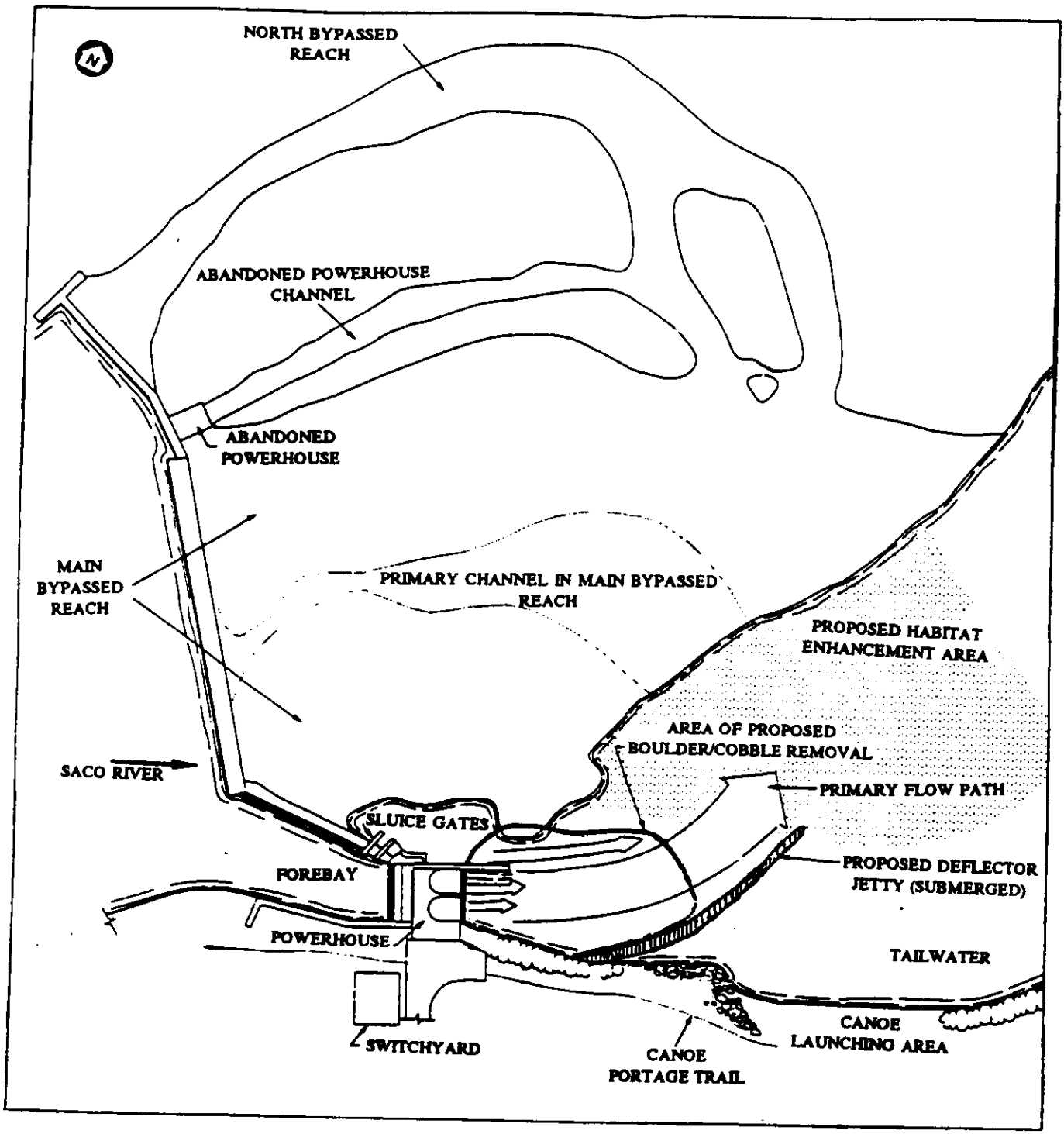

Figure 4-21 Swans Falls' proposed tailrace and fish habitat improvement plan, Saco River, Maine (Source: SFC, 1992).

lead to the need for additional fishways. Specifically, flows from the dam could impact fish attraction flows from fish passage facilities. Both Interior and MDEP request that final construction plans for the habitat improvement work be approved by, and carried out under the auspices of, the MDIFW, USFWS, and ASRSC. MDEP further recommends that the enhanced area be monitored on an annual basis to determine if ice and high spring flows have altered the placement of boulders. SFC would then be required to make any necessary modifications to the enhanced area.

We agree with SFC's alternative proposal of habitat mitigation in lieu of establishing flows in the bypassed reach. Combined with the construction of the deflection jetty in the project tailrace, the placement of boulders and rocks below the bypassed reach would provide significantly enhanced salmonid habitat. Further, we agree that final construction plans for the habitat improvement work should be approved by, and carried out under the auspices of, the MDIFW, USFWS, and ASRSC, and that the enhanced area should be monitored on an annual basis with any necessary modifications made by SFC to the enhanced area.

Fisheries resources summary

SFC's proposals would provide Atlantic salmon juveniles and adults with adequate upstream and downstream passage at the project. Additionally, the construction of a deflection jetty in the project tailrace and the placement of boulders and rocks immediately below the bypassed reach would protect and enhance salmonid habitat in the project area.

4.3.1.3 Vegetation and wildlife resources

SFC is proposing to continue to operate Swans Falls in a run-of-river mode as it has currently and historically. Under such an operational mode, no effect on vegetation and associated wildlife resources, both upland and wetland, would occur.

4.3.1.4 Recreation resources

SFC proposes no new recreational facilities, but does propose to continue to maintain the existing canoe portage. SFC's proposed increase in maximum turbine flow from 390 cfs to 880 cfs would increase turbulence in the tailrace area. Turbine flow increases could adversely impact the public safety of AMC's canoe launching area. In response, SFC proposes two mitigative measures as part of their proposed "Fish Habitat and Tailwater Improvement Plan" (1992). To minimize potential impacts on the canoe launching area, SFC proposes: (1) removing rocks and debris blocking the tailrace channel, and (2) constructing a concrete and rock jetty to deflect flows away from the shore. These measures are designed to decrease flow velocity in the tailrace and deflect flows away from the boat launching area.

SFC would construct the proposed jetty from precast reinforced concrete sections and local rock which would extend from the shore about 140 feet with a 4-foot-wide crest. SFC plans to construct the jetty so that it's submerged about 6 inches below the normal

summertime water surface (380.9-foot- elevation). By ensuring that the jetty is underwater, SFC expects to prevent anglers from using the jetty as a fishing pier. SFC would prevent anglers from using the structure to avoid conflicts between anglers and canoeists launching their boats at the put-in located below the proposed jetty.

MDEP and AMC concur with SFC's proposal to maintain the existing canoe portage trail around the dam. Interior recommends that SFC permit public access to the project area for recreational uses, subject to reasonable safety and liability limitations. Further, MDEP and Interior concur with SFC's proposed "Fish Habitat and Tailwater Improvement Plan" (*see fisheries resources section 4.3.1.2. for further discussion*).

SFC currently provides public access to the project lands with the exception of those areas which are fenced-off for public safety purposes. We agree that SFC should both continue to maintain the canoe portage facility and implement the proposed "Fish Habitat and Tailwater Improvement Plan". The canoe portage and the canoe launching area below the dam are valuable recreational facilities due to the high percentage of canoeing use along the Saco River in the project vicinity. SFC's proposal to maintain the canoe portage trail would continue to protect canoe touring opportunities along the Saco River by ensuring a safe route around the project dam.

Developing the proposed tailrace modifications and deflection jetty would adequately protect the canoe launching area from turbulent waters resulting from the increased powerhouse discharges. Ensuring that the jetty is submerged should prevent conflicts between canoeists and anglers, and also prevent potential safety hazards resulting from anglers fishing off the jetty near turbulent waters. Further, SFC's tailrace fish habitat improvements would create additional salmonid habitat and benefit recreational fishing below the project (*for further discussion and description of the tailrace improvements see section 4.3.1.2*).

In summary, SFC's proposal to maintain the existing canoe portage and modify the tailrace would adequately protect recreational opportunities in the project area.

4.3.1.5 Geology and soils

SFC proposes no land-disturbing or land-clearing activities that would adversely impact geology and soils. SFC's proposed turbine flow increases could result in erosion impacts along the eastern bank of the tailrace. SFC's proposed tailrace channel modifications and deflector jetty would direct the increased powerhouse discharge away from the downstream bank. These proposed measures would minimize turbulence near the shoreline that could contribute to embankment erosion.

4.3.1.6 Aesthetic resources

SFC proposes no land-disturbing or land-clearing activities that could disrupt the aesthetic resources at Swans Falls. SFC's proposed measures to upgrade the generating

facilities would increase the combined discharge capacity of the project and sluice gates from 2,850 cfs to 3,300 cfs. The increased discharge capacity would slightly decrease the amount of time that flows are spilled over the dam, resulting in decreased flows to the bypassed reach. Spillage would occur about eight percent of the time and leakage (25 gpm) would still provide flows to the ledge area located in the bypassed area's primary channel.

We conclude that SFC's proposed project would not adversely affect the aesthetic resources in the project vicinity. Reduced flows over the spillway resulting from SFC's proposed upgraded generating facilities would not significantly affect scenic views of the ledge area in the bypassed reach.

4.3.1.7 Archeological and Historic resources

Although the Swans Falls' facilities date back to about 1923, they are not eligible for listing on the National Register due to their loss of historic integrity. There are no known archaeological sites of historic significance in the project area. We conclude that Swans Falls would not affect any cultural resources listed in or eligible for listing in the National Register.

Nevertheless, there is still the possibility that undiscovered cultural resources exist in the project area. Further consultation with the SHPO would ensure the protection of undiscovered cultural resources if SFC undertakes ground-disturbing activities other than those approved in the exemption.

4.3.1.8 Land use

SFC proposes no measures that would disrupt the existing land use in the project area.

4.3.2 Modifications to the proposed project

4.3.2.1 Water quality and quantity

Monitoring and Gaging. The MDEP recommends that SFC submit plans for controlling and monitoring the impoundment's water level. Interior further recommends that SFC submit plans for releasing and monitoring the required minimum flows (including run-of-river operation) and water level. Interior recommends that the plans include descriptions of all mechanisms and structures that would be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and a plan for maintaining these data for inspection and providing it to the Commission and resource agencies. Additionally, MDEP recommends these plans be reviewed and approved by MDEP.

We agree. The requirement that the exemptee file plans describing the methods for releasing and maintaining run-of-river operation, stable water levels, and how flows would be maintained below the project when the impoundment is refilled after any maintenance and/or repairs should be a condition of any exemption issued for the project. The plans should

include descriptions of all mechanisms and structures that would be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and providing it to the Commission and resource agencies for inspection. Filing and approval of the plans should be required before any new construction or changes in project operation take place.

4.3.2.2 Fisheries resources

Fish passage. Interior, MDEP, and NHDFG generally concur with SFC's conceptual fish passage plans. Interior, however, further states that the upstream and downstream facilities should be in accordance with specifications of the USFWS and that the facilities should be constructed according to the following schedule:

NHDFG concurs with the Interior's schedule for the preparation and filing of fish passage plans.

The MDEP states that the upstream and downstream facilities at Swans Falls should be constructed according to the following schedule:

Upstream: within 1 year following the installation and successful operation of upstream fish passage facilities at Hiram, with plans prepared and filed no later than the completion of the above described facilities at Hiram;

Downstream: no later than 2 years following the initiation of juvenile Atlantic salmon stocking above Swans Falls, or following the successful passage of adult salmon above the project, with plans prepared and filed no later 1 year following the initiation of stocking above Swans Falls.

Additionally, Interior, MDEP, and NHDFG all generally state that plans covering the facilities' operation, maintenance, and monitoring should be developed by SFC in consultation with, and filed for approval with, the agencies. Interior requests this information no later than 6 months prior to completion of the facilities. The MDEP requests the plans be submitted with the final design drawings specified in the above schedule. The NHDFG simply requests that the plans be developed prior to facility installation.

SFC objects to Interior's specific timetable for installation of fish passage facilities at Swans Falls. SFC comments that the requirement for fish passage facilities at Swans Falls should be linked to the successful operation of fish passage facilities at downstream dams and to a successful salmon stocking program upstream of Swans Falls *before* facilities are required at Swans Falls.

We disagree. Establishment of a successful Atlantic salmon stocking program or the successful passage of salmon at projects below Swans Falls before requiring facilities to be installed at Swans Falls is not related to the degree of success. Simple initiation of an active fishery management program would be reason enough to require the installation of adequate

facilities. For example, the stocking of juvenile salmon above Swans Falls would require adequate downstream fish passage facilities at Swans Falls. Downstream passage facilities would be required regardless of the relative success of the stockings. Further, we agree that plans covering the passage facilities' operations, maintenance, and post-construction monitoring are necessary. These plans should be developed in consultation with the agencies and filed with the agencies for approval before construction.

Fisheries resources summary

SFC's proposed fish passage facilities, combined with the agencies' requirements, would provide Atlantic salmon juveniles and adults with upstream and downstream passage at the project. Additionally, SFC's proposed deflection jetty in the project tailrace would protect existing uses and access below the project while deflecting project waters to enhanced salmonid habitat immediately below the bypassed reach. Thus, the redevelopment and continued operation of Swans Falls would be fully consistent with the long range Saco River fishery management plans outlined in USFWS *et al.* (1987) (*for further discussion see sections 3.2.1, 3.3.1.2, and 4.3.1.2*).

4.3.2.3 Vegetation and wildlife resources

The agencies either recommend or agree with the run-of-river operational mode. As discussed in section 4.3.1.3, no effect on vegetation and associated wildlife resources, both upland and wetland, would occur under this operational mode.

4.3.2.4 Recreation resources

Public Access Signs. Interior recommends that SFC permanently and prominently post the public access at Swans Falls so that its availability is made known to the public.

We agree. Swans Falls is located within a section of the Saco River that receives significant use among canoeists, and a safe, well marked portage around the project dam is essential. Permanent and prominent signs at SFC's canoe portage would ensure that the public is made aware of and is able to locate the portage around the project dam.

We conclude that SFC could improve the public's awareness of the canoe portage by ensuring that it has signs at the take-out above the dam, the put-in below the dam, and directional signs along the 600-foot-long trail. Conspicuous signs posted at the canoe portage facility would ensure that the public is aware of the recreational access opportunities at Swans Falls.

4.3.2.5 Other resources

Access to project Interior requests that the exemptee permit representatives from the USFWS access to all of the project facilities related to fish and wildlife mitigative measures and for their purposes of documenting compliance with license conditions.

We concur. Permitting the USFWS access to the project for the purpose of reviewing project operations or facilities, as they relate to fish and wildlife protection measures would provide the Commission, the exemptee, and the resources agencies with valuable information regarding the adequacy of required mitigative measures. We have, for example, recommended that the agencies be allowed access to project flow records so that information regarding the adequacy of their recommended mitigative measures can be evaluated. Furthermore, we believe that project records should be provided to the USFWS, MDEP, and MDIFW within 30 days of the agency's written request for such data.

Land Use AMC, in a letter filed April 15, 1994, requests the we investigate shoreland protection opportunities at Swans Falls for the protection of aesthetic and recreational resources.

The Swans Falls impoundment is about 4 miles long and we estimate that the total shoreline length including both sides of the impoundment is about 8 miles. Lands surrounding the impoundment between the normal full pond elevation (395.9 feet) and the 396.4-foot-elevation contour are included within the project boundary. SFC currently owns about five acres within the project boundary, and most of the land area owned by SFC is near the Swans Falls dam and powerhouse.

SFC proposes no land-disturbing or land-clearing activities that would adversely affect the aesthetic resources along the impoundment. Continued operation of Swans Falls as proposed is in accordance with Maine's shoreland zoning ordinances. Existing municipal shoreland zoning ordinances are discussed in section 3.1.2 and 4.2.2.1.5.

Providing an additional buffer zone around the Swans Falls impoundment would likely require SFC to obtain lands or easements at a substantial financial cost. For example, SFC would need to acquire the rights for nearly 100 acres in order to provide a 100-foot-wide buffer around the impoundment. Swans Falls is a small hydroelectric project and requiring a buffer zone of this size would likely result in significant effects on the project economics.

We conclude that the existing project boundary at Swans Falls ensures adequate protection of the recreation opportunities at the project. The SRCC and the State of Maine's shoreland zoning laws would continue to protect natural resources along the Saco River from excessive or inappropriate development. No federal or state agency recommended the need for a buffer zone around the project impoundment, and we conclude that additional buffer zones are not warranted at Swans Falls.

4.3.3 No Action Alternative (Swans Falls)

Under the no action alternative, SFC would continue to operate Swans Falls as an operating unlicensed project. There would be no increased energy production and no enhancement of the existing environment. Upstream fish passage would continue to be blocked by the dam and access to potentially available Atlantic salmon habitat above the project would be denied. Downstream fish passage from any upstream stockings would be accomplished via spillage over the dam.

4.4 RELATIONSHIP TO LAWS AND POLICIES

NEPA[35] mandates the preparation of an EIS for all federal actions significantly affecting the quality of the human environment. We have determined that issuance of new licenses for Bonny Eagle and Skelton, an exemption for Swans Falls, and amendments for Hiram, West Buxton, and Bar Mills in a manor generally consistent with the scheme for installation of fish passage facilities set forth in the Agreement, are actions that fall within this NEPA mandate.

Section 10(a) of the FPA[36] requires that each licensed project be best adapted to a comprehensive plan for improving or developing a waterway for, among others, beneficial public uses including recreational purposes. The Commission, therefore, requires that each license applicant consult with the concerned federal, state, and local recreation agencies to determine an appropriate level of development to help meet the recreational needs of the area.

The Commission, the SHPO, and the Council executed a Programmatic Agreement on October 27, 1993, for protecting historic properties affected by 10 of CMP's new licensed projects. The Programmatic Agreement would satisfy all of the Commission's obligations under Section 106 of the National Historic Preservation Act (NHPA). For Swans Falls, the Commission, after consulting the SHPO under Section 106 of the NHPA, determined that the project would not affect any historic properties.

Under the Fish and Wildlife Coordination Act[37], the Commission must consult with the USFWS and the MDIFW on preventing loss or damage to fish and wildlife resources and on developing and improving water resources.

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[35] 42 U.S.C. §§4332 *et seq.*

[36] 16 U.S.C. §803(a)

[37] 16 U.S.C. §§661 *et seq.*

Consistent with the requirements of the Endangered Species Act[38], the Commission requires applicants for license and exemption to submit a list of federally listed or proposed threatened or endangered species and critical habitats occurring in the vicinity of projects. Interior says that except for occasional transient individuals, no federally listed or proposed endangered or threatened species are known to exist in the projects' impact area. Therefore, no biological assessment or further consultation under the Endangered Species Act is required.

CMP and SFC would need to consult with the Corps to determine if a permit is needed for the proposed excavations of the river below their respective projects. This is required under Section 404 of the Clean Water Act, which regulates the placing of dredge or fill materials in waters of the United States.

Pursuant to Section 401(a)(1) of the Clean Water Act, the Commission may not issue a license for a hydroelectric project unless either the license applicant obtains water quality certification from the state in which the discharge will originate, or the certifying agency waives certification.[39] Section 401(a)(1) permits a federal licensing agency to deem certification waived if the certifying agency fails to act on a water quality certification request within a reasonable period of time, not to exceed one year. While a WQC is not required for an exemption, the MDEP issued a WQC for Swans Falls on July 6, 1993. CMP applied for WQCs for Bonny Eagle and Skelton on December 16, 1991, and December 12, 1991, respectively. CMP simultaneously withdrew and refiled the requests on December 8, 1992. CMP again simultaneously withdrew and refiled the requests on December 8, 1993, December 5, 1994, and again on December 1, 1995. MDEP is currently reviewing CMP's requests.

Maine has regulations to maintain water quality standards in the Saco River. In addition, the Clean Water Act has anti-degradation policies, which are to prevent degradation of waters that meet or exceed the standards. The mechanism by which the state enforces the anti-degradation policy for hydropower projects is water quality certification. In the WQC, the state specifies requirements for project operation that it feels are sufficient to maintain adequate water quality.

4.5 UNAVOIDABLE ADVERSE IMPACTS

Short-term, unavoidable impacts from increased dust, noise, heavy equipment traffic, and increased water turbidity would occur during the construction of fish passage facilities at all the projects, the placement of fish habitat boulders at Skelton, and the construction of the deflection jetty and tailwater habitat improvements at Swans Falls.

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[38] 16 U.S.C. §1531, as amended

[39] 33 U.S.C. §1341(a)(1).

4.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Continued operation of the existing projects would continue the commitment of lands and waters previously developed for energy production. Habitat lost or changed during the construction of fish passage facilities at the projects, the placement of fish habitat boulders at Skelton, and the construction of a deflection jetty and tailwater habitat improvements at Swans Falls would be reversed in time with proper reclamation techniques.

4.7 RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

The Saco River Projects are expected to provide an average of about 237,000 GWh of energy each year to CMP's and PSNH's service area. This long-term productivity would extend at least as long as the duration of the licenses (30 years). The recommended alternative is designed to avoid long-term decreases in biological productivity of the system.

If the projects were to operate solely to maximize hydroelectric generation, there would be a loss of long-term productivity of the river fisheries and anadromous fisheries restoration efforts due to decreases in habitat availability and the loss of upstream and downstream fish passage. With the alternatives recommended and appropriate enhancement or mitigation at each site, the Saco River Basin should still be able to achieve the anadromous fisheries restoration goals established by the agencies and other enhancements to aquatic life.

5. STAFF'S CONCLUSIONS

This section summarizes the staff's conclusions regarding the installation of fish passage facilities, the issuance of new licenses for Bonny Eagle and Skelton, and the issuance of an exemption for the unlicensed Swans Falls. Section 5.1 is a summary of the cumulative effects, and the significant environmental effects of the principal alternatives are presented in section 5.2. Section 5.3 contains an economic evaluation and summary of the alternatives while section 5.4 deals with staff's findings and recommendations. The fish and wildlife agency recommendations are discussed in section 5.5. Section 4 contains additional details and the basis for the impacts assessment summary.

As concerns fish passage, the principal alternatives evaluated are:

(1) Recommend that the proposed scheme for installation of fish passage facilities set forth in the Agreement be adopted and implemented as proposed. This alternative includes approving the amendments to the existing licenses, which were filed by CMP per the Agreement.

(2) No Agreement alternative resulting in no change to the existing environment (*as described in sections 2.2.3, 3.2.1, and 4.1.4*). Fish passage facilities would not be installed at some of the mainstem projects and all projects would continue to operate under the terms and conditions of the existing licenses. Interior, however, has reserved the authority to prescribe fish passage facilities at the projects currently up for relicensing and presumably, would do so.

In section 4.1.2, we also evaluated modifications to the scheme proposed in the Agreement. However, our analysis indicated that the Agreement's scheme was not only the most effective approach, but the only reasonable approach, for installing fish passage facilities at dams on the mainstem Saco River given the inherent uncertainties surrounding fish restoration in the basin. Therefore, we have not included any further staff modifications to the Agreement's scheme as an alternative, except including provisions for Commission statutory responsibilities and authority over licensed projects affected by the Agreement.

For licensing Bonny Eagle and Skelton, the four principal alternatives evaluated are:

(1) Licensing the projects as proposed by CMP. The enhancement measures would be those proposed by CMP following consultation with the resource agencies (*see section 2.3.1 for proposed enhancement measures*).

(2) Licensing the projects as proposed by CMP, but supplemented by Interior's recommended enhancement measures (*see section 2.3.2 for recommended enhancement measures*).

(3) Licensing the projects as proposed by CMP, but supplemented by staff-recommended enhancement measures (*see sections 2.6 and 5.4*).

(4) No action alternative resulting in no change to the existing environment (*as described in section 3*). The projects would continue to operate under the terms and conditions of the existing licenses.

The no action alternative would result in no change to the existing environments. The projects would continue to operate under the terms and conditions of the existing licenses. None of the parties have recommended the no action alternative for either Bonny Eagle or Skelton, and adoption of this alternative would forego any enhancement measures CMP proposes to provide, in addition to those enhancement measures recommended by federal and state agencies and NGOs.

For Swans Falls, the two principal alternatives evaluated are:

(1) Exempting the project as proposed by SFC. The enhancement measures would be those proposed by SFC following consultation with the resource agencies and those terms and conditions mandated by the state and federal agencies (*see section 2.4.1 and 2.4.2 for SFC's proposed enhancement measures and the agencies terms and conditions*).

(2) No action alternative resulting in no change to the existing environment (*as described in section 3*). The unlicensed project would continue to operate as it currently does.

None of the parties have recommended the no action alternative for Swans Falls, and adoption of this alternative would forego any enhancement measures SFC proposes to provide, in addition to those enhancement measures recommended by federal and state agencies.

In section 4.3.2, we also evaluated modifications to the proposed Swans Falls Project; however, our analysis indicated that no additional enhancement measures were needed. The proposed project, with all of the terms and conditions mandated by the state and federal resource agencies would adequately protect all resources in the project area and would be the most beneficial use and development of the water resources. Therefore, we have not included any further alternatives.

5.1 CUMULATIVE EFFECTS SUMMARY

As we defined in Section 1.3.1, the scope of our cumulative effects analysis (CEA) for each resource encompassed different geographic areas depending on their distribution. For anadromous fisheries, the geographic scope of analysis encompasses the Saco River Basin. For wetlands, wetland dependent wildlife resources, and recreational resources, the geographic scope of analysis encompasses the mainstem Saco River. For hydroelectric generation the

geographic scope of analysis encompasses the lower mainstem Saco River at and below Bonny Eagle. For the remaining resource areas, we focused our analysis on the specific project areas of Bonny Eagle, Skelton, and Swans Falls.

The temporal scope looked 30 - 50 years into the future, concentrating on resource effects from reasonably foreseeable future actions. As stated in section 1.3.1, the historical discussion of past actions and effects was, by necessity, limited to the amount of available information for each resource. Table 5-1 summarizes our analysis of the anticipated cumulative effects. Incorporating our enhancement measures as requirements in any new licenses or exemption issued for Bonny Eagle, Skelton, and Swans Falls would result in long-term beneficial impacts to fisheries, recreational resources, wetlands and dependent wildlife resources of the Saco River Basin.

Table 5-1 Cumulative Effects Summary for key resources within the Saco River Basin (Source: the staff)

CEA Resource	CMP's Proposal including Agreement	CMP's proposal with Interior's recommendations	Staff selected alternative	No Action
Anadromous fisheries	Anadromous fish restoration efforts would result in cumulative benefits due to the immediate installation of upstream fish passage facilities at Cataract and Skelton and downstream passage facilities at all mainstem projects. Habitat during fish migration periods would result in cumulative benefits by increased flows from Bonny Eagle and Skelton.	Effects from installation of fish passage facilities would be the same as those under CMP's proposal Interior's flows would be higher and habitat availability and duration would be somewhat increased	With implementation of the Agreement, fish passage effects would be the same as those proposed by both Interior and CMP. Beneficial cumulative effects would result from the increase in anadromous fish migration flows during major migration periods and low flow months. Further, staff's flows would provide significant habitat increases below Bonny Eagle, West Buxton, Skelton, and Cataract.	Installation of fish passage facilities would vary depending on existing license conditions. Flows for fish habitat, including necessary zone-of-passages, would continue to fluctuate widely at projects below Bonny Eagle.
Wetlands and wildlife resources	Cumulative beneficial effects on wetlands below the projects would result from minimum flow releases.	Although additional downstream flows would provide wetlands enhancement below the projects, an estimated loss of 52 acres of wetlands on the Bonny Eagle reservoir from run-of-river operation may not be offset by enhancements, therefore resulting in a net loss of wetlands.	Cumulative beneficial effects on wetlands would result from minimum flow releases and required enhancements of degraded wetlands. An estimated loss of 52 acres of wetlands on the Bonny Eagle reservoir from run-of-river operation may not be offset by enhancements, therefore resulting in a net loss of wetlands.	No change.

Table 5-1 (Continued)

CEA Resource	CMP's Proposal including Agreement	CMP's proposal with Interior's recommendations	Staff selected alternative	No Action
Recreation resources				
Sport Fishing	Installing fishways at the projects would result in long term cumulative angling benefits by restoring an anadromous fishery at the project sites; minimum flow increases and tailrace modifications would improve angling opportunities	Interior's recommended minimum flows would further benefit boat fishing below the projects	Improved access to Bonny Eagle's bypassed reach and our recommended minimum flows would further enhance angling opportunities below the projects	Angling for anadromous fish would remain limited in the Saco River; periods when tailrace & bypassed flows are restricted to leakage would continue to limit angling
Canoe Touring	CMP's recent portage improvements and proposed measures to investigate the need for additional primitive camp sites and portage improvements cumulatively benefit canoe touring on the lower Saco River	No additional benefit	Providing additional access signs and our recommended canoe portage improvements at Bonny Eagle would result in cumulative benefits on canoe touring on the lower Saco River	Portaging canoes at Bonny Eagle would remain a safety issue and inhibit canoeing on the lower Saco River
Hydroelectric generation	Cumulative effects on hydroelectric generation would result from increased minimum flows, resulting in a decrease of about 7,565,000 kWh	Cumulative effects on hydroelectric generation would result for increased minimum flows, resulting in a decrease of about 9,153,000 kWh	Cumulative effects on hydroelectric generation would result from increased minimum flows, resulting in a decrease of about 9,153,000 kWh	No change from existing generation of 294,420,000 kWh of energy

5.2 COMPARISON OF ENVIRONMENTAL EFFECTS OF PROPOSED ACTIONS AND ALTERNATIVES

5.2.1 Fish Passage Agreement

Table 5-2 provides a summary comparison of the effects and enhancement measures associated with the Agreement under the two alternatives. The projects as they currently exist (no Agreement alternative) provide the greatest amount of power generation, but result in either no fish passage enhancements or uncertain future enhancements. The Agreement establishes criteria and a comprehensive approach to the future installation of fish passage facilities while providing for the continued generation of electric power.

Table 5-2 Comparative environmental effects of the Agreement and the no Agreement alternative (Source: the staff).

Project	Agreement as Proposed	No Agreement
Cataract	Upstream and downstream fish passage facilities for salmon, shad, and river herring operational at all dams by May 1, 1997. Would open 12 miles of potential habitat.	Same as under the Agreement[1]
Skelton	Upstream and downstream fish passage facilities for salmon, shad, and river herring operational by May 1, 1998, or within 3 years of new license, whichever occurs later. Would open 3 miles of potential habitat and 23% of Basin's shad habitat. Would also provide trap-and-truck facilities.	Same as under the Agreement[2]
Bar Mills	**Upstream** - Treated as group with West Buxton, Bonny Eagle, and Hiram with passage at first of dams to be operational no earlier than 5/1/2005. Subsequent facilities dependent on assessments and spaced at minimum 2 year intervals. Would open 4 miles of potential habitat and access to West Buxton tailwaters. Reach from Bar Mills to Bonny Eagle contains 33% of Basin's shad habitat. **Downstream** - installed within 2 years of license amendment.	Continued inclusion of Article 21 which states facilities to be installed as prescribed by FERC.

[1] By Order issued July 18, 1994, the Director DPCA approved CMP's request for an extension of time to install fish passage facilities at Springs and Bradbury consistent with the Agreement.

[2] CMP proposes to install fish passage facilities as part of their new license proposal.

Table 5-2 (Continued)

Project	Agreement as Proposed	No Agreement
West Buxton	**Upstream** - same as Bar Mills. However, would open 2 miles of potential habitat including access to New River Channel.	**Upstream** - Continued inclusion of Article 404 requiring functional design drawings by 1/1/2004.
	Downstream - installed within 2 years of license amendment.	**Downstream** - status currently pending.
Bonny Eagle	**Upstream** - same as Bar Mills. Would open 20 miles of potential habitat and 51% of Basin's salmon habitat.	**Upstream** - no provisions for future installation. Access for migrating fish would continue to be blocked.
	Downstream - installed within 2 years of new license.	**Downstream** - within 2 years of the new license.
Hiram	**Upstream** - same as Bar Mills. Would open 46% of Basin's salmon habitat.	No future provisions for the installation of facilities. Fish passage would continue to be blocked.
	Downstream - installed within 2 years of upstream stocking of salmon.	
Swans Falls	**Upstream** - Installed in tandem with Hiram. Would open river to New Hampshire headwaters.	No future provisions for the installation of facilities.
	Downstream - installed within 2 years of upstream stocking of salmon.	

5.2.2 New Licenses

5.2.2.1 Bonny Eagle and Skelton

Table 5-3 and Table 5-4 provides a summary comparison of the impacts and enhancement measures associated with Bonny Eagle and Skelton under the various alternatives, respectively. The projects as they currently exist (no action alternative) provide the greatest amount of power generation, but result in no environmental enhancements. The projects as proposed with our modifications (*see sections 2.6 and 5.4 for list of recommended measures*) provide a substantial amount of enhancement while providing for the continued generation of electric power.

Table 5-3 Comparative environmental effects of the Bonny Eagle Project with CMP's proposal, CMP's proposal with Interior's recommendations, CMP's proposal with staff's modifications, and the no action alternative (Source: the staff).

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Water Quality and Quantity				
Project operation and minimum flows	Overall water quality enhanced at both Bonny Eagle and West Buxton due to seasonal minimum flows; significantly enhanced water quality in the New River Channel from implementation of 50 cfs seasonal flow	Establishment of year-round minimum flows and run-of-river operations would enhance water quality - incrementally, more beneficial than CMP's proposed flows; New River Channel water quality similar although flows would be higher	Same as Interior's	Project would have no minimum flow in either the tailwaters or the New River Channel; leakage flows would remain commonplace
Fisheries				
Fish passage	Downstream passage installed immediately would provide long-term cumulative benefits for downstream migrants; future provisions for upstream facilities	Same as CMP's	Same as CMP's	No future provisions for installing fish passage; downstream passage would continue to be interim while upstream passage would continue to be blocked

Table 5-3 (Continued)

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Minimum flows	Minimum flows would result in cumulative beneficial effects on fisheries habitat below Bonny Eagle; adequate zone-of-passage below Bonny Eagle and resident trout habitat increased under extreme flow conditions in the critical summer months	Run-of-river operation and minimum flows would result in cumulative beneficial effects on fisheries habitat for most species below Bonny Eagle; optimum zone-of-passage would be provided during the peak of anadromous fish migration periods below projects downstream of Bonny Eagle	Same as Interior's	No enhancement of aquatic habitat: leakage flows from the project would be maintained during periods when the project was not peaking; zone-of-passage would be temporary, available only during high flow events or peaking
New River Channel	Seasonal trout fishery would be established with release of 50 cfs	100 cfs would provide slightly more habitat than under CMP's proposal	Same as Interior's	No enhancement of aquatic habitat; leakage flows and periodic spill events would be the only flows
Impoundment levels	Impoundment fisheries would continue to be adversely impacted by fluctuations (especially centrarchids)	Impoundment fisheries would be significantly enhanced by maintenance of a stable water level during spawning	Same as Interior's	Same as CMP's
Vegetation and Wildlife				
Reservoir wetlands	No effect	Adverse effect: potential loss of about 52 acres of aquatic bed wetlands by maintenance of the reservoir at full pool (i.e., run-of-river operation)	Potential loss of about 52 acres of aquatic bed wetlands during certain times of the year; beneficial effects from the enhancement of 15 acres of wetlands	No effect

Table 5-3 (Continued)

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Reservoir wildlife	No effect	Minor to moderate beneficial effect on nesting waterfowl because of stable reservoir levels from May 1 through July 15	Same as Interior. The benefits of 15 acres of wetlands enhancement	No effect
Downstream wetlands and wildlife	Minor cumulative benefits on wetlands would occur as a result of CMP's minimum flow releases from May 1 to Nov. 30	Minor cumulative benefits on wetlands would occur as a result of run-of-river flows and minimum flow releases; enhancement slightly more beneficial than CMP's	Same as Interior	No effect. wetlands would continue to be adversely affected by project's peaking operation
Recreation				
Fish passage	Long-term cumulative benefits on angling are expected as a result of the proposed fishways and efforts to restore anadromous fish in the Basin	Same as CMP's	Same as CMP's	Angling opportunities for anadromous fish species would continue to remain limited
Monitoring studies	Maintain existing rec facilities and periodically monitor the need for additional rec facilities	No additional benefit	No additional benefit	No established opportunity for CMP and agencies to evaluate the need for additional facilities
Bypassed reach minimum flows	Minimum flows of 50 cfs would improve angling quality in the bypassed reach by 100% over leakage flows	Relatively small incremental increase in angling quality from 50 cfs to 100 cfs	Relatively small incremental increase in angling quality from 50 cfs to 100 cfs	Limited angling opportunities within the bypassed reach due to leakage flows of 5 cfs

Table 5-3 (Continued)

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Additional recreation facilities	Long term benefits resulting from the development of the only project barrier-free rec facility	Additional hard-surfaced boat launch would provide an alternative to the existing commercial launch	Barrier-free picnic area providing access to the bypassed reach; improved canoe portage; and additional access signs would further enhance recreation opportunities over CMP's proposal	Recreation opportunities would remain limited in the lower section of the project and remain unaccessible to disabled population
Geology and Soils				
Shoreline erosion	Continued localized shoreline erosion resulting water level fluctuations; restricting impoundment fluctuations to 4.3' would help to prevent erosion effects from excessive drawdowns	Project operation would stabilize impoundment and benefit geological resources by minimizing shoreline erosion caused from water level fluctuations	Project operation would stabilize impoundment and benefit geological resources by minimizing shoreline erosion caused from water level fluctuations	Without any impoundment water level restrictions, excessive drawdowns could result in significant erosion effect
Cultural				
Historic project facilities & 10 archaeological sites	Long term benefits from implementing the Programmatic Agreement; protecting historic features of the project facilities and archaeological sites	No additional benefits	No additional benefits	Routine maintenance may affect the historic values of the project facilities and long term adverse effects may occur to the archaeological sites due to recreation use or localized erosion

Table 5-4 Comparative environmental effects of the Skelton Project with CMP's proposal, CMP's proposal with Interior's recommendations, CMP's proposal with staff's modifications, and the no action alternative (Source: the staff).

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Water Quality and Quantity				
Project operation and minimum flows	Overall water quality significantly enhanced at both Skelton and Cataract due to year-round minimum flows; especially during DO critical summer periods	Establishment of year-round minimum flows and run-of-river operations would significantly enhance water quality - although higher flows than CMP's proposed flows, water quality effects would be similar	Same as Interior's	Project would have no minimum flow and leakage flows would remain during non-peak periods
Fisheries				
Fish passage	Upstream and downstream fish passage facilities operational by May 1, 1998, or within 3 years of new license, whichever occurs later. Cumulative beneficial effects would result from an additional 3 miles of anadromous fish habitat and 23% of Basin's shad habitat. Would also provide trap-and-truck facilities.	Same as CMP's	Same as CMP's	Existing upstream passage facilities would remain in place, although the facilities are inadequate for the upstream movement of anadromous fish; downstream facilities would continue to consist of an interim log sluice

Table 5-4 (Continued)

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Minimum flows	Cumulative beneficial effects on fisheries habitat below Skelton would result from seasonal minimum flows; adequate zone-of-passage at Skelton and resident trout habitat increased in the critical summer months	Run-of-river operation and minimum flows would provide cumulative benefits on anadromous fisheries below Skelton; optimum zone-of-passage would be provided during the peak of anadromous fish migration periods below projects downstream of Skelton	Same as Interior's	No enhancement of aquatic habitat; leakage flows from the project would be maintained during periods when the project was not peaking
Vegetation and Wildlife				
Reservoir wetlands and wildlife	No effect	No effect	No effect	No effect
Downstream wetlands and wildlife	Minor cumulative benefits on wetlands would result from year-round minimum flow releases	Minor cumulative benefits on wetlands would occur as a result of run-of-river operation and minimum flow releases; enhancement slightly more beneficial than CMP's	Minor cumulative benefits on wetlands would occur with staff's minimum flow releases; enhancements similar to CMP's	No effect
Recreation				
Fish passage	Long-term cumulative benefits are expected as a result of implementing the proposed fishways and efforts to restore an anadromous fishery in the Basin	Same as CMP's	Same as CMP's	Angling opportunities for anadromous fish species would continue to remain limited

Table 5-4 (Continued)

Resource	CMP's Proposal	CMP's Proposal with Interior's Recommendations	CMP's Proposal with Staff's Modifications	No Action
Recreation monitoring	Maintain existing rec facilities and periodically monitor the need for additional rec facilities	No additional benefit	No additional benefit	No established opportunity for CMP and agencies to evaluate the need for additional facilities
Geology and Soils				
Shoreline erosion	Continued localized shoreline erosion resulting water level fluctuations; restricting impoundment fluctuations to 2.5' would help to prevent erosion effects from excessive drawdowns	Project operation would stabilize impoundment and benefit geological resources by minimizing shoreline erosion caused from water level fluctuations	Project operation would stabilize impoundment and benefit geological resources by minimizing shoreline erosion caused from water level fluctuations	Without any impoundment water level restrictions, excessive drawdowns could result in significant erosion effect
Cultural				
Archaeological sites	Long term benefits from implementing the Programmatic Agreement which would protect the four archaeological sites	No additional benefits	No additional benefits	Long term adverse effects may occur to the archaeological sites due to recreation use or localized erosion

5.3 ECONOMIC EVALUATION OF THE PROPOSED ACTIONS AND ALTERNATIVES

As explained in *Mead Corporation* [3], the Commission assesses the economic consequences of proposed alternatives using a current-cost approach that does not purport to predict future economic trends over the term of the license; rather, it reviews economic considerations in light of what is known at the time of licensing.

As discussed in section 2.6.1 and shown in Table 2-3, the six existing CMP mainstem Saco River Projects under median flow conditions, generate 294,420,000 kWh of energy consisting of 160,766,000 kWh of on-peak energy and 133,654,000 kWh of off-peak energy. Bonny Eagle and Skelton contribute 43,632,000 kWh and 103,008,000 kWh of energy, respectively. **The power produced by CMP's Saco River Projects under existing conditions would be about $1,652,000 less expensive (net annual benefits) then CMP's current avoided costs for the same amount of power**.

We have duplicated Table 2-2 and included it below as Table 5-5 for the convenience of reading the following discussion:

Under CMP's proposed operational and non-operational enhancement measures at the six CMP projects, including provisions of the Agreement, cumulative energy generation would decrease by about 7,565,000 kWh (about 2.6 percent) with on-peak energy generation decreasing by about 5,686,000 kWh. Off-peak energy would decrease by about 1,879,000 kWh. The cumulative power value would decrease by about $217,075 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,222,375 annually. The power produced by CMP's Saco River Projects as proposed would be about **$3,570,375** more expensive than alternative generation in the region **(net annual benefits)**.

Under Interior's and the NGO's recommended operational and non-operational enhancement measures for the six projects, including provisions of the Agreement, cumulative energy generation would decrease by about 9,153,000 kWh (about 3.1 percent) with on-peak energy generation decreasing by about 22,097,000 kWh. Off-peak energy, however, would increase by about 12,944,000 kWh. The cumulative power value would decrease by about $302,898 annually. The cumulative cost of CMP's non-operational enhancement measures at all six projects, combined with the cumulative power value loss at all six projects would be about $5,218,688 annually. The power produced by CMP's Saco River Projects under Interior's and the NGO's alternative would be about **$3,566,688** more expensive than alternative generation in the region **(net annual benefits)**.

Staff's recommended minimum flow operating proposals and non-operational enhancement measures for the six CMP projects, including provisions of the Agreement,

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[3] 72 FERC ¶ 61,027 (1995).

Table 5-5 Changes in production, power values, incremental costs, and net benefits for all CMP's Saco River Projects[1] under each operational alternative considered (Source: the staff).

Min. Flow Proposed by	On-peak Energy Generation Loss/Gain in 1,000 kWh	Off-peak Energy Generation Loss/Gain in 1,000 kWh	Operational Incremental Annual Costs or Benefits in Dollars	Total Annual Costs Including Non-Operational Environmental Enhancement Costs in Dollars	Total net annual benefits/loss considering all capital costs and operational costs
CMP's	-5,686	-1,879	-$217,075	-$5,222,375	-$3,570,375
Interior's	-22,097	+12,944	-$302,898	-$5,218,688	-$3,566,688
Staff's 800 cfs	-17,609	-3,473	-$520,399	-$5,551,629	-$3,899,629
Staff's 600 cfs	-13,321	-4,798	-$436,867	-$5,468,097	-$3,816,097
Staff's R-O-R	-28,982	+20,588	-$324,617	-$5,355,847	-$3,703,847
Staff's 800/250 cfs scenario	-13,891	-1,641	-$386,079	-$5,417,309	-$3,765,309
Staff's recommended scenario	-22,097	+12,944	-$302,898	-$5,334,128	-$3,682,128

[1]Hiram, Bonny Eagle, West Buxton, Bar Mills, Skelton, & Cataract.

would result in cumulative energy generation decreasing by about 9,153,000 kWh (about 3.1 percent) with on-peak energy generation decreasing by about 22,097,000 kWh. Off-peak energy, however, would increase by about 12,944,000 kWh. The cumulative power value would decrease by about $302,898 annually. The cumulative cost of staff's non-operational enhancement measures combined with the cumulative power value loss at all six projects would be about $5,334,128 annually. The power produced by CMP's Saco River Projects under the staff's alternative would be about **$3,682,128** more expensive than alternative generation in the region **(net annual benefits)**.

5.4 COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA, 16 U.S.C §§ 797(e) and 803(a)(1), respectively, require the Commission to give equal consideration to all uses of the waterway on which the project is located. When the Commission reviews a hydropower project, the recreational, fish and wildlife, and other nondevelopmental values of the involved waterway are considered equally with its electric energy and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

5.4.1 Fish Passage Agreement

Based on our independent review and evaluation of the proposed Agreement and the no action alternative under Sections 4(e) and 10(a) of the FPA, we have selected the proposed Agreement including the Annex as the preferred option. The Annex to the Agreement, filed on April 15, 1996, sets forth criteria to determine the need for, timing, and design of interim and permanent upstream fish passage facilities at Bar Mill, West Buxton, Bonny Eagle, Hiram, and Swan Falls. The data and technical information generated from the various tasks of the Annex would allow for the orderly and effective determination of anadromous fish restoration needs and implementation of passage measures for the Saco River. Based on our findings, we recommend that the Agreement and Annex be approved and that its provisions be included in any new licenses issued for Bonny Eagle and Skelton. Further, we recommend approving the amendments, filed in accordance with the Agreement, for the existing licenses of Bar Mills, West Buxton, and Hiram.

We recommend the scheme for installation of fish passage facilities contained in the proposed Agreement because: (1) including the provisions of the Agreement in new licenses for Bonny Eagle and Skelton and amendments for Bar Mills, West Buxton, and Hiram would allow CMP to operate the projects as beneficial and dependable sources of electric energy for CMP's customers; (2) implementing the proposals contained in the Agreement would result in improvements to the existing environment; and (3) we believe those proposals would be best adapted to a comprehensive plan for the use of water power development, while concurrently protecting and enhancing natural resource values and uses.

5.4.2 New licenses

Based on our independent review and evaluation of the proposed projects, the projects with the resource agency recommendations, the projects with our recommendations, and the no action alternative under Sections 4(e) and 10(a) of the FPA, we have selected the proposed projects with our recommended environmental measures, including the Agreement (*see section 5.3.1 above*) as the preferred option. Based on our findings, we recommend issuing new licenses for the continued operation of Bonny Eagle and Skelton.

We recommend this alternative because: (1) issuing new licenses would allow CMP to operate the projects as beneficial and dependable sources of electric energy for CMP's customers; (2) implementing our recommended environmental measures would result in improvements to the existing human environment; and (3) we believe our alternative would be best adapted to a comprehensive plan for the use of water power development, while concurrently protecting and enhancing natural resource values and uses. Our selected alternative includes the measures that are listed below under each project.

5.4.2.1 Bonny Eagle

(1) Water Resources

- Provide plans describing the methods for releasing required minimum flows and monitoring project operations
- Limit reservoir drawdowns to no more than 1 foot from October 15 to ice-out

(2) Fishery Resources

- Install downstream fish passage facilities, as stipulated in the Agreement
- Provide for the future installation of upstream fish passage facilities, as stipulated in the Agreement
- Monitor the effectiveness of the fishway facilities for 3 years following installation
- Ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS, subject to final Commission approval
- Reserve the Commission's authority to require the construction, operation and maintenance of fishways prescribed by the Secretary of the Interior
- Operate the project in a run-of-river mode from May 1 through July 15 and from September 1 through October 15. All other times the minimum flow should be 800 cfs or inflow, if less.
- Provide a seasonal minimum flow of 100 cfs in the New River Channel from April 1 to September 30 for the establishment of a seasonal trout fishery (flow would be a portion of the overall project minimum flow)
- Monitor the fish populations and the adequacy of flows in the New River Channel
- Conduct benthic macroinvertebrate sampling below West Buxton for 2 years

(3) Terrestrial Resources

- Enhance 15 acres of degraded wetlands at three existing sites around the Bonny Eagle Reservoir

(4) Recreation Resources

- Maintain the existing recreation facilities at Bonny Eagle which includes ensuring the continued operation of the Limington Rips recreation facility

- Periodically conduct recreation use monitoring studies in consultation with the resource agencies and evaluate the future need for additional recreation facilities (i.e., impoundment boat launch and additional primitive campsites along the impoundment)

- Provide an interpretive sign describing Bonny Eagle's history

- Improve the existing canoe portage by constructing a series of crib steps which gradually lead down to the canoe put-in area

- Develop a barrier-free picnic area on the northeast side of Bonny Eagle Island that would also provide access to the New River Channel

- Provide additional signs at the recreation access areas to ensure that the public is aware of the recreational resources at Bonny Eagle

(5) Cultural Resources

- Implement the executed Programmatic Agreement to protect cultural resources at Bonny Eagle

Among the measures we've selected for Bonny Eagle, there are several that affect the project's economics and warrant further discussion. These measures were analyzed in section 4 and are discussed below under the appropriate resources: water resources, fisheries resources, terrestrial resources, recreation resources, and cultural resources.

Water Resources. We recommend that plans describing the methods for releasing minimum flows and monitoring project operation, and showing how the required flows will be maintained below the project when the impoundment is refilled after any maintenance and/or repairs be prepared by CMP. Information included in the plans should be descriptions of all mechanisms and structures that will be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and providing it to the Commission and resource agencies for inspection. These plans should be approved before any changes in project operation take place.

The capital cost associated with the preparation of these plans would be minimal. Requiring the plans, however, would provide the resource agencies and the Commission with useful and necessary information.

Fishery Resources. We recommend several enhancements for the benefit of fishery resources in the project area and in the Saco River Basin.

Downstream fish passage - In section 4.1.1.3, we discussed the need for fish passage facilities at Bonny Eagle and the requirements for the immediate installation of downstream fish passage facilities contained in the Agreement. We concluded that CMP's proposed conceptual design drawings for Bonny Eagle's downstream fish passage facilities, consisting of a surface bypass at the powerhouse and a downstream gate on the New River Dam, would provide adequate downstream fish passage.

CMP estimates the capital cost associated with the installation of downstream fishways at $250,000. While final fishway design specifics, including spillage and/or transport flows during operation, is proposed to be determined during the final design phase in consultation with the fishery agencies, we conclude that CMP's proposed design would provide significantly improved downstream fish passage. At an annual cost of $57,590 we conclude that the benefits that would result to the Saco River's anadromous fish restoration are worth this expense.

Upstream fish passage - In section 4.1.1.3, we discussed the need for fish passage facilities at Bonny Eagle and the requirements for the future installation of upstream fish passage facilities contained in the Agreement. We concluded that upstream passage facilities would be necessary at some point in the future based on the success and criteria of the anadromous fishery restoration efforts and the fact that the need for the future installation of upstream facilities has been demonstrated by the past, present and future planned stockings of anadromous fish above the projects.

CMP estimates the capital cost associated with the future installation of upstream fishways between $2.3 and $3.3 million (annual cost of $540,140 at worst-case scenario) depending on the number of ladders required. Installation of the ladder(s) would, however, provide significant cumulative benefits to the Saco River's anadromous fish restoration and would eventually enable anadromous fish to utilize significant portions of the upper Saco River, including access to both the Ossipee River and the Little Ossipee River.

Fishway effectiveness studies - To monitor the effectiveness of the upstream fishways, we recommend that CMP's proposed fishway effectiveness studies be conducted for up to 3 years following the installation of upstream fishways. While the capital cost of conducting the studies is estimated at $170,000 per year, information obtained from the studies would provide useful data on current and future fishway design. The annual cost of $80,690 the studies would be more than offset by the benefits to the anadromous fishery restoration.

Project operation and minimum flows - For the enhancement of the Saco's anadromous fish and resident salmonids, we concur with Interior's flow regime. This flow regime would require a run-of-river operation from May 1 through July 15 and from September 1 through October 15 and 800 cfs or inflow, in the remainder of the year. Run-of-river operation during

the early summer and early fall would provide consistent high flows (zone of passage) during the peak of spring upstream migration by Atlantic salmon, American shad, and river herrings and during the peak of fall upstream Atlantic salmon migration. Under run-of-river operation upstream migrating anadromous fish would not be subjected to significantly reduced flows that would occur during peaking operation or with a low minimum flow. Further, habitat availability would be enhanced for inmigrating shad and river herring downstream of Bonny Eagle that would occur under CMP's proposed 400 cfs flow. The USFWS estimates that more than 75 percent of available habitat for shad and river herring in the Saco River basin occurs above Skelton.

As discussed in sections 3.2.1, 3.3.2.2, and 4.2.1.1.2, Atlantic salmon available spawning habitat is extremely limited in the Bonny Eagle/West Buxton Project area and represents only about 3 percent of the available salmon spawning habitat in the entire Saco River basin. In excess of 90 percent of the available salmon spawning habitat in the basin lies above Bonny Eagle. For shad and river herring, based on MDMR's habitat assessment, habitat within the actual tailwater reaches of Bonny Eagle and West Buxton is also not a major portion of the potential spawning and juvenile habitat in the immediate area. Thus, for anadromous fish, we find that the most important use of project waters would be primarily for zone-of-passage flows.

Generally, MDMR (1982) indicates that juvenile American shad and alewife downstream migration takes place from July to December, with spawning taking place from May to July. Our recommended seasonal run-of-river/800 cfs minimum flow or inflow, if less, would provide significantly enhanced zone-of-passage during the major migration period while also providing flows for enhanced shad and river herring spawning and incubation.

For example, at 800 cfs, American shad would generally have excellent habitat availability at Bonny Eagle, with the exception of spawning habitat. Inmigration, larval/juvenile, and outmigration (including alewife) habitat availability were all near 100 percent at Bonny Eagle (*see Figure 4-3*). Overall, the effects of our recommended 800 cfs flow results in a composite WUA curve indicating that 51 percent of inmigrating, 44 percent of spawning, 56 percent of larval/juvenile, and 54 percent of outmigrating maximum WUA is available at Bonny Eagle and Skelton for American Shad (*see Figures 4-14 and 4-15*).

Below Bonny Eagle, adult trout habitat at 800 cfs would range from 89 percent of the maximum available WUA for brook trout to 99 percent of the maximum WUA for brown trout (*see Figure 4-2*). Taking both Bonny Eagle and West Buxton together, adult brook trout habitat would be nearly maximized within the two reaches, while adult rainbow trout and brown trout habitat availability would be 84 percent and 93 percent of the maximum WUA, respectively.

The operational cost of releasing our recommended flows would be about $17,638 annually (*see Table 2-10*) or about $35,000 less than the annual operational cost under CMP's proposal (*see Table 2-4*). In total, our recommended mode of operation would result in a

cumulative annual cost of about $303,000 at all the mainstem Saco River Projects (*see Table 2-10*). Further, the annual cost of installing a minimum flow structure would be about $78,290. While we recognize that these are substantial expenses, our recommended flows would provide significant cumulative benefits to the Saco River's anadromous fish restoration, and resident fish in the Saco.

New River Channel minimum flows - For the establishment of a seasonal salmonid fishery, we recommend that a seasonal minimum flow of 100 cfs be provided in the New River Channel from April 1 to September 30. Our recommended flow would be consistent with Interior's recommendation and would be a portion of our recommended overall project minimum flow (*see discussion above*).

As discussed in section 4.2.2.1.2, providing a seasonal minimum flow of 100 cfs would maximize brook and rainbow trout habitat in the New River Channel and provide optimum conditions for a stocked brook and rainbow trout fishery. Given the overall low amount of brook and rainbow trout habitat in the project area and the potential habitat available in the New River Channel, we conclude that the operational costs of providing these flows is worth the potential enhancements to the fisheries. The annual operational costs of releasing a 100 cfs minimum flow is included in the cost of our recommended project flows discussed above. The annual cost of installing a New River Channel minimum flow structure would be $10,580.

New River Channel fish studies - To monitor the fish populations and the adequacy of instream flow releases in maintaining there populations, we recommend that CMP conduct studies for up to 3 years following implementation of the minimum flow release. We estimate these studies would cost about $4,800 annually. Results of these studies would be useful in determining the success of management objectives for the New River Channel.

Aquatic invertebrate studies - To evaluate the response of benthic macroinvertebrates below West Buxton to a new minimum flow release from Bonny Eagle, we recommend that CMP's proposed sampling be conducted for up to 2 years. This study would commence following implementation of the new flow regime and would cost an estimated $3,200 annually. Results of these studies would be useful in determining the effect of minimum flow releases on the benthic invertebrates (diversity and abundance) which are significant indicators of water quality and important food items for stream fishes.

Terrestrial Resources. The capital cost associated with enhancement of 15 acres of degraded wetlands is estimated to range from $40,000 to $108,000. For purposes of this discussion, we are using the worst-case analysis of $108,000.

Requiring the restoration of these wetlands would increase the total acreage of high quality wetlands at the Bonny Eagle project; improve water quality of the reservoir and downstream Saco River by reducing nutrient, sediment, and pesticide runoff into the reservoir;

and increase the buffer strip and potentially the conservation easements which would maintain and improve the natural aesthetic appeal of the reservoir area.

In addition, enhancing 15 acres of wetlands would partially off-set the potential loss of 52 acres of wetlands resulting from the change in project operation. Releasing Interior's recommended minimum flows and operating the project in a run-of-river mode from May 1 through July 15 and September 1 through October 15 would result in the potential loss of 15 percent or about 52 acres of existing reservoir wetlands. However, this mode of project operation when balanced with other resources would provide overall benefits to nesting waterfowl to include common loons, fisheries, invertebrates, and water quality.

At an annual cost of $17,090, we conclude that these wetlands enhancements for 15 acres of existing degraded wetlands are worth the additional expense.

Recreation Resources. CMP's proposed recreation measures for Bonny Eagle which were also recommended by the staff include: (1) maintaining the Bonny Eagle recreational facilities; (2) conducting recreation use assessments every 6 years; (3) evaluating the need for additional recreational facilities (i.e., impoundment boat launch and impoundment campsites); and (4) providing an interpretive sign describing Bonny Eagle's history.

Requiring these measures would ensure that Bonny Eagle's recreation facilities remain available to the public and would provide opportunities to reassess Bonny Eagle's recreation facilities. Also, providing an interpretive sign describing the historic hydropower structure would enhance the public's awareness of Bonny Eagle's cultural resources. These recreation measures would result in an annual cost of $8,250.

In addition to these costs, we recommend several recreational measures at Bonny Eagle to further enhance the recreational opportunities offered at the project. These measures include: (1) improving the existing canoe portage trail at $4,000, (2) developing a barrier-free picnic area on the northeast side of Bonny Eagle Island at $34,500, and (3) providing additional recreation access signs at $10,000. The annual cost for these measures is about $7,450.

Canoe portage - As discussed in the recreation section 4.2.2.1.4, canoe portage trail enhancements are needed at Bonny Eagle due to safety concerns associated with the existing stairway near the put-in area below the dam. CMP's conceptual design plans (CMP, 1995) to relocate the canoe portage trail would ensure a gradual descent down to the canoe put-in and eliminate the safety hazard of carrying canoes down the stairway. The added expense to relocate the canoe portage trail is reasonable when the benefit to canoe touring is compared to the minimal cost of this enhancement ($610 annual cost).

Bonny Eagle Island picnic area - Providing an improved recreation facility on Bonny Eagle Island would offer the public an added recreational alternative to the heavily used Limington Rips recreation area at the project's uppermost boundary. While CMP proposed a

barrier-free picnic area at the northwest side of Bonny Eagle Island, we recommend that CMP develop the picnic facility on the northeast side of the island. Developing the facility on the northeast side of the island would offer the public additional benefits not afforded at CMP's proposed site -- enhancing angling and whitewater boating access opportunities at the bypassed reach.

Although our recommended location for the picnic area would involve an additional cost of about $14,500 over CMP's proposed site ($34,500 versus $20,000), we concluded that these costs are offset by the added recreation opportunities afforded to the public. Improved public access at the bypassed reach is particularly critical due the resource agencies intent to improve the recreational trout fishery in the bypassed reach, the efforts to restore an Atlantic salmon fishery in the Saco River, and the increased popularity of whitewater boating. Based on the public benefits of providing barrier-free picnicking, angling access, and whitewater boating access at the New River Channel, we conclude the additional access facility is worth the annual cost of $5,300 (versus CMP's proposed facility at an annual cost of $3,360).

Access signs - Although CMP's Signage Plan (1988) includes an objective to inform the public when recreational facilities are provided by CMP, the plan doesn't include any specific plans to provide additional signs at Bonny Eagle. In our recreation analysis (4.2.2.1.4) we concluded that additional signs at Bonny Eagle's recreation facilities are warranted to ensure that the public is aware of the recreational resources at the project. We conclude that the minimal annual cost of $1,540 for CMP to provide additional access and directional signs is reasonable given the public benefits associated with this enhancement.

Cultural Resources. We recommend that CMP implement the Programmatic Agreement executed among the Commission, the SHPO, and the Council. Implementing the Programmatic Agreement ensures the long-term protection of historic and archaeological resources at Bonny Eagle. CMP, as a concurring party to the Programmatic Agreement, has allotted about $521,000 to design and implement a monitoring and data recovery plan at the archaeological sites at Bonny Eagle.[4] The cost to protect the archaeological sites amounts to annual cost of $87,480. We conclude that these expenditures are warranted and in the public's interest given the value of protecting Bonny Eagle's cultural resources afforded by the Programmatic Agreement.

Measures considered, but not recommended

Our selected alternative did not include adopting two recommended or requested measures provided by the agencies and NGOs. The recommendations or requested measures include: (1) developing an additional impoundment boat launch, and (2) providing buffer

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[4] Based on CMP's calculated funding levels for the Programmatic Agreement (CMP 1993)

zone around the project impoundment. We concluded that the costs to implement these measures are more than the value of their potential benefits.

Boat launch. Providing Interior's recommended impoundment boat launch at Bonny Eagle would require an annual expense of $9,780. Based on CMP's use estimates, there is currently not a demand for an impoundment boat launch in addition to the commercial launch provided at Libby's Campground. CMP's recreation use assessments would provide the opportunity to reevaluate the need for an additional boat launch in the future. Therefore, we conclude that the economic costs to provide an impoundment boat launch would result in marginal public benefits and are not currently warranted.

Buffer zones. AMC requested that CMP expand the Bonny Eagle project boundary to a minimum buffer of 500-foot-wide along the impoundment. Providing AMC's suggested buffer zone could require CMP annual expenditures over $3.5 million at Bonny Eagle to acquire land rights around the impoundment. These annual costs are not warranted when compared to their potential benefits. We conclude that the CMP's existing project boundary provides the public adequate access to project lands and adequately protects the impoundment shoreline from inappropriate or excessive development.

5.4.2.2 Skelton

(I) Water Resources

- Provide plans describing the methods for releasing required minimum flows and monitoring project operations

(2) Fishery Resources

- Install downstream fish passage facilities, as stipulated in the Agreement
- Install upstream fish passage facilities with trap-and-truck facilities, as stipulated in the Agreement
- Monitor the effectiveness of the fishway facilities for 3 years following installation
- Ensure that the design, location, installation (including scheduling), maintenance, and operation of fishways at the project conform to the specifications of the USFWS, subject to final Commission approval
- Reserve the Commission's authority to require the construction, operation and maintenance of fishways prescribed by the Secretary of the Interior

- Operate the project in a run-of-river mode from May 1 through July 15 and September 1 through October 15. All other times the minimum flow release should be 811 cfs of inflow, if less.

- Implement channel modifications below Skelton to eliminate fish stranding potential

- Enhance instream fisheries habitat below Skelton by the placement of boulder clusters to provide salmonid holding and feeding lies

- Conduct benthic macroinvertebrate sampling and DO monitoring below Skelton for 2 years

(3) Recreation Resources

- Maintain the existing recreation facilities at Skelton which includes the canoe portage, impoundment boat launch, and the tailrace access area

- Periodically conduct recreation use monitoring studies in consultation with the resource agencies and evaluate the future need for additional recreation facilities (i.e., a gate restricting vehicular access to the recreation facilities from dusk to dawn, barrier-free tailrace fishing facilities, sanitation facilities, and primitive campsites along the impoundment)

- Provide an interpretive sign describing Skelton's history

- Provide additional signs at the recreation access areas to ensure that the public is aware of the recreational resources at Skelton

(4) Cultural Resources

- Implement the executed Programmatic Agreement to protect cultural resources at Skelton

Among the measures we've selected for Skelton, there are several that affect the project's economics and warrant further discussion. These measures were analyzed in section 4 and are discussed below under the appropriate resources: water resources, fisheries resources, and recreation resources.

Water Resources. We recommend that plans describing the methods for releasing minimum flows and monitoring project operation, and showing how the required flows will be maintained below the project when the impoundment is refilled after any maintenance and/or repairs be prepared by CMP. Information included in the plans should be descriptions of all mechanisms and structures that will be used, the level of manned or automatic facility operation, the methods for recording and maintaining data on project operations and providing

it to the Commission and resource agencies for inspection. These plans should be approved before any changes in project operation take place.

The capital cost associated with the preparation of these plans would be minimal. Requiring the plans, however, would provide the resource agencies and the Commission with useful and necessary information.

Water quality studies. To monitor the response of benthic macroinvertebrates and DO levels to a new flow regime below Skelton, we recommend the monitoring studies proposed by CMP and recommended by Interior and the Coalition. CMP would conduct the studies for at least 2 years following the implementation of a new minimum flow regime. The studies would cost about $3,200 annually. Data obtained from these studies would be used in determining the adequacy of the new minimum flow in protecting macroinvertebrates and maintaining and enhancing DO levels.

Fishery Resources. We recommend several enhancements for the benefit of fishery resources in the project area and in the Saco River.

Downstream fish passage - In section 4.1.1.2, we discussed the need for fish passage facilities at Skelton and the requirements for the immediate installation of downstream fish passage facilities contained in the Agreement. We concluded that CMP's proposed conceptual design drawings for Skelton's downstream fish passage facilities, consisting of a surface bypass at the powerhouse, would provide adequate downstream fish passage.

The capital cost associated with the installation of downstream fishways is estimated to be $250,000. While final fishway design specifics, including spillage and/or transport flows during operation, is proposed to be determined during the final design phase in consultation with the fishery agencies, we concluded that CMP's proposed design would provide significantly improved downstream fish passage. At an annual cost of $113,820, we conclude that the benefits to the Saco River's anadromous fish restoration are worth the additional expense.

Upstream fish passage - In sections 4.1.1.2 and 4.2.1.2.2, we discussed the need for upstream fish passage facilities at Skelton and CMP's proposed upstream fish passage facilities. We concluded that upstream passage facilities would be necessary based on the anadromous fishery restoration efforts and the fact that the need for the installation of upstream facilities has been demonstrated by the past, present and future planned fish stockings above the project and the present returns of anadromous fish to the project.

The capital cost associated with the construction of CMP's proposed fish lift is estimated to be about $4.7 million to construct. Installation of the lift would, however, provide significant cumulative benefits to the Saco River's anadromous fish restoration and would enable anadromous fish to utilize additional portions of the Saco River. While the

annual cost of the facilities would be $825,790, the benefits to anadromous fishery restoration would be significant and well worth the expense.

Trap-and-truck facility - To transport Atlantic salmon, American shad, and river herring to upstream areas, we recommend that CMP construct and operate their proposed trap-and-truck facility, as per the Agreement. Operation of the facility would allow fish to be transported and stocked into upstream areas, identified by the resource agencies, where potential habitat and potential restoration success would be greater. While the cost of the trap-and-truck facility is estimated at $500,000 to construct and $110,000 annually to operate (annually cost at $195,960), the recommended facilities would provide significantly improved upstream fish passage and would further the goals and objectives of the Saco River's anadromous fish restoration efforts.

Fishway effectiveness studies - To monitor the effectiveness of the upstream fishway, we recommend that CMP's proposed fishway effectiveness studies be conducted for up to 3 years following the installation of the proposed upstream fish lift. While the capital cost of conducting the studies is estimated at $170,000 per year, information obtained from the studies would provide useful data on current and future fishway design. The $72,000 annual cost of the studies would be more than offset by the benefits to anadromous fishery restoration efforts.

Project operation and minimum flows - For the enhancement of the anadromous fish and resident salmonids, we concur with Interior's flow regime at Skelton. This flow regime would require run-of-river operation from May 1 through July 15 and September 1 through October 15. At all other times a minimum flow of 811 cfs or inflow, if less would be required. This flow regime would provide significantly enhanced instream flows during anadromous fish migration periods, fully accomplishing the agencies' objectives of managing the reach below Skelton as primarily a migratory pathway. Further, this flow regime would ensure the continued protection to the Saco River estuary year round.

During the anadromous fish migration period, run-of-river operation would ensure nearly natural flows during the peak of spring upstream migration by Atlantic salmon, American shad, and river herring and the peak of the fall upstream Atlantic salmon migration while also providing sufficiently high flows to protect and enhance available habitat for anadromous and resident species.

At an 811 cfs minimum flow some enhanced habitat conditions would be provided for anadromous fish below Skelton. For American shad larval/juvenile habitat would be about 77 percent of the maximum WUA. Inmigration, spawning and outmigration habitat availability would be 40 to 50 percent of maximum WUA. For Atlantic salmon, however, inmigrating habitat would be about 26 percent of maximum WUA at 811 cfs which is higher than other minimum flow alternatives. With the exception of American shad larval/juvenile habitat significant enhancements would not occur with an 811 cfs flow, however, this flow would be implemented after the peak migration/spawning period for anadromous fish when the project

would be operated run-of-river. For resident trout WUA would be 36 percent of maximum for brook trout, 94 percent of maximum for brown trout and 99 percent of maximum for rainbow trout at 811 cfs.

The operational cost of releasing our recommended flows would be about $229,000 annually (*see Table 2-10*) or an additional annual operational cost of about $117,000 (*see Table 2-4*) over CMP's proposed mode of operation. In total, our recommended mode of operation would result in a cumulative annual cost of about $303,000 at all the mainstem Saco River Projects (*see Table 2-10*). Further, the annual cost of installing necessary minimum flow release structures would be $78,290. While we realize that these are substantial expenses, our recommended flows would provide significant cumulative benefits to the Saco River's anadromous fish restoration and resident fish in the Saco.

Tailrace channel modifications - To eliminate fish stranding potential and to provide escape routes for fish, we recommend that CMP implement their proposed tailrace channel modifications below Skelton. The capital cost of the modifications is estimated to be about $18,000, which results in an annual cost of $3,020.

Enhancement of instream fisheries habitat - To provide salmonid holding and feeding lies, we recommend that CMP implement their proposed plan to place boulder clusters in the tailwater below Skelton. As discussed in section 4.2.1.2.2, during periods of high generation flows, the boulder clusters would hold resident and anadromous salmonids and bass during periods of high flow, improve upstream access to Skelton's fish passage facilities by preventing fish fallback during high flows, and provide fishing opportunities to both bank and wading anglers.

While the capital cost of implementing CMP's proposed plan is estimated at $82,000 (annually cost at $14,170), the anticipated enhancements would have a cumulative beneficial effect on anadromous salmonids in the basin which we think is worth the cost.

Recreational Enhancements. CMP's proposed recreation measures for Skelton which were also recommended by the staff include: (1) annual maintaining Skelton's recreational facilities; (2) conducting recreation use assessments every 6 years; (3) studying the need for additional recreational facilities (i.e., impoundment campsites); and (4) providing an interpretive sign describing Bonny Eagle's history.

Requiring these measure would ensure that Skelton's recreation facilities remain available to the public and would provide opportunities to reassess Skelton's recreation facilities. Also, providing an interpretive sign at the project facilities would enhance the public's awareness of Skelton's cultural resources. Annually, these recreation measures would cost about $13,200.

We also recommended that CMP provide additional signs at the recreation access areas to ensure that the public is aware of the recreational resources at Skelton. CMP's Signage

Plan (1988) included potential recreation information signs; yet, it is not clear whether CMP intends to provide additional recreation access signs. We conclude that CMP could provide signs that ensure that the public is aware of and able to find Skelton's recreation resources without any significant capital cost.

Measures considered, but not recommended

Our selected alternative did not include adopting one recommended or requested measures provided by the agencies and NGOs. The recommendations or requested measures include (1) providing buffer zones around the project impoundments. We concluded that the costs to implement this measure is more than the value of its potential benefits.

Buffer zones. AMC requested that CMP expand the Skelton project boundary to a minimum buffer of 500-foot-wide along the impoundment. We conclude that CMP's existing project boundary provides the public adequate access to project lands and adequately protects the impoundment shoreline from inappropriate or excessive development. Providing AMC's suggested buffer zone could require CMP annual expenditures over $3 million at Skelton to acquire land rights around the impoundment. Given these annual costs, we conclude that additional protection is not warranted.

5.4.3 Consistency with comprehensive plans

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2) of the FPA, federal and state agencies filed a total of 14 comprehensive plans that address various resources in Maine. Of these, we identified and reviewed 11 plans relevant to the hydroelectric projects on the Saco River.[5] No inconsistencies were found.

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[5] **State:** Strategic plan for management of Atlantic salmon in the State of Maine, Maine Atlantic Sea-Run Salmon Commission, July 1984; Maine rivers study-final report, Maine Department of Conservation, May 1982; State of Maine comprehensive rivers management plan, Maine State Planning Office, Volume 1-3, May 1987; State of Maine comprehensive rivers management plan, Maine State Planning Office, Volume 4, December 1992; State of Maine comprehensive rivers management plan, Maine State Planning Office, Volume 5, February 1993; and the Saco River: a plan for recreational management, Southern Maine Regional Planning Commission, October 1983

Federal: Saco River strategic plan for fisheries management, Department of the Interior, January 1987; North American waterfowl management plan, U.S. Fish and Wildlife Service, May 1986; Fisheries USA: the recreational fisheries policy of the

(continued...)

We also reviewed federal and state plans that were relevant to the project but weren't listed as Commission approved comprehensive plans. They are as follows: Saco River operational plan for inland fisheries management, Maine Department of Inland fisheries and Wildlife, 1990; Anadromous fisheries river management plan, Maine Department of Marine Resources, 1982; New Hampshire wetlands priority conservation plan, New Hampshire Office of State Planning, 1989; Saco River Basin water quality management plan, New Hampshire Water Supply and Pollution Control Commission, 1975; and the Water resources study: Saco River Basin, Maine, U.S. Army Corps of Engineering, 1989.

Conclusion of Section 10(a)(1) and 10(a)(2)

From our evaluation of the environmental and the economic effects of the projects and the alternatives, as well as comprehensive plans relevant to the projects, we conclude that relicensing Bonny Eagle and Skelton, and implementation of the fish passage measures outlined in the Agreement and our environmental recommendations, would best adapt the projects to a comprehensive plan for developing the Saco River drainage basin.

5.5 FISH AND WILDLIFE AGENCY RECOMMENDATIONS

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations provided by the federal and state fish and wildlife agencies for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources affected by the project(s).

Section 10(j) of the FPA states that whenever the Commission believes any fish and wildlife agency recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law, the Commission and the agencies shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agencies.

We believe that our recommendations contained in this FEIS are consistent with those filed by Interior, as shown in Table 5-6 and Table 5-7 for Bonny Eagle and Skelton, respectively.

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[5](...continued)

U.S. Fish and Wildlife Service, U.S. Fish and Wildlife Service, undated; Final environmental impact statement - restoration of Atlantic salmon to New England rivers, Department of the Interior, May 1989; and the nationwide rivers inventory, National Park Service, January 1982.

Table 5-6 Summary of agency recommendations and actions at Bonny Eagle (Source: the staff).

Recommendation	Agency	Within the scope of 10(j)	Annual cost of environmental measures	Adopted
Operate the project as run-of-river from May 1 to July 15 and September 1 to October 15 with 800 cfs minimum flow at all other times	Interior	Yes	$17,638	Adopted
Limit impoundment drawdown to no more than 1 foot from October 15 to ice-out	Interior	Yes	Indeterminate	Adopted
New River Channel minimum flow of 100 cfs from April 1 to September 30	Interior	Yes	Indeterminate	Adopted
Minimum flow and project operational monitoring plan	Interior	Yes	Indeterminate	Adopted
Monitor fish populations in the New River Channel	Interior	Yes	$4,750	Adopted
Monitor aquatic invertebrate populations in downstream areas	Interior	Yes	$3,160	Adopted
Develop plan for new boat launch	Interior	No	$9,780	Not Adopted - We conclude that there is no current demand for an additional boat launch, and the additional costs to adopt this recommendation are not justified.
Monitor recreational use	Interior	No	$3,020	Adopted

Recommendations in the DEIS

Pursuant to Section 10(j), we made a preliminary determination in the DEIS that certain recommendations of Interior were inconsistent with the purpose and requirements of the FPA and applicable law, namely the comprehensive planning and public interest standards of Section 4(e) and 10(a) of the FPA. Interior's recommendations pertaining to recreational facilities at Bonny Eagle and Skelton were considered outside the scope of 10(j), but were considered under 10(a) of the FPA.

For the Bonny Eagle Project we disagreed with Interior's recommendations for: a seasonal run-of-river/800 cfs minimum flow, an impoundment drawdown of no more than 1 foot from October 15 to ice-out, monitoring of fish populations in the New River Channel,

and monitoring of aquatic invertebrates downstream of Bonny Eagle. We recommended an 800/250 cfs minimum flow regime and a 4.3-foot impoundment fluctuation but did not recommend any monitoring of fish populations and aquatic invertebrates. Further, we made a preliminary determination that Interior's recommendation for developing a new boat launch and monitoring recreational use at the project are inappropriate fish and wildlife recommendations.

For the Skelton Project we disagreed with Interior's recommended seasonal run-of-river/811 cfs minimum flow regime and monitoring of DO levels and aquatic invertebrates downstream. We recommended an 800/250 cfs minimum flow regime but no monitoring of DO and aquatic invertebrates. Further, we made a preliminary determination that Interior's recommendation for monitoring recreational use at the project is an inappropriate fish and wildlife recommendation.

Table 5-7 Summary of agency recommendations and actions at Skelton (Source: the staff).

Recommendation	Agency	Within the scope of 10(j)	Annual cost of environmental measures	Adopted
Operate the project as run-of-river from May 1 to July 15 and September 1 to October 15 with 811 cfs minimum flow at all other times	Interior	Yes	$228,965	Adopted
Minimum flow and project operational monitoring plan	Interior	Yes	Indeterminate	Adopted
Develop plan for installing habitat improvement structures in tailwaters	Interior	Yes	$14,170	Adopted
Monitor DO levels and aquatic invertebrate populations in downstream areas	Interior	Yes	$3,160	Adopted
Monitor recreational use	Interior	No	$3,020	Adopted

10(j) Meeting

In an attempt to resolve the above issues, the staff held a teleconference 10(j) meeting with Interior (as represented by USFWS) on February 28, 1996 (see Appendix D for a meeting summary). At this meeting USFWS and CMP summarized the status of their on-going settlement negotiations to resolve the minimum flow issue at Bonny Eagle and Skelton. To date, there is agreement on a tentative flow regime that will be field tested in the spring/early summer of 1996, once high flows have subsided.

There was general agreement between staff and USFWS that it was pointless to debate the above issues. The USFWS stated that its flow scenario recommendations would likely change to something less once the ongoing minimum flow negotiations are concluded. The USFWS stated that they no longer considered DO and benthic invertebrate monitoring 10(j) issues, since the water quality certificates (yet to be issued) would address these conditions. The USFWS further stated that they are no longer concerned whether fish monitoring occurs at Bonny Eagle since their fish monitoring recommendation is superseded by the Saco River Fish Passage Agreement. They stated that the Saco River Fish Passage Agreement would provide all of the information the USFWS needs to ensure that the fishery resources are adequately protected. Pending a flow agreement among USFWS, CMP, and others, we have revised our minimum flow recommendations for Bonny Eagle and Skelton to be consistent with USFWS (Table 5-6 and Table 5-7).

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Appendix A

Saco River Fish Passage Agreement

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94 NOV 22 AM 11:57

November 21, 1994

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E., Room 3110
Washington, D.C. 20426

Re: Saco River Environmental Impact Statement
Project Nos. 2528, 2527, 2194, 2531, 2529, 2530
Offer of Settlement

Dear Ms. Cashell:

Please find enclosed for submittal in accordance with Rule 602 of the Commission's Rules of Practice and Procedure as an Offer of Settlement the Saco River Fish Passage Agreement. The Agreement encompasses Central Maine Power Company's Cataract, Skelton, Bar Mills, West Buxton, Bonny Eagle and Hiram facilities. The Agreement was previously filed with the Commission on August 9, 1994. At that time, the Agreement had not been signed by the State of New Hampshire. New Hampshire signed the Agreement on October 6, 1994.

The Agreement resulted from many months of negotiations among CMP, the cities of Biddeford and Saco, state and federal agencies and a cross-section of environmental groups. It affords a comprehensive approach to providing fish passage for anadromous fish species at mainstem Saco River hydro projects. The Agreement calls for a lock system to provide fish passage at the Springs and Bradbury dams (Cataract Project) between the two cities and a fish lift at the Skelton Project. In addition, the Agreement includes a long-range plan for providing fish passage at CMP's four upriver dams that will be driven by the periodic assessment of fish migrations by fishery agencies and other parties to the Agreement.

Thus, the Agreement represents a comprehensive solution for the entire Saco River. By considering the river in its entirety, it is expected that lengthy and contentious relicensing debates over fish passage will be avoided in the future.

Two of the projects covered by the Agreement (Skelton and Bonny Eagle) are under annual license and CMP has requested new licenses. CMP has proposed that the applicable terms of the Agreement be incorporated into any new license issued for these two projects. Two other projects (Cataract and West Buxton) received new licenses in the mid 1980s and the Division of Project Compliance and Administration of the Office of Hydropower Licensing has already issued Orders incorporating the terms of the Agreement applicable

to Cataract and West Buxton. The remaining two CMP projects (Hiram and Bar Mills) have licenses that expire in 2022 and 2004 respectively. In accordance with the terms of the Agreement, CMP intends in the near future to apply for amendments to those licenses to incorporate the applicable terms of the Agreement.

The Division of Project Review of the Office of Hydropower Licensing is also analyzing the Agreement within the scope of the Environmental Impact Statement that it is currently preparing for the Saco River.

If you have any questions, please contact Sarah Verville at (207) 623-3521.

Sincerely,

F. Allen Wiley, P.E.
Director, Hydro Operations

Enclosure

cc: Eddie Crouse
Robert Grieve
Service List

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Document Accession #: 19961003-0372 Filed Date: 08/31/1996

SACO RIVER FISH PASSAGE AGREEMENT

May 24, 1994

BACKGROUND AND PARTIES

Beginning on July 21, 1993, Central Maine Power Company hosted a series of meetings to negotiate a consensus plan for fish passage facilities at dams on the main stem of the Saco River for the purpose of assisting in restoring populations of anadromous fish, including Atlantic salmon, American shad, and river herring. The participants in the meetings included Central Maine Power Company (CMP); Swans Falls Corporation; the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the Maine Atlantic Sea Run Salmon Commission, the Maine Department of Marine Resources, the Maine Department of Inland Fisheries and Wildlife (collectively herein "Fisheries Agencies"); the Maine Department of Environmental Protection (DEP); the Maine State Planning Office; the cities of Saco and Biddeford (Cities); a coalition of non-governmental conservation organizations including the Saco River Salmon Club, Trout Unlimited, the Maine Council of Trout Unlimited, the Atlantic Salmon Federation, the Maine Council of the Atlantic Salmon Federation, and American Rivers, Inc. (the Coalition); the New Hampshire Department of Fish and Game; the Biddeford-Saco Water Company; and the Maine Energy Recovery Co.

The parties to this agreement include all those listed above as participants, except for the Maine Department of Environmental Protection, Swans Falls Corp., Biddeford-Saco Water District and Maine Energy Recovery Company.

This is a settlement agreement for issues regarding the construction of fish passage facilities at projects currently undergoing licensing proceedings before the Federal Energy Regulatory Commission (FERC), including a license amendment for the Cataract Project (FERC No. 2528), and relicensing of the Skelton (FERC No. 2527) and the Bonny Eagle (FERC No. 2529) projects. In addition, Central Maine Power agrees that it will petition the FERC within 12 months of the effective date of this agreement to amend existing licenses at Bar Mills (FERC No. 2194), West Buxton (FERC No. 2531), and Hiram (FERC No. 2530) to incorporate into the licenses for those projects the applicable terms of this agreement.

On December 7, 1993 the parties agreed to the objectives, principles and specific provisions for each project set forth below. Final acceptance of this agreement is indicated by the signature of the official representative from each party.

The parties agree to the following objectives, principles, terms and provisions for restoring anadromous fish populations and providing fish passage at dams on the Saco River.

OBJECTIVES

Agreement on the following objectives does not mean that all parties agree that achieving all objectives is feasible under all circumstances.

1. There is general agreement that the objective of restoring anadromous fish populations on the Saco River is the establishment of viable, self-sustaining runs of Atlantic salmon, shad and river herring, with optimum utilization of suitable habitat, where possible. Providing passage for salmon above Swans Falls is a long term goal. For shad and river herring, the goal is to provide passage on the main stem of the Saco River only to above Bonny Eagle, and to tributaries below the Hiram Project.[1] The ultimate size of the populations will depend on, among other things, the interaction among species, including wildlife species, and must take into consideration the natural fluctuations in populations from year to year. Other objectives of anadromous fish restoration on the Saco River are to provide for fishing/angling opportunities within the constraints of the resource; to provide other wildlife and ecosystem benefits for predator species; and to provide other non-consumptive benefits.

GENERAL PRINCIPLES

2. For the Fisheries Agencies and the Coalition, permanent trap and truck is not a viable long term management strategy. These groups see trap and truck as a short term means to accommodate upstream migrating fish prior to constructing upstream passage facilities. CMP's position is that long term trap and truck may be the most biologically sound method of providing upstream passage at specific Saco River dams in order to achieve the goal of restoring anadromous fish populations.

3. There is some uncertainty regarding shad's ability to pass multiple barriers. This may affect the ability to restore shad to certain portions of the Saco River, and could affect the timing and design of fishways constructed at Bar Mills, West Buxton and Bonny Eagle.

4. Downstream passage is needed at all dams above which anadromous fish have passed, or have been stocked or trucked. Schedules for constructing permanent downstream passage facilities are specified below for each dam. CMP agrees to provide interim downstream passage (e.g. controlled spills during downstream migration periods, installation of temporary downstream fish passage facilities or other feasible measures) necessary to allow downstream fish passage at each dam above which anadromous fish have been stocked or trucked. Such efforts shall continue until permanent downstream fish passage facilities are installed and operational in accordance with this agreement.

5. A comprehensive fish passage plan should be biologically defensible and, from CMP's perspective, be more cost effective than constructing upstream passage facilities in the order of relicensing.

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[1] Restoration goals also include providing upstream passage at dams on tributaries that flow into the Saco River above Bonny Eagle, such as the Ossippee and Little Ossippee Rivers, but those dams are not within the scope of this agreement.

6. The rate of growth of anadromous fish populations above Skelton is somewhat uncertain, making it necessary to conduct periodic assessments to determine the need for, design and schedule for implementing fish passage measures at Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls. Assessment criteria ("Criteria") will be established in advance as outlined below. Criteria may address the following factors, among others: spawning escapement, trap and truck capacity and mortality, habitat utilization, size of runs, fallback below one or more dams, rate of increase in populations, stock origin of run, etc.

The parties agree that the state and federal Fisheries Agencies will develop by January 1, 1995 the Criteria to be used in future assessments to determine the need for, timing and design of interim and permanent upstream passage facilities at Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls. The Criteria will be developed in consultation with the parties to this agreement, using a consensus process to endeavor to achieve acceptance by all parties. If, after meetings between the parties with a facilitator, a consensus can not be achieved, the Fisheries Agencies' Criteria shall be used to determine the schedule for construction of upstream fish passage facilities above Skelton.

7. A final design of any permanent upstream or downstream fish passage facility must be approved in writing by an authorized official of the Department of the Interior (U.S. Fish and Wildlife Service) and/or the Department of Commerce (National Marine Fisheries Service) pursuant to Section 18 of the Federal Power Act, as amended, before the dam owner is obligated to construct that facility at its project site. Additionally, CMP will consult with the Maine Department of Marine Resources, Maine Atlantic Sea Run Salmon Commission, Maine Department of Inland Fisheries and Wildlife, and the Maine Department of Environmental Protection regarding the final design of fish passage facilities, as may be necessary under applicable state law.

CMP will conduct effectiveness studies of all newly constructed upstream and downstream fish passage facilities at its project sites in accordance with a study plan to be developed in consultation with the state and federal Fisheries Agencies listed above.

8. Complete restoration of Atlantic salmon to the Saco River watershed would require stocking of juvenile fish above Hiram and Swans Falls dams (in New Hampshire). Stocking of salmon in New Hampshire is dependent on, among other things, an inter-agency agreement on stocking between the relevant state and federal Fisheries Agencies, and an adequate supply of suitable Atlantic salmon stocks. All parties will use their best efforts to expedite such agreements as are necessary for restoring Atlantic salmon to the New Hampshire portion of the Saco River basin.

CATARACT PROJECT

9. The parties agree that the numbers of shad and river herring that passed at Cataract East and West Channel in 1993 exceeded expectations. The size of the stock below the dam was

also higher in 1993 than expected. Salmon were also passed successfully in 1993, with numbers consistent with expectations. The facilities at East and West Channel were well built.

10. All parties agree that the fish lift/lock concept proposed by CMP is an acceptable alternative for upstream fish passage at the Springs and Bradbury Dams. CMP and the Cities believe that the fish lift/lock concept is the preferred alternative to dam removal (which is politically difficult and has uncertain mitigation costs) and Denil fishways (which are more expensive to construct). The Cities believe that removal or lowering of the dams at Springs and Bradbury is not an acceptable fish passage option. Should CMP seek to remove or lower the dams at Springs and Bradbury, the Cities may pursue any available legal rights they may have.

Assuming that the lift/lock concept proves to be feasible and less expensive than Denil fishways, all parties agree to the following schedule for construction. The 1994 season will be used for telemetry, engineering, and flow studies. Construction of upstream passage facilities at Springs or Bradbury would begin in 1995 with passage facilities to be operational by May 1, 1996. Construction of the upstream facility at the other dam will be completed and operational by May 1, 1997, or sooner.

Because there are no generation facilities at Springs and Bradbury dams, the Fisheries Agencies agree that there is no foreseeable need to construct permanent downstream fish passage facilities at those dams.

11. CMP agrees to trap and truck (or arrange for the trapping and trucking) of Atlantic salmon, shad and river herring from the East Channel fish lift in accordance with the specifications of the state and federal Fisheries Agencies. Depending on the numbers of returning fish, some salmon may be trucked around Bonny Eagle from East Channel as early as 1994.

SKELTON PROJECT

12. CMP agrees that full, permanent upstream and downstream fish passage facilities at Skelton will be designed to pass salmon, shad and river herring, and will be operational by May 1, 1998, or within three years of receipt of a new license for Skelton, whichever occurs later. The returning run of shad and river herring from the 1993 spawning season is expected in 1998.

13. All parties agree that a fish lift with trap and truck facilities is the current favored design for Skelton. Once the Skelton facilities are operational and fish are present at Skelton in sufficient numbers, trapping and trucking of salmon, shad, and river herring is expected to move to Skelton from Cataract East Channel. The trap and truck program will be paid for by CMP, but decisions on the number of fish to be trucked and the destinations in Maine and New Hampshire will be made by the appropriate state and federal Fisheries Agencies.

BAR MILLS, WEST BUXTON, BONNY EAGLE, HIRAM AND SWANS FALLS PROJECTS

14. CMP agrees to construct interim, permanent or, under appropriate circumstances, both interim and permanent upstream passage facilities, at Bar Mills, West Buxton, Bonny Eagle and Hiram according to the schedule and conditions below.

a) The state and federal Fisheries Agencies will conduct the first assessment in 1999 according to the Criteria described in paragraph 6 above to determine the identity of, the need for, the design and the timing of the first upstream fish passage facility to be constructed. The assessment will be conducted in consultation with the parties to this agreement using a consensus process (which shall include meetings between the parties with a facilitator) to endeavor to achieve acceptance by all parties. Subsequent, similar assessments will also be conducted under these same guidelines in 2003, 2007 and 2011.

b) The Fisheries Agencies will use the assessments in their determination of anadromous fish restoration needs, including such fishways as may be prescribed by the Department of Interior (U.S. Fish and Wildlife Service) and/or Department of Commerce (National Marine Fisheries Service) pursuant to Section 18 of the Federal Power Act, as amended, and such other measures as may be necessary under applicable state law.

c) The first upstream passage facility will be required to be operational no earlier than May 1, 2005. Construction and operation of the first facility may occur later than May 1, 2005 if an assessment determines that the facility is not needed until a later date.

d) The identity of, need, design and schedule for any additional upstream passage facilities will be determined by the assessments, but in no event will upstream passage facilities at or above the Bar Mills project be required to be completed less than two years apart, except for Swans Falls which may be scheduled for simultaneous completion with Hiram.

15. CMP agrees to construct permanent downstream passage facilities at Bonny Eagle within 2 years of receipt of the Bonny Eagle license, and at Bar Mills and West Buxton within 2 years of receipt of the license amendment for downstream passage at each facility. CMP will apply to the FERC for the license amendments at Bar Mills and West Buxton, if necessary, within 12 months of execution of this agreement by all parties.

16. The need for permanent downstream passage for salmon at Hiram and Swans Falls hinges on the presence of juvenile or adult fish. This could result from the annual production stocking* of juvenile salmon or trucking of adults and their subsequent natural reproduction. Either event (stocking or trucking) is dependent on the participation of appropriate state and federal Fisheries Agencies in Maine and New Hampshire including the New Hampshire Fish

and Game Department and the U.S. Forest Service. Permanent downstream passage will be provided at each of the two dams no more than two years from commencement of annual production stocking of salmon above such dam.

* "annual production stocking" is defined as scheduled annual stocking based on an inter-agency agreement and a written management plan by the Fisheries Agencies with the specific objective of establishing a continuous run of returning fish. It does not include intermittent, unplanned or one time stockings, including, for example, stocking for studies of habitat utilization, growth rates, etc.

17. The current license exemption application for Swans Falls calls for upstream passage facilities to be completed no later than 2011. This schedule could be modified according to the terms and conditions in Swans Falls' license exemption to require passage at Swans Falls sooner, or to allow a delay if, among other things, passage facilities are not constructed at Hiram before 2011.

ADDITIONAL CONSIDERATIONS

18. This agreement shall be effective when signed by the appropriate authorities representing Central Maine Power Company, the Maine Department of Inland Fisheries and Wildlife, the Maine Department of Marine Resources, the Maine Atlantic Sea Run Salmon Commission,the Maine State Planning Office, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the New Hampshire Department of Fish and Game, Saco River Salmon Club, Trout Unlimited, Maine Council of Trout Unlimited, Atlantic Salmon Federation, Maine Council of the Atlantic Salmon Federation, American Rivers, Inc., the City of Saco, the City of Biddeford, and when reviewed and acknowledged without objection by the Maine Department of Environmental Protection.

19. This agreement shall terminate, unless extended by the parties, on December 31, 2022 or upon the expiration of the renewed licenses of the Skelton or Bonny Eagle projects, whichever is later.

20. This agreement shall bind and inure to the benefit of the successors and assigns of the signing parties.

21. The parties will endeavor to resolve in good faith any dispute that may arise in carrying out this agreement, using a consensus process which shall include meetings between the parties with a facilitator. The intent of the parties is to maintain the spirit of cooperation and understanding that led to this agreement, even as circumstances change (including changes in applicable law) or new information is acquired.

22. Nothing in this agreement shall be construed as obligating the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Forest Service, the State of Maine, or the State of New Hampshire, their officers, agents or employees, to expend any funds in

excess of appropriations or other amounts authorized by law.

We, the undersigned, having the authority to bind our respective parties, agree to the terms of this agreement, and will represent and support this agreement in applicable proceedings before the Federal Energy Regulatory Commission and other regulatory bodies:

Central Maine Power Co.

Its President & CEO Date June 28 1994

Maine Atlantic Sea Run Salmon Commission

Its Commissioner Date June 28, 1994

Maine Department of Inland Fisheries and Wildlife

Its Director Date June 28, 1994

Maine Department of Marine Resources

Its Commissioner Date 6.28.94

U.S. Fish and Wildlife Service

Its Supervisor, New England Fish Offices Date 6/28/94

Maine State Planning Office

Its Director Date 6/28/94

National Marine Fisheries Service

Its Acting Director, Habitat Div. Date 6/28/94

Saco River Salmon Club

Its Vice President Date 6/29/94

Trout Unlimited

Its Assistant CEO - Date 6/28/94

Atlantic Salmon Federation

Its Acting U.S. Director Date 6/28/94

American Rivers, Inc.

Its Date

Maine Council, Atlantic Salmon Federation

Its Pres. Date 6/28/94

Maine Council, Trout Unlimited

Its Chairman Date 6/28/94

City of Saco

Its Mayor Date 6/28/94

City of Biddeford

Its Mayor Date 6/28/94

New Hampshire Department
of Fish and Game

Its Date

Its Date

Atlantic Salmon Federation

_____ _____
Its Date

American Rivers, Inc.

Kevin J Coyle 7-28-94
Its President Date

Maine Council, Atlantic Salmon Federation

_____ _____
Its Date

Maine Council, Trout Unlimited

_____ _____
Its Date

City of Saco

_____ _____
Its Date

City of Biddeford

_____ _____
Its Date

New Hampshire Department
of Fish and Game

_____ _____
Its Date

Atlantic Salmon Federation

Its _____ Date _____

American Rivers, Inc.

Its _____ Date _____

Maine Council, Atlantic Salmon Federation

Its _____ Date _____

Maine Council, Trout Unlimited

Its _____ Date _____

City of Saco

Its _____ Date _____

City of Biddeford

Its _____ Date _____

New Hampshire Department
of Fish and Game

John D Nelson Jr 10/6/94
Its Acting Executive Director Date

_____ _____

Saco River Fish Passage Agreement
ANNEX 1: ASSESSMENT PROCESS AND CRITERIA

January 20, 1995

INTRODUCTION

The Saco River Fish Passage Agreement, dated May 24, 1994 (the Agreement), was signed by Central Maine Power Company (CMP), Swans Falls Corporation and 15 other parties, including state and federal fisheries agencies, the Cities of Saco and Biddeford, and a coalition of conservation organizations to settle licensing issues relating to fish passage at seven hydroelectric projects on the main stem of the Saco River. The purpose of the Agreement was to assist with restoring populations of anadromous fish, including Atlantic salmon, American shad, and river herring. The projects covered in the Agreement include the following: the Cataract Project (FERC No. 2528), the Skelton Project (FERC No. 2527), the Bonny Eagle Project (FERC No. 2529), the Bar Mills Project (FERC No. 2194), the West Buxton Project (FERC No. 2531), the Hiram Project (FERC No. 2530) and the Swans Falls Project (FERC No. 11365). The Agreement includes specific deadlines and criteria for constructing upstream fish passage facilities at Cataract and Skelton, and provides conditions for scheduling construction of upstream fish passage at Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls.

The Agreement requires the state and federal Fisheries Agencies to develop by January 1, 1995 "assessment criteria" (herein called Assessment Criteria) to be used in future assessments "to determine the need for, timing and design of interim and permanent upstream fish passage facilities at Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls" (Paragraph 6 of the Agreement). As stated in the Agreement, the Assessment Criteria must be determined "in advance" and "in consultation with the parties to the agreement, using a consensus process to endeavor to achieve acceptance by all parties."

This Annex to the Agreement represents the fulfillment of the above stated requirement to develop Assessment Criteria as described in Sections 6 and 14 in the Agreement. Meetings to develop the Assessment Criteria began on September 1, 1994 and included representatives from the state and federal Fisheries Agencies, Central Maine Power Company, Swans Falls Corp., and the coalition of conservation organizations. Although the ultimate authority for developing the Assessment Criteria rests with the Fisheries Agencies, a consensus process was used, led by a neutral facilitator, as called for in the Agreement. This Annex describes an "Assessment Process", "Assessment Criteria", and an "Assessment Report" as agreed to by the parties.

This Annex is intended to address only upstream fish passage facilities or measures. The parties

acknowledge that the Agreement provides adequate criteria under which permanent downstream fish passage will be provided.

SUMMARY OF ASSESSMENT PROCESS

The Assessment Process is designed around a four-year planning/data collection/assessment cycle. The purpose of the four-year cycle is to plan for and collect appropriate data to prepare an Assessment Report in the fourth year based on defined Assessment Criteria, as defined in Task 3 below. The first cycle begins in 1996 and ends with an Assessment Report in 1999. The second cycle begins in 2000 and ends with an Assessment Report in 2003. Additional cycles will be completed in 2007 and 2011. The Assessment Reports will be used to determine actions to be taken under Section 14 of the Agreement.

In short, the Assessment Report must answer the following five questions:

- Are the management goals and objectives stated at the beginning of the four year Assessment cycle still current?
- What is the present status of anadromous fish populations on the Saco River?
- Is progress toward the management goals and objectives being made?
- Is the rate of progress as expected?
- What conclusions can be drawn regarding the need, timing and design for constructing new upstream fish passage facilities at the Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls projects?

The conclusions contained in the Assessment Report shall reflect the consensus of the parties or the conclusions by the Fisheries Agencies if the parties can not reach consensus. Task 7 below describes the content of the Assessment Report in more detail.

A summary of the Assessment Process tasks for each cycle is in Table 1. A more detailed description of each task follows the table.

ORGANIZATION AND RESPONSIBILITIES

A Coordinating Committee, comprised of representatives of all the parties to the Agreement, will have responsibility for implementing the Assessment Process described in this Annex. In addition, a Fisheries Agency Assessment Committee (FAAC) will be comprised of the Maine Atlantic Sea Run Salmon Commission, the Maine Department of Marine Resources, the Maine Department of Inland Fisheries and Wildlife, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, the U.S. Forest Service and the New Hampshire Fish and Game Department. The FAAC will function as the Executive Committee for the full Coordinating Committee. Typically, the FAAC will prepare recommendations for the Coordinating Committee to review, revise and accept by consensus. The Coordinating Committee will endeavor to achieve

consensus on all plans, analyses and reports. If consensus can not be achieved, the FAAC's decisions and findings regarding the Assessment will prevail.

The Coordinating Committee will meet in March 1995 to plan for the first Assessment cycle that will begin in 1996. The Committee will review on-going management activities, plans and goals that affect anadromous fish restoration on the Saco River. At that meeting, the FAAC will select a chair for the first Assessment cycle, who will chair both the FAAC and the Coordinating Committee. The chair, with the assistance of CMP and the other parties, will be responsible for calling meetings, for ensuring completion of study plans, for issuing an interim report at the end of each year, and for ensuring completion of the final Assessment Reports at the end of each cycle. The agenda for each Coordinating Committee meeting will generally include the tasks listed in Table 1 by year below. In addition to the meetings defined herein, any party may request a meeting of the Coordinating Committee at any time.

TABLE 1: SUMMARY OF ASSESSMENT PROCESS TASKS			
FA AC	**CC**	**Assessment Cycles: 1996-1999 2000-2003 2004-2007 2008-2011**	
		YEAR 1 Coordinating Committee meeting will be held in January of Year 1, with the following agenda:	
✓	✓	Task 1.	Review current management goals and objectives, and the status of anadromous fish populations and existing management plans, as presented by the FAAC.
	✓✓	Task 2.	Define key problems or issues affecting successful restoration.
	✓	Task 3.	Define the Assessment Criteria.
	✓	Task 4.	Develop a four year study plan, indicating specific data needs, responsibilities, and work products to be used in the Assessment in Year 4.
		YEARS 2 & 3 Coordinating Committee meetings will be held in January of Year 2, with the following agenda:	
✓	✓	Task 5.	Conduct studies according to study plan and meet annually to coordinate studies, share interim results and update plans as necessary.
		YEARS 3 & 4:	
	✓	Task 6.	FAAC will review data and outline the Assessment Report (November of Year 3).
	✓	Task 7.	FAAC conducts Assessment (Winter of Year 3/4) and prepares a draft "Assessment Report" for distribution by February 1 of Year 4.
✓		Task 8.	Coordinating Committee meetings begin in April of Year 4 (with a facilitator) to develop to a consensus Assessment Report.
✓	✓	Task 9.	Consensus Report (or FAAC and comments by parties if no consensus) will be filed with FERC by December 1 of Year 4.

FAAC = Fisheries Agencies Assessment Committee
CC = Coordinating Committee

DESCRIPTION OF ASSESSMENT TASKS

Task 1. Review Management Goals and Objectives, and the Status of Populations and Existing Management Plans.

At the first meeting of the Assessment cycle, the FAAC will present the current management goals and objectives for anadromous fish restoration on the Saco River to the full Coordinating Committee for its review as a basis for completing the remaining tasks below. The FAAC will also prepare and present a concise review of the status of anadromous fish populations and existing restoration and management plans.

For the first Assessment cycle (1996 to 1999) the management objectives are those contained in the 1987 Strategic Plan for the Saco River.

Task 2. Define Key Problems and Issues Affecting Successful Restoration

At the Year 1 Coordinating Committee meeting in January, the Committee representatives will define or revise by consensus the key impediments to achieving the management goals and objectives defined in Task 1 above, including problems and issues confronting the restoration of anadromous fish. This exercise is intended to allow strategies and plans to be developed to address specific problems or issues.

At a minimum, the Assessment Process will address the following restoration issues:

A) Cumulative impact of dams, including impacts from turbine mortality, upstream and downstream passage efficiency, etc.

B) Availability of wild and hatchery stocks (fish, fry or eggs), both river-specific and generally.

C) Availability of staff and resources.

D) State of knowledge or uncertainty regarding biological parameters in the river.

E) Impacts of other sources of mortality, including marine losses, angling, predation.

F) Amount, quality and location of habitat.

Other issues may be defined to assist in preparing study plans for data collection, and for conducting the Assessment.

Task 3. Define Assessment Criteria

The Assessment Criteria defined below will be reviewed and may be revised by the Coordinating Committee using a consensus process, incorporating the latest knowledge and circumstances. If no consensus can be achieved, the FAAC will determine the Assessment Criteria for the upcoming cycle.

Assessment Criteria will include but not be limited to the following:

A) Trends in population size over time.
- by species
- using appropriate time periods for analysis
- using both past data and projections of future levels

B) Level of recent stocking effort and plans for future stocking.
- number
- species and life stage
- locations

C) Passage efficiency of existing fishways.
- by species
- upstream and downstream passage

D) Degree of turbine mortality by species.

E) Degree of attrition due to multiple barriers.

F) Relative suitability of habitat in each river reach, comparing habitat and utilization below the barrier to habitat above the barrier.

G) Production estimates and spawning escapement for each river reach (revise existing figures as necessary).

H) Degree and location of salmon fallback.

I) Comparison of Saco River anadromous fish restoration performance relative to other East Coast rivers.

J) Evidence of limiting factors (predation, ocean losses, angling, water quality, etc)

K) Effectiveness of interim trap and truck operations.

- capacity vs. size of runs
- mortality
- sorting and fallback

L) Biological characteristics of runs, including stock origin.

Task 4. Determine Data Needs and Develop Study Plans

In Year 1 of each Assessment cycle, the Coordinating Committee will consider the data needs and develop study plans for collecting the necessary data to address the Assessment Criteria defined in Task 3 above. These plans must be sufficiently detailed to indicate:

- the specific data needs including a priority listing,
- the specific methods to be used to collect the data,
- the parties responsible for data collection and analysis,
- the schedule for data collection and reporting, and
- the expected format of the work product.

The parties to the Agreement recognize that financial and staff resources for data collection are likely to be limited, making it necessary to determine data collection priorities to address the Assessment Criteria in Task 3 above. This Annex does not require any specific level of data collection for all the Assessment Criteria. The Coordinating Committee will develop study plans that make the best use of available resources, and will consider ways to make use of pertinent data being collected for other purposes.

Generally, CMP (or Swans Falls Corp. in the case of the Swans Fall Project) will be responsible for studies and data related to fish passage measures (e.g. effectiveness), as well as studies required as part of FERC licenses and/or exemptions. Agencies generally will be responsible for studies related to habitat, riverine populations, fisheries management, etc.

Task 5. Conduct Studies and Meet Annually to Review Results and Update Study Plans

During Years 1, 2 and 3 of each Assessment cycle, each party responsible for conducting studies will complete its work as scheduled, while keeping other parties apprised of interim findings, as called for in the study plans. At a minimum, the Coordinating Committee will meet annually in January to review study results and update plans, as necessary. The plans will be revised as needed to respond to lessons learned, new methods available, changing field conditions, or resource constraints.

Task 6. Review Data and Outline the Assessment

In November of Year 3, the FAAC will review available data and make assignments to conduct the Assessment and prepare the draft Report by February 1 of Year 4.

Task 7. Conduct Assessment and Prepare Draft "Assessment Report"

The FAAC will prepare a Draft Assessment Report , and provide a copy of the report to the other parties by February 1 of Year 4. Other parties will assist the FAAC as appropriate in preparing the Draft Report.

The Assessment Report will specifically answer the following five questions:

- Are the management goals and objectives stated at the beginning of the four year Assessment cycle still current?
- What is the present status of anadromous fish populations on the Saco River?
- Is progress toward the management goals and objectives being made?
- Is the rate of progress as expected?
- What conclusions can be drawn regarding the need, timing and design for constructing new upstream fish passage facilities at the Bar Mills, West Buxton, Bonny Eagle, Hiram and Swans Falls projects?

Furthermore, the Report must include the following elements:

A) Consider the availability and accuracy of necessary data to respond to the Assessment Criteria and support conclusions in the Report using the best available data. The final report will utilize to the extent possible data collected in Year 4.

B) Demonstrate that all the Assessment Criteria defined in Task 3 have been addressed to the fullest extent practicable. In the Assessment process, the Criteria will be applied in combination to develop biologically defensible conclusions and plans. Furthermore, the Assessment should clearly explain the relative importance assigned to the various Criteria.

C) Develop specific conclusions regarding the need for and timing of upstream fish passage facilities.

D) Develop as part of the Report, specific plans for future fish passage measures. If there are plans for installation of upstream fish passage facilities, these plans should indicate whether fish passage operational dates are "firm" or "tentative pending further

Assessment." Fish passage plans included in the Report should allow at least two years prior to the operational dates for design, permitting and construction of the facilities. The Report should also specify obligations of the parties for the next four year cycle, including the need for further studies and the anticipated timing of future decisions regarding fish passage facility construction.

E) Demonstrate that the conclusions and plans will contribute to achieving the management goals and objectives identified in Task 1.

F) Consider cost effective means of achieving the management goals and objectives.

G) Identify the administrative procedures required for each party to adopt and implement the conclusions and plans.

Task 8. Develop a Consensus Assessment Report

In early April of Year 4, the Coordinating Committee will meet with the assistance of a neutral facilitator to review the data, analyses, draft report and conclusions. The Committee will endeavor to reach consensus on a final Assessment Report by September 1 of Year 4.

Section 21 of the Saco River Fish Passage Agreement states the following:

> 21. The parties will endeavor to resolve in good faith any dispute that may arise in carrying out this agreement, using a consensus process which shall include meetings between the parties with a facilitator. The intent of the parties is to maintain the spirit of cooperation and understanding that led to this agreement, even as circumstances change (including changes in applicable law) or new information is acquired.

Whether or not a consensus can be reached, the FAAC will prepare a final Assessment Report that is consistent with the terms agreed to herein and distribute it to the Coordinating Committee by October 1 of Year 4 . The parties may accept the Report in whole or in part, and, if necessary, prepare and file comments on areas of disagreement. Each party will distribute copies of their acceptance and/or comments to all other parties by November 1.

Task 9. Filing With FERC

The Licensee or Exemptee will file a copy of the final Assessment Report with the Federal Energy Regulatory Commission by December 31 as evidence of compliance with the Agreement and this Annex. At the same time, the Licensee or Exemptee will file any notices, petitions, schedules or

comments as necessary to amend or attach conditions to the affected Projects' licenses or exemptions.

The Fisheries Agencies may also file individually a copy of the Assessment Report with FERC in a timely fashion, along with any other notices, petitions, schedules or comments necessary to pursue implementation of the Report's conclusions and plans. As stated in Section 14 of the Agreement, the Fisheries Agencies will use the Assessment Report in their determination of anadromous fish restoration needs, including such fishways as may be prescribed by the Department of Interior (U.S. Fish and Wildlife Service) and/or Department of Commerce (National Marine Fisheries Service) pursuant to Section 18 of the Federal Power Act, as amended, and such other measures as may be necessary under applicable state law. If the parties have not reached a consensus Assessment Report, the Fisheries Agencies' conclusions will prevail.

To expedite FERC's review of the Assessment results, parties will coordinate or combine their filings, as appropriate and practical. Other parties may file comments on the Assessment Report, notices or petitions, as desired.

CLOSURE

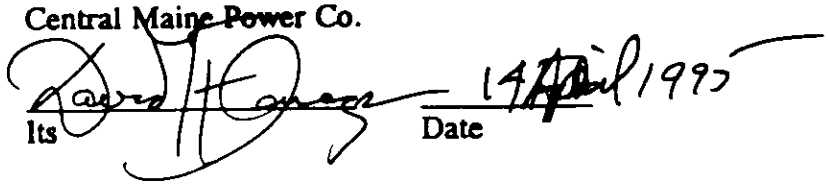
By signing below, the parties adopt this Annex as a part of the Saco River Fish Passage Agreement, dated May 24, 1994.

Nothing in this agreement shall be construed as obligating the U.S. Fish and Wildlife Service, The National Marine Fisheries Service, the U.S. Forest Service, the State of Maine, or the State of New Hampshire, their officers, agents or employees, to expend any funds in excess of appropriations or other amounts authorized by law.

This agreement shall bind and inure to the benefit of the successors and assigns of the signing parties. This agreement shall terminate, unless extended by the parties, on December 31, 2022 or upon expiration of the renewed licenses of the Skelton and Bonny Eagle projects, whichever is later.

We, the undersigned, having the authority to bind our respective parties, agree to represent and support this Agreement Annex in applicable proceedings before the Federal Energy Regulatory Commission and other regulatory bodies:

Central Maine Power Co.



Its _____ Date 14 April 1995

Appendix B. Detailed Economics of Hiram, West Buxton, Bar Mills, and Cataract Hydroelectric Projects

1. Hiram Hydroelectric Project (FERC No. 2530)

A. Power and Economic Benefits

The Hiram Hydroelectric Project (Hiram) is already licensed, and is generating on average about 57,023,000 kilowatthours (kWh) of energy without any environmental enhancement measures.

Hiram is operated in a run-of-the-river mode, and there is no requirement to release any minimum flows. According to Central Maine Power Company's (CMP) revised data, the net project investment and projected non-enhancement capital improvements are equal to $11,912,000 through December 12, 1994; the construction work in progress is equal to $31,000 through December 31, 1994; and the projected non-enhancement capital improvements would equal to $13,000 in 1995. CMP proposes the following environmental measures at Hiram (CMP, 1994b): (1) constructing downstream fish passage facilities to cost $300,000, with an annual operation cost of $34,000; (2) constructing upstream fish passage facilities to cost $4,700,000, with an annual operation cost of $34,000; and (3) performing fish passage studies to cost $510,000.

We estimated that the flow spilled to operate the proposed downstream fish passage facility at Hiram would reduce the power generation by about 1,140,460 kWh (2 percent of 57,023,000 kWh). With this lose, the total annual generation would decrease from about 57,023,000 kWh to about 55,882,540 kWh.

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include the net investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity addition available. We assumed a total operation and maintenance (O&M) expenses of $611,000 estimated by CMP for 1995. We used the CMP's 1995 avoided cost of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which is based on Gulf Island Hydroelectric Project avoided cost (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates starting in January 1995. We also evaluated the project's economic benefits with the proposed environmental enhancements.

The annual project cost, without any environmental measures, would be about $2,400,860 in 1995 dollars, or about 42.1 mills/kWh. We estimate the cost of alternative power would be about 35.3 mills/kWh. The project's net economic benefit, without any additional enhancement measures, would be about -$386,580 or about -6.78 mills/kWh.

B. Cost of environmental measures

Table B-1 shows the costs (reduction of the project's economic benefit) that would result from the various recommended enhancement measures we evaluated.

Table B-1 The annual economic impact, or costs of the various enhancement measures considered at Hiram, including any associated capital costs (Source: The Staff).

Enhancement Measures	Annual Cost	Cost in mills/kWh
Downstream Fish Passage-Bypass	$83,540	1.46
Upstream Fish Passage	$779,680	13.67
Fish Passage Studies	$80,690	1.41
Loss of Energy Due to Proposed Fish Passage	$26,100	0.60
Total	$970,010	17.14

2. West Buxton Hydroelectric Project (FERC No. 2531)

A. Power and Economic Benefits

The West Buxton Hydroelectric Project (West Buxton) is already licensed, and is generating on average about 31,339,000 kWh of energy annually without any environmental enhancement measures.

According to CMP's revised data, the net project investment and projected non-enhancement capital improvements are equal to $957,000 through 12/31/94; the construction work in progress is equal to $112,000 through 12/31/94; and the projected non-enhancement capital improvements would equal to $344,000 in year 1995.

CMP proposes the following environmental measures at West Buxton (CMP, 1994b): (1) constructing downstream fish passage facility to cost $250,000, with an annual operation cost of $17,000; (2) constructing upstream fish passage facilities to cost $3,500,000, with an annual operation cost of $17,000; (3) performing fish passage studies to cost $510,000; and (4) constructing a minimum-flow-release facility to cost $525,000 (Estimated by CMP for the Bonny Eagle Hydroelectric Project). We used this cost estimate for all minimum flow scenarios at West Buxton.

CMP estimates that the release of minimum flows at the Bonny Eagle Hydroelectric Project (Bonny Eagle) would decrease/increase the power generation at West Buxton as follows:

(1) With the minimum flows proposed by CMP, the generation would be reduce from about 31,339,000 kWh (baseline) to about 30,157,000 kWh annually. This would be about 1,182,000 kWh less energy than the baseline condition. About 657,000 kWh of the loss would be from on-peak energy, and about 525,000 kWh from off-peak energy. We estimate the value of the lost energy would be about $27,612.

(2) With the minimum flows recommended by the resource agencies, the generation would increase from about 31,339,000 kWh (baseline) to about 31,621,000 kWh. This would be about 282,000 kWh more energy than the baseline condition. However, the resource agencies' minimum-flow regime would force the project to generate less on-peak energy and more off-peak energy. The on-peak energy generation would decrease by about 2,629,000 kWh, and the off-peak energy would increase by about 2,911,000 kWh. The difference in total generation would be less than one-percent, and in effect, about 2,630,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. The estimated lost value of the energy shifted would be about $8,591 annually, or about $19,021 less than the loss that would be caused by CMP's proposed operation regime ($27,612).

We estimated that the flow spilled to operate the proposed downstream fish passage facility at West Buxton would reduce the power generation by about 626,780 kWh (2 percent of 31,339,000 kWh). With the CMP's proposed minimum flow release at Bonny Eagle, and losses due to operating the downstream fish passage at West Buxton, the total annual generation would decrease from about 30,157,000 kWh to about 29,530,220 kWh. With the resource agencies' recommended minimum flow regime at Bonny Eagle, and losses due to downstream fish passage at West Buxton, the total annual generation would decrease from about 31,621,000 kWh to about 30,994,220 kWh.

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include the net investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity addition available. We assumed a total O&M expenses of $705,000 estimated by CMP for 1995. We used the CMP's 1995 avoided cost of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which is based on Gulf Island Hydroelectric Project avoided cost (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates for a 30-year period, starting in January 1995. We also evaluated the project's economic benefits with the proposed or recommended environmental enhancements.

The annual project cost, without any environmental measures, would be about $922,700 in 1995 dollars, or about 29.4 mills/kWh of energy produced. We estimate the cost of alternative power would be about 35.8 mills/kWh. The project's net economic benefit, without any additional enhancement measures, would be about $199,590 or about 6.4 mills/kWh.

B. Cost of Environmental Measures

Table B-2 shows the costs (reduction of the project's economic benefits) that would result from the various recommended enhancement measures we evaluated.

Table B-2 The annual economic impact, or costs of the various enhancement measures considered at West Buxton, including any associated capital costs (Source: The Staff).

Enhancement Measures	Annual Cost	Cost in mills/kWh
Downstream Fish Passage-Bypass	$57,590	1.84
Upstream Fish Passage	$517,780	18.25
Fish Passage Studies	$80,680	2.58
Loss of Energy Due to Proposed Fish Passage	$14,640	0.35
Min. Flow Release Facility	$78,280	2.50
Total:	$748,970	25.52

3. Bar Mills Hydroelectric Project (FERC No. 2194)

A. Power and Economic Benefits

The Bar Mills Hydroelectric Project (Bar Mills) is already licensed, and is generating on average about 20,783,000 kWh of energy annually without any environmental enhancement measures.

According to CMP's revised data, the net project investment and projected non-enhancement capital improvements are equal to $1,556,000 through December 31, 1994; the construction work in progress is equal to $4,000 through December 31, 1994; and the projected non-enhancement capital improvements would equal to $62,000 in year 1995.

CMP proposes the following environmental measures at Bar Mills (CMP, 1994b): (1) constructing downstream fish passage facility to cost $250,000, with an annual operation cost

of $17,000; (2) constructing upstream fish passage facility to cost $2,800,000, with an annual operation cost of $17,000; (3) performing fish passage studies to cost $510,000; and (4) constructing a minimum-flow-release facility to cost $525,000 (Estimated by CMP for Bonny Eagle). We used this cost estimate for minimum-flow-facilities for all minimum flow scenario at Bar Mills.

CMP estimates that the release of minimum flows at Bonny Eagle would decrease/increase the power generation at Bar Mills as follows:

(1) With the minimum flows proposed by CMP, the generation would be reduced from about 20,783,000 kWh (baseline) to about 20,169,000 kWh annually. This would be about 614,000 kWh less energy than the baseline condition. About 420,000 kWh of the loss would be from on-peak energy, and about 194,000 kWh from off-peak energy. We estimate the value of the lost energy would be about $14,765.

(2) With the minimum flows recommended by the resource agencies, the generation would decrease from about 20,783,000 kWh (baseline) to about 19,737,000 kWh. This would be about 1,046,000 kWh less energy than the baseline condition. The on-peak energy generation would decrease by about 2,286,000 kWh, and the off-peak energy would increase by about 1,240,000 kWh. The difference in total generation would be about 5 percent, and in effect, about 2,286,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. The estimated lost value of the energy shifted would be about $33,742 annually, or about $18,977 more than the loss that would be caused by CMP's proposed operation regime ($14,765).

We estimated that the flow spilled to operate the proposed downstream fish passage facility at Bar Mills would reduce the power generation by about 415,660 kWh (2 percent of 20,783,000 kWh). With CMP's proposed minimum flow release at Bonny Eagle, and losses due to operating the downstream fish passage at Bar Mills, the total annual generation would decrease from about 20,169,000 kWh to about 19,753,340 kWh. With the resource agencies' recommended minimum flow regime at Bonny Eagle, and losses due to downstream fish passage at Bar Mills, the total annual generation would decrease from about 19,737,000 kWh to about 19,321,340 kWh.

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include the net investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity addition available. We assumed a total O&M expenses of $204,000 estimated by CMP for 1995. We used the CMP's 1995 avoided cost of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which is based on Gulf Island Hydroelectric Project avoided cost (letter from F. Allen

Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates starting in January 1995. We also evaluated the project's economic benefits with the proposed or recommended environmental enhancements.

The annual project cost, without any environmental measures, would be about $452,870, or about 21.8 mills/kWh of energy produced. We estimate the cost of alternative power would be about 35.8 mills/kWh. The project's net economic benefit, without any additional enhancement measures, would be about $291,570, or about 14.0 mills/kWh.

B. Cost of Environmental Measures

Table B-3 shows the costs (reduction of the project's economic benefits) that would result from the various recommended enhancement measures we evaluated.

Table B-3 The annual economic impact, or costs of the various enhancement measures considered at Bar Mills, including any associated capital costs (Source: The Staff).

Enhancement Measures	Annual Cost	Cost in mills/kWh
Downstream Fish Passage	$57,590	2.77
Upstream Fish Passage	$461,030	22.18
Fish Passage Studies	$80,680	3.88
Loss of Energy Due to Proposed Fish Passage	$9,720	0.19
Min. Flow Release Facility	$78,280	3.77
Total	$687,300	32.79

4. Cataract Hydroelectric Project (FERC No. 2528)

A. Power and Economic Benefits

The Cataract Hydroelectric Project (Cataract) is already licensed and is generating on average about 38,635,000 kWh of energy without any environmental enhancement measures.

According to CMP's revised data, the net project investment and projected non-enhancement capital improvements are equal to $9,473,000 through December 31, 1994, and the construction work in progress is equal to $52,000 through December 31, 1994.

CMP proposes the following environmental measures at Cataract's Spring Island dam and Bradbury dam (CMP, 1994b): (1) constructing upstream fish passage facilities to cost

$1,710,000 ($910,000 for Spring Island dam and $800,000 for Bradbury dam), with an annual operation cost of $22,000 ($11,000 for Spring Island dam and $11,000 for Bradbury dam); and (2) conducting fish passage studies to cost $300,000 ($150,000 for Spring Island dam and $150,000 for Bradbury Dam).

CMP estimates that the release of minimum flows at Skelton would decrease/increase the power generation at Cataract's East and West dam as follows:

(1) With the minimum flows proposed by CMP, the generation would be reduced from about 38,635,000 kWh (baseline) to about 38,285,000 kWh. This would be about 350,000 kWh less energy than the baseline condition. The on-peak energy generation would decrease by about 634,000 kWh, and the off-peak energy would increase by about 284,000 kWh. The difference in total generation would be less than 2 percent, and in effect, about 634,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. We estimate the value of the lost energy would be about $10,424.

(2) With the minimum flows recommended by the resource agencies, the generation would decrease from about 38,635,000 kWh (baseline) to about 38,281,000 kWh. This would be about 354,000 kWh less energy than the baseline condition. The on-peak energy generation would decrease by about 1,204,000 kWh, and the off-peak energy would increase by about 850,000 kWh. The difference in total generation would be less than one-percent, and in effect, about 1,204,000 kWh of energy generation would be shifted from on-peak periods to off-peak periods. The estimated lost value of the energy shifted would be about $13,963 annually, or about $3,538 less than the loss that would be caused by CMP's proposed operation regime ($10,424).

Our independent economic studies are based on current electric power conditions. We do not consider future inflation or escalation of prices. The project costs include the net investment through December 31, 1994, construction work in progress through December 31, 1994, projected non-enhancement capital improvements estimated by CMP for 1995, insurance, taxes, and administrative and general expenses. We assumed a capacity value of $109/kW-year (at a fixed charge rate of 14 percent), which is based on a Combined-Cycle Combustion Turbine plant - cheapest, most reasonable, capacity addition available. We assumed a total O&M expenses of $935,000 estimated by CMP for 1995. We used the CMP's 1995 avoided cost of 25.8 mills/kWh for on-peak, and 20.3 mills/kWh for off-peak energy, which is based on Gulf Island Hydroelectric Project avoided cost (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

We evaluated the economic benefits of the project as it presently operates starting in January 1995. We also evaluated the project's economic benefit with the proposed or recommended environmental enhancements.

The annual project cost, without any environmental measures, would be about $2,262,350 in 1995 dollars, or about 61.2 mills/kWh of energy produced. We estimate the cost of alternative power would be about 35.7 mills/kWh. The project's net economic benefit, without any additional enhancement measures, would be about -$984,560, or about -25.5 mills/kWh.

B. Cost of Environmental Measures

Table B-4 shows the costs (reduction of the project's economic benefit) that would result from the various recommended enhancement measures we evaluated.

Table B-4 The annual economic impact, or costs of the various enhancement measures considered at Cataract, including any associated capital costs (Source: The Staff).

Enhancement Measures	Annual Cost	Cost in mills/kWh
Upstream Fish Passage at Spring Island dam and Bradbury dam	$293,890	7.61
Fish Passage Studies for Spring Island dam and Bradbury dam	$47,460	1.23
Total	$341,350	8.84

Appendix C. LETTERS OF COMMENT ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT AND STAFF RESPONSES

The Notice of Availability of the draft environmental impact statement (EIS) was published in the *Federal Register* on December 9, 1994. The draft EIS was mailed to federal, state, local, and non-governmental agencies and individuals on December 1, 1994. Section 8 contains a list of those agencies and individuals that were sent a copy of both the draft EIS and the final EIS.

All timely letters of comment that address specific analyses in the draft EIS were reviewed by the FERC staff. Suggestions for correcting data or text and requests for further discussion of a subject have been considered. Those editorial changes and suggestions which were practicable, reasonable, and which improved the quality of the final EIS were incorporated.

Constructive criticism presenting a major environmental point of view or one in opposition to staff, when persuasively supported, is treated by making revisions in the appropriate part of the final EIS. When the major point of view is not persuasive, reasons are given why the staff did not change its point of view.

The sections or pages of the final EIS that have been modified as a result of comments received are identified in the staff responses to the right of the letters of comments. Other staff responses are self explanatory.

A "no response required" response is given to comments that are statements that raised no questions concerning treatment of subject matter in the draft EIS. A "your opinion has been noted" or "comment is noted" response is given to comments considered to be statements of opinion.

A vertical line drawn to the right of the comment letter text indicates to which comments our response applies. Where possible, our responses start next to the start of the comment, which may extend for several pages. Our responses are numbered sequentially. Where necessary to avoid confusion, the comments are numbered as well. The respondents, the date of their response, and the page on which they occur are as follows:

Commentor	Date of Letter	Page
Central Maine Power Company (CMP)	February 21, 1995	C-2
U.S. Department of the Interior (Interior)	February 21, 1995	C-28
Saco River Salmon Club (SRSC)	February 21, 1995	C-42
U.S. Environmental Protection Agency (EPA)	March 10, 1995	C-45
Central Maine Power Company	April 18, 1995	C-51

Central Maine Power

February 21, 1995

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E., Room 3110
Washington, D.C. 20426

002 005

RE: Saco River Draft Environmental Impact Statement
FERC Project Nos. 2528, 2527, 2194, 2531, 2529, 2510, & 11365
Cataract, Skelton, Bar Mills, West Buxton, Bonny Eagle, Hiram,
and Swans Falls Projects
Comments on Saco River DEIS (FERC\DEIS 0077)

Dear Ms. Cashell:

On December 1, 1994, the Federal Energy Regulatory Commission (FERC or Commission) issued the Draft Environmental Impact Statement (DEIS) for the Saco River projects. Central Maine Power Company (CMP) is Licensee for six of the projects included in the EIS. Swans Falls is owned by others. The following represent CMP's comments on the Saco River DEIS.

Fish Passage Agreement

Section 2.1 of the DEIS examines the proposed action of implementing fish passage requirements at CMP's six Saco River projects consistent with those outlined in the recently developed Saco River Fish Passage Agreement (Agreement) which was signed by CMP and other parties on June 28, 1994[1]. In Section 5.4.1, the DEIS concludes that the Saco River Fish Passage Agreement is the preferred option for implementing fish passage requirements at the Saco River projects, and later in Section 5.4.2.1 the Commission's Staff (Staff) recommends that fish passage facilities be installed as stipulated in the Agreement.

CMP-1

We recommend approving the Saco River Fish Passage Agreement as a Settlement Offer.

[1] The State of New Hampshire signed the Saco River Fish Passage Agreement on October 6, 1994. The Agreement, as signed by all parties, was submitted to the Commission as an Offer of Settlement by letter dated November 21, 1994. On December 2, 1994 the Commission issued a Notice of Settlement Offer, and requested comments by January 3, 1995. To the best of Licensee's knowledge, only the Swans Falls Corporation filed comments on the Settlement Offer. The DEIS is out-of-date with regard to the Agreement and the Final EIS should reflect the current status of the Agreement.

Comment **Response**

CMP strongly supports the DEIS conclusion that the Saco River Fish Passage Agreement is the preferred alternative for providing fish passage along the Saco River. However, as noted in Section 2.1 and elsewhere, the DEIS does not contain an explicit rscommendation that the Agreement be approved by the Commission as a Settlement Offer. In as much as the Agreement is the preferred alternative, the Final EIS should contain a recommendation for approval of the Agreement.

CMP would also like to clarify a few issues regarding the Agreement. The discussion of the Agreement in the DEIS should be revised accordingly and included in the Final EIS.

Section 2.1.1, pp. 2-4 of the DEIS states that, under the Agreement, upstream fish passage at Bar Mills, West Buxton, Bonny Eagle and Hiram would:

> "be treated as a group with passage to be recommended by state/federal fisheries agencies based on the progress of fish restoration in the basin. Progress would be measured by criteria to be developed by the fisheries agencies. Assessments would be conducted every 4 years beginning in 1999 and progressing through 2011, to determine the identity of, the need for, and the design and timing of the first upstream fish passage facility to be constructed."

This characterization of the Agreement should be expanded in the Final EIS to reflect the current status of the Agreement and the "criteria" which have been drafted since signing the original Agreement, and which will become an Annex to the Agreement when executed.

As correctly noted in the DEIS, the Saco Fish Passage Agreement calls for the development of "criteria" which will become the basis for the four-year evaluations and future decisions on the need for, and timing of, upstream fish passage at Bar Mills, West Buxton, Bonny Eagle and Hiram. Beginning in August, 1994, CMP and the other signatories to the Agreement, including the fisheries agencies, began a series of meetings to develop the assessment criteria. By January, 1995 the group had come to consensus on a draft criteria document which it agreed would become an Annex to the signed Agreement. The final draft criteria Annex is currently being reviewed by all of the parties and is close to being finalized and signed. A copy of the January 20, 1995 draft criteria Annex is provided in Attachment 1.

The criteria Annex outlines a process to be followed for each of

CMP-2

We revised the EIS to reflect the current status of the Fish Passage Agreement. We also revised section 4.1.1.3 of the EIS to reflect the status of the Annex to the Agreement filed with the Commission on April 15, 1996.

four-year assessment cycles established by the Agreement. The first assessment cycle will begin in 1996 and conclude in 1999. Four-year cycles will also occur for the periods 2000-2003, 2004-2007, and 2008-2011. During each of the four-year cycles, parties will participate, as outlined in the Annex, in establishing or reaffirming the management goals for the Saco River (agencies only), developing criteria to examine progress in meeting those goals, developing a study plan for the current four-year cycle, conducting studies, collecting and evaluating data, preparing a draft assessment report (agencies only), and preparing a final assessment report representing, if possible, consensus among all parties.

As carefully worded in the Annex, final assessment reports prepared at the conclusion of each of the four-year cycles may include recommendations for the installation of upstream fish passage facilities at Bar Mills, West Buxton, Bonny Eagle and/or Hiram. However, there is no requirement that the four-year report include such a recommendation. Nor are recommendations for installation of fish passage which may be included in the report limited to the next four-year period. In short, the final assesement report could make specific recommendations for installation of upstream fish passage at a stated date; it could conclude that upstream fish passage is likely to be required by a specific date but suggest that a final determination of that need or date be made following some additional data collection and evaluation; or it could conclude that for the next four-year period no upstream fish passage facilities are required.

Finally, the Annex also carries provisions for what happens if consensus on the four-year assessment report is not reached. Specifically, the Annex states that the final report will contain the fishery agencies' conclusions and recommendations, and that if there is not consensus among the parties, the agencies' report will be filed with FERC. However, there is also a provision for all parties to be able to outline and comment on areas of disagreement. Such comments will be filed with FERC as part of the report.

Although the criteria Annex has not yet been signed, it is very close to being final, and is expected to be signed by all parties within the next two months. Therefore, for consistency and clarity, CMP strongly recommends that the Final EIS be written to carefully reflect the process outlined in the criteria Annex. The Final EIS should also reflect the current status of the Agreement, including the fact that all parties have signed the Agreement, and that it has been filed with the Commission as an Offer of Settlement.

On a related matter, page 4-83 of the DEIS states that "Upon a specific request from Interior, and upon Commission approval, fish population studies could be required at a future time by use of our standard re-opener clause." As described above, the Saco River Fish Passage Agreement Annex clearly outlines a process by which future evaluations of anadromous fish in the Saco River will be made. The Annex describes, in general terms, the types of studies which will be conducted for the assessment and outlines basic areas of responsibility between the Agreement parties for conducting required studies. Because the Annex has been developed cooperatively among the Agreement parties, including the Department of Interior, U.S. Fish and Wildlife Service (USFWS), there is no necessity for FERC to make any specific provisions for the use of reopeners to conduct future studies of Saco River fisheries which would not be consistent with the terms of the Agreement, the Agreement Annex, or any amendments thereto.

CMP-3

The standard re-opener article is included in licenses for projects similar in scope and size to Bonny Eagle and Skelton to address any resource needs that may develop during the term of the license. The standard re-opener could be used in instances to address fish resource or other resource needs not contemplated by the Agreement.

Reservation of Section 18 Prescriptive Authority

In a number of places in the DEIS, there is general discussion regarding the reservation of Section 18 authority to the USFWS and National Marine Fisheries Service (NMFS) in the Saco River Project licenses. CMP does not disagree that both USFWS and NMFS have Section 18 authority to prescribe fishways at the Saco River projects. However, since both USFWS and NMFS are a signatory to the Saco River Fish Passage Agreement, CMP believes that reserving Section 18 authority to these agencies through a standard Section 18 reservation article in its' project licenses is unnecessary since the long-term Saco River Fish Passage Agreement sets forth a well thought out, long-term, comprehensive plan for the provision of fish passage at the projects on the Saco River. A standard reservation of prescriptive authority would be inconsistent with the terms of the Agreement.

CMP-4

To date, neither the USFWS nor the NMFS which have mandatory authority under Section 18 to prescribe fishways have concurred with this opinion.

Instead, Licensee believes that any references to a Section 18 article included in the Final EIS, or in its new project licenses for Bonny Eagle and Skelton, or amended licenses for Hiram, Bar Mills, or West Buxton, should reflect more accurately the wording regarding Section 18 authority which is contained in the Agreement. Specifically, CMP suggests that any license article referencing Section 18 authority should state the following:

> The Department of Interior (U.S. Fish and Wildlife Service) and/or Department of Commerce (National Marine Fisheries Service) will use the assessments provided for in paragraphs 6 and 14 of the Saco River Fish Passage Agreement in their

determination of anadromous fish restoration needs, including such fishways as may be prescribed by them pursuant to Section 18 of the FPA, as amended.[2]

CMP believes that the Commission will find that such wording is consistent with the Agreement. CMP further believes that as signatories to the Agreement, the USFWS and NMFS will concur that such wording effectively reserves their authority under Section 18 of the FPA, as amended, to prescribe fishways in a manner consistent with the terms of the Saco River Fish Passage Agreement.

Project Minimum Flows and Fisheries Habitat

Regarding the issues of minimum flows, Licensee is commenting on five specific areas:

1. The "or inflow" clause used in standard minimum flow recommendations.
2. The 100 cfs minimum flow recommended by FERC staff for the New River Channel (at the Bonny Eagle Project) for the April 1 through September 30 period.
3. The 250 cfs, or inflow, whichever is less, minimum flow recommended by FERC staff for the November 1 through March 31 period from Bonny Eagle and Skelton.
4. The 800 cfs, or inflow, whichever is less, minimum flow recommended by FERC staff for the April 1 through October 31 period from Bonny Eagle and Skelton.
5. The inconsistency of minimum flow recommendations made in the DEIS for anadromous fish enhancement in comparison to the strategy conceptualized in the Saco River Fish Passage Agreement.

Each of these items is discussed in detail below:

1. The "or inflow" Clause Used in Standard Minimum Flow Recommendations

   The DEIS discusses the various minimum flow alternatives, and Staff's recommendation, in numerous sections of the document.

[2]See paragraph 14B of the Saco River Fish Passage Agreement.

However, the DEIS does not clearly or consistently make the explicit statement that the Licensee's proposals, the alternatives, or the Staff's flow recommendations, are for the specified cfs, or inflow, whichever is less. Although this is standard language in recommendations for projects of this sort, and is implicit in the DEIS discussions, the Final EIS should be explicit in the wording of all minimum flow discussions and recommendations.

CMP-5

We agree, and we have added this wording where appropriate in the final EIS.

2. New River Channel 100 cfs Seasonal Minimum Flow

The goal of the New River Channel seasonal minimum flow is to support the Maine Department of Inland Fisheries and Wildlife (MDIFW) management objective of hatchery supported brook trout and rainbow trout fisheries. Therefore, flow must be provided during the fishing season, which extends from April 1 through September 30. However, the recommendation by FERC staff of a 100 cfs minimum flow rather than the Licensees' proposed 50 cfs is based solely on erroneous assumptions regarding station generating capacity and the value of the water, and fails to consider fishery agency management objectives and biology.

The DEIS (at page 4-82) describes a 100 cfs minimum flow as providing optimum habitat, with only minor differences from 50 cfs which provides an identical rating for brook trout and only a 20 percent reduction for rainbow trout. Therefore, based on the field observations and Staff's conclusions, a 50 cfs minimum flow would provide excellent habitat and achieve the agency management objective.

But, the DEIS also states that several other important factors should be considered to properly determine appropriate minimum flow enhancements in the New River Channel (DEIS at Page 4-82). These are:

- The minimum flow must be passed either via a non-operational turbine or via the New River Channel Dam.
- The Bonny Eagle tailrace is backwatered to the base of the powerhouse.
- A minimum flow within the Bonny Eagle station tailrace is not a significant concern.
- Any minimum flow in the New River Channel would be a part of the overall project minimum flow.

CMP-6

The additional 50 cubic feet per second (cfs), which would be released to the New River Channel, would reduce the power generation at Bonny Eagle by about 800-900 megawatt-hours (MWh) annually. Based on current economic conditions, alternative peak and off-peak energy cost about 25.8 and 20.3 mills/kilowatt-hours respectively, and the lost peak and off-peak energy at Bonny Eagle would have annual values of about $15,351 and $5,887 respectively. While we recognize that future changes in project facilities and economic conditions may alter what is the best resource balancing under current conditions, we can see little merit in skewing recommendations now based on the possibility that conditions may change in the future. If the project configuration or economic conditions change significantly in the future, the balancing issues may have to be revisited at some future date.

Staff used available information referenced in the draft EIS to arrive at the 100 cfs New River channel flow. Further, based on field observations, habitat enhancement potential and access are greater in the New River channel than in the Bonny Eagle tailwaters.

FERC staff erroneously concludes from this that there is no reason why 100 cfs could not be released into the New River Channel as easily as 50 cfs, and that while the differences in habitat quality in tha New River Channel at 50 and 100 cfs are relatively insignificant, the additional 50 cfs minimum flow would be more beneficial in the New River Channel than as a small portion of a much higher flow in the Bonny Eagle tailwaters.

These arguments in support of the 100 cfs New River Channel flow are unsound. While availability of water and station generating capacity are relevant factors in determining a suitable minimum flow, they are not the only important factors to be considered. Any minimum flow required for the New River Channel must also ba based on a demonstrated need to mitigate or enhance fishery habitat in the reach. Such a demonstration is not made in the DEIS. In fact, as noted earlier, the DEIS clearly states that "differances in the habitat quality at 50 and 100 cfs are relatively insignificant."

What the DEIS does conclude is that the additional 50 cfs cannot be used to generate, that it has no generating value, and therefore, it could be put into the New River Channel at no cost. Notwithstanding the fact that assumptions made by FERC regarding the generation capacity of the turbine units are not correct, Licensee believes FERC should not be making minimum flow recommendations, which will become tsrms of 30-50 year licenses, based solely on the configuration of the Bonny Eagle station today.

Station configuration and related conditions change. One change which Licensee knows will occur, and which will affect how minimum flows are provided in the future, will be the installation of fish passage facilities. Such facilities will, by design, require a minimum flow to operate properly. In turn, fishway flows will change how a total minimum flow through the Project is distributed. However, exact fishway flows or a determination of how minimum flows will be provided once fishways are installed cannot be made today. Other conditions can change as well. Over the term of a new license, the Licensee may do maintenance, modifications or upgrades to the Bonny Eagle station which might change minimum generating flows, or other station characteristics. Therefore, FERC should not make a determination of flow requirements for purposes of enhancing fisheries which will stand for a minimum of 30 years based on today's configuration of the station.

Finally, the DEIS assumes that the station cannot generate with the additional 50 cfs; therefore, there will be no loss of generation associated with requiring 100 cfs in the New River Channel as compared to the Licensee's proposed 50 cfs. This is simply not true. As described in more detail later in this response, Licensee estimates that the increase in minimum flow for the New River Channel from 50 cfs to 100 cfs for the period April 1 through September 30 would result in a loss of 595 MWH of on-peak and 290 MWH of off-peak generation, annually. For a 30-year period, this will cost the Licensee's ratepayers approximately $3.4 million ($719,000 NPV, or $76,000 per year levelized)[3].

For these reasons, the DEIS should be revised to recommend a minimum flow of 50 cfs April 1 through September 1 for the New River Channel.

3. <u>November 1 through March 31 Minimum Flow of 250 cfs, or Inflow, at Bonny Eagle and Skelton</u>

In its license application, the Licensee proposed a 250 cfs, or inflow, whichever is less, minimum flow at Skelton from October 1 through May 31, but no minimum flow at Bonny Eagle from December 1 through March 31.

The FERC staff has recommended a 250 cfs (or inflow if less) minimum flow at both projects from November 1 through March 31. The stated purpose of this flow is to provide enhanced habitat for resident species, primarily brook trout and brown trout. Licensee does not disagree with the justification set forth in the DEIS regarding the appropriateness of a 250 cfs, or inflow, minimum flow at Bonny Eagle during the winter period. In fact, the Licensee has reappraised its Bonny Eagle proposal and is agreeable to a 250 cfs, or inflow, late fall to spring minimum flow as a biological enhancement.

However, the Licensee disagrees with the time frame of November 1 through March 31. A more justified time frame for this flow for resident species should be for the period November 1 through April 30. November 1 through April 30 is consistent with the period when flows required for anadromous fish migration are not necessary. Therefore, the Licensee recommends that the Final EIS include a 250 cfs, or inflow if

[3]These values based on June 28, 1991 avoided costs; 30-year NPV at 10%.

CMP-7

Staff's revised flow recommendations are consistent with flows recommended by Interior. The staff believes the incremental habitat resource gains of its alternative over CMP's proposal, although hard to quantify, justify the higher power benefit losses that would be caused by its alternative.

less, minimum flow for the period November 1 through April 30 at both Bonny Eagle and Skelton Projects.

4. April 1 through October 31 Minimum Flow of 800 cfs, or Inflow if Less, at Bonny Eagle and Skelton

In its license applications, the Licensee proposed a 400 cfs, or inflow, whichever is less, minimum flow from April 1 through November 30 at Bonny Eagle and an 800 cfs, or inflow, whichever is less, minimum flow at Skelton from June 1 through September 30. The Licensee's 800 cfs flow proposal for Skelton was based primarily on the agencies' original recommendation of the Aquatic Base Flow (ABF = 0.5 cfsm) as a minimum flow for this site, while the 400 cfs proposed at Bonny Eagle was based on the concept of providing a zone-of-passage (ZOP) in the free-flowing reaches below West Buxton, Bar Mills, and Skelton. Zone-of-passage studies conducted by the Licensee at these three sites indicated that a flow of 400 cfs provides a good zone-of-passage to all three anadromous species of interest at all three study locations.

The DEIS recommends a minimum flow of 800 cfs from April 1 through October 31 at both Bonny Eagle and Skelton. The DEIS suggests that this flow was selected primarily to support the agencies' objective of managing the reaches below West Buxton, Bar Mills and Skelton as migratory pathways for anadromous species.[4] Yet, the DEIS never disputes the zone-of-passage (ZOP) which the Licensee's studies show would be available at a flow of 400 cfs. Nor does the DEIS provide any evidence that migratory pathways would be significantly enhanced, or that migration of anadromous fish would be improved, under a flow of 800 cfs as opposed to 400 cfs.

Lacking such evidence, CMP questions whether increasing Bonny Eagle (and Skelton) minimum flows from 400 cfs to 800 cfs for anadromous fish migration can be justified either biologically, or under a multiple use concept for the Saco River. There are four bases for this concern:

- The presence of a good ZOP at all projects below Bonny Eagle at a flow of 400 cfs, as documented by the Licensees' studies.

- Agency management plans for, and timing of, restoration

[4] See DEIS discussion on pages 4-76 and 4-77.

CMP-8

As discussed in the EIS, 800 cfs flow for the period April 1 to October 31 does not only provide a zone of passage for anadromous species. This flow would provide protection for resident salmonids during the typically low flow high temperature summer months and for maintenance of reservoir wetlands. Also, this flow would provide for enhanced shad and river herring spawning and incubation and protect the Saco River estuary during the productive months.

of anadromous fish, including the interim trap and truck operation integral to the Saco River Fish Passage Agreement.

- Anadromous fish enhancements not related to migration paths.
- Lost hydroelectric generation.

Provision of Good None-of-Passage at 400 cfs

The Bonny Eagle tailrace is backwatered by the West Buxton impoundment, and, as demonstrated by the Licensee's studies, the riverine reaches below West Buxton, Bar Mills, and Skelton all have good ZOP for upstream and downstream migration of anadromous fish at 400 cfs. The ZOP at West Buxton is the most restrictive, but still good, with a wide channel on each side of the island, average thalweg depths of approximately 1.5 feet, and the lengths of the shallowest sections (one in each channel) are only approximately 150 feet. Based on these results, there is no need for a flow in excess of 400 cfs for a migration path alone. The DEIS provides no evidence or analysis to demonstrate that the ZOP provided at 400 cfs is not sufficient to meet agency management objectives for maintaining migratory pathways. Moreover, the DEIS provides no evidence or analysis to demonstrate that flows in excess of 400 cfs will provide any significant improvement in fish passage. In fact, all the DEIS clearly concludes is that "a higher minimum flow than CMP's proposed 400 cfs, could be necessary to ensure adequate instream flows for migrating anadromous fish".[5]

8a. See response CMP-8.

The Extent of Migratory Pathways Needed are Not Known at this Time

The extent to which migratory pathways below Bar Mills and West Buxton will be needed has not yet been established. The means by which anadromous fish will move upstream in the Saco River will be determined by the criteria set forth in the Saco River Fish Passage Agreement and Annex. Under the terms of the Agreement, fishways will be installed within the next two years at Springs and Bradbury dams (Cataract Project) and within five years at the Skelton

[5]DEIS pg 4-77. Emphasis added.

Project[6]. Until the Skelton upstream fishway is completed, a trap and truck operation will be used to truck shad and alewife from the Cataract Project into the Cataract and Skelton impoundments, and Atlantic salmon from Cataract to above Bonny Eagle.

Once the fish lift at Skelton is completed, trap and truck operations will move to that location and will be used, for the foreseeable future, to move Atlantic salmon to above Bonny Eagle. In addition, if a determination is made by the Maine Department of Marine Resources (DMR) to extend shad and alewife restoration above Bar Mills, trap and truck operations may be used to move those species into the Bar Mills and West Buxton impoundments. According to the Agreement, under no circumstances will upstream fish passage be installed at Bar Mills any earlier than 2005. Moreover, it is not known at this time that Bar Mills will be the next dam on the Saco River where upstream fish passage will be installed. Such a determination will be made according to the assessment process contained in the Agreement and Agreement Annex. Therefore, requiring a minimum flow of 800 cfs solely for the purpose of providing an enhanced migration path would not justified for some time, if indeed it is necessary at all.

The Licensee also believes that the FERC staff recommendation of April 1 as the start of the higher migration path flow is not necessary, biologically. Based on recent history, it is unlikely that there will be any significant migration of Atlantic salmon in the Saco River this early, and certainly no shad or alewife. A more realistic and practical date to initiate the higher flow would be May 1. This coincides with the May 1 through October 31 period of operation of upstream fish passage facilities which has been recommended by the fishery agencies at the Cataract Project and for the Saco River in general.

Enhancement of Other Anadromous Habitat Above Skelton Project Not Necessary at this Time

The DEIS concludes that migratory path flows over 250 cfs will also enhance anadromous fish habitat for other life stages. These would be shad and alewife larval and juvenile life stages, and spawning shad and alewife. As discussed above, it is not known when there

[6]The Saco River Fish Passage Agreement requires that a new upstream fish lift be installed at the Skelton Project by 1998, or within three years of issuance of a new license for the Skelton Project, whichever is later.

8b. See response CMP-8. Staff is not convinced that releases of the higher flow from Skelton and Bonny Eagle should commence on May 1 instead of April 1. It would seem reasonable to staff to have these higher flows in effect prior to the May 1 operation start up date for the upstream passage facilities. This earlier release date would accommodate correcting any maintenance or operation problems that could delay fish passage during the recommended time frame. Further, the agreement states that upstream passage facilities be operational by May 1

will be shad or alewife spawning above Bar Mills (the upper limit of the trap and trucking operation until large numbers of fish return to the Saco River), so considerations of spawning and nursery habitat are logically confined to the Skelton Project in this DEIS.

Attachment 2 is a summary of the results of IFIM studies conducted by the Licensee. The results for the Shad-Larval/Juvenile life stage below Skelton is a range of 63 to 77 percent of maximum Weighted Usable Area (WUA) available at flows of 400 to 800 cfs. This is for the 4,000-foot-long IFIM study reach, and it is important to note that the entire Cataract and Springs/Bradbury impoundments are shad and alewife nursery habitat. Similarly, for the Shad-spawning life stage, there is a range of 27 to 50 percent of maximum WUA at flows of 400 to 800 cfs. The central factor for shad and alewife spawning is that these are schooling broadcast spawners and a small area of suitable habitat will serve a large number of fish, e.g., the pool below the Skelton Dam could provide enough spawning area for this reach. This same discussion applies to the Saco River below the West Buxton Project, should shad and alewife eventually be introduced to this reach. While the IFIM reach had little nursery or spawning habitat, there is a large downstream impoundment and certainly significant amounts of spawning habitat.

8c. See response CMP-8.

Lost Hydroelectric Generation

Licensee utilized its HEC-5 based Saco River Operations Model to evaluate the effects on generation associated with the DEIS minimum flow proposal, and has concluded that the cost in terms of lost generation associated with the DEIS minimum flow recommendation cannot be justified based on uncertain benefits to migratory fish. Instead, Licensee recommends as a proper balancing of power and non-power resources, a minimum flow of 400 cfs or inflow, whichever is less, for the period May 1 through October 31 from both Bonny Eagle and Skelton.

Results of Licensee's HEC-5 evaluation of DEIS minimum flow proposal, and of Licensee's revised proposal for minimum flows[7], at Bonny Eagle and Skelton are provided in Attachment 3.

[7]Some of the figures for energy and value in this filing may vary, by less than 0.1%, when compared to previous filings due to a slightly refined configuration of the Saco River Operations Model.

Comment

Response

Specifically, Attachment 3 shows the on-peak, off-peak and total generation at all of CMP's Saco River projects for the following four scenarios:

BASELINE: Represents current operation of all projects under existing license conditions.

CMP ORIGINAL PROPOSAL: Bonny Eagle 400 cfs or inflow 4/1-11/30, including 50 cfs New River Channel 5/1-9/30, downstream fishway flow of 100 cfs 5/1-10/31, 4 ft pond fluctuation; Skelton 800 cfs or inflow 6/1-9/30, 250 cfs or inflow 10/1-5/31, upstream and downstream fishway flow of 180 cfs 5/1-10/31, 2.5 ft pond fluctuation.

DEIS RECOMMENDED FLOW: Bonny Eagle minimum flow 800 cfs or inflow 4/1-10/31 with 100 cfs in the New River Channel 5/1-9/30, 250 cfs or inflow 11/1-3/31, downstream fishway flow of 100 cfs 5/1-10/31, 4 ft impoundment fluctuation; Skelton 800 cfs or inflow 4/1-10/31, 250 cfs or inflow 11/1-3/31, upstream and downstream fishway flow of 180 cfs, 2.5 ft impoundment fluctuation.

CMP REVISED PROPOSAL: Bonny Eagle minimum flows of 400 cfs or inflow 5/1-10/31 including 50 cfs New River Channel 5/1-9/30, 250 cfs or inflow 11/1-4/30, downstream fishway flow of 100 cfs 5/1-10/31, 4 ft pond fluctuation; Skelton minimum flows of 400 cfs or inflow 5/1-10/31, 250 cfs or inflow 11/1-4/30, upstream and downstream fishway flow of 180 cfs, 2.5 ft pond fluctuation.

In addition, Attachment 3 summarizes the generation values for each scenario in terms of total, net present value, and levelized amounts over a 30-year period beginning in 1995.

The HEC-5 results for the DEIS recommended minimum flow scenario for Bonny Eagle and Skelton indicate a significant reduction in on-peak, off-peak and total generation. Specifically, HEC-5 results show that implementing the DEIS recommended flow regime at these two stations would result in a loss of 13,891 MWH of on-peak generation, and 1,641 MWH of off-peak generation annually as compared to current operations.

8d The staff's recommended alternative (based on CMP' HEC-5 results) shows an on-peak loss of 22,097 MWh and an off-peak gain of 12,944 MWh for all six hydroelectric plants together (not for only Bonny Eagle and Skelton)

The revised CMP proposal (based on CMP's HEC-5 results) shows an on-peak loss of 5,686 MWh and an off-peak loss of 1,879 MWh for all six hydroelectric plants (not only for Bonny Eagle and Skelton).

The future monetary losses or levelized losses CMP claims, which are based on escalation of alternative power costs, are speculative. The staff's alternative would reduce the cumulative on-peak energy generation in the basin by about 1,588 MWh more than CMP's proposal, but CMP's proposal would reduce the cumulative off-peak energy generation in the basin by about 1,879 MWh (the staff's recommended alternative would result in an off-peak gain of 12,944 MWh). Based on current economic conditions, overall, staff's alternative would cost about $85,823 more annually in lost power benefits than CMP's proposal

The staff's flow recommendations are consistent with Interior's flow regime recommendation. The staff believes the incremental habitat resource gains of its alternative over CMP's proposal, although hard to quantify, justify the higher power benefit losses that would be caused by its alternative. Furthermore, Interior's flow recommendations would not significantly affect project economics.

By comparison, a minimum flow requirement of 400 cfs, or inflow, whichever is less, May 1 through October 31, and 250 cfs, or inflow, whichever is less, November 1 through April 30 (400/250 cfs) at both projects (CMP's Revised Proposal) results in a loss 6,486 MWH of on-peak generation and 2,714 MWH of off-peak generation, annually, as compared to baseline. Yet, the 400/250 cfs flow regime provides nearly all of the same habitat benefits to resident and anadromous fish species as the DEIS proposal.

Each of the alternative flow regimes would be costly, and would cause significant reductions in generation and value from existing conditions. Specifically, the original flow proposal made by Licensee would cost $44.2 million more than the baseline of current operation over a period of 30 years. This has a 30-year net present value (NPV) cost of $9.3 million, and a levelized cost of $986,000 per year more than existing conditions[8].

The DEIS recommended flow regime would cost approximately $68.9 million ($14.4 million NPV, $1.5 million annually) more than existing conditions. As a part of this cost, the cost of providing an additional 50 cfs in the New River Channel (over the 50 cfs proposed by Licensee, for a total of 100 cfs) is approximately $3.4 million of lost generation (30-year NPV of $719,000, levelized cost of $76,000 per year)[9]. This regime has a significant negative impact on the cost of generation, and does not provide any significant environmental improvement over Licensee's proposal.

Licensee's revised minimum flow proposal of 400/250 cfs provides significant improvements in baseline habitat at a cost of approximately $36.2 million over 30 years when compared to existing conditions. This translates to a 30-year NPV reduction of $7.6 million, and a levelized cost of $810,000 per year over baseline conditions. While this proposal will significantly increase the cost of generation, the cost is considerably more in line with the resource benefits that are anticipated compared to the alternative

[8]Value of generation based on June 28, 1991 avoided costs; 30 year NPV at 10%.

[9]The figures used for the cost of an additional 50 cfs in the New River Channel are actually the costs of adding 50 cfs in the New River Channel (for a total of 100 cfs) to the Licensee's revised proposal of 400/250 cfs at Bonny Eagle and Skelton. The loss would be somewhat different based on the DEIS recommended flow, but Licensee has not calculated the loss for this specific scenario.

regimes. As shown in Attachment 3, the DEIS recommended flow regime would cost $32.7 million ($6.8 million NPV, $720,000 per year levelized) more than Licensee's revised proposal, while providing what the DEIS concludes are either insignificant or assumed increases in habitat.

Considering the practical biological factors associated with the documented ZOP at 400 cfs, the scope of the interim trap and trucking program, the uncertainty of the development of large anadromous fish populations, and the abundance of shad and alewife nursery and spawning habitat available in adjacent impoundments at a flow of 400 cfs, the Licensee does not believe that an anadromous fish migration path flow of 800 cfs is necessary and believes that it cannot be justified given the cost, in terms of the lost generation, associated with this flow regime.

Therefore, the Licensee recommends that the Final EIS include a minimum flow recommendation of 400 cfs, or inflow, whichever is less, for the period of May 1 through October 31 at both Bonny Eagle and Skelton projects.

The results of the HEC-5 modeling indicate, from a generation standpoint, there is a moderate improvement from Licensee's original flow proposal and its revised flow proposal of 400/250 cfs for both Bonny Eagle and Skelton. Yet, Licensee's revised flow proposal would provide a significant increase in resident trout habitat below Bonny Eagle and West Buxton during the late fall-winter period. Licensee's revised proposal also provides a continuous, good zone-of-passage for migrating fish species/lifestages below Skelton, Bar Mills and West Buxton. In short, Licensee's revised minimum flow proposal for Bonny Eagle and Skelton provides a win-win result; a more moderate loss in generation from existing conditions in exchange for significant enhancement of resident and anadromous fish habitat and migratory pathways.

Finally, Licensee utilized HEC-5 to examine the impact to generation of providing the DEIS recommended 100 cfs in the New River Channel as compared to the 50 cfs propoeed by Licensee. For purposes of this evaluation, Licensee ran HEC-5 with a minimum flow requirement of 400 cfs or inflow, whichever is less, May 1 through October 31 and 250 cfs or inflow, whichever is less, November 1 through April 31 at both Bonny Eagle and Skelton. In anticipation of the installation of permanent downstream fish passage in the near future, Licensee also assumed a downstream fishway flow of 100 cfs (approximately 2% of station capacity) at Bonny Eagle. Under this scenario, 250 cfs would be provided through the powerhouse,

100 cfs would be provided through the downstream fishway, and 50 cfs would be provided in the New River Channel.

The results of the HEC-5 modeling indicate that under the new 400/250 cfs minimum flow proposal for both Bonny Eagle and Skelton, providing an additional 50 cfs in the New Rivar Channel would result in a loss of 595 MWH of on-peak and 290 MWH of off-peak generation, annually. Licensee does not believe that increasing minimum flows in the New River Channel which results in insignificant differences in fishery habitat is justified based on this projected loss of gensration.

5. Inconsistency Between DEIS Minimum Flow Recommendation and Saco River Fish Passage Agreement

The basic premise behind the recently completed Saco River Fish Passage Agreement is wise utilization of public resources throughout the development, installation and operation of expensive fish passage facilitiee on the Saco River on an "as needed" basis. In fact, the fundamental principal of tha Agreement is that future decisions on fish passage needs would be based on biologically sound evaluations of anadromous fish restoration progress conducted at regular and frequent intervals. Staff has stated in the DEIS that the Fish Passage Agreement is the preferred alternative.

Licensee believes that any minimum flow recommendation contained in the Final EIS, and ultimataly new project licenses, should embody the same concept. Specifically, since there is no evidence provided in the DEIS which convincingly demonstrates that a minimum flow of 800 cfs at Bonny Eagle and Skelton is required to successfully and effectively move anadromous fish upstream, and since the parties have agreed to use specified assessments to determine the need for fish passage at the projects, the Final EIS should recommend a minimum flow of 400 cfs or inflow, whichever is less from May 1 through October 31 at both Bonny Eagle and Skelton.

The Final EIS should also allow for a license condition to reassess the adequacy of the 400 cfs flow for continuing anadromous fish restoration efforts on the four-year assessment cycle contained in the Saco River Fish Passage Agreement. Until such time that a higher minimum flow is needed, based on evaluations of restoration progress (such as that envisioned in the Saco River Fish Passage Agreement and criteria Annex) which demonstrate that more flow is needed to effectively pass anadromous fish, FERC should require the

CMP-9

See response CMP-7.

Staff does not agree with this conclusion regarding flows in the draft EIS. See revised sections 4.2.1.1 and 4.2.1.2 for discussions of WUA at 400 cfs for trout, Atlantic salmon, and alocides. Further, a 400 cfs flow during the low flow summer months would not cause the flushing and circulation patterns in the estuary that have been established under the higher flow regime from Cataract.

Any licenses issued for Bonny Eagle and Skelton would require monitoring of project operations/minimum flows that would allow for adjustments of the minimum flows if appropriate.

lowest minimum flow which is protective of resident fish habitat and which allows anadromous fish an effective zone-of-passage. To do otherwise would be a waste of public resources in the form of valuable low-cost peak generation, and is not required at this time in order to fully support anadromous fish restoration efforts in the Saco River. As noted above 400/250 cfs protects resident fish habitat and provides a good zone-of-passage for anadromous fish.

EIS Should Adopt Licensee's Revised Minimum Flow Proposal as the Recommended Flow Alternative

In summary, based on the abundance of evidence presented herein, the EIS must be revised to recommend a minimum flow of 400 cfs or inflow, if lower, for the period May 1 through October 31 (including a New River Channel flow of 50 cfs April 1-September 30), and 250 cfs, or inflow if lower, for the period November 1 through April 30 at both Bonny Eagle and Skelton. Justification for such a recommendation can be summarized as follows:

1. Habitat conditions for resident fish species in the free-flowing reaches below Skelton, West Buxton, and Bonny Eagle are not significantly improved by increasing base flows from 400 to 800 cfs. This conclusion was already drawn in the DEIS. 10a.

2. Spawning and nursery habitat for anadromous fish in the free-flowing reaches below Skelton, West Buxton and Bonny Eagle is increased at 800 cfs over that available at 400 cfs, but for the most part, these habitat increases are very small in comparison to the total amount of that habitat type available to anadromous species in the adjacent reservoirs. 10b.

3. A good zone-of-passage is provided in the free-flowing reaches below Skelton, Bar Mills and West Buxton at a flow of 400 cfs. There is no evidence to suggest that the ZOP provided at 400 cfs is not adequate to meet anadromous fish restoration objectives for the Saco River, or that a ZOP provided at 800 cfs is significantly better. 10c.

4. The zone-of-passage provided at a flow of 400 cfs is most restrictive in the reach below West Buxton. However, it is not known when this reach will be required as a migratory pathway for significant numbers of anadromous fish. 10d.

CMP-10

10a. It is staff's analysis that 800 cfs would provide a greater amount of riverine and estuarine habitat protection during the low flow and high temperature months than a 400 cfs flow. Further, 400 cfs is less than the estimated 7Q10 flow of 478 cfs for the Saco River.

10b. There is no specific information about the amount of potential spawning and nursery habitat for American shad and alewives in the Saco River reservoirs. However, the USFWS estimates that more than 75% of the habitat in the Saco River basin for these species occurs above Skelton which would include riverine and reservoir habitat.

10c. The 800 cfs flow would not only enhance passage but would also provide for protection and enhancement of water quality and aquatic habitat downstream during the critical low flow warm temperature summer months.

10d. Comment is noted.

5. A recommended minimum flow of 400 cfs May 1 through October 31 at both Bonny Eagle and Skelton, until such time that a higher minimum flow is demonstrated to be needed to further snhance anadromous fish restoration efforts, would be consistent with the fundamental principals embodied in the Saco River Fish Passage Agreement. Moreover, the assessment process provided for in the Agreement, and outlined in the Annex, provides an excellent means for periodically evaluating flow requirements. 10e.

10e. Comment is noted.

6. A recommended minimum flow proposal of 400 cfs or inflow May 1 through October 31 and 250 cfs or inflow November 1 through April 30 for both Bonny Eagle and Skelton provides the best balance of resources. It is a win-win result; a reasonable reduction in generation in exchange for significant enhancement of resident and anadromous fish habitat and migratory pathways. 10f.

10f. Comment is noted.

Project Minimum Flows and Wetlands

The DEIS's conclusion at Section 4.2.1.1.3 (p. 4-43), that the current operation of the Bonny Eagle Project provides for the enhancement of project area wetlands is appropriate and properly founded on the study results submitted to the Commission. Licensee agrees with Staff's conclusion that the continued operation of the Project as a peaking facility will continue to provide the resource enhancement caused by the cyclically fluctuating headpond, i.e. the tidal effect of the operation will better support wetland development than a stable pond at this project.

Licensee strongly believes that its' proposal for a summer minimum flow of 400 cfs, or inflow, whichever is less, is the most appropriate minimum flow that will allow generation and the continued enhancement of the wetland resources of the Bonny Eagle impoundment.

CMP-11

Comment is noted. See revised section 5.4.2.1 of the final EIS.

Project Minimum Flows and Water Quality

Licensee has, in the above sections, revised its minimum flow proposals for the Bonny Eagle and Skelton projects to more closely reflect appropriate fisheries considerations. Licensee would note that its revised proposal of 400 cfs or inflow May 1 through October 31 would still be protective of water quality. This is clearly indicated by the DEIS where, in Sections 4.2.1.1.1 and 4.2.2.1.1, Staff concluded that a minimum flow of 400 cfs from Bonny Eagle during the summer months should be adequate to create

CMP-12

This conclusion is based on habitat improvements that would occur at flows greater than the current minimum or leakage flows. A 400 cfs flow in staff's opinion does not provide the best protection for the various aquatic resources of the Saco River.

a more diverse and abundant aquatic macroinvertebrate community, and would have a beneficial effect on water quality in the free flowing reaches of the river below Bonny Eagle, West Buxton, and Bar Mills. This conclusion is based on the results of the study by Eco-Analysts.

Staff also concluded that flows of greater than 400 cfs from Bonny Eagle would not create a significantly different effect. The only potentially significant difference noted in the DEIS between Licensee's previous proposal and the alternatives considered was in periodicity; Licensee did not propose a winter minimum flow from Bonny Eagle. Although the water quality studied of the Saco River did not reveal any water quality concerns in any way during the winter months, Licensee's revised proposal to provide a minimum flow during the winter makes the concern of periodicity moot.

Recreation Resources and Access Recommendations

The Commission, in Section 5 of the DEIS, makes a number of recommendations concerning recreational resources. These recommendations closely track the proposals made by Licensee in its 1991 application, with three exceptions. These are the recommendations to 1) gate-off an informal access site near the Little Ossipee's confluence with the Saco River, 2) relocate the proposed barrier free picnic area on Bonny Eagle Island, and 3) construct a new canoe portage below Bonny Eagle consisting of a series of wooden ramps and landings.

Licensee agrees to undertake all of the DEIS recommendations concerning recreational resources with the clarifications, discussed below. Additionally, Licensee agrees with the Commission's findings that a new boat launch at Bonny Eagle is not warranted and that the need for such a boat launch can be periodically reassessed as part of the regular recreation assessment proposed by Licensee.

Licensee wishes to clarify several aspects of the three proposals mentioned above. First, the informal access near the Little Ossipee River has already been gated from vehicular access, beginning in 1994. This action has already served to reduce inappropriate activities and to maintain the area for better resource usage. We agree that continued gating at this time is necessary and appropriate.

Second, the DEIS recommendation to move the proposed picnic area on Bonny Eagle Island to an area adjacent to the New River Channel

CMP-13

13a. We revised the appropriate sections of the EIS to incorporate the current status of this informal access site.

will not provide full accessibility for the disabled as anticipated in the DEIS. Licensee has conducted an initial investigation of the area to assess its suitability for access for fishing in the New River Channel. Licensee finds that the area cannot be fully ADA[10] accessible to the waters' edge because of the coarse topography of the river bed, and other site considerations. We have consulted with the Maine Department of Conservation (MDOC) and they agree that barrier free access to the river on the north side of Route 35 as anticipated in the DEIS is not practical. There may, however, be an opportunity to provide a higher level of accessibility on the south side of the highway if the Maine Department of Transportation (MDOT) right-of-way can be used for parking, and if aesthetic concerns for a concrete access to the river can be addressed. Licensee has not at this point attempted to address these concerns. Licensee believes that if the Final EIS continues to recommend a facility in this area, it must recognize that the existing topography concerns may result in a facility that is less than fully ADA accessible.

Third, the Licensee has further investigated the DEIS recommendation that a new canoe portage be constructed below Bonny Eagle. As the DEIS notes, the existing slopes and stairs at the lower end of the canoe portage are excessive (average slope of 60%) and also are prohibitive of trails meeting ADA design standards. To address these difficulties, the DEIS recommends an extensive structure consisting of wooden ramps with landings to descend the steep bank. Licensee believes that this series of wooden ramps and landings would require excessive disruption of the embankment for the installation of concrete bases for the post system that would be necessary to support the structure. Also, the switchbacks and overall size of the structure would require substantial cutting of vegetation on the embankment, and would create a potential for erosion of the bank beneath the structures.

Licensee believes that the portage can instead be accomplished by means of a series of crib steps built into the embankment. Licensee has conducted a topographic survey of the area south of the powerhouse and developed a conceptual plan of a trail that crosses the slope on a long diagonal and utilizes gravel-filled crib stairs as appropriate. This design would reduce ground disturbance since, with the exception of the very top of the bank, most of the trail/stairway would involve filling and compacting gravel in the crib stairway. The downslope side of the trail/stairway would be supported by the boulders that are on site.

[10]Americans with Disabilities Act

13b. We recognize that the recommended picnic area would provide limited accessibility to the river for individuals with disabilities. We recommended that CMP develop the picnic area on Bonny Eagle Island, which would include barrier free parking, picnic tables, grills, and seasonally provided portable toilets. CMP would develop the recommended picnic area either north or south of Route 35 on the northeastern side of Bonny Eagle Island, providing river access to the New River Channel.

13c. We agree. We revised our recommendation to incorporate CMP's conceptual plan for the canoe portage.

We have attached a conceptual plan in Attachment 4. The conceptual plan shows the location of the possible new canoe portage access area below the Bonny Eagle powerhouse, along with a proposed new parking area and picnic table for day use. This new barrier free parking area and picnic table would be located adjacent to the existing paved access road. From this site, there is a limited view downstream for those not fully capable of negotiating the proposed portage trail to the river.

This approach should prove to be less of a structural intrusion on the bank and less expensive to construct and maintain, while providing safe and more than adequate portaging capabilities. Licensee has consulted with the MDOC on this approach. The MDOC concurs that, although this approach is not fully ADA accessible, it is a good and effective concept for providing a canoe portage at this difficult site below Bonny Eagle. Documentation of the consultation is included in Attachment 4.

Finally, regarding recreation and access, we fully concur with the Staff's conclusions in the DEIS that existing State and local regulations, in combination with the existing Project boundaries, provide adequate protection and public access to the shorelines of the Bonny Eagle and Skelton projects. The high cost to the public (ratepayers) of providing additional and expansive buffer zones would far outweigh the public benefit in these cases.

13d. We agree that the existing project boundaries provide adequate protection and public access to the shorelines of the Bonny Eagle and Skelton Projects.

Project Economics

Licensee questions the economic evaluations contained in the DEIS. The economic information is either 1) not current, 2) not based upon the facts that have been presented to the Commission, 3) not based on an accurate perspective of the money available to fund the recommended enhancements or mitigation, or 4) based on the incorrect economic evaluations of the costs by Staff.

CMP-14

The economic evaluation in the EIS was based on the Commission's position on economic analyses [see Mead Corporation, Publishing Paper Division, 72 FERC ¶ 61,027 (1995)].

We used CMP's 1995-avoided on-peak and off-peak energy costs to value the power generation of all the projects for the various cases studied. We multiplied CMP's 1995 avoided costs by the on-peak and off-peak energy generation amounts that CMP computed in its HEC-5 operation studies

Adequacy of Economic Evaluations

The Licensee recently met with Commission Staff concerning the economic evaluations conducted by Staff[11]. As agreed upon

[11]Licensee, at the public meeting held by the Commission on January 5, 1995, requested a meeting with the Staff in order to clarify Licensee's understanding of the economic evaluations used in developing the DEIS. On January 26, 1995 the Commission

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with Staff in the February 16, 1995 meeting, there are many, and potentially, significant, corrections and revisions that need to be made to the economic evaluations used in the DEIS. These corrections and revisions are summarized below. Of most concern are the corrections that have an impact on determining the value of lost generation from the minimum flow proposals, and on determining the overall costs and value of the hydro generating facilities. It is Licensee's belief that the economic evaluations **must** be revised before Staff can properly make enhancement recommendations, and before the EIS can be finalized.

The primary corrections that need to be made to the DEIS economic evaluation are summarized below. Licensee will follow-up in a separate filing with more complete and detailed comments.

- The avoided-cost projections should be used as provided by Licensee, not prorated differently by project or by on-peak and off-peak rates (except as is already differentiated in the data provided) as was attempted with the Bonny Eagle, Skelton, and Cataract Projects. 14a.
- The estimated costs of the recommended enhancements need to be levalized corractly and consistently. 14b.
- The estimated costs must account for lost generation for upstream fish passage flows and all of the costs of upstream fish passage effectiveness studies. 14c.
- The DEIS evaluations must correctly consider the costs of Federal and State income taxes, property taxes, operation and maintenance costs, capital costs, and project net investment . 14d.
- The DEIS assumed project costs and benefits for Hiram that were prorated from other projects. This is not appropriate and project specific information should have been requested and used. Licensee will provide this information in a follow-up filing. 14e.

provided public notice and an agenda of the meeting. The meeting was held at the Commission's offices on February 16, 1995, and was open to all interested parties.

for the various cases. We verified CMP's HEC-5 peaking-operation study results using our in-house multiple-project peaking operations spreadsheet developed by our staff, which produced total on-peak and off-peak generation results within five percent for each project and within about 2 percent cumulatively

14a. We used the Gulf Island Hydroelectric project's avoided costs. For the on-peak energy: 25.8 mills/kilowatt-hours, and for the off-peak energy: 20.3 mills/kilowatt-hours (letter from F. Allen Wiley, P.E., Hydro Operations Director, Central Maine Power, Augusta, Maine, August 25, 1995).

14b. Comment noted. We evaluate project economics based on current economic conditions.

14c. For the upstream fish passage flows we applied a uniform loss equal to 2 percent of total generation (except for the Cataract fishway which is already constructed). We also included all the costs for upstream as well as downstream fish passages including costs of operation & maintenance and costs of effectiveness studies, as presented in CMP's submittal dated May 27, 1994.

14d. For Federal tax we used 34 percent tax rate; for State, local and property tax we used 3.05 percent tax rate on the initial net investment; for the operation and maintenance expenses we used the CMP's projected costs for 1995; and for total capital costs and project net investments we used CMP's data.

14e. For the Hiram economic studies, we used CMP's data.

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Ability to Fund the Recommended Enhancement Measures

The Commission's approach to recommending enhencement or mitigation measures appears to be to 1) determine the "benefit" of the project and then 2) recommend measures that are either environmentally necessary or desirable and, can be paid for or afforded by the project. The benefit of the project is being defined as the difference between Licensee's cost of generation and the cost of alternative power. However, the theory that a project can "afford" or "support" a measure because the project does not have a negativa cash flow is misleading. The fact that a project has a positiva value does not result in a profit or "available cash" to use for additional enhancements.

As a regulated utility, CMP's projects are very beneficial to its customers because CMP's cost of production is at least competitive with, if not bettar than, purchasing blocks of power on the market. When CMP can generate with its' hydro projects, it is able to keap the customer's prices down, i.e. CMP does not have to charge for mora expensiva power purchases when it can generate with its hydro projects. This benefit, or savings, is not, however, a profit or "available cash" in any manner. The positive value or benefit of CMP's hydro projects is actually the ability to help keep CMP's prices lower than they otherwise might be.

Therefore, while determining tha actual ability of a project to financially "support" e seasure is absolutely necessary to help decide that a measure should not be recommended, the Commission's perception that a project might still be able to remain beneficial is not a valid determinant of whether a measure should be recommended.

CMP-15

Comment is noted.

Use of Current and Complete Information

Finally, Licensee agreed at the February 16, 1995 meeting to provide the Commission with 1) a more detailed description and itemization of the corrections and revisions that need to be made, 2) data and information as appropriate to make the corrections, 3) additional information on the Hiram Project that the Commission had not praviously requasted. Licensee also plans to consolidate and summarize the economic and cost information that has previously been filed with the Commission and interested parties. As agreed to with Commission Staff, Licensee has not furnished this information in this filing.

CMP-16

No response necessary.

because there was insufficient time (two working days) since Licensee and Staff were able to determine the scope of the errors in the analysis. Licensee plans to submit the above information within 30 days.

Water Quality Certification

The DEIS takes note at several places (Sections 2.3.1.1.3, 2.3.1.2.3, and 4.4) that Licensee applied for Water Quality Certification for the Bonny Eagle and Skelton projects in December 1991, and withdrew and reapplied for certification in December 1992. The Final EIS should reference that the Licensee again, at the request of the Maine Department of Environmental Protection (MDEP), withdrew and refiled both applications on December 8, 1993 and again on November 30, 1994. These refilings were to provide the MDEP with additional time to process the applications They did not make any changes to the applications or the project proposals.

The MDEP comment letter of January 17, 1995 describes their schedule for processing the applications. The schedule is to issue draft certifications for Bonny Eagle and Skelton by June 30, 1995 and August 30, 1995 respectively, with the final certifications to follow after a review period. The MDEP has also suggested that the Commission schedule the issuance of the Final EIS to occur after the issuance of the final 401 certifications. This would allow the Final EIS to incorporate both the final comments of the MDEP and the conditions of the certification into the Final EIS. The Licensee concurs with this suggestion and urges the Commission to adopt such a schedule.

CMP-17

We revised the final EIS to reflect the current status of the water quality certification (WQC).

To date, CMP has not received a WQC for Bonny Eagle or Skelton, and it appears that Maine Department of Environmental Protection (MDEP) will again request that CMP withdraw and reapply for the WQC for these projects. Since it is still not clear when CMP will receive the WQCs, we are issuing the final EIS prior to CMP's receipt of the WQC. While we would prefer to finalize the EIS to include an analysis of the WQC, we will address the WQC in the Bonny Eagle and Skelton license orders upon receiving the WQC.

Section 10 (j) of the FPA, and Fish and Wildlife Agency Recommendations

Section 5.5 of the DEIS discusses the consistency of Staff's recommendations with those of the fish and wildlife agencies. Staff concludes in this section that some of their recommendations are inconsistent with those of the agencies. In accordance with Section 10 (j) of the Federal Power Act, the Commission will attempt to resolve those inconsistencies prior to finalizing the EIS.

Based on the discussions above regarding the necessity for Licensee to provide additional economic information, and the Staff to reevaluate the economic bases of its recommendations, Licensee recommends that FERC not initiate the Section 10 (j) process until

CMP-18

Comment is noted. We revised our economic analyses prior to finalizing our response to the 10(j) recommendations.

after Staff has reevaluated the economic issues in relationship to its enhancement and mitigation proposals. To do so any earlier could rasult in wasted effort by all parties, including staff, if its revised economic evaluations lead staff to different recommendations than those contained in the DEIS.

Summary and Conclusions

In summary, Licensee in this filing has:

1) Presented the following conclusions;

   - The recreation area recommended in the DEIS on Bonny Eagle Island cannot on a practical basis be fully ADA accessible as envisioned in the DEIS; CMP-19
   - The minimum flow recommendations contained in the DEIS are not supported by biological studies, fishery agency management goals, the Saco River Fish Passage Agreement, or economics, and; CMP-20
   - The economic evaluations used for the DEIS are faulty and need significant revision and correction in order to be useful in determining enhancement recommendations.

2) Agreed to provide to, and summarize for, the Commission, the information and data necessary to revise and correct the DEIS economic evaluations;

3) Provided the HEC-5 model energy values requested by the Commission for the DEIS alternative minimum flow consideration; CMP-21

4) Provided the HEC-5 model energy values evaluated by Licensee for its' new minimum flow proposal; and,

5) Made the following proposals;

   - To revise the conceptual plan for the lower end of the Bonny Eagle canoe portage to consist of a trail and series of gravel-filled crib steps arranged on a diagonal down the river embankment; CMP-22
   - To provide a minimum flow of 50 cfs in the New River during the period April 1 through September 30; CMP-23

CMP-19

We agree. Section 4.2.2.1.4 in the final EIS reflects this position.

CMP-20

Comment is noted.

CMP-21

The economic studies were revised in accordance with the Commission's position on economic analyses, which are based on current economic conditions.

Our economic analyses we used information provided to us by CMP.

CMP-22

Comment is noted.

CMP-23

Comment is noted.

- To provide a minimum flow from both the Bonny Eagle and Skelton projects of 400 cfs, or inflow if less, during the period May 1 through October 31;

- To provide a minimum flow from both the Bonny Eagle and Skelton projects of 250 cfs, or inflow if less, during the period November 1 through April 30;

- That any further considerations for minimum flow recommendation to support future anadromous fish restoration efforts should be commensurate with the progress of the restoration effort, and consistent with the philosophy of the Saco River Fish Passage Agreement; and,

6) Requested that the schedule for the Final EIS, including formulation of final Staff recommendations, be extended until after:

- Completion of the revisions to the Commission's economic evaluations;

- The issuance of the final 401 Water Quality Certifications for the Bonny Eagle and Skelton projects.

If you have any questions about the projects, or these comments, please contact Frank H. Dunlap at (207) 621-4469.

Sincerely

F. Allen Wiley, P.E.
Director, Hydro Operations

FAW/FHD

cc: Robert Bell, FERC
Rich McGuire, FERC
Jack Duckworth, FERC
Robert Grieve, FERC
Edward Crouse, FERC
Service List

Attachments

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CMP-24

Comment is noted.

CMP-25

Comment is noted. The staff revised their economic analyses; however, the 401 Water Quality Certificate for Bonny Eagle and Skelton will be addressed in any orders issued for the projects.

United States Department of the Interior

OFFICE OF THE SECRETARY

REF: ER 94/978

February 21, 1995

Honorable Lois D. Cashell
Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Dear Ms. Cashell:

This is the United States Department of the Interior's (Department) review of the Draft Environmental Impact Statement (DEIS) for the Saco River Projects, located in Maine and New Hampshire, and covering the following proposed actions: issuance of new licenses for the Skelton and Bonny Eagle hydroelectric projects; amendment of existing licenses for the Cataract, Bar Mills, West Buxton, and Hiram projects in order to implement the recently signed Saco River Fish Passage Agreement between hydropower interests (principally Central Maine Power Company), resource agencies and other parties; and, issuance of an exemption from licensing for the currently operating Swans Falls project. We note that this DEIS was prepared by the Federal Energy Regulatory Commission (Commission) staff 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 following comments are provided in three parts: an overall assessment of the adequacy of the DEIS in addressing issues of concern to this Department; Attachment A, a section-by-section analysis of the DEIS; and, Attachment B, which contains updated and/or modified recommendations and fishway prescriptions, that have been previously provided by the Department pursuant to Secs. 10(j) and 18 of the Federal Power Act (FPA), respectively.

GENERAL COMMENTS

The Department believes that the DEIS generally addresses issues that have been raised by the Fish and Wildlife Service (FWS) and others regarding fish and wildlife resources in the Saco River Basin, including anadromous fish, protection of wetlands, and recreational needs. We also concur with certain staff recommendations, including those pertaining to the Saco River Fish Passage Agreement. However, we do not agree that the staff has given equal consideration to fish and wildlife resources in its proposed measures for the Skelton and Bonny Eagle projects. As discussed in greater detail in Attachment A, we also believe

Interior-1

Comment is noted.

that the staff has given undue weight to the economic interests of the applicant, and has overlooked mitigation requirements in previous licensing actions that would be compromised if the recommendations in the DEIS are adopted by the Commission. We recommend that the staff give serious consideration to these inconsistencies before issuing its final environmental document on these projects.

Thank you for the opportunity to comment on this DEIS.

Sincerely,

Andrew L. Raddant
Regional Environmental Officer

Comment

Response

ATTACHMENT A:
SECTION BY SECTION ANALYSIS OF THE
DEIS FOR SACO RIVER PROJECTS

PURPOSE AND NEED

NEPA requires that an environmental impact statement contain a statement on the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action (40 CFR, Sec. 1502.13). This portion of the document is crucial in that it allows for the identification and subsequent evaluation of a proper range of alternatives.

The Saco River DEIS does not contain a clear description of the underlying "purpose and need", as required by NEPA. Although the DEIS describes the "action" as the potential issuance of new long-term licenses (and exemption in the case of Swans Falls) and amendments for seven hydroelectric projects in the Saco River Basin, and discusses how the document will be used to "evaluate potentially significant environmental effects of the projects", the overall/basic project purpose(s) and need(s) are not defined.

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) section 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. The statment 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.

The DEIS does paraphrase portions of Sections 4(e) and 10(a) of the FPA regarding the Commission's obligations for fish and wildlife and other non-developmental interests. However, this implies that there may be a variety of project purposes and needs, specific to the Saco River Basin. The DEIS does not elaborate on what the specific needs and purposes are that should be addressed in order to ensure that comprehensive river basin development is achieved.

Need for Power

As discussed by the Commission staff, Central Maine Power Company (licensee for all of the projects covered in the DEIS except for Swans Falls) is part of the New England Power Pool (NEPOOL), and uses its Saco River hydroelectric facilities to help meet regional demands for electricity. In fact, the "need for power" that is identified in the DEIS is a

Interior-2

We disagree. As stated in section 1, the purpose of the federal action is to restore fish passage to the Saco River and to continue hydropower generation at three sites on the Saco River.

Interior-3

The reporting parties (utilities, such as CMP) located in the NEPOOL service area are within economical transmission reach of each other. As a result, if a need for power exists in NEPOOL, staff finds it unnecessary to consider separately the power needs of member utilities individually.

regional demand based on expected growth rate projections within the NEPOOL service area. The DEIS does not explain whether there is a need for power within CMP's service area or more specifically within the Saco River Basin. We recommend that the Commission staff provide more detail on the use of the power that is generated at the hydroelectric facilities in the Saco River Basin, including information on local needs (i.e., within CMP's service area).

We believe that it is important to elaborate on local power needs in light of the fact that CMP is currently reducing its reliance on "non-utility generators" (NUG's) in Maine to lower its costs of purchased power. While this is being done primarily to lower rates for its customers, CMP's diminishing use of NUG's is also reducing the generating capacity that is available to NEPOOL. This would indicate a surplus of power, at least within CMP's service area, and perhaps throughout NEPOOL, contrary to the conditions that are portrayed in the DEIS.

The DEIS should also identify the fact that the electrical output of the Swans Falls Project is currently being sold to Public Service Company of New Hampshire (PSNH), not CMP. The DEIS should discuss whether a need for power currently exists within PSNH's service area, in the same manner as is done for CMP.

We also recommend that needs beyond increased generating capacity be included in this portion of the DEIS in order to satisfy the comprehensive development requirement (multiple beneficial public uses) contained in the FPA. We believe that the need to protect, restore and enhance fish and wildlife resources should also be identified at the outset of the document. This is particularly appropriate in this DEIS as the proposed license amendments are designed to address anadromous fish passage needs in the basin.

SCOPE OF THE EIS

The Commission staff has largely confined its environmental analysis in the DEIS to the main stem of the Saco River. However, given the presence of operating hydroelectric facilities on several tributaries (Ossipee, Little Ossipee and Ellis Rivers), we believe that the geographic scope should extend beyond the main stem, at least with regard to the evaluation of cumulative impacts. The DEIS should also include the estuarine portions of the river below the Cataract Project, particularly with regard to instream flow needs, as discussed below.

The DEIS indicates that cumulative impacts have been evaluated with respect to anadromous fish, wetlands, and hydroelectric generation. Additional aquatic resources, including invertebrate communities inhabiting free-flowing reaches, have also been cumulatively impacted by hydropower development in the Saco River Basin, and should be addressed in the DEIS.

PROPOSED ACTION AND ALTERNATIVES

The DEIS considers a range of alternatives that deal primarily with alternate operations of the hydroelectric facilities in the Saco River Basin. However, given the regional need for

In preparing the annual OE-411 Reports, data submitted by all reporting parties (which would include CMP) are edited and coordinated during preparation. As a result, separate consideration of CMP's service area would serve no useful purpose. State Public Utilities Commissions require utilities in their state to make the lowest-cost power available to their customers. If CMP can purchase power at a cost that is lower than CMP's production cost, it will make the necessary "economy purchase"--even though it has capacity available to generate.

We agree and we clearly identified actions beyond increased generating capacity; the first proposed action identified in the EIS addressed anadromous fish passage. Further, in the first section of the EIS, we clearly identified that, in addition to developmental purposes, we would address the purposes of protecting, mitigating, and enhancing fish and wildlife resources. We believe that the document provides adequate discussion and evaluation of both developmental needs and non-developmental needs in the basin.

Interior-4

See revisions to Sections 1.3, 3.2.1, and 3.2.3.
In regard to the Saco River estuary refer to response to Interior-12. Staff would agree that hydroelectric operations have affected to some degree, benthic invertebrate communities by reducing flows downstream. Staff continues to believe, however, that these impacts are site specific and not cumulative. Benthic invertebrates have limited mobility and therefore are unable to avoid site specific changes in the quality and quantity of habitat. In the Saco River the greatest change in habitat occurs from the daily peaking mode of operation of Bonny Eagle. Operation of Bonny Eagle regulates operation of the

power that is identified in the DEIS, the Commission staff should expand their consideration of alternatives to measures and locations outside of the Saco River. This should include not only other hydroelectric facilities that currently are, or could be utilized by NEPOOL, but other types of electrical generating equipment, as well as conservation, that could be used either singly or in combination to meet capacity demands. Interior-5

Other Issues Involving Alternatives

1. Use of economic analyses in evaluating alternatives. The staff should more fully explain its rationale and methodology used for factoring economics into its alternatives analysis. Otherwise, it appears that the staff has given undue weight to certain economic factors in deciding whether to recommend a particular alternative. Interior-6

2. No Action Alternative. Under NEPA the Commission must include a "No Action" alternative in this and other EIS documents. According to the DEIS for the Saco River Basin, the staff considers the "no action" alternative to include the issuance of annual licenses for Skelton and Bonny Eagle for the next 30 to 50 years, with no change in current operations, including modifications to benefit fish and wildlife and other environmental values. Similarly, the Swans Falls Project would continue to operate without being licensed, even though the staff has previously found it to be under the Commission's jurisdiction. Interior-7

We believe that this use of the "No Action" alternative is fundamentally incorrect, in that the issuance of an interim, annual license for the pending projects represents an "action" by the Commission. The Commission staff would also be carrying out other actions on these projects including its safety and compliance inspections, 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 staff would not hesitate to take a variety of actions, including ordering major repairs or implementation of enforcement proceedings.

Use of the "No Action" alternative is clearer when the licensing action involves a proposed new dam or modification of an existing facility, namely the new project does not go on-line, and associated environmental impacts do not occur. The same is not true for hydroelectric projects that are reauthorized by the Commission on a yearly basis while relicensing decisions are pending. Impacts due to impeded fish passage, degraded habitat, and impaired public access continue, and are sanctioned through the annual licensing process.

In the case of Swans Falls there is no annual license, because the project has never received an original license from the Commission. Therefore, continued operation of the project under the "No Action" alternative would be inconsistent with the FPA. Accordingly, it must not be viewed as a reasonable alternative in this DEIS.

downstream projects which pass nearly the same volume of water as Bonny Eagle on a 24-hour basis. Therefore, there is little cumulative change in flows and habitat downstream of Bonny Eagle. Water quality also affects diversity and abundance of benthic invertebrates, and these effects may be cumulative in a downstream direction. What part flow and water quality contribute to the diversity of benthic invertebrates in the Saco River would require seasonal studies.

Interior-5

Operating hydropower projects which have been in operation for the normal license period, without major new construction or uprating to increase project output, will normally have amortized the total project cost. As a result, these projects are capable of producing electric power (capacity and energy) at a lower cost than any other currently available alternative form of generation. The primary energy required for hydropower generation is supplied by a renewable resource, and hydropower produces no atmospheric pollution. In nearly all instances, hydropower is the most desirable source of electric power available.

Item 3A of the Annual OE-411 Reports gives the projected values for the NEPOOL "Internal Demand" for each year of a ten-year planning period. The 1995 OE-411 Report planning period extends from 1995 to 2004, inclusive. Reported Internal Demand data reflect the expected effects of utility indirect Demand Side Management programs such as conservation programs, improvements in efficiency of electric energy use, rate incentives and rebates.

We believe that the Commission staff must reexamine its use of the "No Action" alternative when relicensing is involved (or when dealing with newly jurisdictional, but currently operating facilities such as Swans Falls). The "No Action" means denying the license. Accordingly, we recommend that the Commission staff modify their description of the "No Action" alternative in the DEIS as discussed above. Issuance of annual licenses and other actions should be included under a separate alternative in the DEIS.

The DEIS does not consider a variety of measures that could be used to meet regional capacity needs, including additional generation and energy savings. Given that hydropower contributes only a small fraction of NEPOOL's total capacity needs, other means of producing power should be addressed in the DEIS. This not only includes conventional generating facilities that are currently in use in the region (i.e., nuclear and fossil fuel), but also emerging technologies such as windpower, which are presently being considered in Maine. The use of non-utility facilities (NUG's) should also be addressed in terms of satisfying regional energy needs. Finally, the DEIS should give serious consideration to conservation as an alternative to reducing the demand for any type of generating facility, hydroelectric or otherwise. Interior-8

3. Failure to consider denial of license applications. The DEIS states that no one has recommended license denial, decommissioning of facilities and removal of the dams at the Skelton and Bonny Eagle projects, and therefore these were not considered as reasonable alternatives in the DEIS.

We believe that 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. 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 environmental acceptable to do so. Accordingly, we recommend that license denial for all pending applications remain a reasonable alternative in the DEIS. Interior-9

AFFECTED ENVIRONMENT

Anadromous Fish

The DEIS provides a general description of natural resources within the Saco River Basin, giving particular attention to the section of the main stem that is occupied by the existing hydroelectric projects. We believe that additional consideration should be given to the estuarine portions of the basin, located immediately below the Cataract Project. As discussed in the Commission's license and accompanying environmental assessment (EA) for the Cataract Project, dated June 29, 1989, the Saco River estuary contains a variety of important anadromous, estuarine and marine fish species, including striped bass, tomcod, bluefish, and menhaden. Habitats for these and other fish and wildlife resources are affected by the quantity and quality of riverine discharges, including those that are artificially regulated by the hydroelectric projects in the basin. Interior-10

Interior-6

Your opinion has been noted. The Commission considers and evaluates recommendations under Section 10(a) of the Federal Power Act; that is, we must consider all aspects of the public interest in the use of the waterway by weighing, or giving value to, the resources the recommendation would affect. While we do factor economics into our alternative analysis and we compare the economic effects of the reasonable alternatives, we also analyze and compare the nondevelopmental resource value effects of the reasonable alternatives. Our recommendations are based on the alternative that we consider best adapted to a comprehensive use for improving or developing a waterway.

Interior-7

The "no action" alternative is the action, which if selected, results in no change to the existing environment. The Commission defined the existing environment at operating projects to be as it is today not up to 50 years ago (Commission Order 513, issued May 17, 1989). This is reasonable because there is no practical way to get data about the environment as it existed pre-hydroelectric development. We did, however, provide extensive discussion on the existing environment which includes project effects on resources associated with the Saco River.

Interior-8

NEPOOL's OE-411 Reports include the projected capacity-requirement reduction benefits which the reporting parties, which include the applicant, will accrue from demand-side management (DSM). DSM includes conservation. Wind power is not economically competitive with hydropower. Projected "right-priced" non-utility generated (NUG) energy and capacity are accounted for in the NEPOOL OE-411

The DEIS states that runs of American shad and river herring (alewife and blueback herring) never extended upstream of the natural falls in the Saco-Biddeford area. This finding is contrary to the position taken by the resource agencies in their Saco River Strategic Plan for Fisheries Management (Strategic Plan), and is inconsistent with the Commission staff's finding in the EA for the Cataract Project, which states that these species were common in the Saco River Basin. Admittedly it is somewhat difficult to historically document the upstream extent of anadromous fish in the Saco River, given that dams were first built in the early 1700's, as discussed in the DEIS. However, for purposes of identifying potential restoration activities, the agencies' Strategic Plan considers the historical upstream limit of shad and river herring to be Hiram Falls, located at river mile 46. We recommend that the DEIS adopt the same historical basis for anadromous fish runs in the basin.

Wetlands

The DEIS states that the existing wetlands at the Bonny Eagle Project are of high quality, and provide for a variety of wildlife uses. The staff also agrees with CMP's finding that the daily drawdown/peaking cycle at the project is responsible for the quantity and quality of these wetlands. We do not entirely agree with these conclusions.

Although the present extent of wetlands in the project area are largely the result of the hydraulic influences of the impoundment, and may in fact occupy a larger area than under pre-project conditions, it has not been established that the existing wetlands are significantly different than, or superior in quality to what would have existed in the area prior to the construction of the dam. CMP could have easily done this by examining the composition and function of wetlands in undammed portions of the river (e.g., in backwaters or other slow-moving areas), or by comparing the wildlife value of the impoundment area to known maximum carrying capacities using a technique such as Habitat Evaluation Procedures. Until further investigations are conducted to establish the relative quality of wetlands in the project area, we cannot agree with the staff's assessment of the beneficial effects of peaking at Bonny Eagle.

Interior-11

Further evidence on the adverse consequences of peaking at the Bonny Eagle Project is contained in the DEIS, itself. The staff acknowledges that the regular drawdown exposes habitat for invertebrates and fishes, resulting in stranding. (See Sec. 3.3.1.3) This is a clear indication that the value of shallow water wetlands in the impoundment is diminished by the drawdowns.

ENVIRONMENTAL IMPACTS

Saco River Fish Passage Agreement

The DEIS finds that implementation of the Saco River Fish Passage Agreement would best meet the identified fish passage needs of anadromous fish in the basin. We agree with that assessment, and are prepared to work with CMP and others within the framework of the Agreement to restore anadromous fish in the Saco River Basin.

12a.

data. The emerging sources of generation (fuel cells, photovoltaic, et cetera) are currently not cost-competitive with hydropower.

Interior-9

We disagree. We considered the license denial as a possible alternative, but eliminated it from detailed study. No party provided a basis for this alternative and we determined that the license denial alternative is unrealistic in this case. License denial would result in the loss of substantial electric power generation, prevent the parties from implementing the fish passage agreement, eliminate CMP's proposed environmental enhancement measures at Skelton and Bonny Eagle, and require the Commission to identify another agency willing and able to assume regulatory control and supervision of the existing facilities.

Interior-10

We agree. See revised Section 3.2.1.

Interior-11

Comment is noted.

Interior-12

12a. Comment is noted.

New Licenses for Bonny Eagle and Skelton Projects

Instream Flow Impacts

The DEIS describes the current operation of hydroelectric facilities in the Saco River Basin, and analyzes how CMP's proposed modifications at the Bonny Eagle and Skelton projects would affect anadromous fish and other aquatic life, wetlands and recreational opportunities. As is discussed in the DEIS, all of CMP's projects on the Saco, particularly below Hiram, are integrated and run as a system. What occurs at Bonny Eagle is reflected at, and below the other projects located downstream. 12b.

Absent from the DEIS, however, is any discussion of cumulative impacts below all of the hydropower projects in the basin. This is a glaring omission, particularly in light of the fact that the Commission has previously acknowledged significant impacts to habitats and fish and wildlife resources in the estuary below the Cataract Project. As stated in the EA that accompanied the new license for the Cataract Project in 1989, hydropower operations on the river have an influence on estuarine and marine fishes, including Atlantic menhaden, Atlantic herring, Atlantic pollock, Atlantic silversides, bluefish, American sand lance, and Atlantic mackerel. 12c.

The Cataract EA goes on to describe the impacts of hydropower operations in the Saco River on both the quantity and quality of habitats in the estuary. For example the EA found that changes in freshwater inflow (as might occur with store-and-release operations) can alter estuarine flushing characteristics and circulation patterns, and could therefore disrupt natural physical, chemical, and biological processes. The EA also stated that freshwater inflows into estuaries affect primary and secondary productivity, influencing physiological processes such as growth in penaeid shrimp and softshell clams, as well as phenomena such as parasitation in oysters. The EA also found that year-round minimum flows at Cataract could benefit a variety of estuarine fishes and invertebrates by maintaining a nutrient trap at the saltwater-freshwater interface, ultimately resulting in food production for sport and commercial fisheries. 12d.

We believe that the Commission correctly acknowledged basin-wide impacts of hydropower when it issued the new license for the Cataract Project. Recognizing the importance of these estuarine resources, the Commission required in that license a year-round minimum flow of 851 cfs or inflow, whichever is less. Given that the instream flow conditions below Cataract are largely determined by the operation of the Bonny Eagle and Skelton projects, the DEIS must consider hydropower impacts in the estuary, and evaluate the degree to which the alternative proposals for mitigation meet the recognized need for protection of fish and wildlife habitats and populations below the Cataract Project. 12e.

In contrast to instream flow recommendations by the FWS and other fishery agencies, CMP has focused its proposals for minimum flow on the season in which anadromous fish are likely to be migrating either upstream or downstream in the Saco River (April - November). This included a "zone of passage" analysis that was done subsequent to other instream flow studies to identify the quantity of water needed to allow anadromous fish adequate depth and velocity during the upstream and downstream migration periods. 12f.

12b. Comment is noted.

12c. The EIS discusses cumulative impacts of various hydro operational alternatives on resources (anadromous fisheries, wetlands, and recreation) identified for cumulative impact analysis in the Saco River basin. Table 5-1 provides a summary of this analysis. While hydropower operations may have an influence on Saco estuarine fishes, to date there has been no quantification of effects. Any quantification of effects would require long term studies. The various operational alternatives discussed in the EIS would tend to enhance habitat conditions for the listed fish when they are present in the Saco River estuary. We note that most of these species do not occur in the Saco River estuary during the winter months.

12d. Comment is noted.

12e. See response Interior-12c and revisions to Sections 4.2.1.2, 4.2.2.2, and 5.4.2.2.

12f. Comment is noted

Comment | **Response**

The FWS and other fishery agencies never recommended zone of passage studies at these projects, and believe that the instream flow studies and other analyses (e.g., invertebrate studies and assessment of habitat impacts in the estuary) that have also been done provide a more holistic approach to identifying impacts and mitigation. Under CMP's approach, the entire Saco River below Bonny Eagle, including the estuary, would be subjected to periods of leakage flow over a four-month interval (December - March), causing significant impacts to resident aquatic life in the river and to anadromous species and other fish and wildlife that may be present in the estuary during winter months (e.g., rainbow smelt). The staff's recommended alternative of 250 cfs during this winter period would appear to offer little relief, particularly in light of the fact that the 7Q10 flow (7-day, 10-year low flow), considered to be an absolute minimum for maintaining water quality, is 487 cfs in the Saco River, as identified in the DEIS. 12g.

12g. Staff's revised flow recommendations are consistent with Interior's recommendation. See response CMP-7

We also believe that the staff's assessment of impacts below Bonny Eagle fails to adequately consider conditions below the West Buxton Project, located immediately downstream. As is discussed in the DEIS, additional instream flow studies were conducted below West Buxton, because this run-of-river project almost immediately reflects what is discharged upstream at Bonny Eagle. If Bonny Eagle is not releasing flow, a condition that is not readily evident because of high tailwater levels, the greatest impact is seen at West Buxton, where significant amounts of substrate can become exposed, limiting use by invertebrates and fish. The staff's DEIS analysis of habitat impacts below Bonny Eagle fails to adequately consider the direct consequences of manipulated flows on the river segment below West Buxton. We believe that any instream flow mitigation at Bonny Eagle will have limited benefit unless it is on a year-round basis in order to protect downstream areas such as those below West Buxton. 12h.

12h. We agree. See sections 4.2.1.1 and 4.2.2.1 for discussion of the effects of the various operational alternatives on habitat below West Buxton.

The staff should also give further consideration to impacts to spawning Atlantic salmon below Skelton under the alternative flow regimes that are considered in the DEIS. Incubating eggs and developing larvae require permanent instream flows to maintain a silt-free, oxygen-rich environment. We question whether these conditions would exist under the reduced flow regimes proposed by CMP and the staff in the DEIS. 12i.

12i. The instream flow study in which USFWS was a participant and conducted below Skelton dam looked at only Atlantic salmon immigration habitat. Therefore, there is no quantitative data available for other life stages. Further, the USFWS reported in 1987 that spawning and rearing habitat below Skelton represents less than 1 percent of the total available in the basin. Instantaneous flow releases discussed in the EIS would improve habitat conditions for all life stages compared to the current flow regime that ranges from leakage to peak generation flows.

Wetlands

The DEIS states that alternative operations of the Bonny Eagle Project, involving diminished or no drawdowns would result in significant wetland losses (52 acres). What is not reported in the DEIS, however, is the fact that regular drawdowns at the project expose 55 acres of littoral zone habitat. Given that this area is largely uninhabitable by fish and water dependent wildlife when the impoundment level recedes, we cannot agree that the absence of a drawdown would necessarily result in negative impacts to wetlands. In addition, the 52 acres of wetlands that CMP claims would be "lost" are deeper aquatic beds that would not receive adequate light with a higher water level and would therefore be expected to lack submerged vegetation. This area would still be covered by water (in contrast to the 55-acre drawdown zone), and usable by fish and other aquatic life, including sessile invertebrates.

Interior-13

Comment is noted. We agree that Interior's recommended operation would result in benefits to fisheries and other aquatic life, including sessile invertebrates, as well as wildlife. See revised sections 4.2.2.1.3 and 5.4.2.1 of final EIS.

Issuance of an Exemption for the Swans Falls Project

We concur with the staff's assessment of environmental impacts associated with the issuance of an exemption for the Swans Falls Project. We believe that the terms and conditions that would apply to that exemption for the purposes of preventing loss of, or damage to fish and wildlife resources, as previously identified by FWS and other agencies, are adequate.

Interior-14

No response is required.

Unavoidable Adverse Impacts

As stated previously it may be possible to significantly reduce unavoidable adverse impacts to fish and wildlife resources by modifying the CMP's existing and/or proposed operation of their projects covered in the DEIS. Pursuit of additional non-hydropower alternatives and conservation could also reduce unavoidable adverse impacts to fish and wildlife resources in the Saco River Basin.

Interior-15

Our recommended operation for Bonny Eagle and Skelton would enhance the existing environment and not result in unavoidable adverse impacts. We find that the proposed construction measures to enhance fishery resources would result in short-term, minimal effects.

Irreversible and Irretrievable Commitment of Resources

We concur with the conclusion in the DEIS that licensing of the projects would result in a commitment of the area to energy production. However, this single use of a large portion of the Saco River for waterpower development would appear to be contrary to the comprehensive planning mandate in Sec. 10 of the FPA, where other beneficial public uses, such as fish and wildlife, are to receive equal consideration, unless significant modifications are made in proposed operating conditions.

Interior-16

We disagree. We have given all of the resources equal consideration and our recommended measures would further enhance the environmental resources of the Saco River.

Relationship between Short-term Uses and Long-term Productivity

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 CFR 1502). However, the DEIS appears to consider the annual production of 237,000 GWh 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 staff concludes that the proposed mitigation that would be implemented during the term of the licenses would avoid long-term decreases in productivity, and allow for the resource agencies to achieve their anadromous fish restoration goals for the river.

We view 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. Without appropriate monitoring and other continuing studies, it remains to be seen whether the staff's proposed mitigation is effective in offsetting losses in long-term productivity.

Interior-17

Comment is noted.

Comment	Response
STAFF'S CONCLUSIONS	
We concur with the staff's conclusions in the DEIS regarding the implementation of the Saco River Fish Passage Agreement and the issuance of an exemption for the Swans Falls Project. While there are alternative means of achieving fish passage at Saco River hydropower dams (e.g., different schedules), the Saco River Fish Passage Agreement represents a balanced approach, in which new facilities are constructed based on the progress of anadromous fish restoration in the basin. The Agreement also calls for continuing involvement of not only CMP, Swans Falls Corporation and the resource agencies, but also the non-governmental conservation organization who have, and will continue to play a key role in anadromous fish restoration in the basin. We believe that the endorsement by the Commission staff of this public-private partnership is good policy, and is consistent with the evolving role of government in matters involving the protection and enhancement of natural resources.	Interior-18 No comment necessary.
Similarly, issuance of an exemption for the Swans Falls Project provides the most effective means of achieving fish passage and other resource protection measures at the site. The terms and conditions that have been provided by the FWS and other resource agencies should ensure that fish passage facilities and other mitigative measures are implemented in a timely fashion. Although alternative means are potentially available for achieving passage at the site in the event that the project does not receive an exemption or license (e.g., government funding of fishways), we believe that continued jurisdiction and oversight by the Commission are the most efficient process for implementing measures designed to benefit fish and wildlife resources and associated public uses.	
With regard to the issuance of new long-term licenses for the Bonny Eagle and Skelton projects, the Commission has not given equal consideration to fish and wildlife needs as is required by the FPA. The Commission has not given due regard to the findings and recommendations of the FWS and other natural resource agencies, and has instead adopted the conceptual approach of CMP by endorsing a highly seasonal regime for instream flow releases. More significantly, the Commission does not recognize its own previous findings on the cumulative impacts of hydropower operation and mitigative requirements below the Cataract Project.	Interior-19 Staff's flow recommendations are consistent with Interior's recommendation. See response CMP-7. Article 401 of the license for Cataract requires the release of 851 cfs or inflow to the reservoir whichever is less. During non generation times inflow to the Cataract pond is only from leakage from Skelton. The water quality certificate for Cataract requires an instantaneous release of 200 cfs.
This disregard for the Commission's earlier findings and requirements is most obvious in the conclusion in the DEIS that a release higher than 250 cfs (between December and March) at Skelton would be inconsistent with what is being recommended by the staff for Bonny Eagle. This finding is clearly arbitrary in light of the standing license requirement for a year-round instream flow release of 851 cfs at the Cataract Project, the natural resources below which will be severely compromised if the recommendation for 250 cfs is implemented into new long-term licenses for the Skelton and Bonny Eagle projects.	
We believe that the Commission acted responsibly and appropriately when they recognized the need to protect estuarine fish and wildlife resources and habitats below the Cataract Project. We continue to recommend that this level of resource protection be maintained by including corresponding requirements for year-round instream flow releases at the upstream hydropower projects that are covered in this DEIS.	

We also believe that the staff's recommendations for continued peaking operations at the Skelton and Bonny Eagle projects are inconsistent with the stated need for power in the DEIS. As discussed in Sec. 2.6 of the DEIS, operation of the two projects in a strict run-of-river mode or under the instream flow restrictions that we and others have recommended would result in less of a reduction in power than would occur under CMP's and the staff's recommended alternatives. If a need for power truly exists (a questionable condition based on CMP's ongoing actions to reduce its contracts with independent power producers), selection of the alternative that yields the most energy would seem to be a logical choice. However, the staff has ignored this obvious course of action, and has instead recommended an operating mode that produces a greater deficit in energy supplies in the region.

Interior-20

Your opinion is noted. We agree that Interior's recommended flow alternative results in less of a reduction in power than the 800\250 cfs alternative.

With respect to the staff's recommended flows for the New River Channel at the Bonny Eagle Project, we agree with the conclusion that an increase from 50 to 100 cfs will result in increased fishery benefits. However, this concurrence does not offset our concern for insufficient year-round flows in the main channel and in downstream river reaches, as discussed above.

Consistency with Comprehensive Plans

As stated in our previous comments in these proceedings, we believe that the licensing of the Bonny Eagle and Skelton projects as proposed by CMP would be inconsistent with comprehensive resource management plans that have been filed by the FWS and other agencies pursuant to Sec. 10(a) of the FPA. (See for example the Department's comments to the Commission, dated October 1, 1993.) This finding is based on what we see as an inconsistency between proposed operating flows at the two projects and what has been shown through instream flow studies to be needed for resident and anadromous fish in the river. While the Commission has recommended in the DEIS an increase in CMP's proposed flows, the level of resource protection falls far short of what has already been required downstream at the Cataract Project, and what is being recommended for the upriver facilities. Accordingly, we cannot agree with the finding in the DEIS that no conflicts exist between the staff's recommended action and resource agency comprehensive plans.

Interior-21

Your opinion is noted. Staff has revised its flow recommendation in the EIS to be consistent with Interior's flow regimes for Bonny Eagle and Skelton; therefore, there is no inconsistencies with resource agency comprehensive plans.

Fish and Wildlife Recommendations

The FPA requires that licenses issued by the Commission contain conditions intended to adequately and equitably 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 recommendations received pursuant to the Fish and Wildlife Coordination Act (FWCA), 16 U.S.C 661 et seq., from the National Marine Fisheries Service, 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.

Interior-22

22a. Comment is noted.

Comment	Response
The FWS has provided initial Sec. 10(j) recommendations in its comments on the license applications for the Skelton and Bonny Eagle projects. The Commission staff has rejected a number of these 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 Secs. 4(e) and/or 10(a) of the FPA due to economic implications (i.e., the resource benefits are in the staff's estimation not worth the cost in lost generation).	22b. Comment is noted.
The Department disagrees with the Commission's finding, noting that both sections of the FPA 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 Sec. 10(j) recommendations by the FWS for these two projects that were subsequently rejected by the Commission staff were entirely within the letter of the FPA. We believe that the staff may be reading more into Secs. 4(e) and 10(a) than actually exists.	22c. Comment is noted.
Furthermore, based on the information provided in the DEIS, it appears that the "economic filters" methodology used in weighing costs and natural resource benefits, has been inconsistently applied by Commission staff in the licensing process. We are not aware of similar considerations when the staff addresses a safety issue at an operating project. For example, if during a routine inspection, a project dam is considered to be unsafe, thereby risking human safety downstream, we expect that the licensee would be asked to comply with modifications prescribed by the Commission staff, with little regard to cost, or face a requirement for dam removal to alleviate the threat. In contrast when the safety and health of aquatic ecosystems are placed at risk, the staff does not hesitate to first consider the "cost effectiveness" of environmental protection. Environmental protection must be a cost of doing business in order for the public interest to be served.	22d. Your opinion is noted. During the balancing process staff must balance the developmental and non developmental interests in determining a licensing action that best serves the public interest. If during the term of the license aquatic resources experience unanticipated impacts, these may be addressed through the reopener conditions that would be included in any license issued.
The staff indicates in the DEIS that it will attempt to resolve differences with the FWS over fish and wildlife recommendations for the Skelton and Bonny Eagle projects. The FWS shares this desire to reach agreement over fish and wildlife conservation measures, but recommends that both the National Marine Fisheries Service and Maine's fish and wildlife agencies be included in any future discussions on mitigation and enhancement at the two projects.	22e. Comment noted.

ATTACHMENT B:
REVISED SEC. 10(J) RECOMMENDATIONS AND
SEC. 18 FISHWAY PRESCRIPTIONS

The Commission's regulations (18 CFR Subchapter B Part 4) allow for modification of recommendations and prescriptions previously provided by resource agencies pursuant to Sections 10(j) and 18 of the FPA, when the licensing proceeding involves preparation of a DEIS. Accordingly, we are providing the following modified recommendations and prescriptions for the projects covered in the Saco River DEIS.

Skelton Project

Section 10(j) Recommendations

The information and analysis presented in the DEIS do not indicate a need to modify the FWS' recommendations pursuant to Section 10(j) of the FPA, as contained in the Department's October 1, 1993, letter to the Commission.

Interior-23
Comment is noted.

Section 18 Prescription

The Section 18 fishway prescription that was contained in the Department's October 1, 1993, letter to the Commission is sufficient to allow for implementation of the Saco River Fish Passage Agreement. The Department anticipates that future Section 18 prescriptions for this project will be fully consistent with the provisions of the Agreement.

Interior-24
Comment is noted.

Bonny Eagle Project

Section 10(j) Recommendations

The information and analysis presented in the DEIS do not indicate a need to modify the FWS' recommendations pursuant to Section 10(j) of the FPA, as contained in the Department's October 1, 1993, letter to the Commission.

Section 18 Prescription

The Section 18 fishway prescription that was contained in the Department's October 1, 1993, letter to the Commission is sufficient to allow for implementation of the Saco River Fish Passage Agreement. The Department anticipates that future Section 18 prescriptions for this project will be fully consistent with the provisions of the Agreement.

Cataract, Bar Mills, West Buxton, and Hiram Projects

Section 18 Prescription

The Secretary of the Interior's authority to prescribe the construction, operation and maintenance of fishways is reserved under Section 18 of the Federal Power Act. The Department anticipates that future Section 18 prescriptions for these projects will be fully consistent with the provisions of the Saco River Fish Passage Agreement.

ORIGINAL

Saco River Salmon Club

"Dedicated to Fisheries Restoration"

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95 FEB 22 PM 12:40

February 21, 1995

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Re: Project Nos. 2528, 2527, 2194, 2531, 2529, 2530, and 11365. Comments on the Draft EIS.

Dear Ms. Cashell:

On behalf of the "coalition of conservation groups", that participated in the negotiations of the Saco River Comprahensive Fish Passage Plan, I have reviewed the Federal Energy Regulatory Commission's recently completed Draft Environmental Impact Statement (DEIS) and make the following comments.

On pages 5-18 and 5-28 of the DEIS, FERC has recommended minimum flows of 800 cfs from April 1st through October 31st and 250 cfs from November 1st through March 31st for Central Maine Power Company's (CMP) Bonney Eagle and Skelton projects. FERC's 800/250 cfs flow model is a regime that allows a near run-of-river mode from April through October (7 months) and a peaking mode of operation from November through March (5 months), at each of CMP's six Saco River projects.

This appears to be a fine compromise between the needs of the fish and aquatic life and the needs of CMP. Until one realizes that FERC has not completed the modeling of this flow regime, sufficiently, for the users of the DEIS to identify and compare the percentage of total power loss and the loss of peak and off peak power with the other proposed minimum flow regimes.

Without adequate explanation, FERC has assumed that the levelized annual operating costs and the total levelized loss in annual power are so similar between the year round flow model of 600 cfs and the 800/250 cfs peaking flow model, as to recommend the peaking mode of operation. Also, FERC has assumed that the loss in power generation are similar, as well. (See the enclosed table for comparison.)

It appears that FERC has improperly excluded from considaration the Interior's 800 cfs/run-of-river flow model. This model resulted in a total loss in power generation of only 3.1%, as opposed to 6.1% at either 600 cfs or 800/250 cfs models and results in levelized annual operation costs that are nearly identical to the 600 cfs or

FEB 22

SRSC-1

Our flow recommendations are consistent with Interior's flow regime identified in Section 2.3 and discussed in Section 4.2.2. See response CMP-7.

The modeling of 800/250 cfs minimum flow scenario was completed by CMP and used in our new economic analyses. On-peak and off-peak power losses were compared with other proposed minimum flow regimes.

800/250 cfs models. The benefit of Interior's proposed flow model is that it protects the resident fish and aquatic life throughout the entire year, while at the same time providing flows adequate for the migration of anadromous fish. FERC should recognize that the anadromous fry need a place to live until they are ready to migrate back to the ocean.

The levelized net annual benefits are less than 1% (.2%) lower for the 800 cfs Interior model than for FERC's 800/250 cfs model (for a total of only $40,780 in annual savings). When balanced against both the net increase in power generation and the benefits to fish and wildlife of the 800 cfs Interior plan, the .2% increase in dollar value of the 800/250 cfs generating scheme does not justify FERC's recommendation.

While compromises were made in the negotiated fish passage agreement, compromise on the minimum water flow is unacceptable. The fish and aquatic life that inhabit the Saco River must have the river as stable as possible in order to survive and grow. Unfortunately, FERC's favored 800/250 cfs flow model allows peaking operations for 5 months of the year to de-water the river bottom used by fish and aquatic life for a nominal dollar benefit.

FERC's justifications for the peaking operation cited on page 5-21 of the DEIS are: "....the current peaking operation of the project has developed the extensive reservoir wetlands....operation of the project in a run-of-river mode would result in the potential loss of 52 acres of reservoir wetlands."

In rebuttal, it should be pointed out that the wetlands are not naturally occurring but instead are man-made, the result of CMP's headpond. Also, FERC's 250 cfs flow regime from November through March would have little beneficial effect on the wetlands since the most productive time for these wetlands is the period from May through Mid-July.

For these reasons, we feel that FERC should re-evaluate its minimum flow recommendations in favor of the Interior's 800 cfs/run of river mode.

Sincerely,

Edmond Laing/mb

Edmond L. Laing
Vice-President,
Saco River Salmon Club
for American Rivers, Atlantic Salmon Federation, Maine Council of Atlantic Salmon Federation, and Trout Unlimited

enclosure
cc: Janopaul, Bowman, Albright, Horvath, and Callen

SRSC-2

Comment is noted. We agree that the most productive time for wetlands is in the spring and summer and not from November through March. See revised section 5.4.2.1 of the final EIS.

DEIS PROPOSED MINIMUM FLOWS *

Operation Mode	Total Energy Generation (1,000 kwh)	% of Energy Loss	On Peak (kwh)	Off Peak (kwh)	Levelized Annual Operating Costs	Levelized Annual Power Value	Total Levelized Net Annual Benefits (capital & operating costs)
Baseline	294,420		160,788	133,854		$38,031,808	
FERC's 800 cfs		-6.10%	(13,321)	(4,798)	($1,622,028)	($3,678,236)	$20,033,772
FERC's 800/280 cfs		-8.00% est.	unk.	unk.	($1,620,000)	($3,680,000)	$19,682,154
Interior's 800 cfs/RR		-3.10%	(22,087)	12,844	($1,083,000)	($3,920,780)	$18,882,220

* Sources: Table 2-2, page 2-35 and 6-15 and Table 2-3, page 2-36 of DEIS.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

JFK KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203-2211

Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C.

re: Draft Environmental Impact Statement for the Saco River, Maine, Hydroelectric Projects (FERC Project Nos. 2528, 2527, 2194, 2531, 2529, 2530, and 11365)

Dear Secretary Cashell:

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 has reviewed the draft Environmental Impact Statement (dEIS) prepared by the Federal Energy Regulatory Commission (FERC) for the above referenced hydroelectric projects on the Saco River in Maine.

FERC's dEIS evaluates the environmental impacts associated with Central Maine Power's (CMP) applications for relicensing of the Bonny Eagle and Skelton projects on the mainstem of the Saco River, Maine, and Swan Falls Corporation application for an exemption for their unlicensed Swan Falls project. CMP is not proposing to increase the power production at either the Bonny Eagle or Skelton facilities. CMP plans to file a Settlement Agreement with FERC for a consensus plan for the installation of fish passage facilities at all seven of their mainstem Saco River hydropower projects. The Saco River Fish Passage Agreement is a negotiated agreement between CMP, federal and state resource agencies, and interested non-governmental organizations. The agreement sets a proposed sequence and schedule for development of fish passage facilities at mainstem dams on the Saco River. These fish passage facilities are needed to aid the restoration of anadromous fish populations such as Atlantic salmon, American shad, and river herring. The agreement would provide for the new licenses issued to Bonny Eagle and Skelton to meet the agreement's fish passage requirements. FERC's Saco River dEIS includes an evaluation of the environmental impacts from the fish passage agreement.

The dEIS analyzes four alternatives for the Saco River Projects. While all the alternatives incorporate upstream and downstream fish

Comment | **Response**

passage facilities consistent with the agreement, only the alternative proposed by the Department of the Interior (DOI) establishes seasonal run-of-river operations, seasonal minimum flow requirements, and maximum drawdown levels at the Bonny Eagle and Skelton projects. EPA believes these measure are important to protect the water quality, wetlands and wildlife resources of the Saco River. Furthermore, EPA believes the DOI alternative appropriately balances hydropower generation and protection of environmental and recreational resources on the Saco River and is consistent with the Federal Power Act Section 4(e) equal consideration requirement for multiple potential uses of a public waterway. Therefore, EPA recommends FERC consider this alternative as the preferred alternative for relicensing of the Saco River hydropower facilities.

EPA's specific comments on FERC's proposed action follow.

Water Quality

As noted in the dEIS, studies of benthic life populations indicate violations of Maine's Class C aquatic life water quality criteria in the free flowing reaches below the Bonny Eagle and Skelton developments. Project operations, including excess river flow and fluctuations in flow velocities, are identified as possible factors contributing to these violations.

EPA is concerned about potential adverse impacts to the benthic community from FERC's recommended release schedule of seasonal flows of 250 and 800 cubic feet per second (cfs) at Bonny Eagle and Skelton. While the benthic community may be able to withstand flow fluctuations between moderate flows of 800 cfs and peaking flows of 4500 or 3800 cfs (for Bonny Eagle and Skelton, respectively), frequent flow fluctuations from low flows of 250 cfs to high peaking flow rates may continue to adversely impact benthic communities immediately downstream of these projects.

Additionally, EPA believes FERC's dEIS fails to adequately consider the affect of seasonal minimum flows of 250 cfs at the Bonny Eagle and Skelton developments on fishery habitat and the water quality in the downstream and estuarine portions of the Saco River. The West Buxton and Cataract projects, which were recently relicensed by FERC, have had higher minimum flows (768 and 851 cfs, respectively, or inflow) imposed in the licenses to protect and maintain aquatic life and habitat in the river and the estuary. EPA recommends FERC impose minimum flows for Bonny Eagle and Skelton consistent with the West Buxton and Cataract facilities minimum flow license conditions.

The alternative flow regimes recommended by the fishery agencies to support fishery needs (combinations of run-of-river operations and seasonal minimum flows of 800 and 811 cfs below Bonny Eagle and Skelton, respectively) would: 1) benefit the benthic community

EPA-1

We disagree. Both the staff's recommended and CMP's proposed alternatives include seasonal minimum flows and maximum drawdown levels at the Bonny Eagle and Skelton. Implementing the measures included in either of these alternatives would significantly enhance environmental and recreational resources in the project areas.

EPA-2

We agree that there may be some impact on aquatic macroinvertebrates downstream of Bonny Eagle and Skelton from increasing flows from the minimum flow of 250 cfs to peaking(4500 cfs and 3800 cfs), respectively. However, this impact should be reduced from current levels as generation flows increase from leakage. Further, any license issued for Bonny Eagle and Skelton would likely require that flows be monitored which could result in flow modifications, if needed, to protect aquatic resources.

Our revised flow recommendations are consistent with Interior's flow regimes identified in Section 2.3 and discussed in Section 4.2.2 for Bonny Eagle and Skelton. These flows should protect and enhance aquatic biota and habitat in the lower Saco River and estuary.

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downstream of the developments by substantially increasing minimum flows and reducing scouring from daily peaking operations; 2) enhance fishery and wetland values in the impoundments by reducing or eliminating drawdowns; and 3) enhance aquatic communities throughout the river downstream of the Bonny Eagle facility by increasing minimum flows throughout the river.

Wetlands

According to FERC's dEIS, operating the Bonny Eagle impoundment as a run-of-river facility would cause the loss of 52 acres of aquatic beds; however, EPA believes potential benefits to the aquatic ecosystem from run-of-river operations would outweigh the possible loss of these beds. Implementing run-of-river operations would permit aquatic beds to re-establish in the drawdown zone. Additionally, the minimum drawdown level associated with a run-of-river operation would provide a more stable spawning habitat for fish (e.g., smallmouth bass), improve nesting habitat for waterfowl utilizing the impoundment, and provide habitat stability for non-mobile species. EPA also believes that stable flows would enhance or provide for the development of new wetland systems downstream of these facilities, while run-of-river operations would eliminate peak discharges and its destructive scouring effect on downstream aquatic beds. Furthermore, EPA believes that a run-of-river operation at the Bonny Eagle coupled with managing the impoundment at a water level lower than the current level would provide protection for some of the existing aquatic beds. EPA recommends that the final EIS evaluate this operational alternatives as well as whether maintaining a lower level impoundment would have adverse impacts on other bordering wetland systems.

EPA-3

We agree that the overall environmental benefits associated with a run-of-the-river mode of operation would outweigh the potential loss of some wetlands. See revised sections 4.2.2.1.3 and 5.4.2.1 of the final EIS.

Wetland Mitigation

FERC's dEIS discusses three wetland sites CMP has proposed for enhancement. Mitigation measures at two of these sites would involve establishing a 100 foot buffer zone along the impoundment to address sedimentation and nutrient input problems associated with grazing cattle wading into the impoundment drawdown zones. This buffer zone would be created by fencing and/or lease restrictions.

The third mitigation site consists of a large corn field abutting the Bonny Eagle impoundment. Agricultural runoff from these fields contributes to excessive loadings of nutrients, sediments, and pesticides to the impoundment. CMP's wetland mitigation efforts would discontinue agricultural activity along 1000 feet of shoreline, create a 100 foot buffer, and reseeding and the naturalization of the previously farmed areas.

EPA concurs with FERC's conclusion that these measures would enhance wetlands as well as improve the water quality of the Saco River by reducing nutrient, sediment, and pesticide runoff. EPA

EPA-4

Comment is noted.

recommends these measures be included in the final EIS and set as conditions of FERC's license.

Other Issues

While the DEIS included impacts associated with Bonny Eagle, Skelton, and Swan Fall, as noted above, the dEIS does not adequately address how the operation of these facilities would affect other projects on the Saco River (e.g., Bars Mill, West Buxton, Hiram, and Cataract). Specifically, the dEIS does not discuss how minimum drawdowns and flows at the Bonny Eagle and Skelton facilities would affect operations at these other Saco River projects. Similarly, no information is provided in the dEIS regarding whether Saco River hydropower project operating procedures would affect other Saco River wetlands systems than those noted for the Bonny Eagle and Skelton projects. EPA recommends this issued be evaluated in the final EIS. EPA-5

The exemption proposed for the Swan Falls project includes the provision that the facility comply with conditions mandated by state and federal resource agencies, including run-of-river operation, and construction of fish passage facilities, a submerged berm to deflect tailrace flows, and fish habitat improvements. The Swan Falls facility is also being proposed for an increase in rated capacity from 350 to 820 kW. The dEIS does not discuss impacts from the construction of these environmental modification or the potential construction associated with the increase in rated capacity. If any Swan Falls construction would have an adverse impact on wetlands or water quality, these impacts should be presented, and mitigation offer to offset the impact, in the final EIS. EPA-6

The EPA supports the conditions for relicensing the Bonny Eagle and Skelton hydropower facilities as proposed by the Department of the Interior to establish seasonal run-of-river and minimum flow operations. This alternative would also establish maximum drawdown levels for the associated impoundments. The dEIS discusses the run-of-river operation at full impoundment levels; the final EIS should evaluate this mode of operation at lower impoundment levels. EPA-7

On the basis of the comments above, we have rated this project "Environmental Concerns - Insufficient Information" (EC-2). Please see the attached sheet for a full explanation of this rating. EPA-8

EPA-5 See revisions to sections 4.2.1.1.3, 4.2.1.2.3, 4.2.2.1.3, 4.2.2.2.3, and 4.3.1.1.
Our analysis of minimum flows at Bonny Eagle and Skelton included the cumulative environmental and energy effects on the projects below Bonny Eagle. All of the alternatives we evaluated in the EIS, except the "no action" alternative, provided minimum flows that would cumulatively enhance fisheries, terrestrial resources, and recreational resources in the lower Saco River below Bonny Eagle.

The staff's analysis regarding minimum flow effects on downstream projects below Bonny Eagle relied on numerous studies that included: (1) Eco-Analysts' studies of aquatic life below West Buxton and Skelton Projects; (2) Charles Ritz Associates' zone-of-passage studies for anadromous fish at Bonny Eagle, West Buxton, Bar Mills, and Skelton; and (3) CMP's IFIM studies at Bonny Eagle, West Buxton, and Skelton. We concluded that these studies and the additional information in the applications adequately provided the data needed to determine the effects of the minimum flows analyzed in the EIS.

EPA-6 See revisions to section 4.3.1.1. Swans Falls Corporation's (SFC) proposal to increase the rated capacity of the project involves no new construction. SFC would increase their capacity by installing an additional turbine\generator unit in an existing shaft. Further, we found that SFC's proposal to continue operating the project in a run-of-river mode would not impact wetlands.

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Thank you for the opportunity to review and comment on this draft EIS. EPA is available to work with FERC and the applicant to assure that our concerns are adequately addressed in the final EIS. If you have any questions about our comments, please contact Steven John of my Environmental Review taas at 617/565-3426.

Sincerely,

John P. DeVillars
Regional Administrator

EPA-7

As staff understands this comment, the discussion you are requesting for Bonny Eagle and Skelton is included in the EIS.

EPA-8

We disagree with EPA's conclusion that the EIS contains insufficient information. CMP conducted numerous studies during the consultation process to determine the environmental effects of their Bonny Eagle and Skelton Projects. EPA has not indicated how these studies or how the staff's analysis in the EIS are insufficient in addressing the environmental effects of the projects. On the basis of our responses to the comments above, we believe that sufficient information to fully assess environmental impacts has been provided.

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.

INFORMATION HAS BEEN REMOVED FOR PRIVILEGED TREATMENT

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E., Room 3110
Washington, D.C. 20426

RE: Saco River Draft Environmental Impact Statement
FERC Project Nos. 2528, 2527, 2194, 2531, 2529, 2530, & 11365
Cataract, Skelton, Bar Mills, West Buxton, Bonny Eagle, Hiram,
and Swans Falls Projects
Comments on Saco River DEIS (FERC\DEIS 0077)

Dear Ms. Cashell:

On December 1, 1994, the Federal Energy Regulatory Commission (FERC or Commission) issued the Draft Environmental Impact Statement (DEIS) for the Saco River projects. On February 16, 1995, representatives from Central Maine Power Company (Licensee or CMP), and another interested party, met with Commission staff to clarify the economic analysis in the DEIS. The Commission issued a summary of the meeting on February 28, 1995.

By letter dated February 21, 1995, CMP provided comments on the DEIS. Because of the short time frame after the economic meeting with staff, Licensee committed in its February 21, 1995 comments to provide a follow-up filing that would deal more specifically with the economic analysis for its Saco River projects.

This filing includes 1) a request for privileged treatment for projected cost and pricing information, 2) additional economic information as discussed at the February 16, 1995 meeting, 3) updated cost projections and information, 4) current avoided cost projections, and 5) complete and corrected economic analyses for all of CMP's Saco River projects. It also includes Licensee's comments regarding the U.S. Department of Interior and U.S. Environmental Protection Agency letters of February 21, 1995 and March 7, 1995 respectively.

Comment

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[illegible] FERC DEIS [illegible]

Privileged Information

In accordance with Rule 112 of the Commission's Regulations concerning Freedom Of Information Act Requests 18 CFR §388.112, CMP has, under separate cover, requested Privileged and Confidential treatment for information being provided to the Commission in the above-captioned matter. Specifically, CMP maintains that the projected future cost and pricing information being provided for the Hiram, Bonny Eagle, West Buxton, Bar Mills, Skelton, and Cataract Projects, is Confidential Information.

Pursuant to Rule 112, CMP is providing Confidential Information to Commission staff on the condition that a protective scheme be implemented such that the information will not be released or duplicated to any other person or party. Release or duplication of the Confidential Information to anyone other than Commission staff, without CMP's prior notice and consent, would place CMP at a competitive disadvantage in marketing power from its hydroelectric plants. In order to protect the confidentiality of the privileged information, Licensee has this day delivered to Commission Staff, this single copy of its filing containing the Confidential Information. This copy must not be released or duplicated without prior notice to and consent of the Licensee.

All privileged and confidential information provided to the Commission herein is clearly indicated as such.

CMP-1

By letter dated October 5, 1995, the Commission returned the economic data which was included as part of this filing. The Commission requested that CMP refile the economic data, omitting the information considered confidential.

Approach to Economic Evaluation

In reviewing, analyzing, and applying the economic information that is contained in this and previous filings, it is important for the Commission to recognize several issues. First, the benefit of these projects, as determined by the difference between avoided costs and production costs, represent cost savings to the public by having lower electric rates. Second, and related, the costs of enhancements and losses in generation are not taken out of a large unregulated profit, as is often the perception. These costs are borne by the electric consumers as the cost of production per kwh increases. Finally, enhancement measures should not be proposed simply because it seems that there might be an increase in habitat, or a commenting entity thinks it would be desirable. Enhancement or protection measures should only be required when there is a demonstrated need for the measure, based on the numerous and detailed studies conducted, and when there is a significant and demonstrable benefit that is justified by the costs and by the impacts to power resources.

CMP-2

Your opinion has been noted.

The Commission will see, through careful review of the enclosed information, that the measures proposed in the Draft EIS are pushing the limits for these projects to remain viable and competitive. The costs that put the greatest pressure on the economics of the Saco River projects are non-power enhancement costs, in particular the cost of fish passage facilities and related measures, and the loss in generation from the provision of minimum flows. With regard to the issue of minimum flows, Licensee does not believe that there is biologically supported justification for the magnitude of agency or DEIS minimum flow recommendations. Licensee's revised year round minimum flow proposal of 400 cfs, or inflow if less, including 50 cfs in the New River Channel, in the summer, and 250 cfs, or inflow if less, in the winter at the Bonny Eagle and Skelton projects is far more biologically justified than the minimum flows recommended by USFWS and others or the minimum flows recommended in the DEIS.

The 400/250 cfs, or inflow, revised minimum flow proposal for the Bonny Eagle and Skelton projects, is detailed in Licensee's February 21, 1995 filing with the Commission. This flow proposal is protective of the areas' non-power resources, greatly improves many of the resources, is biologically sound, meets State water quality standards, and has the least negative impact to the viability of the projects.

Licensee believes that implementation of the 400/250 cfs minimum flow proposal, in combination with the Saco River Fish Passage Agreement and the other appropriate resource measures, provides a balanced approach to protecting and enhancing the area's natural resources, and demonstrates the Commission's equal consideration in the treatment of all of the area's resources. Licensee also believes that the above combination of measures provides the best balance between enhancement of environmental resources and preserving some level of viability and cost competitiveness for power resources.

The following are CMP's comments and additional information regarding the economic analyses for the Saco River DEIS. This updated information has been assembled in a concise format that will allow the Staff to correct the DEIS analysis, and will guide the Commission through a more complete understanding of the impacts of the EIS recommendations.

1. Overview of the February 16, 1995 Meeting and Licensee's February 21, 1995 Comments

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[illegible] February 16, 1995 Meeting

The Licensee and the Conservation Law Foundation (CLF) (in attendance by phone)[1] met with Commission staff on February 16, 1995, to discuss and clarify the economic analysis of the enhancements that were considered in the DEIS. Licensee identified a number of deficiencies and errors in the DEIS analysis that render the conclusions in the DEIS inaccurate. Licensee agreed to follow-up in a separate filing with information to address the deficiencies and errors. Licensee believes that the economic analysis must be corrected before Staff or the Commission can make appropriate and informed recommendations and decisions.

Generally, the deficiencies and errors arise from the use of faulty assumptions. The DEIS should conduct its analysis using actual data. The major deficiencies and errors that were identified are summarized below:

- Licensee's actual avoided-cost projections should be used and not prorated differently by project or otherwise (except as is already differentiated in the data provided) as was attempted by Staff for the Bonny Eagle, Skelton, and Cataract projects. 3a.
- The estimated costs of the recommended enhancements need to be levelized correctly and consistently. 3b.
- The estimated costs must fully account for lost generation for fish passage flows and all of the costs of fish passage effectiveness studies, and facility O&M. 3c.
- The DEIS evaluations must use the Licensee's actual and projected costs of Federal and State income taxes, property taxes, operation and maintenance costs, capital costs, and project net investment. 3d.
- The DEIS assumed project costs and benefits for Hiram that were prorated from other projects. The DEIS should use cost projection information specific for Hiram. 3e.
- The analysis must properly allow for the financing of outstanding debt and the retirement of project investment. 3f.

[1] Public notice of the meeting was issued by FERC on January 26, 1995.

CMP-3

3a. Our new economic analysis is based on Gulf Island Hydroelectric Project avoided cost submitted to us by CMP. See CMP letter to FERC dated August 25, 1995.

3b. in our new economic analysis we do not consider future inflation or escalation of prices, and we do not levelize.

3c. in our analysis we included the lost generation due to fish passage flows, as well as the costs of fish passage effectiveness studies and facility O&M.

3d. we applied 34 % for federal tax and 3.05 % for local taxes. For O&M costs, capital costs and project net investment we used CMP's data.

3e. for Hiram we used CMP's data.

3f. for outstanding debt and retirement of project investment we used CMP's data.

Overview of the Licensee's February 21, 1995 Comments

Licensee agreed at the February 16, 1995 meeting, and in its February 21, 1995 filing, to provide the Commission with 1) a more detailed description and itemization of the corrections and revisions that need to be made, 2) data and information as appropriate to make the corrections, and 3) additional information on the Hiram Project that the Commission had not previously requested. Licensee also proposed to consolidate and summarize the economic and cost information that has previously been filed with the Commission and interested parties.

2. Existing Project Costs and Relative Values

A. Updated Project Costs

The 1991 Application for License, Exhibit D, and Licensee's letter of June 23, 1994, provided statements of net investment and construction work in progress (CWIP), as well as projected costs for capital improvements and operation and maintenance (O&M) for five out of six of CMP's Saco River projects.

Attached Tables 1 and 2 provide a current update for the above costs for all six projects. The net investment and CWIP costs are actual as of December 31, 1994. The non-enhancement capital and O&M costs are based on the current year budget and forecasts over the 30-year period. Total costs in nominal dollars, net present value (NPV) and levelized costs are provided for a 30-year period for each facility.

Tables 1 and 2 contain privileged information and have been removed.

B. Sample Capital Recovery (Economic Analysis) Program

In the DEIS economic analysis, estimated values were used for cost of capital and tax rates. The attached Table 3 is a sample of the economic analysis program that CMP uses to evaluate project costs. Table 3 shows the actual cost of capital rates for short term and long term debt, preferred and common stock, the weighted average cost of capital, and State, Federal, and composite tax rates.

Pages 2 and 3 of Table 3 also show the results of the analysis based on a capital investment of $1 to illustrate how the annual levelized costs or revenue requirements are determined. The actual input values are derived from Tables 1 and 2 as

CMP-4

On October 5, 1995, the Commission returned the privileged information to CMP.

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[illegible] attached Tables 9 through 14. Recovery of [illegible] are based on a 30-year book life and 20-year tax life.

Table 3 contains privileged information and has been removed.

1. Baseline Generation Values

Table 4 shows the anticipated annual generation for each of Licensee's Saco River hydro projects. The baseline energy figures (MwH/year) are based on the Saco River Hydraulic Model (HEC-5) projection of median year generation under current operation. The generation figures are the same figures that have been used in previous filings, most recently on February 21, 1995.

Tables 5, 6, and 7 show the annual dollar value of project generation expressed in terms of total value, net present value (as of January 1, 1995), and levelized value, respectively. These values are based on the on-peak and off-peak avoided costs of June 28, 1991, as filed in the 1991 Applications for New License. Table 8 lists the June 28, 1991 avoided costs.

Tables 5 through 8 contain privileged information and have been removed.

D. Updated Economic Analysis - Baseline Conditions

Tables 9 through 14 are the individual economic analyses of existing conditions (i.e. prior to enhancements) for the six projects. These analyses are based on the data presented in Tables 1 - 8. The recovery of capital investments is expressed in Tables 9 - 14 as a levelized capital recovery. The tables show the net savings (value or benefit) to the customer by having CMP generate the necessary energy at its own hydro facilities under current conditions, versus receiving the generation from the next available source.

The values expressed in Tables 9 - 14 represent the baseline (current conditions) to which all alternatives are compared. The results are expressed in terms of 30-year total value, net present value (January 1, 1995), and levelized value.

Tables 9 through 14 contain privileged information and have been removed.

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3. Review of Enhancement Options

Licensee next reviewed the costs of enhancements that were considered in the DEIS for the Saco River projects. Tables 15 through 20 show the estimated costs of the various enhancements considered for each project in the DEIS. The costs are shown in the year that they are to occur, in that year's nominal dollars. The enhancement costs shown are the same as previously submitted, escalated to the appropriate year as necessary. The tables also include the O&M costs and lost generation costs for fish passage which were not always considered consistently in the DEIS analyses. Licensee has verified the assumption made in the DEIS that the cost of lost generation for fish passage flows approximates 2% of baseline generation. The costs in Tables 15 - 20 do not include financing or the recovery of capital investments for enhancements.

Tables 21 through 26 show the final costs of the enhancements considered, including financing and the recovery of capital investments for enhancements, for each project.

Tables 15 through 26 contain privileged information and have been removed.

CMP-5

On October 5, 1995, the Commission returned the privileged information to CMP.

4. Economic Analysis Summary (Using June 1991 Avoided Costs)

Tables 27 through 32 provide a summary of the data contained in Tables 1 - 26 in a simple table for each project. These tables show the value of the generation and the cost of operating the existing projects with no additional environmental enhancements. These two values combined show the net benefit of the projects under existing conditions, i.e. generation value minus costs equals baseline net benefit to the public.

Tables 27 - 32 also summarize the costs of all resource enhancements that were considered in the DEIS. These summaries include the cost of lost generation for minimum flows under Licensee's original proposal, the DEIS recommendation, and Licensee's revised minimum flow proposal of 400 cfs or inflow in the summer, and 250 cfs or inflow in the winter, from both the Bonny Eagle and Skelton projects, as well as the costs of the other resource enhancements. The information from these tables is condensed below.

By reviewing these costs one can see the effect of any one enhancement, or combination of enhancements, on increasing the cost of generating electricity from this renewable resource. Alternatively, by subtracting these costs from the net benefit

CMP-6

On October 5, 1995, the Commission returned the privileged information to CMP.

Comment

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discussed above, the overall effects of any combination of enhancements can be seen in the reduction of benefits relative to avoided costs. Licensee again cautions the Commission that none of these enhancements is paid for out of an accumulation of available cash or profits, but represents a direct increase in the cost of producing electricity for the public.

The remainder of this response, including the summary table, contains privileged information and has been removed.

Tables 27 through 32 contain privileged information and have been removed.

5. Updated Economic Analysis Summary (Using June 1994 Avoided Costs)

As has been noted, the above analysis was conducted using the avoided costs of June 28, 1991. Licensee used the June 28, 1991 avoided costs in its 1991 applications. However since that time, CMP's avoided costs have dropped significantly. Licensee, therefore, recalculated the economics of the projects using the most recent avoided costs, June 15, 1994, on file with the Maine Public Utilities Commission. Table 33 shows these avoided cost rates.

Tables 34 through 55 duplicate Tables 4 - 7, 9 - 14, and 21 - 32, except that they use the June 15, 1994 avoided costs rates. As can be seen, the lower avoided costs considerably lowers the margin between obtaining power at CMP's production costs and obtaining power at avoided costs. It also lowers the comparative cost of lost generation due to minimum flows. Therefore, the costs of enhancements makes the projects even more marginal economically when compared to updated projected avoided costs.

The table below condenses the results of the analysis under the June 15, 1994 avoided costs. This summary re-emphasizes the small margin of competitiveness that remains once the various enhancements are accounted for.

The remainder of this response, including the summary table, contains privileged information and has been removed.

Tables 33 through 55 contain privileged information and have been removed.

CMP-7

On October 5, 1995, the Commission returned the privileged information to CMP.

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6. Conclusions and Recommendations

Licensee has clearly demonstrated in previous filings, most recently on February 21, 1995, that its minimum flow proposals provide substantive and significant protection and enhancement measures that are not now available to the natural resources associated with the Saco River. The Licensee's revised minimum flow proposal is as follows:

- To provide a minimum flow of 50 cfs in the New River Channel during the period April 1 through September 30;
- To provide a minimum flow from both the Bonny Eagle and Skelton projects of 400 cfs, or inflow if less, during the period May 1 through October 31;
- To provide a minimum flow from both the Bonny Eagle and Skelton projects of 250 cfs, or inflow if less, during the period November 1 through April 30;
- That any further considerations for minimum flow recommendation to support future anadromous fish restoration efforts should be commensurate with the progress of the restoration effort, and consistent with the philosophy of the Saco River Fish Passage Agreement.

Licensee's studies demonstrate that these flows provide significant benefit to both resident and anadromous fisheries. The Saco Fish Passage Agreement also provides substantial benefit to the fisheries resources of the Saco River.

The costs of minimum flows, fish passage (including related studies, etc.), and other enhancements significantly raises the costs of providing electricity to the public, and pushes the limits for these projects to remain economically viable and competitive. With Licensee's revised minimum flow and the DEIS's other recommended enhancements, the levelized net benefit of the six projects will decrease in aggregate by an astounding 47%, ranging from a decrease of 27% at the Skelton Project to 85% at the West Buxton Project. With the DEIS minimum flow recommendation and the other recommended enhancements, the levelized net benefit will decrease by 54% in aggregate, from 33% at the Skelton Project to 98% at the Cataract Project, using June, 1994 avoided costs.

Licensee does not argue that there might be additional environmental benefits to be derived from optimum or near optimum conditions as recommended by agencies, others, or the DEIS. However, all enhancements must be measured in terms of units of

CMP-8

Comment is noted.

Comment

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[illegible] amount expended. For instance, any increment above the minimum flows proposed by the Licensee has been shown to be at considerable expense, while there has been no demonstration of significant increases in benefits to the environment or to the public. Such treatment is clearly unacceptable.

Licensee strongly recommends that the Final EIS recommend the 4,000 cfs, or inflow if less, minimum flow arrangement for the Bonny Eagle and Skelton projects as the most effective enhancement to fishery resources and the least costly option. This flow proposal, in combination with other appropriate enhancements, represents the best balance between non-power and power resources for the Saco River.

Request for Modification of License Expiration Dates

In its 1994 Notice of Proposed Rulemaking (NOPR) on cumulative impacts and license reopeners, the Commission discussed the merits of finding a means by which projects in the same river basin could be made to have licenses which are co-terminus. Licensee supports the concept of simultaneous expiration of the licenses as a means towards reviewing any continuing impacts of project operations on a cumulative basis. Toward this end, Licensee proposes the following license terms for its projects on the Saco River which will result in near simultaneous expiration of its licenses.

Project	Current Expiration	Current Term (yrs)	Proposed Expiration	Change(yrs) (see notes)
Hiram	11/30/2022	40	11/30/2032	+10 to 50
Bonny Eagle	annual	annual	12/31/2037	New @ 42
West Buxton	12/31/2017	30	12/31/2037	+20 to 50
Bar Mills	06/30/2005	50	12/31/2037	New @ 32
Skelton	annual	annual	12/31/2037	New @ 42
Cataract	11/29/2029	40	12/31/2037	+8 to 48

[2]See Licensee filing dated February 21, 1995, for such demonstration regarding Licensee's revised minimum flow proposal.

[3]FERC should carefully review all of the other recommended enhancements to see if they too should be limited or withdrawn.

CMP-9

Because the proposed and recommended enhancement measures for CMP's Saco River Projects would result in significant economic costs, we will recommend that the Commission extend the term and expiration dates for CMP's Saco River Projects to make the licenses coincide. Concurrent license terms would enable the Commission to consider the future relicensing of these projects in a comprehensive proceeding.

Notes: 1) Expect Hiram Project license to be made coincident with others during next round of relicensing.
2) Presumes new licenses for Bonny Eagle and Skelton projects by December 1995.
3) Anticipated new term after Bar Mills Project license expires.

Given the dramatic increase in the costs of producing electricity at these projects due to the Saco River Fish Passage Agreement and the other anticipated enhancement measures, the modifications noted above for the six Saco River project license terms are also necessary in order to allow the Licensee adequate time to recover its investments for the various enhancements.

Response to Comments on the DEIS

U.S. Department of Interior

The Licensee has reviewed the February 21, 1995 comments by the U.S. Department of the Interior (USDOI). The Licensee finds that the USDOI letter contains many misleading and purely argumentative comments, but very few facts that can assist the Commission in its decision making responsibilities. While the Licensee does not wish to engage in a continued argument regarding the USDOI's various opinions as to FERC's use of the data and facts that it has for the EIS, or the need for power, or the benefits of clean renewable hydropower, it is incumbent upon Licensee to respond to at least a few of the issues raised by the USDOI in its letter of February 21, 1995.

Statement of Need

In discussing purpose and need in its comment letter, the USDOI states that the DEIS should discuss the non-developmental needs that are necessary to ensure that comprehensive river basin development is achieved. The USDOI further states that Sections 4(e) and 10(a) of the FPA imply that there should be a variety of project purposes and needs. USDOI's reading of the FPA is misleading. The FPA does not imply that there should be a variety of purposes and needs, including non-developmental purposes and needs, for a hydropower project. Instead, the FPA requires that the Commission give equal consideration to the purposes and needs of other resources in issuing a license. As defined in 40 CFR, Section 1502.13, under NEPA, the statement of need in the EIS shall "briefly specify the underlying purpose and need to which the agency is responding in proposing the alternatives

CMP-10

Comment is noted.

Ms. [illegible] Cashell, Secretary
[illegible] River DEIS FERC DEIS [illegible]
April [illegible]
[illegible]

[illegible] the proposed action", i.e. licensing and operating [illegible] power facility. In other words, the statement of need [illegible] the action which the applicant is proposing, not [illegible] potential needs of the river basin.

Need for Power

The USDOI discusses in its February 21, 1995 letter, its opinion that the Staff should further describe the need for power in the EIS. In its discussion, the USDOI correctly states that as of the date of its letter there was a surplus of power available in the northeastern United States. What the USDOI failed to acknowledge is that this surplus is projected to be short-lived. Projections for the not-too distant future show a regional need for power. This is due to both load growth projections and the anticipated retirement of several generating stations in the region. These projections are documented in Licensee's Long-Range Forecast of Electric Energy and Peak Load 1990-2020, and Energy Resource Plan submitted to the Commission in its 1991 Applications (Exhibits H-II and H-III respectively). Indeed, recent difficulties encountered at the 860 MW Maine Yankee nuclear power plant, of which CMP owns 38%, highlight how quickly even near-term power surpluses can turn into power deficiencies with little or no advance notice.

CMP-11

Comment is noted.

Additionally, the USDOI implies that CMP is renegotiating the power purchase contracts that it has with Non-Utility Generators (NUG's) in part to reduce the surplus of power in the Northeast, and in CMP's service territory. This is simply not correct. CMP is renegotiating power purchase contracts to reduce the cost of electricity that it supplies to its customers. The contractual commitments to NUG power requires CMP to buy the power, and pay up to three to four times the rate of other available power. This high cost of NUG contracts has been the cause of approximately 80% of CMP's rate increases in the past five years. So, while a surplus of power should actually allow the cost of available power to be lowered, CMP's customers have had their rates increased because of the cost of State and Federally mandated NUG contracts. CMP's generating costs at its hydro plants are much more in line with regional competitive generation costs.

In renegotiating power contracts, CMP is trying to reduce the cost of electricity, not the availability of electricity. In fact the mere assumption that the renegotiation of the NUG contracts always results in the loss of a power source is

incorrect. CMP recently bought out a NUG contract and continued to operate the plant when it was able to make the economics favorable. CMP needs to be able to produce low cost electricity from its own generating plants, particularly its clean, efficient, hydroelectric system. It also needs to purchase electricity for its customers from cost competitive sources from both within and outside of its service territory.

Irreversible and Irretrievable Commitment of Resources

Regarding the irreversible and irretrievable commitment of resources, the USDOI states "the single use of a large portion of the Saco River for waterpower development would appear to be contrary to the comprehensive planning mandate in section 10 of the FPA". Again, this is a misleading statement. The Saco River is currently, and will continue to be, a multi-resource, multi-use river. The Saco River has good to excellent resident fish habitat and fisheries. It has good to excellent recreation opportunities and use. It has among the best opportunities and use for riverine canoe touring in the State. It has an anadromous fishery that both CMP and the USDOI are working to restore under the auspices of the Saco River Fish Passage Agreement. These and many other multiple uses occur under existing environmental conditions, with the current project licenses and operation. The Staff has given all of the resources equal consideration in the DEIS. Both Licensee and the Staff have made proposals and recommendations respectively, to further enhance the environmental resources of the Saco River. USDOI's implication that the Saco River is a single use river, and that the DEIS did not give equal consideration to other resources or comprehensive planning is absurd.

CMP-12

Comment is noted.

Instream Flows for Bonny Eagle and Skelton Projects, and Consistency with the Cataract Project and Comprehensive Plans

The USDOI contention that neither the Licensee's proposal nor the DEIS minimum flow recommendation is consistent with the license conditions or the environmental assessment (EA) for the Cataract Project is incorrect. The USDOI needs to review the EA carefully and put its comments into proper context with the relicensing process for the Cataract Project, the actual findings of the EA, and the results of flow studies conducted for the Bonny Eagle and Skelton projects.

The USDOI states that the Cataract Project license contains a minimum flow requirement of 851 cfs, and that any minimum flow

CMP-13

Comment is noted.

requirement for less than that at Skelton and Bonny Eagle is clearly arbitrary. Neither of these statements is true. The Cataract Project license contains a minimum flow requirement of 851 cfs, or inflow, whichever is less [emphasis added]. In recommending and then requiring a minimum flow of 851 cfs or inflow, both the U.S. Fish and Wildlife Service (USFWS) and the Commission respectively, clearly acknowledged that 851 cfs is not an absolute minimum below which flow is not expected to drop. They both understood that neither unregulated nor regulated low flows were consistently above 851 cfs.

The 851 cfs, or inflow, whichever is less, minimum flow is based upon a USFWS regional policy called the Aquatic Base Flow policy (ABF). This policy utilizes a non-site specific formula, which equates to approximately 0.5 cfsm, from which to recommend flows. In developing the policy, the USFWS reasoned that the 0.5 cfsm represented the regional August median flow. In the EA for the Cataract Project, the Commission, despite Licensee's objections, simply adopted the USFWS ABF flow recommendation, stating that the flow should help protect or enhance the resources.

The flow proposals that have been made by Licensee for the Bonny Eagle and Skelton projects are not based on policy, but are based on site specific biological studies and evaluations of actual conditions along the Saco River and at the project sites. The USFWS participated in the scoping of these studies.

The USDOI representation that 851 cfs was designed specifically to protect the Saco River estuary is not correct[4]. If anything, the Maine Department of Environmental Protection Section 401 Water Quality Certification more closely portrays the flows that are useful in protecting the general resources of the estuarine portion of the river. The 401 WQC contains a minimum flow requirement of 250 cfs. This was required specifically based on water quality criteria for diluting municipal treatment plant discharges in the estuary, and for the enhancement of fish and wildlife habitat.

[4]Further, Licensee believes that the USEPA in its March 7, 1995 comments has misrepresented or misunderstood the context under which the minimum flows for the Cataract Project, and the West Buxton Project, were established. Licensee's discussion of the USDOI comments address this.

U.S. Environmental Protection Agency

The USEPA's comments of March 7, 1995 on the DEIS were not only late, but were not served on the Licensee. Licensee's comments on the March 7, 1995 letter are as follows:

General

The USEPA in the introductory section of its March 7, 1995 letter states that "only the alternative proposed by the Department of the Interior (DOI) establishes seasonal run-of-river operations, seasonal minimum flow requirements, and maximum drawdown levels at the Bonny Eagle and Skelton projects." This is incorrect and misleading. While only the DOI has recommended run-of-river operations, both the DEIS alternative and the Licensee's proposal address seasonal minimum flow requirements and maximum drawdown levels.

Additionally, the March 7, 1995 letter states that the DOI alternative gives equal consideration to, and appropriately balances the various resources, and goes on to recommend the DOI scenario as the preferred alternative. What the USEPA fails to evaluate and comment on is that the DOI alternative does not give equal consideration to power resources, but that the Licensee's proposal does give equal consideration to all resources, and provides a well reasoned and appropriate balance among the resources.

CMP-14
Comment is noted.

Water Quality

Licensee objects to the USEPA's attempts to recommend conditions regarding compliance with Maine's water quality standards. The Maine Department of Environmental Protection, under its authority to issue the Water Quality Certifications, will review both the Bonny Eagle and Skelton projects to ensure that the discharges are in compliance with Maine's water quality standards (which have previously been approved by USEPA as meeting Federal requirements). The USEPA, under Section 401 of the Clean Water Act, does not have the authority to determine what conditions will meet State water quality standards. Its authority is to ensure that the State water quality standards meet minimum Federal requirements.

The USEPA comments that the peaking operations under the DEIS alternative may continue to adversely impact the benthic communities immediately downstream of the Bonny Eagle and Skelton projects. USEPA ignores the fact that the studies conducted by Licensee show that the flows proposed by Licensee

CMP-15
Comment is noted.

will reduce the effects of fluctuating flows, enhance the benthic community, and should allow the river reaches to meet Maine's water quality standards. USEPA provides no independent, objective evidence to show that 1) Licensee's proposal, or the DEIS flow recommendation,, will not protect the benthic community, or 2) that the DOI alternative will.

Wetlands and Wetland Mitigation

The Licensee is concerned that the USEPA does not understand the operation of the projects or the existing environmental conditions along the river, and is making generic comments. By example, in its March 7, 1995 letter, the USEPA states that a run-of-river operation at the Bonny Eagle Project would improve nesting habitat for waterfowl and also reduce its destructive scouring effects on downstream aquatic beds. These statements are simply not based on facts; the Bonny Eagle impoundment has good to excellent waterfowl usage as reported in the on-site studies, and the existing project has no scouring effect on existing or potential aquatic beds. Again, USEPA has offered no evidence to the contrary.

CMP-16

Comment is noted.

Licensee objects to the USEPA's conclusion that the DEIS contains insufficient information. Licensee has submitted an abundance of studies regarding the resource issues upon which USEPA comments. USEPA has not demonstrated in any way how these studies are insufficient in addressing resources. Finally, it is more than a little late to be commenting that there is insufficient information on which to evaluate the projects. The USEPA has had ample opportunity over the last **six years** in which to request resource information, or to review the volumes of information which Licensee has submitted to EPA.

Summary

In summary, Licensee has provided in this submittal 1) extensive economic information and analysis that can help the Commission in its evaluation of the Saco River projects, and 2) substantive comments on the USFWS and USEPA submittals regarding the Saco River Draft Environmental Impact Statement.

Licensee's revised minimum flow proposal of 250 cfs, or inflow if less, in the winter, and 400 cfs, or inflow if less, in the summer, from both the Bonny Eagle Project and the Skelton Project will provide significant increases in protection and enhancement of the areas' resources. In combination with the Saco River Fish Passage Agreement and the various other resource enhancements that the Licensee has either proposed or agreed to, these proposals provide

CMP-17

Comment is noted.

Ms. Lois D. Cashell, Secretary
Comments on Saco River DEIS (FERC/DEIS 0077)
April 28, 1995
Page 2

the best balance between power and non-power resources.

Finally, given FERC's desire to make license terms for projects in the same river basin co-terminus, and CMP's needs to adequately recover the significant investments for the various resource enhancements, FERC should adjust the license terms for Licensee's six projects on the Saco River as specified herein.

If you have any questions about the projects, or these comments, please contact Frank H. Dunlap at (207) 621-4469.

Sincerely,

F. Allen Wiley

F. Allen Wiley, P.E.
Director, Hydro Operations

FAW/FHD

cc: Robert Bell, FERC
Rich McGuire, FERC
Dennis Tarney, FERC
Jack Duckworth, FERC
Robert Grieve, FERC
Edward Crouse, FERC
Kristina Nygaard, FERC
Service List, without attachments

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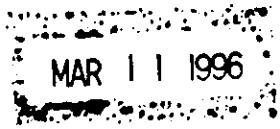
Appendix D

Section 10(j) Meeting Summary

Document Accession #: 19961003-0372 Filed Date: 08/31/1996

Project Nos. 2529-005 & 2527-002-Maine
Bonny Eagle and Skelton Projects
Central Maine Power Co.



To the Parties Addressed:

Transmitted for your information is a copy of the February 28, 1996, Meeting Summary concerning 10(j) inconsistencies for the above mentioned projects.

Sincerely,

John H. Clements,
Director, Division of
Project Review

Enclosures:
Meeting Summary
List of Addresses

Document Accession #: 19961003-0372 Filed Date: 08/31/1996

SUMMARY OF THE 10(J) MEETING FOR THE BONNY EAGLE AND SKELTON PROJECTS (FERC Nos. 2529 & 2527) HELD ON FEBRUARY 28, 1996, AT THE FEDERAL ENERGY REGULATORY COMMISSION, DIVISION OF PROJECT REVIEW 888 FIRST ST. NE WASHINGTON, DC 20245

On February 28, 1996, the Federal Energy Regulatory Commission's (Commission) staff held a teleconference meeting with representatives from U.S. Fish and Wildlife Service (FWS), Central Maine Power Company (CMP), the Maine Department of Environmental Protection (MDEP), and American Rivers. The meeting was held in attempt to resolve inconsistencies between fish and wildlife recommendations and requirements of the Federal Power Act (FPA), pursuant to Section 10(j) of the FPA.

A list of participants is appended to this summary. The 10(j) issues discussed were previously described in the staff's Draft Environmental Impact Statement for the Saco River Projects, issued December 1, 1994.

Section 10(j) issues:

Issues for discussion, based on the inconsistencies between staff's recommended enhancement measures in the Draft Saco River Environmental Impact Statement and the U.S. Fish and Wildlife Service's 10(j) recommendations, included:

- project operation and minimum flows;
- impoundment drawdowns;
- dissolved oxygen and macroinvertebrate monitoring; and
- fish population studies.

The resource agencies and CMP summarized the status of their on-going settlement negotiations regarding minimum flows at CMP's Saco River Projects, which includes the Bonny Eagle and Skelton Projects. These negotiations began in the late Spring of 1995 and continued until November 1995, when the parties agreed to evaluate what they have termed a "straw man" proposal. The straw man proposal includes the following flow scenarios:

At Hiram: 300 to 400 cfs or inflow with a retention of the current headpond fluctuations from 1 to 2 feet;
At Bonny Eagle: 250 cubic feet per second (cfs) or inflow;
At West Buxton: inflow from Bonny Eagle;
At Bar Mills: inflow from West Buxton;
At Skelton: reregulation of flows;
At Cataract: unchanged from existing conditions; and
At New River Channel: 50 to 100 cfs would be released during the summer.

Natural high water flows have prevented a field analysis of the straw man flow proposal. There is optimism among the group that flows may be low enough by late spring or early summer of this year (1996) to field test the straw man flow proposal. The negotiating parties anticipate a successful minimum flow agreement this year.

Based on computer simulations, the MDEP said that the straw man flows are not likely to meet the state water quality standards below West Buxton and Skelton. They found that flows between 550 and 600 cfs may be needed at Bonny Eagle to meet state water quality standards; however, with field verifications of the straw man flows, the MDEP may find that flows in the range of 400 to 450 cfs acceptable. The MDEP anticipates issuing the 401 water quality certificates (WQC) for the Bonny Eagle and Skelton Projects by December 1996.

There was general agreement among the participants that it was pointless to debate the above mentioned 10(j) issues since the FWS's recommendations would definitely change once an agreement is reached. The FWS said that they no longer considered dissolved oxygen and macroinvertebrate monitoring 10(j) issues, since the WQCs would address these conditions. The FWS also said that they are no longer concerned whether fish monitoring occurs at Bonny Eagle since their fish monitoring concerns are superseded by the Saco River Fish Passage Agreement. The Saco River Fish Passage Agreement would provide all the information the FWS needs to ensure that the fishery resources are adequately protected.

The staff emphasized the need to proceed with the issuance of the Saco River Final Environmental Impact Statement, realizing that the settlement negotiations are still underway and that MDEP has not issued WQCs. The parties generally agreed that issuing the Final Environmental Impact Statement prior to the WQCs would not disrupt the minimum flow settlement negotiations. The staff would address requirements of the WQCs and any minimum flow agreement in the Bonny Eagle and Skelton license orders issued by the Commission.

Attendees at the 10(j) meeting for the Bonny Eagle and Skelton Hydroelectric Projects (FERC Nos. 2529 & 2527)
February 28, 1996

Name	Organization	Phone Number
Eddie Crouse	FERC-DPR	(202) 219-2794
Ray Feller	FERC-DPR	(202) 219-2796
John Novak	FERC-DPR	(202) 219-2828
Dennis Tarnay	FERC-DPR	(202) 219-2819
Lee Emery	FERC-DPR	(202) 219-2779
Rich McGuire	FERC-DPR	(202) 219-3084
Gordon Russell	FWS	(207) 827-5938
Brent McCarthy	MDEP	(207) 287-3901
Margaret Bowman	American Rivers	(202) 547-6900
Frank Dunlap	CMP	(207) 621-4469
Sarah Verville	CMP	(207) 623-3521
Bob Richter	CMP	(207) 626-9600

Document Accession #: 19961003-0372 Filed Date: 08/31/1996

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