Federal Energy Regulatory Commission

Office of Energy Projects

November 2001

FERC/FEIS – 0135F

U[illegible] River Projects

E.J.West Project (FERC Project No. 2318-002)
Stewarts Bridge Project (FERC Project No. 2047-004)
Hudson River Project (FERC Project No. 2482-014)
Feeder Dam Project (FERC Project No. 2554-003)

888 First Street N.E., Washington, DC 20426

Document Accession #: 20020102-0123 Filed Date: 11/01/2001

TO THE PARTY ADDRESSED:

Attached is the Final Environmental Impact Statement (FEIS) for the E.J. West Hydroelectric Project (No. 2318-002), Stewarts Bridge Hydroelectric Project (No. 2047-004), Hudson River Hydroelectric Project (No. 2482-014), and the Feeder Dam Hydroelectric Project (No. 2554-003), located on the Sacandaga and Hudson rivers in Saratoga, Warren, Fulton, and Hamilton counties, New York.

The FEIS documents the views of the Federal Energy Regulatory Commission (Commission) staff regarding the four hydroelectric projects. Before the Commission makes a decision on these projects, it will take into account all concerns relevant to the public interest. The FEIS will be part of the record from which the Commission will make its decision. The FEIS was sent to the Environmental Protection Agency and made available to the public on or before November 23, 2001.

Copies of the FEIS are available for review in the Commission's Public Reference Branch, Room 2A, located at 888 First Street, NE, Washington, DC 20426. The FEIS may also be viewed on the Internet at http://www.ferc.fed.us/online/rims.htm. Please call 208-2222 for assistance.

Attachment: Final Environmental Impact Statement

FINAL MULTIPLE PROJECT ENVIRONMENTAL IMPACT STATEMENT FOR HYDROPOWER LICENSES

UPPER HUDSON RIVER PROJECTS

E.J. West Hydroelectric Project
Project No. 2318-002–New York

Stewarts Bridge Hydroelectric Project
Project No. 2047-004–New York

Hudson River Hydroelectric Project
Project No. 2482-014–New York

Feeder Dam Hydroelectric Project
Project No. 2554-003–New York

Applicants:

Erie Boulevard Hydropower, L.P.
225 Greenfield Parkway, Suite 201
Liverpool, NY 13088

Hudson River-Black River Regulating District
350 Northern Boulevard
Albany, NY 12204

Federal Energy Regulatory Commission
Office of Energy Projects
Division of Environmental and Engineering Review
888 First Street, N.E.
Washington, D.C. 20426

November 2001

COVER PHOTOGRAPHS

Top Photo: E.J. West Project on 6-30-00 (by Lee Emery, FERC).

Bottom Left Photo: Sacandaga River 1 ½ miles below the Stewarts Bridge Project on 6-29-00 during non-generating flows of around 45 to 50 cfs. Note large boulder in center right of photo. (by Dan Davis, Louis Berger & Assoc., Inc.).

Bottom Center Photo: Kayakers on the Sacandaga River 1/4 mile below the Stewarts Bridge Project on 6-30-00 (by Dan Davis, Louis Berger & Assoc., Inc.).

Bottom Right Photo: Sacandaga River 1 ½ miles below the Stewarts Bridge Project on 6-30-00 during generation at the Stewarts Bridge Project. Note top of large boulder in center right of photo (by Dan Davis, Louis Berger & Assoc., Inc.).

COVER SHEET

a. Title: Relicensing the E.J. West Hydroelectric Project (FERC No. 2318-002), Stewarts Bridge Hydroelectric Project (FERC No. 2047-004), Hudson River Hydroelectric Project (FERC No. 2482-014), and Feeder Dam Hydroelectric Project (FERC No. 2554-003)

b. Subject: Final Multiple Project Environmental Impact Statement

c. Lead Agency: Federal Energy Regulatory Commission

d. Abstract: Erie Boulevard Hydropower L.P.'s (Erie's) predecessor company, Niagara Mohawk Power Corporation (NMPC), filed applications for new licenses for the existing E.J. West, Stewarts Bridge, Hudson River, and Feeder Dam hydroelectric projects, located on the Sacandaga and Hudson rivers in northern New York.[1] On April 12, 2000, Erie filed an amendment to its license application to add the Hudson River-Black River Regulating District (District) as a co-applicant with Erie for the E.J. West Project. However, on August 27, 2001, the District filed a request to withdraw its application as co-applicant for a license for the E.J. West Project.

Flow in the river segments on which these four projects are located is generally governed by state mandated functions of flood control and low flow augmentation. The District accomplishes these objectives by manipulating the water level of Great Sacandaga Lake (GSL) and controlling daily releases from Conklingville Dam through the E.J. West powerhouse. Erie schedules the timing of the daily releases to maximize generation during periods of peak energy demand. Releases usually occur during the day, and there are currently no base flow release requirements during periods of non-generation at any of the four subject projects. Operation of the Feeder Dam Project has historically served to stabilize the resultant pulsed flows from GSL to the Hudson River Project tailwaters, creating relative constant river flow downstream of the Feeder Dam tailrace.

[1] On July 26, 1999, the Commission issued an order approving the transfer of these projects along with others from NMPC or, in the case of the Feeder Dam Project, NMPC, and Finch, Pruyn & Company, Inc., to Erie, 88 FERC ¶62,082.

This complex operating scheme results in benefits but also affects aquatic and riparian habitat, recreational opportunities, and cultural resources from GSL to the Feeder Dam Project. The major issues pertaining to these four projects were resolved to the satisfaction of the applicants, resource agencies, and non-governmental organization stakeholders, in the Settlement Offer filed with the Commission on April 12, 2000. The terms of this Settlement Offer represent the applicants' proposed actions for the four projects.

The staff's recommendation is to relicense the proposed actions, with additional staff-recommended measures including developing an erosion and sedimentation control plan for GSL, developing a cultural resources management plan for GSL and Conklingville Dam, conducting surveys for Karner blue butterflies and blue lupine at proposed construction sites at the Hudson River and Feeder Dam projects, and conducting a flow evaluation after the first 5 years of operation under a new licensed flow regime to ensure that re-regulated flows downstream of the Feeder Dam Project are protective of aquatic habitat and not adversely affecting downstream hydropower generation.

e. Contact:

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f. Transmittal:

This Final Multiple Project Environmental Impact Statement prepared by the Commission's staff on the hydroelectric license applications filed by Erie's predecessor company, for the existing E.J. West Hydroelectric Project (FERC No. 2318-002); Stewarts Bridge Hydroelectric Project (FERC No. 2047-004); Hudson River Hydroelectric Project (FERC No. 2482-014); and Feeder Dam Hydroelectric Project (FERC No. 2554-003) is being made available to the public on or about Nov. 23, 2001, as required by the National

Environmental Policy Act of 1969[2] and the Commission's Regulations Implementing the National Environmental Policy Act (18 CFR Part 380).

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

FOREWORD

The Federal Energy Regulatory Commission (Commission), pursuant to the Federal Power Act (FPA)[3] and the U.S. Department of Energy Organization Act[4] 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:

> That 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)...[5]

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.[6] Compliance with such conditions during the licensing period is required. The Commission's Rules of Practice and Procedure allow any person objecting to a licensee's compliance or noncompliance with such conditions to file a complaint noting the basis for such objection for the Commission's consideration.[7]

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[3] 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).

[4] Public Law 95-91, 91 Stat. 556 (1977).

[5] 16 U.S.C. §803(a).

[6] 16 U.S.C. §803(g).

[7] 18 C.F.R. §385.206 (1987).

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS AND ABBREVIATIONS

ac-ft	acre feet
ADA	Americans with Disabilities Act
ADK	Adirondack Mountain Club
AHDC	Adirondack Hydro Development Corporation
AIR	Additional Information Request
APA	New York State Adirondack Park Agency
APE	Area of Potential Effect
AWA	American Whitewater Affiliation (also known as American Whitewater)
BOD	biological oxygen demand
Bureau	U.S. Department of the Interior, Bureau of Indian Affairs
cfs	cubic feet per second
CRMP	Cultural Resources Management Plan
Commission	Federal Energy Regulatory Commission
CWA	Clean Water Act
District	Hudson River-Black River Regulating District
DO	dissolved oxygen
EPA	U.S. Environmental Protection Agency
Erie	Erie Boulevard Hydropower L.P. (Orion Power New York)
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FPA	Federal Power Act
FPC	Finch, Pruyn & Company, Inc.
fps	feet per second
ft	feet
FWS	U.S. Fish and Wildlife Service
GSL	Great Sacandaga Lake
IFIM	instream flow incremental methodology
Interior	U.S. Department of the Interior
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
mi^2	square miles
MGD	million gallons per day
mg/l	milligrams per liter
ml	milliliter
μmhos	micromhos

MPEIS	multiple project Environmental Impact Statement
MW	megawatt
MWh	megawatt-hours
NEPA	National Environmental Policy Act
NERC	North American Electric Reliability Council
NGO	non-governmental organization
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NMPC	Niagara Mohawk Power Corporation
NRHP	National Register of Historic Places
NYCRR	New York Codes, Rules and Regulations
NYISO	New York Independent System Operator
NYRU	New York Rivers United
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYSOPRHP	New York State Office of Parks, Recreation, and Historic Preservation
O&M	operation and maintenance
PA	programmatic agreement
PMF	Probable Maximum Flood
RBC	River Basin Council
REA	ready for environmental assessment
RM	river mile
ROR	run-of-river
rpm	revolutions per minute
SD1	Scoping Document 1
Settlement	Settlement Offer dated March 27, 2000
SHPO	State Historic Preservation Officer
USGS	United States Geological Survey
WQC	Water Quality Certification

EXECUTIVE SUMMARY

On December 13, 1991, Erie Boulevard Hydropower L.P.'s (Erie's) predecessor company, Niagara Mohawk Power Corporation[1] (NMPC), filed an application with the Federal Energy Regulatory Commission (FERC or Commission) for a major new license for the 20 megawatt (MW) E.J. West Project (FERC No. 2318). The project is located on the Sacandaga River in Saratoga, Fulton, and Hamilton counties, New York and withdraws water from Great Sacandaga Lake (GSL). The license for the project expired on December 31, 1993. Erie does not propose any new capacity at the E.J. West Project. On April 12, 2000, Erie amended its license application to include the Hudson River-Black River Regulating District (District) as a co-applicant. On August 27, 2001, the District filed a request to withdraw its application as co-applicant for a license for the E.J. West Project.

On June 23, 1998, Erie's predecessor company, NMPC, filed an application for a major new license for the 30 MW Stewarts Bridge Project (FERC No. 2047). The Stewarts Bridge Project is located on the Sacandaga River in Saratoga County, New York. The license for the project expired on June 30, 2000. No new capacity is proposed at this project.

On December 19, 1991, Erie's predecessor company, NMPC, filed an application for a major new license for the 73.2 MW Hudson River Project (FERC No. 2482). The Hudson River Project consists of two developments, the Spier Falls development (44.4 MW) and the Sherman Island development (28.8 MW), located on the Hudson River in Warren and Saratoga counties, New York. The license for the project expired on December 31, 1993. Erie proposes to upgrade Unit 8 at Spier Falls and Units 2, 3, and 5 at Sherman Island to increase the total capacity of the Hudson River Project to 79.62 MW.

On December 20, 1991, Erie's predecessor company, NMPC, filed an application for a major new license for the 6 MW Feeder Dam Project (FERC No. 2554). The Feeder

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[1] On July 26, 1999, the Commission issued an order approving the transfer of these projects along with others from NMPC, or, in the case of the Feeder Dam Project, which was co-owned by NMPC, and Finch, Pruyn & Company, Inc., to Erie (88 FERC ¶62,082). In the text of this Multiple Project Environmental Impact Statement (MPEIS), we use "NMPC" if the reference pertains to past events up to the license transfer, and "Erie" if the reference pertains to events after the license transfer (i.e., current and future operations).

Dam Project is located on the Hudson River in Warren and Saratoga counties, New York. The license for the project expired on December 31, 1993. No new capacity is proposed at this project.

During the pending proceedings for the E.J. West, Hudson River, and Feeder Dam projects, the New York State Department of Environmental Conservation (NYSDEC) denied, without prejudice, NMPC's applications for water quality certification (WQC), pursuant to Section 401 of the Clean Water Act. NMPC appealed NYSDEC's denials through the state administrative hearing process beginning in 1992. This appeal led to settlement discussions to resolve issues that would enable NYSDEC to issue WQCs for the Upper Hudson River projects.

The settlement discussions that occurred between August 1995 and December 1999 culminated in a final settlement document entitled "Upper Hudson/Sacandaga River Offer of Settlement - March 27, 2000," (Settlement) signed by 30 parties and filed with the Commission on April 12, 2000. The Settlement anticipates that NYSDEC would issue WQCs for all four projects within several months of the Settlement. A WQC was issued on May 25, 2001, for the Stewarts Bridge Project. To date, the WQCs for the remaining three projects have not been issued .

In this MPEIS, we analyze and evaluate the effects associated with the issuance of new licenses for these projects and recommend measures for inclusion in any licenses issued. For any license issued, the Commission must determine that the project adopted would be best adapted to a comprehensive plan for improving or developing the waterway. In addition to the power and development purposes for which licenses are issued, the Commission must give equal consideration to energy conservation, the protection and enhancement of fish and wildlife, aesthetics, cultural resources, and the protection of recreational opportunities. This MPEIS for the Upper Hudson and Sacandaga River projects reflects the staff's consideration of these factors.

Based on our consideration of all developmental and nondevelopmental resource interests related to the projects, we recommend that any licenses issued for the four projects should include the appropriate terms of the Settlement (which are also the licensees' proposals for the projects). In addition, we recommend that the following additional measures also be included in the specific licenses: (1) include site-specific erosion and sediment control measures in the final design of proposed actions that entail ground disturbing actions (all four projects); (2) develop and implement, as appropriate, a shoreline erosion and sedimentation control plan for GSL; (3) continue to stabilize the GSL shoreline where active erosion is evident (E.J. West and District Project); (4) notify FWS, NYSDEC, the District, Saratoga County (Stewarts Bridge only), and the Commission at least 30 days prior to any scheduled maintenance drawdowns in excess of

those required for peaking operation or flashboard replacement (Stewarts Bridge, Hudson River, and Feeder Dam Projects); (5) develop and implement a plan to conduct flow evaluations of discharges from the Feeder Dam Project after 5 years of operating under the conditions of the new license; (6) conduct surveys for Karner blue butterflies or blue lupine (Hudson River and Feeder Dam Projects); (7) develop a cultural resources management plan (CRMP) for the Conklingville Dam and GSL (E.J. West and District Project); and (8) develop a CRMP for the Feeder Dam Project.

We recommend these additional environmental measures to improve water quality, fisheries, terrestrial, recreational, and cultural resources. In addition, the electricity generated from the projects would be beneficial because it would continue to reduce the use of fossil-fuel, electric generating plants; conserve nonrenewable energy resources; and continue to reduce atmospheric pollution.

Section 10(j) of the Federal Power Act (FPA) requires each hydroelectric license issued by the Commission to include conditions based on recommendations of federal and state fish and wildlife resource agencies for the purpose of adequately and equitably protecting, mitigating damages to, and enhancing fish and wildlife (including spawning grounds and habitat) affected by the project. The U.S. Department of the Interior (Interior) filed 45 recommendations for the projects on September 7, 2000. We make a preliminary determination that 18 of Interior's recommendations are outside the scope of Section 10(j) because they are not specific measures for protecting fish and wildlife. However, 10 of these 18 recommendations that are outside the scope of 10(j) have been considered under FPA Section 10(a) and are recommended for adoption by staff. The remaining eight non-10(j) recommendations (two identical recommendations for each project) are not recommended for adoption in any licenses issued for the four projects.

Under Section 18 of the FPA, Interior requested that the Commission reserve authority for Interior to prescribe fishways at the projects. Consistent with the Commission policy, staff recommends including the requested reservation of authority in the licenses.

Based on our independent analysis of the projects, including our consideration of all relevant economic and environmental concerns, we conclude that the proposed actions (which essentially follow the terms and conditions of the Settlement) with additional staff-recommended measures, would be best adapted to a comprehensive plan for the proper use, conservation, and development of the Upper Hudson and Sacandaga rivers.

I. APPLICATIONS

A. E.J. West Project

On December 13, 1991, Erie Boulevard Hydropower L.P.'s (Erie's) predecessor company, Niagara Mohawk Power Corporation (NMPC), filed an application for a new license for its E.J. West Project, FERC No. 2318, with the Federal Energy Regulatory Commission (Commission).[1] The existing project is located on the Sacandaga River about 6 miles upstream of its confluence with the Hudson River in the towns of Hadley, Day, Edinburg, Providence (Saratoga County), Broadalbin, Mayfield, Northampton (Fulton County), and Hope (Hamilton County), New York (figure 1). The project license expired on December 31, 1993.

On April 12, 2000, Erie filed an amended license application to include the Hudson River-Black River Regulating District (District) as a co-applicant for the E.J. West Project.[2] The District currently controls the dam and Great Sacandaga Lake (GSL) for other than hydropower purposes, and neither the dam nor GSL are included in the existing project license for the E.J. West Project. Erie and the District requested in their amendment filing for the E.J. West Project, that the Commission consider issuing a separate license for the powerhouse and generating facilities (which would be the E.J. West Project) and, after designating a new project number, issue a separate license to the District for the dam and impoundment (a nonpower District project). This MPEIS examines the environmental impacts of licensing the entire unit of development (all facilities of both co-applicants) only. By letter filed on August 27, 2001, the District filed an application to withdraw its application as co-applicant for a license for the E.J. West Project. The Commission will address this application to withdraw as a co-applicant in any order issued on the application for license as amended.

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[1] On July 26, 1999, the Commission issued an order approving the transfer of these projects along with others from NMPC, or, in the case of the Feeder Dam Project, NMPC, and Finch, Pruyn & Company, Inc.(FPC), to Erie (88 FERC ¶62,082). In the text of this Multiple Project Environmental Impact Statement (MPEIS), we use "NMPC" if the reference pertains to past events up to the license transfer, and "Erie" if the reference pertains to events after the license transfer (i.e., current and future operations).

[2] A public notice of this amendment of license application was issued on May 2, 2001, with a 60-day commenting period commencing at notice issuance.

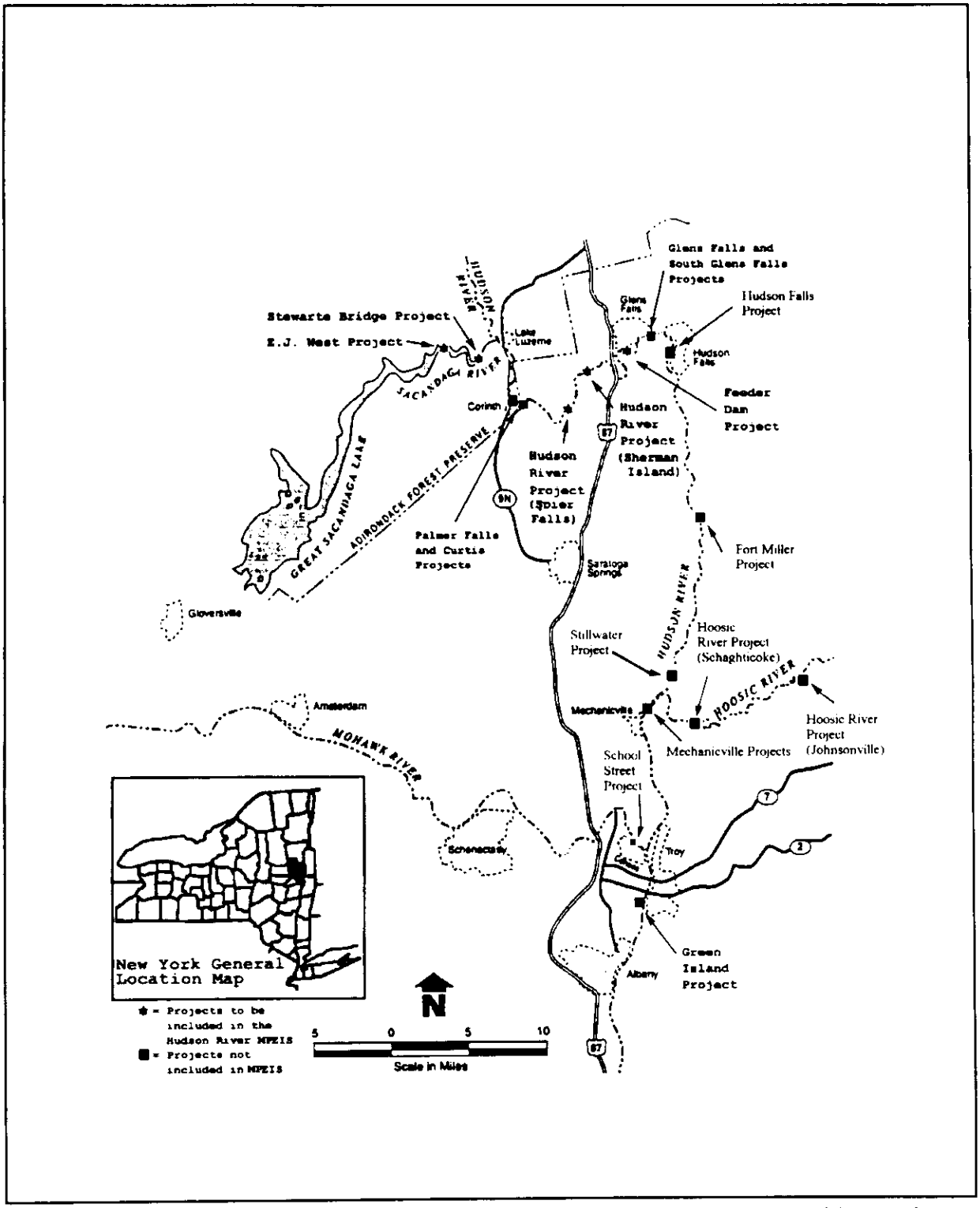

Figure 1. Locations of the E.J. West Project (FERC No. 2318), Stewarts Bridge Project (FERC No. 2047), Hudson River Project (FERC No. 2482), and Feeder Dam Project (FERC No. 2554) (Source: applications as modified by staff).

B. Stewarts Bridge Project

On June 23, 1998, Erie's predecessor company, NMPC, filed an application for a new license for its Stewarts Bridge Project, FERC No. 2047. The project is located on the Sacandaga River, about 3 miles upstream from its confluence with the Hudson River in the town of Hadley, Saratoga County, New York (figure 1). The existing license for the project expired on June 30, 2000.

C. Hudson River Project

On December 19, 1991, Erie's predecessor company, NMPC, filed an application for a new license for its Hudson River Project, FERC No. 2482. The project consists of two developments located at river mile (RM) 209 and 212 on the Hudson River in the towns of Moreau, Corinth (Saratoga County), Lake Luzerne, and Queensbury (Warren County), New York (figure 1). The project license expired on December 31, 1993.

D. Feeder Dam Project

On December 20, 1991, NMPC filed an application for a new license for its Feeder Dam Project, FERC No. 2554. The project is located at RM 203 on the Hudson River in the towns of Moreau (Saratoga County) and Queensbury (Warren County), New York (figure 1). The project license expired on December 31, 1993.

E. The Settlement Agreement

During the pending proceedings on the E.J. West, Hudson River, and Feeder Dam projects, in November 1992, the New York State Department of Environmental Conservation (NYSDEC) denied, without prejudice, NMPC's applications for water quality certification (WQC) for these three projects. NMPC appealed NYSDEC's WQC denials through the state administrative hearing process beginning in 1992. This led to settlement discussions, which began in 1995, to resolve issues that would enable NYSDEC to issue WQCs for each of the Upper Hudson and Sacandaga River projects.[3] The Settlement discussions culminated in a final settlement document entitled "Upper Hudson/Sacandaga River Offer of Settlement–March 27, 2000" (Settlement, 2000

[3] NYSDEC's role in initiating and facilitating the settlement discussions for the Upper Hudson and Sacandaga River projects is detailed in Appendix A of the Settlement.

[referenced as "Settlement" throughout the remainder of this document]), signed by 30 parties and filed with the Commission on April 12, 2000.[4]

The Settlement is a comprehensive and detailed document that proposes a number of specific environmental and operational measures. The Settlement addresses the quantity and method of instream flow releases, the nature and extent of fish passage facilities, the extent of whitewater releases at the Stewarts Bridge Project, and the type and general location of recreational facilities at all four projects. These are the major issues that we identified during the scoping process for these projects. For the purposes of this MPEIS, we consider the proposed measures contained in the Settlement to supersede the proposed measures in the license applications filed for the four Upper Hudson River projects and subsequent filings by the applicant prior to the negotiation of the Settlement. In effect, the Settlement becomes the proposed action for each of the four projects.

The Settlement also includes two provisions that the signatories specifically request not be included in any licenses issued for these projects: (1) recreational facilities detailed in table 1.2-1 of section 1 of the Settlement that are not to be included in the project boundary; and (2) the mechanism for the formation and administration of the River Basin Council (RBC), four Advisory Councils, enhancement funds, and any reassessment of benefit charges by the District as detailed in sections 8.1 through 8.4 of the Settlement. The Settlement anticipates that NYSDEC would issue WQCs consistent with the provisions of the Settlement for all four of the subject projects.

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[4] The parties to the Settlement are the Adirondack Boardsailing Club, Adirondack Council, Adirondack Mountain Club (ADK), Adirondack Park Agency, Adirondack River Outfitter, Inc., American Canoe Association, American Rivers, American Whitewater, Association for the Protection of the Adirondacks, Erie, Feeder Canal Alliance, Fulton County Board of Supervisors, Glens Falls Chapter of the ADK, GSL Association, Great Sacandaga Fisheries Federation, GSL Marinas, District, Hudson River Rafting Co, Inc., International Paper, the National Audubon Society (New York State Chapter), the National Park Service, New York Rivers United (NYRU), New York State Conservation Council, Inc., NYSDEC, Sacandaga Outdoor Center, Saratoga County Board of Supervisors, town of Hadley, Trout Unlimited (New York State Council), the U.S. Fish and Wildlife Service (FWS) and W.I.L.D.W.A.T.E.R.S. While not signatories to the Settlement, the New York Power Authority had no objection to the Settlement provisions (letter from Beverly Ravitch, Principal Attorney, New York Power Authority, New York, NY, to Betty Ann Hughes, NYSDEC, Albany, NY, dated April 10, 2000).

The Settlement contains within its principal agreements conditions for any licenses issued, including appropriate conditions to ensure that the licensee operates and maintains the project works appropriately to achieve compliance with the Settlement. The Settlement includes provisions to adjust the schedule for implementation of environmental measures for which any rehearing or appeal is pending. Another key aspect of the Settlement is that the District would be issued a separate license by the Commission for the project lands and project works which are under its jurisdiction at the E.J. West Project (specified in section 1.8 of the Settlement). An amended license application was filed on April 12, 2000, by Erie and the District requesting that the Commission issue separate licenses in accordance with the Settlement.

II. PURPOSE OF ACTION AND NEED FOR POWER

A. Purpose of Action

The proposed federal action is for the Commission to issue new licenses for the continued operation of the four projects. The purpose of the proposed action is to ensure the provision of electric power service to the public in compliance with FPA requirements. Part I of the FPA provides for the regulation of non-federal hydropower development. A project is licensable as long as it meets public interest standards and other regulatory requirements of the FPA, taking into account its developmental and non-developmental merits.

In deciding whether to issue any license, 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 development purposes for which licenses are issued, the Commission gives equal consideration to the purposes of energy conservation; protection of, mitigation of damage to, and enhancement of fish and wildlife; protection of recreational opportunities; and preservation of other aspects of environmental quality.

This draft MPEIS analyzes and evaluates the environmental effects associated with the continued operation of the four projects owned and operated by Erie and recommends conditions for inclusion in any licenses issued.

B. Scope of MPEIS

The Commission issued a Scoping Document (SD1) and a Public Notice for three scoping meetings in New York on March 31, 1995, for the E.J. West, Hudson River, and Feeder Dam projects. The Public Notice also announced the staff's intent to prepare a MPEIS.

The staff reviewed public and agency comments filed with the Commission and issued a revised SD1. The revised SD1 included the Stewarts Bridge Project.

The staff prepared both SD1s to aid federal, state, and local resource agencies; Indian Tribes, non-governmental organizations (NGOs); and other interested individuals in their understanding of the proposed projects. The staff also prepared the SD1s, as well as held the scoping meetings, to encourage participation in the scoping process, and to solicit comments on the scope of the final MPEIS.

1. Site-specific Effects

The revised SD1 identified issues to be addressed in the MPEIS. These issues include potential effects on: (1) water quality and quantity; (2) aquatic biota; (3) terrestrial resources; (4) aesthetic resources; (5) recreational resources; and (6) cultural resources. We did not include geology and soils because the proposed projects entail only minor ground-disturbing activities, and erosion and sedimentation is addressed in our discussion of water quantity and quality. We did not include land use and socioeconomics because we conclude that the proposed projects would have minimal effects on these resources.

2. Cumulative Effects

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

We evaluate the cumulative effects of the proposed actions and alternatives with regard to other existing and foreseeable development on the Hudson and Sacandaga rivers upstream and downstream from the projects.

Based on information in the license applications, agency comments, other filings on the projects, comments from scoping, and preliminary staff analysis, we identified water quantity and quality, aquatic riverine habitat, and canoe touring as resources or resource issues that may be affected in a cumulative manner by the continued operation of the E.J. West, Stewarts Bridge, Hudson River, and Feeder Dam projects in combination with other activities on the Sacandaga and Hudson rivers. These other activities include the operation of other hydroelectric projects on the river, flow releases from other

projects, and municipal and other wastewater discharges. We used the resource area to determine the geographic and temporal scope of the MPEIS analysis.

a. Geographic Scope

The geographic scope of analysis for cumulatively affected resources is defined by physical limits or boundaries of: (1) the proposed actions' effect on the resources, and (2) contributing effects from other hydropower and non-hydropower activities within the Upper Hudson River Basin. Because the proposed action would affect the resources differently, the geographic scope for each resource may vary.

For water quantity, the scope of analysis encompasses the Sacandaga and Hudson rivers from (and including) GSL to the Troy dam, because flow control measures recommended by the Commission at these projects could influence flood potential and the amount of available water downstream to the head-of-tide at the Troy dam. Re-regulation of river flow would reduce, but not eliminate, the influence of recommendations pertaining to water quantity downstream of the Feeder Dam Project. Because the District's release regime from GSL would change as a result of implementation of the Settlement, we consider the potential economic effects on hydroelectric generation at all projects downstream of Feeder Dam as well as the Curtis/Palmer Falls Hydroelectric Project (FERC Project No. 2609) to the extent allowed by available information.

For water quality, the scope of analysis encompasses the Sacandaga and Hudson rivers from GSL downstream to the vicinity of Newburgh, New York. Potable water may be withdrawn from the Hudson River, at least on an occasional basis (e.g., an auxiliary New York City water supply intake is located in the vicinity of Newburgh), and low flow augmentation from the District's releasing water from GSL through the E.J. West and Stewarts Bridge projects could serve to reduce the encroachment of brackish water into the upper reaches of the tidally influenced Hudson River.

For aquatic riverine habitat, the scope of analysis encompasses the Sacandaga and Hudson rivers from the Stewarts Bridge dam to the Troy dam (there is little riverine habitat between the Conklingville Dam and the Stewarts Bridge impoundment). Peaking flow releases at the Stewarts Bridge and Hudson River projects are interrelated and have a strong influence on the quality of riverine aquatic habitat in free-flowing river reaches that receive releases from these projects. Re-regulation of flows at the Feeder Dam Project should dampen or eliminate this effect downstream of this project. However, the terms of the Settlement may impede some of the historic re-regulation functions of the Feeder Dam, which could influence downstream riverine habitat, such as the 3-mile reach below the Glens Falls dam.

For canoe touring, the scope of analysis encompasses GSL to the Troy dam. The Sacandaga and Hudson rivers serve as a corridor that connects the Adirondack Park to the urbanized area in the Albany and Troy areas. With appropriate access sites and facilities, canoe touring would be facilitated throughout this corridor.

b. Temporal Scope

The temporal scope of our cumulative effects analysis in the MPEIS includes a discussion of past, present, and future actions and their effects on each resource that could be cumulatively affected. Based on the terms of the new licenses, the temporal scope looks 30 to 50 years into the future, concentrating on the effect on the resources from reasonably foreseeable future actions. The historical discussion, by necessity, is limited to the amount of available information for each resource.

C. Need for Power

We assessed the need for power by reviewing the needs of the operating region in which the projects are located. Erie sells energy to NMPC and others to meet their customers' needs throughout upstate New York. Erie currently owns a combined total generating capacity of 617 megawatts (MW) of hydropower facilities.

The four projects (five developments) that are the subject of this MPEIS are estimated to produce approximately 654,200 megawatt-hours (MWh) of electricity per year, with a combined installed capacity of 129.2 MW.[5] Operation of these facilities allows Erie to produce inexpensive and reliable power using renewable resources. This makes the energy available to energy suppliers who must maintain a desirable mixture of energy from various fuel sources.

These facilities are operated to maximize net energy, value of energy produced, recreational potential, and voltage support, while also being used to eliminate or minimize adverse environmental effects, enhance environmental benefits, increase system reliability, and minimize required maintenance. Hydro units are also critical to electrical system restoration following large-scale outages or black-outs because they can be brought on line very quickly.

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[5] In the Settlement (Appendix D) and Erie's August 24, 2000, response to our additional information request, Erie estimated the existing annual generation of the five developments to be as follows: E.J. West and District - 67,000 MWh; Stewarts Bridge - 131,700 MWh; Spier Falls - 240,000 MWh; Sherman Island - 184,400 MWh; and Feeder Dam - 31,100 MWh.

The projects are located in the Adirondack Region of the New York Independent System Operator (NYISO) of the Northeast Power Coordinating Council (NPCC) region of the North American Electric Reliability Council (NERC). NERC annually forecasts electrical supply and demand in the nation and the region for a 10-year period. NERC's most recent report (NERC, 2000) on annual supply and demand projections indicates that, for the period 2000 to 2009, the demand for electric energy in the NPCC region would grow at an average rate of 1.2 percent annually. The projects could displace existing and planned non-renewable fossil-fueled generation. In addition, the hydroelectric generation contributes to the diversification of the generation mix in the NYISO area.

Without these facilities, Erie would not be able to meet its current contracts to provide power and capacity and would be forced to purchase power and capacity on the spot market at prices potentially higher than the cost to produce energy from these facilities. The fuel source for that energy may be fossil-based, contributing to air pollution.

We conclude that present and future use of the power from these projects, their displacement of non-renewable fossil-fired generation, and the contribution to a diversified generation mix support a finding that the power from the projects would help meet a need for power in the NYISO area in the short- and long- term.

III. PROPOSED ACTIONS AND ALTERNATIVES

There are many hydropower facilities in the Hudson River Basin. Table 1 lists the existing hydroelectric facilities along the mainstem of the Hudson (see figure 1) and Sacandaga rivers north of Albany, New York. The Hudson River system drains approximately 8,100 square miles (mi^2) at Albany, New York. The hydropower projects included in the Hudson River MPEIS are located in the northern portion of the drainage basin.

Erie proposes no new capacity at the E.J. West and District, Stewarts Bridge, or Feeder Dam projects; however, they do propose to upgrade Unit 8 at Spier Falls and Units 2, 3, and 5 at Sherman Island. These upgrades would increase the capacity of Spier Falls to 45.42 MW and Sherman Island to 34.20 MW. None of the four projects occupy any lands of the United States. Figure 1 shows the locations of the four projects.

Table 1. Existing hydroelectric projects along the mainstems of the Hudson and Sacandaga rivers (in ascending upstream sequence) (Projects under consideration in this MPEIS are indicated in bold type) (Source: staff)

FERC number	Year constructed	Project name[a]	River	Installed capacity (MW)
13	1923	Green Island	Hudson	6.0
6032	1897	Mechanicville	Hudson	4.5
2934	1882	Mechanicville Upper	Hudson	18.5
4226	1985	Fort Miller	Hudson	4.8
4684	1993	Stillwater Lock and Dam	Hudson	3.5
5276	1996	Hudson Falls	Hudson	44.0
5461	1994	South Glens Falls	Hudson	15.7
2385	1916	Glens Falls	Hudson	12.7
2554	**1924**	**Feeder Dam**	**Hudson**	**6.0**
2482		**Hudson River:**	**Hudson**	
	1923	**- Sherman Island Dvlp.**		**28.8**
	1903	**- Spier Falls Dvlp.**		**44.4**
2609		Curtis/Palmer Falls	Hudson	
	1929	-Palmer Falls Dvlp.		58.3
	1930	-Curtis Dvlp.		10.8
2047	**1952**	**Stewarts Bridge**	**Sacandaga**	**30.0**
2318	**1930**	**E.J. West**	**Sacandaga**	**20.0**
7274	1987	Lake Algonquin	Sacandaga	0.698
4639	1988	Christine Falls	Sacandaga	0.850

[a] In addition to the existing projects, there are two licensed, but currently undeveloped, projects on the Hudson River, downstream of the Hudson Falls Project: the Northumberland Hydroelectric Project, FERC No. 4244 (authorized capacity, 9.7 MW); and the Waterford Hydroelectric Project, FERC No. 10648 (authorized capacity, 10.2 MW).

A. E.J. West and District Project

1. Proposed Action

a. Proposed Facilities

The E.J. West and District Project is located in Saratoga, Fulton, and Hamilton counties on the Sacandaga River approximately 6 miles upstream from its confluence with the Hudson River (figure 2). The Conklingville Dam at the E.J. West and District Project forms GSL. The dam, owned by the District, is 1,100 feet (ft) long and has a maximum height of 100 ft. It forms a 25,950-acre (ac) impoundment (GSL) with a total gross storage of 865,931 acre-feet (ac-ft) at the maximum water surface elevation of 771 ft National Geodetic Vertical Datum (NGVD), a usable storage of 525,700 ac-ft, between 745 and 768 ft NGVD, and has an average annual water surface fluctuation of 23 ft.

Both the dam and GSL are under the control of the District and not included in the current license for the E.J. West Project.[6] Project structures include: (a) an earth fill and concrete dam; (b) an outlet consisting of two spillways; (c) a spillway weir; (d) a concrete canal; (e) a log boom to exclude debris and boaters from entering the canal; (f) an intake structure with 4½-inch clear spaced trashracks located directly in front of the gates; (g) four penstocks; (h) a powerhouse with two vertical Francis turbines (10 MW each, installed nameplate capacity), two generators and appurtenant equipment and controls; and (i) a control house. Items a, b, c, d, e, and i are owned by the District. The remaining items are owned by Erie. There is no bypassed reach.

[6] The Commission's Division of Dam Safety and Inspections is currently considering a proposal to modify the spillway of the Conklingville Dam to improve dam stability and to reduce releases from GSL during extreme flood events.

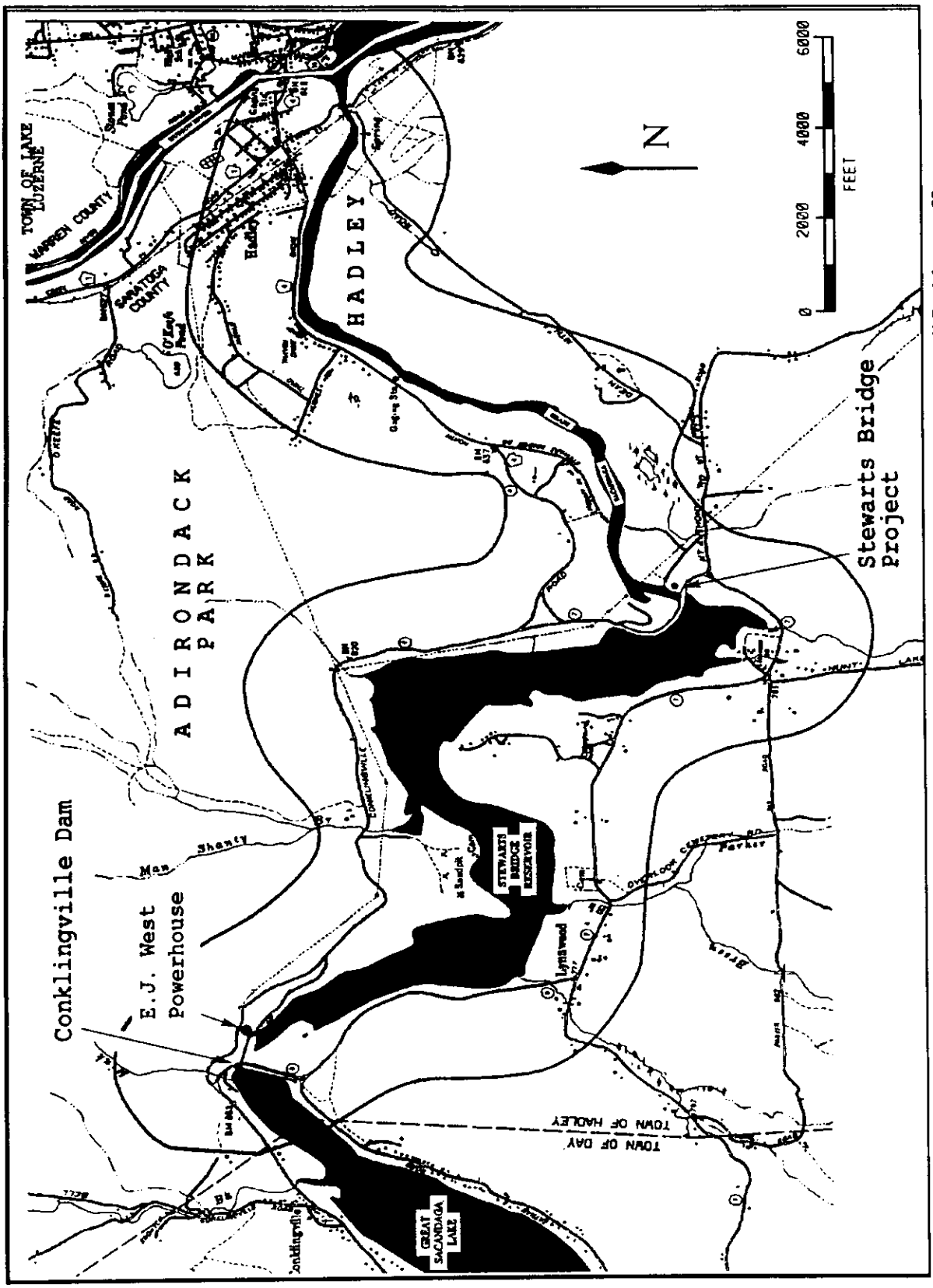

Figure 2. E.J. West and Stewarts Bridge project location (Source: NMPC, 1998, as modified by staff).

b. Proposed Project Operations

The project currently operates in a limited peaking mode, using water stored in GSL at the Conklingville Dam. The E.J. West powerhouse operates in a manner that enables the District's mandate of flood control and low flow augmentation to be retained. The District owns and operates the Conklingville Dam to provide flood protection and seasonal flow augmentation for the lower Hudson River. GSL is drawn down during late winter and outflow restricted for a 3-week period in the spring (typically occurring between mid-March and early May) to allow for collection of water during high flow events. During this period, no water is released to the downstream projects. Water flows are then portioned out throughout the remainder of the year to provide relatively constant flows, flood control, and more stable freshwater availability for downstream communities along the Hudson River, especially during seasonal low-flow conditions. Although not specifically stated by Erie, routine maintenance would most likely occur when GSL is drawn down in later winter.

The District currently determines the amount of water to be released on any given day; Erie determines when that volume of water is released over each 24-hour period (i.e., passing water through the turbines) to generate power. Erie currently has no control over the operation of the dam and impoundment except to determine a 24-hour release pattern. Water discharges directly to the upper end of the Stewarts Bridge impoundment. The project has an installed capacity of 20 MW, an annual average energy production of 67,000 MWh, and a hydraulic capacity of 500 to 3,000 cubic ft per second (cfs). Flows released from the powerhouse range from zero, during the refilling of GSL from March to May, to over 5,400 cfs, on rare occasions, but typically consist of average daily flows of 2,000 to 4,000 cfs. The powerhouse operates with a gross head of 53 ft. There are no transmission lines or facilities included in the existing E.J. West Project as currently licensed.

The District proposes to implement a plan, consistent with the Settlement, for the operation of GSL that is based on maintaining certain minimum and maximum lake elevations, and to follow annual guide curves for lake levels that is intended to meet a number of resource objectives (figures 3, 4, and 5). These objectives include: (1) maintaining the lake at the targeted elevations during the late winter consistent with the usage of storage for flow augmentation; (2) providing flows in the Hudson River to maintain water quality and fish habitat; (3) targeting higher than current lake elevations to enhance fall lake recreation; (4) minimizing energy losses to affected hydropower projects by the aggressive use of storage while maintaining the other objectives; (5) enhancement of whitewater recreation on the Sacandaga River; and (6) providing base flows in the Sacandaga River.

As part of the GSL operation plan, four lake level curves have been developed to express the annual constraints on lake levels in GSL using targeted maximum winter drawdown elevations. Over the term of the license, the maximum drawdown level would decrease by 1 foot increments from elevation 748 ft (beginning at license issuance) to elevation 750 ft NGVD (beginning on June 2, 2020) (table 2). Level curve 1 is considered the bottom of available storage. Erie and the District propose to draw down GSL below this level curve only under rare circumstances detailed in the Settlement.

Level curve 2 represents the top of buffer storage. Buffer storage between level curves 1 and 2 is primarily reserved to augment flows on the Hudson and Sacandaga rivers for water quality, and to provide whitewater flows.

Level curve 3 represents the annual guide curve that the District would follow over the course of any given year, subject to balancing inflow to GSL with other operating constraints. Level curve 3 represents the top of conservation storage. Storage between level curve 2 and 3 is used to augment flows on the Hudson and Sacandaga rivers for water quality and power generation, as well as to provide whitewater flows.

Level curve 4 represents the top of the flood pool and is set at elevation 773 ft throughout the year. Lake level would approach this elevation only in accordance with the District's responsibility to utilize the storage capability of the lake to control flooding on the Hudson River.

Table 2 presents a summary of the water level and flow measures proposed for GSL.

Erie would continue to operate the E.J. West powerhouse as it has in the past (determining when, within each 24-hour period, its daily allocated volume of water is released), but within the constraints of the terms of the Settlement.

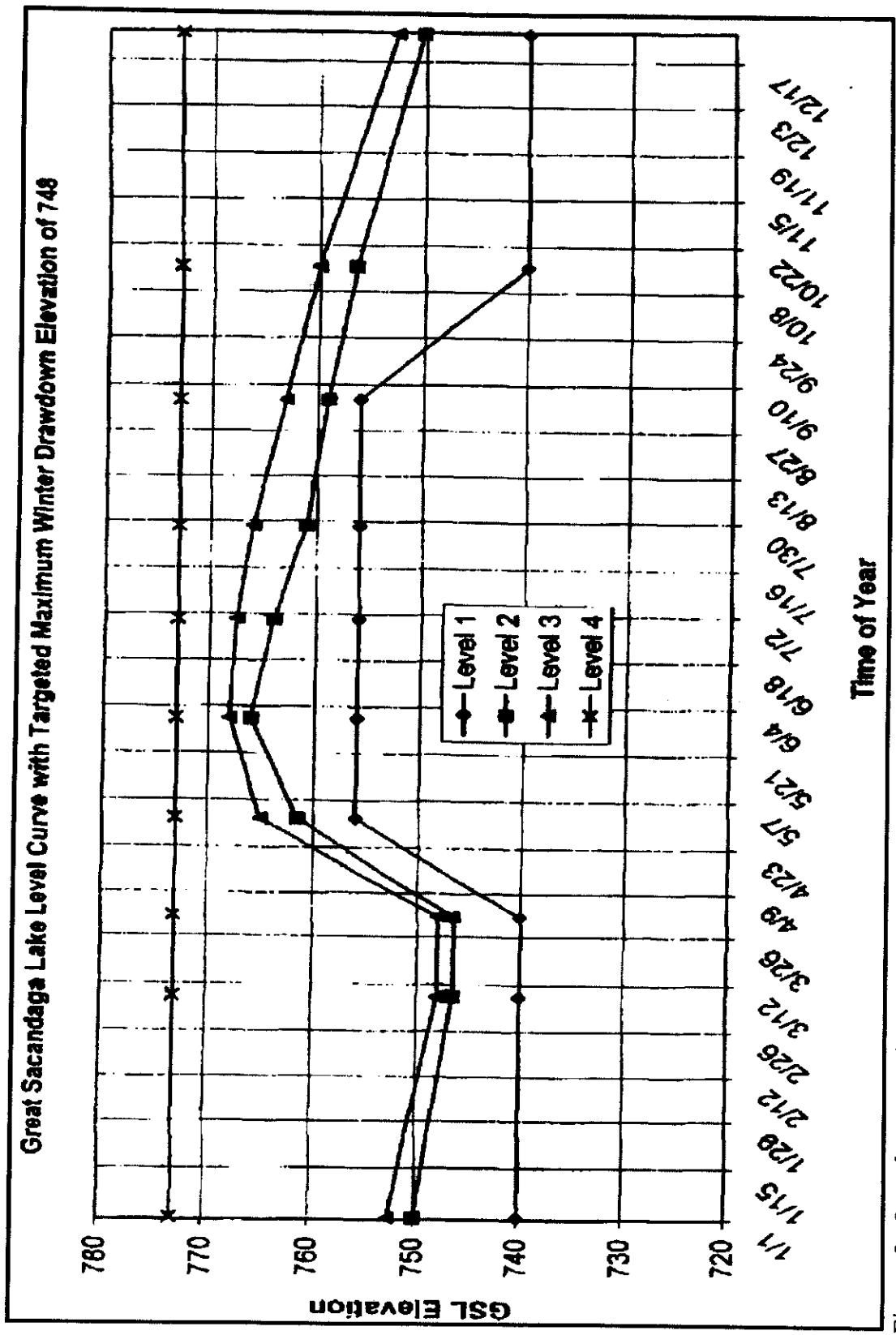

Figure 3. Level curve to be used by the District to operate Great Sacandaga Lake from license issuance through June 1, 2010 (Source: Settlement [2000]).

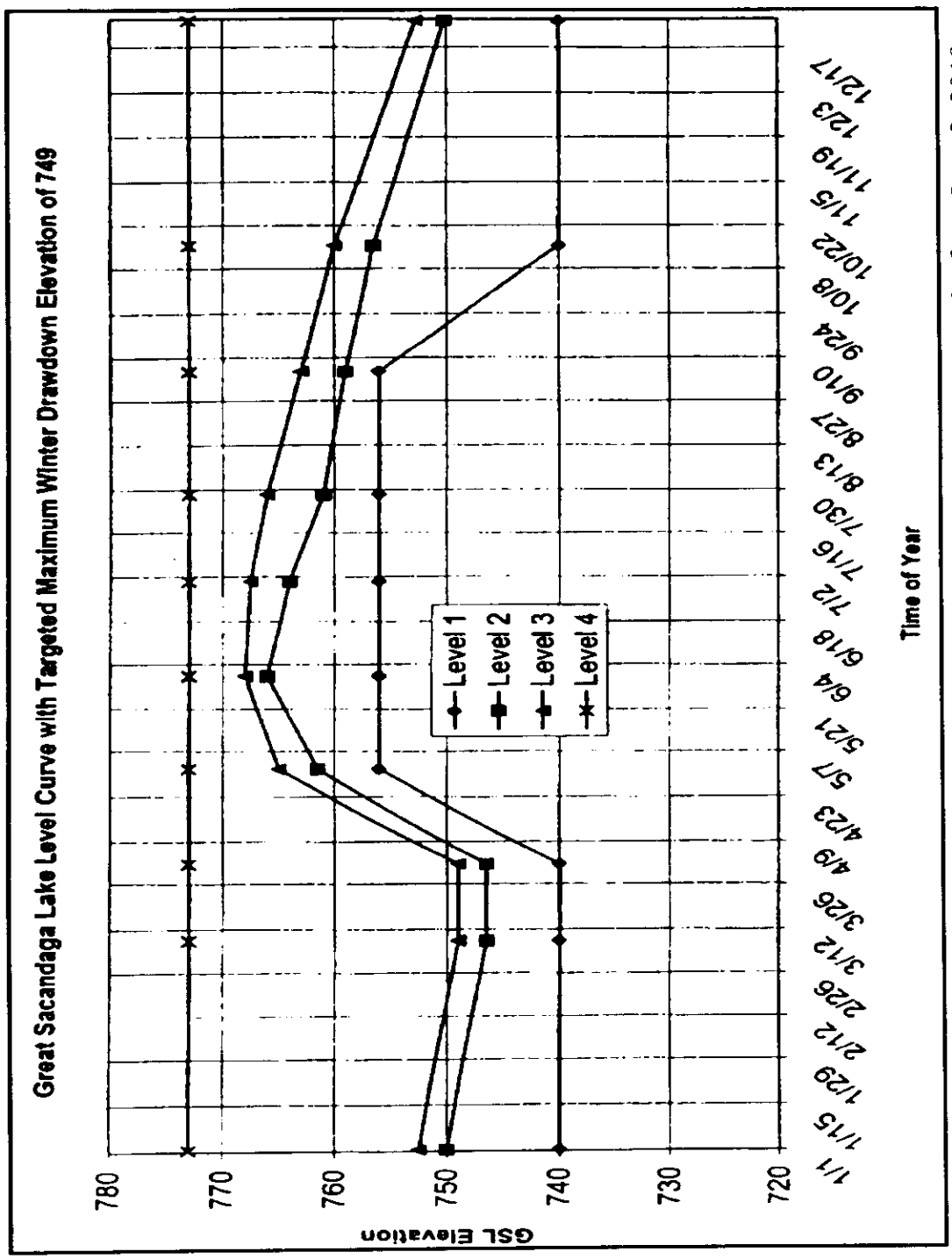

Figure 4. Level curve to be used by the District to operate Great Sacandaga Lake from June 2, 2010 through June 1, 2020 (Source: Settlement [2000]).

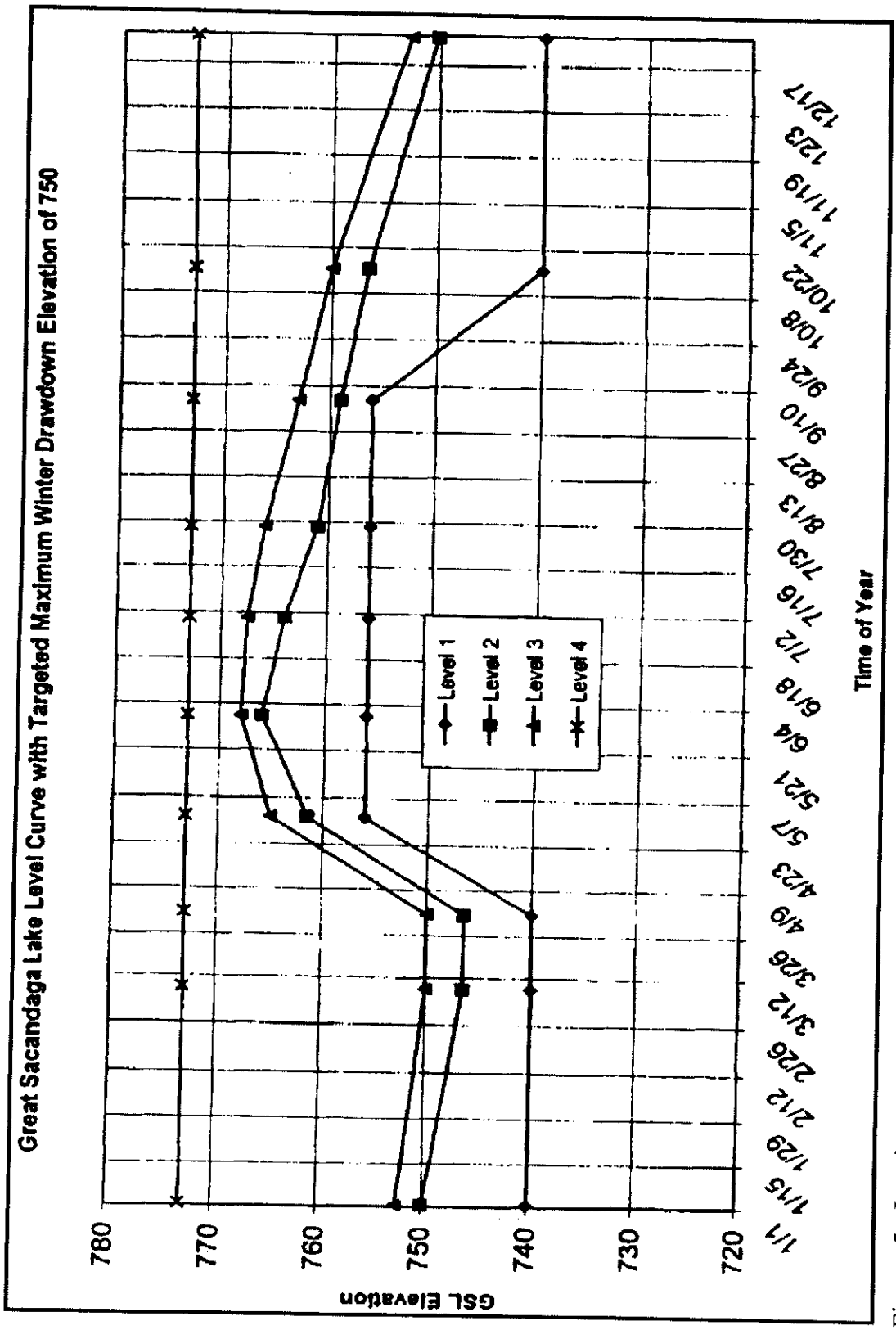

Figure 5. Level curve to be used by the District to operate Great Sacandaga Lake from June 2, 2020 through license expiration (Source: Settlement [2000]).

Table 2. Summary of operational measures for Great Sacandaga Lake (Source: Settlement, 2000, as amended by Erie via letter to the Commission dated July 23, 2001)

Issue	Description of measure	Target flow (cfs)	Implementation schedule
Winter drawdowns (minimum level)	GSL elevation (NGVD)		
	748 ft	-	from license issuance through June 1, 2010
	749 ft	-	from June 2, 2010 through June 1, 2020
	750 ft	-	from June 2, 2020 through license expiration
Operation to target flow augmentation needs on the upper Hudson River just below the confluence with the Sacandaga River (minimum average daily flow)	GSL level curve		from license issuance through June 1, 2013
	1.00-1.19[a]	1,500[d,f]	-
	1.20-1.50[b,c]	1,760	-
	2.50-3.00[c]	2,250	-
	3.50[c]	3,000	-
	4.00[c]	4,000	-
	GSL level curve		from June 2, 2013, through license expiration
	1.00-1.19[a]	1,500[d]	-
	1.20-2.50[c]	1,760	-
	3.00[c]	2,000	-
	3.50[c]	3,000	-
	4.00[c]	4,000	-
Targeted maximum flow in the Hudson River below the confluence with the Sacandaga River for aggressive storage use	GSL elevation[e]		from license issuance
	735.00-755.00 ft	6,000	-
	755.01-769.00 ft	8,000	-
	769.99 ft	10,000	-
	770.00 ft	20,000	-
	773.00 ft	26,000	-
	776.0 ft and above	32,000	-
	GSL level curve[a]		from license issuance
	1.00-1.19	4,000	-
	1.20	6,200	-

Issue	Description of measure	Target flow (cfs)	Implementation schedule
Targeted maximum flows below E.J. West for aggressive storage use[g]	1.50	6,500	-
	2.50-3.00	7,500	-
	3.50	8,500	-
	4.00	28,500	-
	GSL elevation[e]		from license issuance
	735.00-745.00	2,000	-
	745.01-765.00	4,000	-
	768.00	5,400	-
	771.00	8,000	-
	772.00	10,000	-
	774.00	14,000	-
	777.00	25,800	-

[a] The applicable target flow is determined by interpolation between the level curves shown on figures 3, 4, and 5. For example, on all 3 figures, on January 1, the level 1 curve is at elevation 740 ft and the level 2 curve at elevation 750 ft; therefore, level 1.20 on January 1 would be at elevation 742 ft. Consequently, the target flow when GSL elevation is between 740 ft and up to, but not including, 742 ft on January 1, would be 1,500 cfs. NYSDEC and the District would confer in accordance with section 3.4.2 of the Settlement to determine the appropriate flow that would be provided below level curve 1.00.

[b] For levels above 1.50, the corresponding minimum average daily flow targets on the Hudson River exceed the 1,760 cfs required for water quality. The flow targets shown are designed to increase hydropower operating efficiency at the projects.

[c] Flows between specified ranges are to be interpolated.

[d] See exceptions at subsection 3.4.2 of the Settlement.

[e] For those GSL elevations not shown, the targeted maximum allowable flow should be linearly interpolated.

[f] All instream flows are considered nominal flows, and the actual release at any given time may be slightly above or below the value indicated, depending on the headpond elevation. Erie would derive appropriate methods for the provision of instream flows based upon the midpoint of the normal impoundment fluctuation.

[g] Targeted minimum and maximum flows in the upper Hudson River take precedence over targeted maximum flows below E.J. West.

c. Proposed Environmental Measures

Erie and the District propose to implement the following environmental measures, consistent with the terms of the Settlement for the E.J. West and District Project:

- Develop and implement a stream flow monitoring plan in consultation with the District, NYSDEC, and FWS (Erie).
- Prepare and publish a report of daily GSL elevations, inflows to GSL, and flows of the Hudson River (District).
- Install full 1-inch maximum clear spacing trashrack overlays by December 31, 2002, in accordance with section 4.2 of the Settlement.
- Improve the informal overlook on Route 4 within 18 months of license issuance (not to be included in the project boundary).
- Provide portage around the Conklingville Dam and trail to link GSL to Stewarts Bridge impoundment within 18 months of license issuance.
- Develop a Cultural Resources Management Plan (CRMP) for the E.J. West powerhouse and associated structures within 1 year of license issuance.

2. Proposed Action with Additional Staff-Recommended Measures

In addition to the applicants' proposed environmental measures, we recommend the following measures:

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities.
- Develop, in consultation with NYSDEC, the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP), and Saratoga and Fulton counties, and implement an erosion and sedimentation control plan for GSL.
- Continue to stabilize the GSL shoreline where active erosion is evident using appropriate techniques.
- Restrict access to the canoe put-in site during the winter to avoid disturbing bald eagles that use the upper Stewarts Bridge impoundment.
- Prepare a CRMP that encompasses Conklingville Dam and GSL.

B. Stewarts Bridge Project

1. Proposed Action

a. Proposed Facilities

The Stewarts Bridge Project is located on the Sacandaga River approximately 3 miles upstream from its confluence with the Hudson River (see figure 2). Its impoundment extends 3.5 miles upstream to the tailrace area of the E.J. West powerhouse. This project is located in Saratoga County in the town of Hadley, New York.

The principal works of the Stewarts Bridge Project consist of the following features: (a) the 3.5-mile-long Stewarts Bridge impoundment, on the Sacandaga River with a surface area of 480 acres at a water surface elevation of 705.0 ft NGVD; (b) a 1,860-foot-long dam consisting of: (1) a 1,646-foot-long rolled, compacted earth-fill structure 112 ft high at its highest point (crest elevation of 714.0 ft) with a base which varies from 120 ft to 680 ft in width; (2) a reinforced concrete Taintor gate spillway measuring 151 ft long, 49.7 ft wide, and 34 ft high, containing five 27-foot-long by 14.5-foot-high steel Taintor gates;[7] (3) a 63-foot-long reinforced concrete intake structure equipped with two 25-foot-high by 22-foot-wide steel gates with 3 5/8-inch clear spaced steel bar trashracks located directly in front of the gates; (4) a 29-foot-wide roadway along the crest of the dam; (5) a riprap upstream face and a grass covered downstream face of the dam; (6) a 9-foot-diameter, plugged diversion conduit used to pass river flows during project construction; and (7) an 850-foot-long plastic concrete seepage barrier constructed through the impervious dam core; (c) a 216-foot-long, 22-foot inside diameter steel penstock; (d) an 88-foot-long by 78-foot-wide brick-faced structural steel framed powerhouse with one vertical Francis turbine/generator unit; (e) a tailrace which extends 450 ft downstream from the powerhouse; (f) an outdoor transformer, switching station,

[7] Based on a revised Probable Maximum Flood (PMF) analysis of the Conklingville Dam and E.J. West Project, NMPC determined that the revised PMF outflow from the Conklingville Dam and E.J. West Project would exceed the discharge capacity of the Stewarts Bridge spillway and would overtop the embankment dam. This could potentially cause it to become unstable and fail. Erie evaluated several alternatives and has proposed to resolve the issue at Stewarts Bridge by modifying the Conklingville Dam spillway. The modifications would reduce the PMF outflow, and reduce the threat that the embankment dam would not be overtopped. The proposal is currently under review by the Commission's Division of Dam Safety and Inspections.

and 400-foot-long transmission line; and (g) appurtenant facilities. There is no bypassed reach.

b. Proposed Project Operations

The Stewarts Bridge Project currently operates as a peaking facility in tandem with the E.J. West and District Project, typically generating 12 hours a day (normally between 8:00 a.m. to 10:00 p.m.), 7 days a week. Erie proposes to continue this operating mode during the term of a new license. The installed capacity is 30 MW, and the project generates an annual average of 131,700 MWh of energy. Flows through the facility when it is generating are normally about 4,000 cfs, its most efficient setting, even though its hydraulic capacity is 5,475 cfs. Erie indicates that operations below the 4,000 cfs maximum cause excessive cavitation and that prolonged operation under this flow level causes undue wear on the unit.

When the project is not generating, there is currently a base flow of about 35 to 50 cfs which originates from leakage at the powerhouse and dam. Daily impoundment water level fluctuations are less than 1 ft for most of the year. Maintenance drawdowns of up to 15 ft typically are timed to coincide with the drawdown of GSL beginning in mid-March. The duration of the maintenance drawdown would depend upon the nature of the required maintenance.

Erie proposes to provide increased base flows in accordance with the schedule and GSL water surface elevations shown in table 3, consistent with the terms of the Settlement.

Table 3. Proposed base flow release regime from the Stewarts Bridge Project (Source: Settlement, 2000)

	GSL elevation	Base flow or minimum flow[a]
January 1, 2013, through June 1, 2020	>752 ft	350 (± 1) cfs
	749-752 ft	300 (± 1) cfs
	<749 ft	300 (± 1) cfs, or inflow, whichever is lower
June 2, 2020, through license expiration	>752 ft	350 (± 1) cfs
	750-752 ft	300 (± 1) cfs
	<750 ft	300 (± 1) cfs, or inflow, whichever is lower

[a] If Hudson River flow downstream of Sacandaga River confluence is greater than 25,000 cfs, the base flow would be 200 cfs.

Erie proposes to limit normal daily drawdowns to a maximum of 1 ft on a year-round basis. In addition, the annual spring maintenance drawdowns would be discontinued.

c. Proposed Environmental Measures

Erie proposes to implement the terms of the Settlement, which include the following operational and environmental measures:

- Develop within six months of license issuance and acceptance and implement a streamflow and water level monitoring plan in consultation with the District, NYSDEC, and FWS.
- Install full 1-inch maximum clear spacing trashrack overlays for fish protection by the end of the year 2008.
- Provide 25 cfs continually via a modified Taintor gate for downstream fish passage year round beginning in the year 2008.
- Implement whitewater boating releases of 4,000 cfs upon license issuance and acceptance in accordance with the regime shown in table 4.
- Publicize whitewater flow releases and forecasts via the telephone and Internet within 18 months of license issuance and acceptance.
- Improve roads at the impoundment recreation area within 18 months of license issuance and acceptance.
- Provide parking signage along County Route 4 for fishing access within 18 months of license issuance and acceptance.
- Provide impoundment shoreline access within 18 months of license issuance and acceptance.
- Complete impoundment side of canoe portage within 18 months of license issuance.
- Develop a north side put-in/parking area (immediately east of County Route 7) and a trail that connects to the existing canoe portage trail within 18 months of license issuance and acceptance.
- Develop a south side take-out area at the former Hadley Town Beach (on the Hudson River) within 18 months of license issuance and acceptance.
- Continue protection of bald eagle wintering habitat by restricting public access to the northern portion of the Stewarts Bridge impoundment.
- Develop a CRMP within 1 year of license issuance.

Table 4. Proposed whitewater boating release regime at the Stewarts Bridge Project (Source: Settlement, 2000)

Weekends June 1-22		Daily June 23-Sept 8		Weekends Sept. 9-23	
GSL level curve[a]	Whitewater hours	GSL level curve[a]	Whitewater hours	GSL level curve [a]	Whitewater hours
1.0-1.19	0	1.0-1.19	0	1.0-1.19	0
1.2	4	1.2	5	1.2-2.35	3
2.0	5	2.0	7	3.0 and above	6
2.75 and above	6	2.35 and above	8		

[a] See figures 3, 4, and 5 for level curves.

2. Proposed Action with Additional Staff-Recommended Measures

In addition to Erie's proposed environmental measures, we recommend that Erie include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities. If scheduled maintenance drawdowns of the Stewarts Bridge impoundment in excess of 1 ft should be required for any reason, we recommend that Erie notify FWS, NYSDEC, the District, Saratoga County, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures.

C. Hudson River Project

1. Proposed Action

a. Proposed Facilities

The Hudson River Project consists of two developments on the Hudson River: the Spier Falls development at RM 212 and the Sherman Island development at RM 209 (see figure 1). The two developments are located in Saratoga and Warren counties between the city of Glens Falls, New York, and the town of Corinth, New York.

Spier Falls Development

The Spier Falls dam is a total of 1,721 ft long including spillway and non-overflow portions of the structure, with a maximum height of 145 ft. It creates a 638 acre

impoundment with a normal maximum water surface elevation of 436.8 ft, usable storage of 2,526 ac-ft, and a gross storage capacity of 28,926 ac-ft. There is no bypassed reach.

Structures at this development include: (a) three non-overflow concrete gravity dam segments (52 ft, 553 ft, and 306 ft in length) with a maximum height of 145 ft; (b) an 810-foot-long spillway up to 70 ft in height; (c) a forebay canal; (d) two intake structures; one (Unit 8) with 2 1/4-inch clear spaced trashracks located in front of the gates, and two penstocks; and another (Unit 9) with 5-inch clear spaced trashracks located in front of the gates, a trashrack, and eight penstock openings (four of which are sealed); and (e) two conjoined powerhouses; Unit 8 with one 6.8 MW installed capacity, vertical Francis turbine and Unit 9 with one 37.6 MW installed capacity, vertical Francis turbine, and (f) appurtenant equipment and controls. There are no transmission lines or transmission facilities included in the existing project.

Sherman Island Development

The Sherman Island dam has a 949-foot-long spillway with a maximum height of 38 ft and a 584-foot-long non-overflow section with a maximum height of 67 ft. It creates a 305-acre impoundment with a gross storage capacity of 6,960 ac-ft, a usable storage capacity of 1,060 ac-ft, and a normal maximum water surface elevation of 353.3 ft. There is a 4,000 ft-long bypassed reach between the dam and the powerhouse.

Structures at this development include: (a) a buttressed and gravity non-overflow dam; (b) a spillway topped with 3.7-ft and 5.7-foot-high wooden flashboards; (c) a concrete wingwall; (d) a forebay; (e) an intake structure consisting of a power canal with 15 penstocks (three of which are sealed) and 3 1/8-inch clear spaced steel bar trashracks; (f) one powerhouse with four, 7.2 MW installed capacity, vertical Francis turbines and generating units; and (g) a tailrace consisting of a concrete apron to prevent undermining of the powerhouse. There are no transmission facilities or lines included in the existing project.

b. Proposed Project Operations

Spier Falls Development

The Spier Falls development has a total installed (nameplate) capacity of 44.4 MW, an annual average energy production of 240,000 MWh, and a hydraulic capacity of 2,413 to 8,970 cfs. It is operated as a peaking project in tandem with the Sherman Island development, and water from the powerhouse is discharged directly to the upper reach of the Sherman Island impoundment. The powerhouse operates under a normal gross head

of 83 ft. The impoundment typically experiences daily fluctuations of up to 4 ft, though it is occasionally drawn down as much as 8 ft for maintenance. Although the applicant does not state when maintenance drawdowns normally take place, they typically would occur when inflow to the development is less than the hydraulic capacity of the turbines, which generally is during the summer and fall.

Erie proposes to limit daily impoundment fluctuations to 1 ft during the walleye spawning season,[8] and to 2 ft for the rest of the year. Maintenance drawdowns would no longer occur. Erie proposes to upgrade Unit 8 to increase the capacity to 45.42 MW.

Sherman Island Development

The total installed capacity of the Sherman Island development is 28.8 MW, the annual average energy production is 184,400 MWh, and the hydraulic capacity is 2,413 to 7,100 cfs. The Sherman Island development is operated as a peaking project in tandem with the Spier Falls development. Water is discharged through the tailrace to the upper reach of the Feeder Dam Project impoundment. The powerhouse operates under a normal gross head of 69 ft. Maximum normal daily impoundment drawdown is 3.7 ft, but may be as much as 7.4 ft for maintenance. Although the applicant does not state when maintenance drawdowns normally take place, they typically would occur when inflow to the development is less than the hydraulic capacity of the turbines, which generally is during the summer and fall.

Erie proposes to limit daily impoundment fluctuations to 1 ft during the walleye spawning season, and to 2 ft for the rest of the year. Maintenance drawdowns would no longer occur. If the wooden flashboards fail, Erie would maintain a maximum daily drawdown of 6 inches below the dam crest until flashboard replacement begins. During flashboard replacement, Erie would draw the impoundment down to 1 ft below the dam crest until flashboard replacement is complete. Erie also proposes to install partial pneumatic flashboards on two of the straight sections of the Sherman Island dam. The combined length of both pneumatic flashboards would be 278 ft. Erie proposes to upgrade Units 2, 3, and 5 to increase the capacity to 34.2 MW for the project.

c. Proposed Environmental Measures

Erie proposes the following environmental measures for the Hudson

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[8] Walleye spawning season would start when water temperature reaches 4°C for four consecutive days after March 15th of each year. Walleye spawning season would end 30 days after water temperature has reached 10°C for four consecutive days.

River Project:

- Develop and implement a streamflow and water level monitoring plan in consultation with the District, NYSDEC, FWS, Fulton County, and Saratoga County within 6 months of license issuance and acceptance.
- Reduce daily impoundment water fluctuations at Spier Falls and Sherman Island developments from 4.0 and 3.7 ft, respectively, to 1 ft during walleye spawning season and 2 ft for the remainder of the year which would reduce the amount of exposed shoreline substrate and minimize effects on fish and improve aesthetic conditions.
- If flashboards fail, maintain a maximum daily drawdown of 0.5 ft below the crest of the dam until flashboard replacement begins.
- Install full 1-inch maximum clear spacing trashrack overlays at both developments for fish protection (by the end of the year 2010 at Spier Falls and 2006 at Sherman Island).
- Provide 25 cfs continually through modifications to the existing trash sluice gate for downstream fish passage year round (by the end of the year 2010) at Spier Falls as soon as the trashrack overlays are installed.
- Provide 25 cfs continually through modifications to the existing ice sluice gate for downstream fish passage year round (by the end of the year 2006) at Sherman Island as soon as the trashrack overlays are installed.
- Provide a minimum flow of 675 ± 3 cfs to the combined north and south channels of the Sherman Island bypassed reach during the walleye spawning season (see footnote 7) beginning during the spring following license issuance and acceptance.
- Consult with FWS and NYSDEC prior to the first walleye season from license issuance to determine the appropriate location for water temperature monitoring that would determine the beginning and end of the walleye spawning season.
- Provide a minimum flow of 100 ± 1 cfs to the north channel and 150 ± 2 cfs to the south channel of the Sherman Island bypassed reach when walleye are not spawning beginning within 18 months of license issuance and acceptance.
- Design, in consultation with FWS and NYSDEC, and construct a minimum flow release structure at the Sherman Island dam and a weir structure to facilitate distribution of flows into the north and south channels at the Sherman Island development bypassed reach to enhance fish habitat.
- Install partial pneumatic flashboards on the Sherman Island dam to enhance control of flows and protect shoreline habitat from any adverse effects from wooden flashboard failures.

- Modify existing Spier Falls boat launch area to provide facilities accessible to people with disabilities, including parking, low angle access path for wheelchairs to access boats, and at least one picnic table that is accessible to wheelchairs within 18 months of license issuance and acceptance.
- Modify existing Sherman Island boat launch area to provide facilities accessible to people with disabilities, including new parking spaces, low angle access path for wheelchairs to access boats, at least one picnic table that is accessible to wheelchairs, and privies on a trial basis within 18 months of license issuance and acceptance.
- Provide canoe portage at both developments within 18 months of license issuance and acceptance.
- Provide two impoundment campsites at Spier Falls and two island campsites at Sherman Island within 18 months of license issuance.
- Provide fishing access to Sherman Island bypassed reach within 18 months of license issuance and acceptance.
- Continue to allow public access to project land and waters at both developments.
- Cooperate with the town of Queensbury by leasing land for a new boat launch at the Sherman Island impoundment within 18 months of license issuance and acceptance (not to be included in the project boundary).
- Develop a CRMP within 1 year of license issuance.

2. Proposed Action with Additional Staff-Recommended Measures

In addition to Erie's proposed environmental measures, we recommend that Erie include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities. If scheduled maintenance drawdowns of the Spier Falls impoundment in excess of the daily fluctuations of 1 or 2 ft proposed by Erie or the Sherman Island impoundment in excess of 1 ft below the dam crest should be needed for any reason, we recommend that Erie notify FWS, NYSDEC, the District, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures. We also recommend that prior to earth-disturbing activities or vegetation removal associated with the proposed project, Erie conduct a survey for the endangered Karner blue butterfly or its obligate host, blue lupine.

D. Feeder Dam Project

1. Proposed Action

a. Proposed Facilities

The Feeder Dam Project is located on the Hudson River at RM 203 in Saratoga and Warren counties, New York (see figure 1). Feeder Dam serves as a re-regulating dam to even the flows released from peaking operations upstream at the Sherman Island development (Hudson River Project). The New York State Thruway Authority owns the dam, waste gates, and Feeder Canal inlet gates at the Feeder Dam Project, and Erie owns the powerhouse and appurtenant structures.

Feeder Dam is 615-ft-long with a maximum height of 21 ft. It creates a 717 acre impoundment with a usable storage capacity of 1,690 ac-ft, a gross storage capacity of 10,000 ac-ft, and an uncontrolled surface elevation ranging between 284.1 and 281.1 ft NGVD. There is no bypassed reach.

Project structures include: (a) an uncontrolled overflow concrete gravity dam; (b) 3-ft-high wooden flashboards along the crest; (c) headgate structure with 4 ½-inch clear spaced steel bar trashracks and eight stoplog openings; (d) five waste gates and two Champlain Feeder Canal inlet gates at the north dam abutment; and (e) a powerhouse at the dam with five identical vertical fixed blade propeller turbines and generator units (1.2 MW each). There are no transmission lines or facilities included with the existing project; the transmission line for the Feeder Dam Project is licensed separately to Erie as the Feeder Dam Transmission Line Project (FERC Project No. 2641).

b. Proposed Project Operations

The project has an installed capacity of 6 MW, an annual average energy generation of 31,000 MWh, and a hydraulic capacity of 900 to 5,100 cfs. The daily pond fluctuation is 3 ft from the top of the flashboards or crest of dam when the flashboards are not in place. This makes the effective maximum fluctuation 6 ft. The powerhouse discharges water directly back to the river, and operates under a net design head of 15.5 ft. Historically, daily flows from the Feeder Dam Project have been set by the District to maintain an average flow of 3,000 cfs in the Hudson River downstream of the confluence with the Sacandaga River. On Sundays, this average flow was reduced to 1,500 cfs. There currently is no base flow requirement for the Feeder Dam Project. Flow releases generally range between 2,500 and 4,500 cfs, with a minimum release of about 1,000 cfs. Although the applicant does not state when maintenance drawdowns normally

take place, they typically would occur when inflow to the development is less than the hydraulic capacity of the turbines, which generally is during the summer and fall.

Erie proposes to limit daily impoundment fluctuation to 1 ft from April 1 to June 15 (the centrarchid spawning season) and to 2 ft for the remainder of the year. If the wooden flashboards fail, Erie would maintain a maximum daily drawdown of 6 inches below the dam crest until flashboard replacement begins. During flashboard replacement, Erie would draw the impoundment down to 1 ft below the dam crest until flashboard replacement is complete. Erie would discontinue maintenance drawdowns except to replace flashboards. Erie also proposes to replace the existing wooden flashboards on a 125-ft-long section of the permanent crest of Feeder Dam with 3-ft-high pneumatic flashboards and maintain an instantaneous base flow of 1,500 cfs and an average daily flow of 1,760 cfs.[9] The 1,500 cfs base flow would not include dam leakage, the 25 cfs fish passage flow, or the Feeder Canal flow.

c. Proposed Environmental Measures

Erie proposes the following operational and environmental measures for the Feeder Dam Project, consistent with the Settlement:

- Develop and implement a streamflow and water level monitoring plan in consultation with the District, NYSDEC, and FWS within 6 months of license issuance and acceptance.
- Reduce daily water fluctuations at the Feeder Dam impoundment from 3 to 1 ft from April 1 through June 15 to facilitate fish spawning and 2 ft for the remainder of the year which would reduce the amount of exposed shoreline substrate and minimize effects on fish and improve aesthetic conditions.
- If flashboards fail, maintain a maximum daily drawdown of 0.5 ft below the crest of the dam until flashboard replacement begins.
- Install full 1-inch maximum clear spacing trashrack overlays for fish protection by the end of the year 2004.
- Maintain an instantaneous base flow of 1,500 cfs and a minimum average daily flow of 1,760 cfs.
- Provide 25 cfs continually for downstream fish passage year round through modifications to the existing trash sluice gate by the end of the year 2004, as soon as the trashrack overlays are installed.

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[9] If the District modifies releases from GSL due to flows below the level curve 1, an interim base flow would be necessary until lake releases are resumed.

- Install partial pneumatic flashboards on Feeder Dam to enhance control of flows and protect from any adverse effects from wooden flashboard failures.
- Provide tailrace fishing access with parking for one vehicle within 18 months of license issuance and acceptance.
- Continue to allow public access to project land and waters.
- Provide canoe access to the Hudson River and Feeder Canal within 18 months of license issuance and acceptance (a feature of the proposed Overlook Park but not to be included in the project boundary).
- Provide two cement picnic tables and parking for 16 vehicles to accommodate canoeing and biking/walking path along the Feeder Canal within 18 months of license issuance and acceptance (a feature of the proposed Overlook Park but not to be included in the project boundary).
- Develop a car-top boat launch within 18 months of license issuance and acceptance (a feature of the proposed Overlook Park but not to be included in the project boundary).

2. Proposed Action with Additional Staff-Recommended Measures

In addition to Erie's proposed environmental measures, we recommend the following measures:

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground-disturbing activities.
- If scheduled maintenance drawdowns of the Feeder Dam impoundment in excess of 0.5 ft below the dam crest should be needed for any reason, notify FWS, NYSDEC, the District, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures.
- Conduct a comprehensive flow analysis after the first 5 years of operation under the new impoundment and base flow regime to ensure that downstream riverine habitat and hydroelectric generation at other hydropower projects are not adversely affected.
- Conduct a survey for the endangered Karner blue butterfly or its obligate host, blue lupine, prior to conducting earth-disturbing or vegetation removal activities.
- Develop a CRMP to ensure the protection of historic properties within 1 year of license issuance.

E. No-action

No-action would result in no change to the current environmental setting in the project areas. Under no-action , the projects would continue to operate as required by the original project licenses. No alterations to existing environmental conditions would occur. We use this alternative to establish baseline environmental conditions for comparison with other alternatives.

F. Alternatives Considered and Eliminated from Detailed Study

We considered several other alternatives to Erie's relicensing proposals but eliminated them from detailed study because they are not reasonable in the circumstances of these proceedings. They are: (1) federal takeover and operation of any of the projects; (2) issuing a nonpower license for any of the projects; and (3) retirement of any of the projects.

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

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 these proceedings, no agency has suggested its willingness or ability to do so. No party has sought a nonpower license, and since the power is needed, we have no basis for concluding that the projects should no longer be used to produce power, as long as it is economically beneficial to do so. Thus, nonpower licenses are not a realistic alternative to relicensing in these circumstances.

Project retirement could be accomplished with or without dam removal, but either alternative would involve denial of the relicense applications or surrender or termination of the existing licenses with appropriate conditions. No participant has suggested that dam removal would be appropriate, and we have found no adequate basis for recommending it at this time. The current projects and impoundments provide recreational opportunities and fish and wildlife habitat. Thus, dam removal is not a reasonable alternative to licensing the projects with appropriate protection and environmental measures.

The second retirement strategy would involve retaining the dams and disabling or removing equipment used to generate power. Project works would remain in place and could be used for historic or other purposes. Another governmental agency would have to assume regulatory control and supervision of the dam and remaining facilities. As with the dam removal alternative, project capacity and energy would have to be replaced. No participant has advocated this alternative.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation and Interventions

1. E.J. West and District Project

On November 10, 1993, the Commission issued notices that NMPC had filed an application to relicense the E.J. West Project. The notice set January 14, 1994, as the deadline for filing protests and motions to intervene. In response to the public notice, the following entities intervened in the relicensing proceedings:

Intervenor	Date of Letter
GSL Association	November 30, 1993
NYSDEC	December 16, 1993
J. Andrews	December 17, 1993
ADK	January 9, 1994
Frank S. Wozniak	January 11, 1994
Adirondack Boardsailing Club Inc	January 12, 1994
County of Saratoga, New York	January 12, 1994
New York State Adirondack Park Agency (APA)	January 12, 1994
United States Department of the Interior (Interior)	January 13, 1994
New York Rivers United (NYRU), American Whitewater Affiliation (AWA), American Rivers, Adirondack Council, Association for Protection of the Adirondacks, the National Audubon Society, and the Natural Heritage Institute	January 14, 1994
Sacandaga Marine Inc.	January 18, 1994

County of Fulton, New York	January 18, 1994
FPC	January 20, 1994
District	January 31, 1994
Adirondack Hydro Development Corporation (AHDC)	September 20, 1994
New York State Electric and Gas Corporation	June 1, 1995
Fort Miller Associates	June 27, 1995
Curtis/Palmer Hydroelectric Company, LP, et al.	November 17, 1995
NYRU	May 3, 1999
Fourth Branch Associates	June 11, 1999

On July 14, 2000, the Commission issued a public ready for environmental analysis (REA) notice soliciting comments, terms, and conditions for the E.J. West Project license application. In response to this notice, the following entities filed comments:

Commenting Entity	Date of Letter
Interior	September 5, 2000
Frank S. Wozniak	September 5, 2000
ADK	September 6, 2000
AHDC	September 13, 2000

On May 2, 2001, the Commission issued a notice of amended license application to include the District as a co-applicant and soliciting motions to intervene and protests. The notice set July 2, 2001, as the deadline for filing protests and motions to intervene. In response to this notice, the following entities intervened in the amended license proceedings:

Intervenor	Date of Letter
Interior	June 15, 2001
NYSDEC	June 19, 2001
ADK	June 20, 2001
County of Saratoga, New York	June 21, 2001
County of Fulton, New York	June 27, 2001
Frank S. Wozniak	June 28, 2001
Great Sacandaga Lake Fisheries Federation	June 29, 2001
Paul Nolan	July 2, 2001
FPC	July 12, 2001
AHDC	July 18, 2001
NYRU, American Rivers, and the Natural Heritage Institute	August 8, 2001

2. Stewarts Bridge Project

On July 21, 1998, the Commission issued a notice that NMPC filed an application to relicense the Stewarts Bridge Project. The notice set November 30, 1998, as the deadline for filing additional study requests. In response to this public notice, the following entities requested intervenor status for this proceeding, even though the Commission had not yet requested interventions:

Intervenor	Date of Letter
Saratoga County, New York	August 7, 1998
NYSDEC	August 13, 1998
AHDC	August 21, 1998
NYRU, AWA, and the Natural Heritage Institute	November 30, 1998
Trout Unlimited	November 25, 1998
Fourth Branch Associates	June 11, 1999
APA	September 9, 1999

On July 13, 2000, the Commission issued a public REA notice soliciting comments, terms, and conditions for the Stewarts Bridge Project license application. In response to the public notice, the following entities filed comments:

Commenting Entity	Date of Letter
Interior	September 5, 2000
ADK	September 6, 2000
AWA	October 30, 2000

On September 6, 2000, the Commission issued a notice soliciting motions to intervene and protests regarding the Stewarts Bridge Project relicensing. The following entities intervened in the relicensing proceeding:

Intervenor	Date of Letter
APA	September 18, 2000
ADK	November 2, 2000

3. Hudson River Project

On February 9, 1993, the Commission issued a notice that NMPC filed an application to relicense the Hudson River Project. The notice set April 12, 1993, as the deadline for filing protests and motions to intervene. In response to the public notice, the following entities intervened in the relicensing proceedings:

Intervenor	Date of Letter
NYSDEC	March 10, 1993
Interior	April 8, 1993
ADK	April 8, 1993
NYRU, AWA, American Rivers, National Heritage Institute, and the National Audubon Society	April 12, 1993
NYRU, AWA, American Rivers, National Heritage Institute, and the National Audubon Society	August 3, 1993
Fort Miller Associates	June 27, 1995
NYRU and American Rivers	March 25, 1996
Fourth Branch Associates	June 11, 1999

On July 14, 2000, the Commission issued a public REA notice soliciting comments, terms, and conditions for the Hudson River Project license application. In response to this notice, the following entities filed comments:

Commenting Entity	Date of Letter
Interior	September 5, 2000
ADK	September 6, 2000

4. Feeder Dam Project

On March, 25, 1993, the Commission issued a notice that NMPC had filed an application to relicense the Feeder Dam Project. The notice set May 28, 1993, as the deadline for filing protests and motions to intervene. In response to the public notice, the following entities intervened in the relicensing proceedings:

Intervenor	Date of Letter
NYSDEC	April 7, 1993
NMPC	May 13, 1993
ADK	May 24, 1993
Interior	May 27, 1993
NYRU, American Rivers, and AWA	May 28, 1993
Fort Miller Associates	June 27, 1995
Fourth Branch Associates	June 11, 1999

On July 14, 2000, the Commission issued a public REA notice soliciting comments, terms, and conditions for the Feeder Dam Project license application. In response to this notice, the following entities filed comments:

Commenting Entity	Date of Letter
Interior	September 5, 2000
ADK	September 6, 2000

5. Draft Multiple Project Environmental Impact Statement

The Commission sent its draft MPEIS for the proposed relicensing of the E.J. West, Stewarts Bridge, Hudson River, and Feeder Dam projects to the U.S. Environmental Protection Agency (EPA) on May 18, 2001, and EPA issued it on May 25, 2001. The Commission requested that comments be filed within 45 days from the issuance date (by July 9, 2001). Ten letters, representing eight entities, commenting on the draft MPEIS were filed with the Commission. We modified the text of the MPEIS in response to these comments, as appropriate. Appendix A summarizes the comments that were filed.

B. Scoping Process

Scoping meetings were conducted for the E.J. West, Hudson River, and Feeder Dam projects on April 25, 26, and 27, 1995, in Loudonville, Cohoes, Mechanicville, and Glens Falls, New York, respectively. At that time, the Glens Falls Project (FERC No. 2385), the Hoosic River Project (FERC No. 2616), and the School Street Project (FERC No. 2539) also were included in the scoping process. An initial Scoping Document (SD1) was issued for those six projects on April 3, 1995. The following entities filed written comments in response to the SD1:

Commenting Entity	Date of Letter
County of Fulton, New York	April 27, 1995
Great Sacandaga Lake Association et al.	May 1, 1995
A.J. Casale, New York State Assembly	May 9, 1995
D. Lent	May 23, 1995
Marinas of Great Sacandaga Lake	May 24, 1995
FPC	May 24, 1995
AHDC	May 26, 1995
County of Saratoga Board of supervisors	May 26, 1995
NYRU	May 26, 1995
District	May 31, 1995
FWS	May 31, 1995

The staff issued a revised SD1 including the Stewarts Bridge Project on December 16, 1999. No public scoping meeting was held for the Stewarts Bridge Project. Scoping for the project was conducted by requesting responses as part of a paper scoping process. The following entities filed written comments in response to the revised SD1:

Commenting Entity	Date of Letter
Fulton and Saratoga counties, New York	January 31, 2000
ADK	February 9, 2000
FWS	February 10, 2000
NYSDEC	February 11, 2000
AHDC	February 16, 2000

C. Fishway Prescriptions

Section 18 of the FPA states that the Commission shall require a licensee to construct, operate, and maintain such fishways as may be prescribed by the Secretary of the Interior or the Secretary of Commerce, as appropriate. Under Section 18, Interior filed with the Commission, by letter dated September 5, 2000, a request that we reserve our authority to require such fishways as Interior may prescribe in the future, including measures to evaluate the need for fishways and to determine, ensure, or improve the effectiveness of such fishways. Interior states that this reservation includes authority to prescribe fishways at these projects for any fish species to be managed, enhanced, protected, or restored to the basin during the term of the licenses. The Commission recognizes that future fish passage needs and management objectives cannot always be determined at the time of project licensing. Under these circumstances, and upon receiving a specific prescription from Interior, we recommend the Commission follow its practice of reserving the Commission's authority to require such fishways as may be prescribed by the Secretary of the Interior.[10]

D. Water Quality Certification

Under Section 401 of the Clean Water Act (CWA),[11] the Commission may not issue a license for a hydroelectric project unless either the licensee obtains water quality certification from the certifying agency of the state in which the project discharge would originate, or the certifying agency waives certification. Section 401(a)(1) states that certification is deemed waived if the certifying agency fails to act on a water quality certification request within a reasonable period of time, not to exceed 1 year. Section 401(d) of the CWA provides that state certification shall set forth conditions necessary to ensure that licensees comply with specific portions of the CWA and with appropriate requirements of state law.[12]

In 1991, NMPC applied to NYSDEC for Water Quality Certification (WQC) for the E.J. West, Hudson River, and Feeder Dam projects, as required by Section 401 of the

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[10] The Commission has specifically sanctioned the reservation of fishway prescription authority at relicensing. See Wisconsin Public Service Corporation, 62 FERC ¶ 61,095 (1995); affirmed, Wisconsin Public Service Corporation v. FERC, 32 F.3d 1165 (1994).

[11] 33 U.S.C. Section 1341(a)(1).

[12] 33 U.S C. Section 1341(d).

CWA. NYSDEC received the requests on December 11, December 18, and December 16, 1991, respectively, and denied the WQC for these three projects on November 19, 1992, without prejudice. Settlement negotiations ensued over the next 6 years. WQC applications are still pending for these three projects.

NMPC filed its application for WQC for the Stewarts Bridge Project with NYSDEC on June 23, 1998. NMPC withdrew and refiled its application for WQC on May 27, 1999. NYSDEC confirmed the withdrawal and re-application on June 10, 1999. Erie withdrew and refiled its application for WQC on May 31, 2000, and NYSDEC confirmed the withdrawal and receipt of reapplication on May 31, 2000. NYSDEC issued a WQC for the Stewarts Bridge Project on May 25, 2001, that is consistent with the terms of the Settlement.

Following execution of the final Settlement, NYSDEC is expected to issue WQCs for the remaining three Upper Hudson River projects under consideration here, that are consistent with the Settlement.

E. Coastal Zone Consistency Determination

Section 307(c)(3) of the Coastal Zone Management Act requires that all federally licensed and permitted activities be consistent with approved state coastal zone management programs. If the project is located within a coastal zone boundary, or if a project affects a resource located in the boundaries of the designated coastal zone, the applicant must certify that the project is consistent with the state coastal zone management program.

The Upper Hudson River projects under consideration in this MPEIS are not located within the jurisdiction of the New York State coastal zone management program. For the purpose of federal consistency, the coastal zone area along the Hudson River ends at the federal dam at Troy downstream of the Feeder Dam Project. Our assessment is that no coastal zone consistency certifications are needed for these projects.

V. AFFECTED ENVIRONMENT AND ENVIRONMENTAL ANALYSIS[13]

A. General Description of the Upper Hudson River Basin

The Hudson River Basin encompasses about 13,300 square miles and lies in parts of eastern New York, Vermont, New Jersey, Massachusetts, and Connecticut (figure 1). The Upper Hudson subbasin, in which the projects lie, covers about one-third of the Hudson River Basin (about 3,600 square miles). Part of the subbasin is in the Adirondack Highlands, and part is in the Taconic Highland and Hudson Valley. Major rivers in the Upper Hudson subbasin include the Hudson, Sacandaga, Schroon, Battenkill, and Hoosic. About 76 percent of the subbasin is forested, and the majority of the remainder is agricultural land. Only 3.4 percent of the Upper Hudson subbasin is urban.

From its source in the Adirondack Mountains at Lake Tear-of-the-Clouds, the Hudson River flows generally southward to the town of Corinth about 6 miles downstream from the confluence with the Sacandaga River. At Corinth, the river turns eastward to Hudson Falls and then south again. The Hudson River Project (Spier Falls and Sherman Island developments) and the Feeder Dam Project are located in this reach of the river. The Sacandaga River originates deep in the Highlands of the Adirondacks and is a principal tributary of the Hudson River. The Sacandaga Drainage Basin is characterized by many steep-sided hills and mountains. The E.J. West and Stewarts Bridge projects are located on the Sacandaga River above its confluence with the Hudson.

The project area, which is high in both elevation and latitude, is located in Climatic Region I of New York State, which is characterized by extremely cold snowy winters and very cool wet summers. Mean January temperatures are about 15°F, and mean July temperatures are 65°F, the coolest in the state. This region is also the wettest in the state with an average of 35 inches of precipitation each year.

B. Proposed Action and Alternatives

We include in our detailed environmental analysis only those resources that involve substantial project-related issues. We have eliminated geology and soils, land use, and socioeconomics from our detailed analysis for the following reasons:

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[13] Unless otherwise noted, the sources of information are the license applications; Moreau,1991; NMPC, 1991a; NMPC,1993; and NMPC, 1998.

- **Geology and Soils**: The proposed projects involve only minor ground-disturbance associated with the enhancement of existing recreational facilities; construction of new recreational facilities, and possible construction of lay down areas associated with project upgrades (e.g., pneumatic flashboards). Ongoing erosion along the GSL shoreline can be attributed to District operations and natural forces, not to hydropower operations. The District has a program in place to address District-caused shoreline erosion at GSL. We address the need for erosion and sediment control from the hydropower projects in the Water Quantity and Quality section.

- **Land Use**: We reviewed the proposed projects in relation to land use in the project-affected areas and concluded that there would be minimal or no change in land use. Erie would enhance public access for recreation at existing recreational facilities and would develop and transfer several new facilities for recreational access to project waters to public entities. The only likely change in local land classification would result from the transfer of the new, non-commercial whitewater access sites from Erie to the state, or from a utility to the public.

- **Socioeconomics**: We reviewed the potential effect of the proposed project on the socioeconomics of the project vicinity. The continuation of releases for whitewater boating would continue to attract whitewater boaters but not at levels different from the existing use. There would be only minor construction associated with new recreational facilities. Therefore, there would be minimal to no effect on local employment, business, infrastructure, or tax revenues.

1. Water Quantity and Quality

a. Affected Environment

From GSL to the tailrace of the Feeder Dam Project, the Upper Hudson watershed is a controlled system. The overall character in terms of flow distribution for the Sacandaga and Hudson rivers is largely dictated by the use of GSL for flood control (storage) and for low flow augmentation in the Lower Hudson River as mandated to the District. In meeting these mandates, the District releases flow from GSL at the Conklingville Dam in sufficient volume to provide a minimum combined flow of 3,000 cfs downstream of the confluence of the Sacandaga and Hudson rivers. Erie apportions daily flow allocations dictated by the District to take advantage of peak energy demand periods, which typically occur during daylight hours. Consequently, the E.J. West and District, Stewarts Bridge, and Hudson River projects operate in a peaking mode. Feeder Dam re-regulates Sherman Island powerhouse discharges (the lowermost of the two Hudson River Project developments), releasing more evenly distributed flow which

allows the Glens Falls and South Glens Falls projects, and other downstream hydroelectric projects, to operate in a run-of-river (ROR) mode.

Low flow augmentation has been a particularly important component of the District's role for decades. As settlement of the Hudson Valley increased during the 1800 and 1900s, there was concern about the ability of the river to assimilate wastes due primarily to high biological oxygen demand (BOD) loads from paper mills. Prior to construction of the Conklingville Dam and control of flows by the District, recreational use of the river downstream of Corinth and downstream of Glens Falls was impaired. Aquatic life was threatened by low dissolved oxygen (DO) and bottom deposits of sludge. The augmented flow regime since the construction of the Conklingville Dam has supplemented water for municipal and industrial intakes, provided protection of environmentally sensitive areas, provided flow for dilution of treated discharges, provided a degree of control over brackish water intrusion in the tidally influenced portion of the Hudson River downstream of the Troy dam, and supported navigation on the Champlain and Hudson River canal systems.

Table 5 presents available discharge data for portions of the Upper Hudson River Basin that are most applicable to operation of the four projects included in this MPEIS.

Table 5. Discharge data for relevant portions of the Upper Hudson River Basin (Source: United States Geological Survey (USGS) Internet data retrieval at www.water.usgs.gov, August 2000)

USGS Station	Hope	Stewarts Bridge	Hadley	Fort Edward
Location	Sacandaga River upstream from GSL	Sacandaga River 1.5 mi. below Stewarts Bridge	Hudson River at Hadley (0.3 mi above Sacandaga River confluence)	Hudson River 7 mi downstream from Feeder Dam
Gage number	01321000	01325000	01318500	01327750
Period of record	1911- 1999	1907- 1999	1921 - 1999	1976- 1999
Drainage area	491 mi^2	1,055 mi^2	1,664 mi^2	2,817 mi^2
Maximum average daily discharge	23,500 cfs	33,500 cfs	38,100 cfs	34,100 cfs
Minimum average daily discharge	18 cfs	4.2 cfs	208 cfs	652 cfs

USGS Station	Hope	Stewarts Bridge	Hadley	Fort Edward
Average daily discharge	1,103 cfs	2,140 cfs	2,925 cfs	5,194 cfs

Virtually all of the waters of the Upper Hudson River Basin, including its tributaries, are classified by the state as Class A, B, or C waters depending upon the usages deemed most appropriate. Table 6 shows applicable water quality standards for each of these classifications. Best usage of waters are defined as follows:

- Class A waters are considered best used as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing;
- Class B waters are best used for primary and secondary contact recreation and fishing;
- Class C waters are described as best used for fishing; and
- Subdesignations for trout waters include T, suitable for trout holdover (temperature suitable for trout survival) and TS, suitable for trout spawning (temperature suitable for survival and habitat suitable for spawning); whether or not a water body is designated as trout water determines the applicable thermal and DO criteria.

Table 6. New York State ambient water quality standards for Class A, B, and C waters (Source: NYSDEC, 1998)

Physical parameter	Standard
Taste, color and odor-producing, toxic and other deleterious substances	None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages.
Turbidity	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and other floating substances	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.

Physical parameter	Standard
Phosphorus and nitrogen	None in amounts that will result in growth of algae, weeds and slimes that will impair the waters for their best usages.
pH	Shall not be less than 6.5 nor more than 8.5.
Temperature	For non-trout streams, the water temperature at the surface of a stream shall not be raised to more than 90°F at any point; for lakes, the water temperature at the surface shall not be raised more than 3°F over the temperature that existed before the addition of heat of artificial origin (see original source for additional four pages of thermal criteria).
DO	For non-trout waters, the minimum daily average shall not be less than 5.0 mg/l, and at no time shall the DO concentration be less than 4.0 mg/l. For designated trout water (T), the minimum daily average shall not be less than 6.0 mg/l, and at no time shall the concentration be less than 5.0 mg/l. For trout spawning water (TS), DO shall not be less than 7.0 mg/l.
Dissolved solids	Shall be kept as low as practicable to maintain the best usage of waters but in no case shall it exceed 500 mg/l.
Total coliform	The monthly median value and more than 20 percent of the samples, from a minimum of 5 examinations, shall not exceed 2,400 and 5,000 per 100 ml, respectively.
Fecal coliform	The monthly geometric mean from a minimum of 5 examinations, shall not exceed 200 per 100 ml.

Generally, water quality in the Upper Hudson watershed is good. The source of the Hudson River (and the Sacandaga River) is in the Adirondack Highlands yielding nutrient-poor, low alkalinity, and low conductivity water, bearing little, if any, contaminants of human origin. The land use in the upper watershed is not intensive. There are some industrial and municipal outfalls, but these are relatively small and of low enough density that any effects on water quality remain localized.

(1) E.J. West and District Project

Water Quantity

The District built the Conklingville Dam to create GSL and operates it for flood control and low flow augmentation in the Hudson River downstream of the confluence of the Sacandaga River. As a consequence, the District has been drawing the impoundment down an average of about 23 ft (from approximately elevation 768 ft, NGVD, to 745 ft, NGVD) each winter (January through early March) since 1932. The E.J. West hydropower plant was independently installed, and its operations for energy production superimpose only minor daily GSL water surface fluctuations of less than 1 inch. Hydropower operations at the E.J. West Project have been, and would continue to be in any future license, secondary to the primary use of GSL by the District for flood control and downstream low flow augmentation.

The 25,950 acre GSL has a gross capacity of 865,931 ac-ft with 79,201 ac-ft, located between elevations 768 and 771 ft NGVD available for flood storage; 525,700 ac-ft, located between 745 and 768 NGVD, available for stream regulation; and 261,030 ac-ft below elevation 745 ft NGVD, considered dead (inactive) storage for use in emergencies or maintenance inspections. The dam has only discharged over the spillway twice in its 55-year history. Capture of spring runoff usually occurs during a 3-week period that begins as early as late March and is usually complete by early May. During filling, the District does not release any water from GSL and there is little leakage of water from the E.J. West Project.

Discharge through the powerhouse is dictated by the daily flow allocation from the District. Each of the two turbines operates most efficiently at 2,000 cfs. Therefore, if the District specifies that the average daily discharge should be $\leq$ 2,000 cfs, this would typically be released by operating one unit for 12 hours or less during periods of peak energy demand. If the daily average flow allocation is between 2,000 and 4,000 cfs, this would typically be achieved by operating two units for 12 or more hours during peak demand periods. A daily allocation greater than 4,000 cfs would allow both units to operate continuously. If the daily allocation is greater than the maximum hydraulic capacity of both turbines (5,400 cfs), GSL storage would be used until elevation 771 ft is reached and excess flow would spill. Table 7 shows the calculated distribution of flows from the project during a representative dry, wet, and average year, based on data from the Stewarts Bridge gage. Flows discharged from E.J. West are delivered directly into the Stewarts Bridge impoundment.

Table 7. Flow distribution from the E.J. West powerhouse at GSL (Source: NMPC, 1993)

	Average daily flow (cfs) ≤2,000	Average daily flow (cfs) 2,000 - 4,000	Average daily flow (cfs) 4,000 - 5,400	Average daily flow (cfs) >5,400
Dry year (1980)	163 days (45%)	184 days (50%)	19 days (5%)	0 days
Wet year (1971)	116 days (32%)	233 days (64%)	16 days (4%)	12 days (3%)
Average year (1982)	69 days (19%)	238 days (65%)	58 days (16%)	1 day (<1%)

No municipal or non-municipal water systems draw water directly from GSL or the river in the vicinity of the E.J. West and District Project. There are no industrial users, steam-electric generation plants, or irrigation users of project waters. Erie and the District release sufficient flows from GSL that an average of 3,000 cfs is released from the Feeder Dam Project.

Water Quality

GSL has been the subject of several water quality investigations over the last 30 years. Table 8 summarizes the observed ranges over the 1953 through 1986 period. Because of their different morphometry, data from the main basin and northeast arm of GSL are presented separately.

The two basins share an approximately neutral to acidic pH and low alkalinity. The northeast arm experiences lower DO values as a result of thermal stratification which is not experienced in the well mixed main portion of GSL. Water clarity was good to excellent over the sampling periods, 1953 to1986, in both portions of the lake. Nutrients were low indicating productivity classification of oligomesotrophic. Phosphorus is considered the limiting nutrient. The nutrient input is primarily derived from the runoff from the mountainous, forested watershed, which is low in calcareous materials, nitrates, and phosphates.

Table 8. Water quality ranges over 1953 to 1986 samplings in main basin and northeast arm of GSL (Source: NMPC, 1993)

Parameter (units)	Range in main basin	Range in northeast arm
Alkalinity (mg/l)	4.0 - 63	7 - 32
BOD-5 day (mg/l)	0.6 - 2.6	NS
Coliform bacteria MPN/100 ml	3.6 - 2,400	NS

Parameter (units)	Range in main basin	Range in northeast arm
Hardness mg/l as $CaCO_3$	6 - 66	NS
pH	5.6 - 8.1	5.9 - 8.1
DO (mg/l)	2.8 - 11.7	2.0 - 11.0
Secchi depth (ft)	10.0 - 17.2	9.4 - 20.2
Nitrate (mg/l)	0.002 - 0.010	0.003 - 0.036
Total Kjeldahl nitrogen (as mg/l N)	0.11 - 0.34	0.013 - 0.50
Nitrate + nitrate (as mg/l N)	<0.06 - 0.60	0.06 - 0.58
Total phosphorus (as mg/l P)	0.005 - 0.10	0.005 - 0.20
Conductivity (μmhos)	40 - 50	<50

Note: NS = Not sampled

Although project water quality is typically good, the lake nutrient concentrations are so low that they could limit biological productivity not only in GSL but also downstream. According to Shupp, as cited in NMPC, 1993, mobilization and utilization of nutrients from the sediments is reduced by the annual winter drawdown of GSL by the District. While GSL is classified as Class B it is also considered by NYSDEC to be impaired for fish propagation because of flow regulation and drawdown (primarily District functions). The main basin of GSL is wide and shallow, but the northeast arm is deep (70 ft), long, and narrow. During the summer, the deep portions stratify, and hypolimnetic (bottom) water becomes very low in oxygen making these areas inhospitable for fish.

Erosion and Sedimentation

About 60 percent of the GSL shoreline is developed for recreation and commercial uses including 4,200 private camps, 110 beach clubs/associations and more than 75 commercial operations including 20 marinas. These permitees have, over the years, removed the natural shoreline armor (cobble, boulders, vegetation) to encourage the development of beaches and to install docks and other support facilities. Commensurate with this, the District has a 60 year record of rip-rap placement to reinforce those shoreline areas prone to erosion (whether from natural or human origins). About half of the rip-rap placed in 1992 was at locations along the northeast arm of GSL and around the village of Northville.

Erosion is the result of forces (wind, wave, gravity, or ice) acting upon materials with varying abilities to resist the destructive powers of those forces. NMPC compared potential erosion factors with the erosion potential of the shoreline (soils composition,

slope) to identify areas of moderate and high erosion susceptibility. Based upon field observation, examination of aerial photography, and geology and soils mapping, NMPC documented that only 3.7 percent of the undeveloped shoreline of the entire GSL (7,950 ft) is, by virtue of steep gradients combined with excessively drained Colton gravelly sandy loam and Tunbridge-Lyman glacial tills, susceptible to severe erosion. Approximately 25 percent of the undeveloped shoreline has a moderate susceptibility to erosion. Soils with moderate or high erosion susceptibility are concentrated in the northeast arm of the lake. The remaining undeveloped shoreline (about 70 percent) has only a slight potential for erosion. These areas are located around the main basin of GSL.

Despite the apparent ongoing erosion in selected areas, impairment of water quality (turbidity) resulting from it, has not been reported, presumably because the eroding materials are coarse enough to settle out locally. Erosion does not appear to be caused by operation of the E.J. West and District Project for hydroelectric purposes.

(2) Stewarts Bridge Project

Water Quantity

Inflow to the 480-acre Stewarts Bridge impoundment is primarily governed by releases from the E.J. West powerhouse (see table 5). Several small streams provide additional minor inflow to the impoundment (figure 2). One hour prior to start-up of the E.J. West powerhouse, the Stewarts Bridge impoundment is drawn down by 1 ft to enable a stable impoundment level to exist at full pond once E.J. West powerhouse comes on line. The Stewarts Bridge Project discharges those flows released from the E.J. West and District Project. Typically, constant releases of 4,000 cfs are made during 12-hour periods during the daylight hours. When GSL is filling, which typically occurs during a 3-week period sometime between mid March and early May, only leakage flows of 35 to 50 cfs are released to the lower reach of the Sacandaga River from the Stewarts Bridge dam. During peaking releases, the 3-mile stretch of the Sacandaga River between the Stewarts Bridge dam and the Hudson River has two main sets of rapids separated by a 1.1 mile reach of swift-flowing water.

Water Quality

The Stewarts Bridge Project impoundment and the Sacandaga River downstream to its confluence with the Hudson River is designated Class C by the state. Tributaries to this 3-mile reach of the Sacandaga River are also designated Class C or C(T). A series of water quality investigations have been conducted in the Stewarts Bridge impoundment over the last 30 years. These data indicate that the impoundment has approximately

neutral pH and low alkalinity. Depth profiles in 1953 indicated that the system was stratified with a thermocline at 40 to 50 ft. The hypolimnion (below 50 ft) displayed temperatures ranging from 12.8 to 9.4°C and nearly anoxic levels of DO (0.3 to 0.9 mg/l). The pH declined from 7.0 at the surface to 6.1 at the bottom. Like GSL, the Stewarts Bridge impoundment is nutrient poor, particularly for phosphorus, with nitrate + nitrite levels ranging from <0.10 to 0.58 mg/l and soluble phosphorus (bioavailable P) ranging from 0.002 to 0.01 mg/l.

The most recent survey, conducted in 1996, covered the project from the E.J. West powerhouse tailrace to the Sacandaga River just above its confluence with the Hudson River (KA, 1997a). Comparing upstream with downstream sites, the only parameter that experienced a change attributable to the Stewarts Bridge Project, was DO (table 9) which was low in the hypolimnion (deepest water) of the impoundment. No exceedances of state water quality standards for DO were measured downstream in the Sacandaga River, despite daily non-generation periods.

Table 9. Water quality in the Stewarts Bridge impoundment and river reaches downstream of the Stewarts Bridge Project (Source: KA, 1997a)

Site	Temp. (°C)	DO (mg/l)	pH	Secchi depth (ft)
E.J. West tailrace	19.5 - 24.0	7.2 - 8.5	6.9 - 7.1	12.4 - 13.6
Upper impoundment	12.5 - 24.5	5.8 - 8.3	6.9 - 7.0	13.4 - 13.8
Midpoint impoundment	11.0 - 24.5	2.7 - 8.6	7.0 - 7.2	14.1 - 15.2
Lower impoundment	9.0 - 24.5	1.4 - 8.7	7.0 - 7.1	13.8 - 13.9
Stewarts tailrace	20.5 - 24.0	7.9 - 8.5	7.0	N/A
Pool 1 mile downstream from Stewarts Bridge dam	17.0 - 24.5	7.7 - 8.8	7.1	N/A
Above confluence with Hudson River	18.0 - 24.0	7.1 - 8.6	7.1 - 7.2	N/A

N/A = Not applicable

(3) Hudson River Project

Water Quantity

Over the 54 year period of record (1931 to 1985) the average daily flow at the Sherman Island development ranged from a minimum of 321 cfs to a maximum of 40,577 cfs with a daily mean of 5,130 cfs. Flows at the Spier Falls development would be

similar. The Hudson River within this project area is used as a primary water source by the town of Queensbury. Seventy percent of the population of the town receives water through the Queensbury Water Treatment Plant which draws water directly from the Sherman Island impoundment. Currently, withdrawals are reported to be about 5 million gallons per day (MGD) at peak summer demand. An increase to 30 MGD has recently been proposed. The other towns that abut project waters (Lake Luzerne, Corinth, and Moreau), use sources other than the Hudson River for water supply. International Paper Company uses river water for effluent dissipation at its paper mill operation at Corinth, at the upstream end of the Spier Falls impoundment. There are no other significant water users in the project vicinity.

Leakage (5 to 10 cfs) and low flows from the Sherman Island dam currently pass predominantly to the north side of Sherman Island (figure 6) in the bypassed reach. NMPC characterized the channel on the south side of the island during low flows consists of a series of scattered, isolated pools with "stagnant growths of filamentous algae." During spillage, flow passes on both sides of the island.

Water Quality

The Hudson River Project waters are designated by the state as Class C from Corinth to the dam at Spier Falls. Below the Spier Falls dam to the Sherman Island dam, the waters are designated Class A and considered suitable for drinking water supply. From the Sherman Island dam downstream to Feeder dam, the river is classified Class B. Table 10 summarizes the water quality measured at Corinth over the period 1986 to1992.

NMPC measured DO, conductivity, pH, and water clarity in the Spier Falls and Sherman Island impoundments and the Feeder Dam impoundment (into which the Sherman Island powerhouse discharges) during the summer of 1988 (table 11).

All parameters measured at Corinth and influenced by the Hudson River Project operation were well within the ranges for the respective state water quality standards.

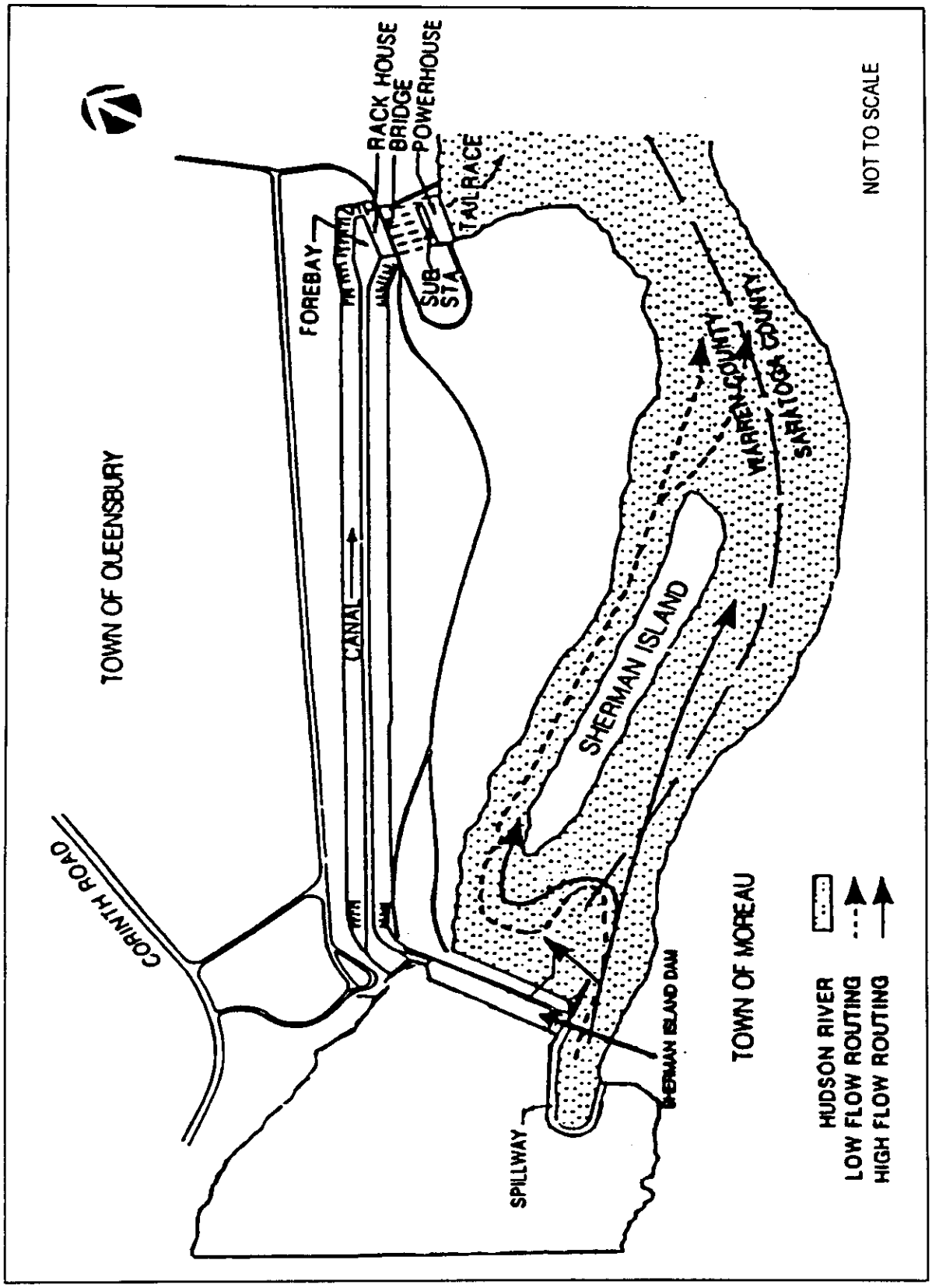

Figure 6. Sherman Island bypassed reach flow routings (Source: NMPC, 1991a, as modified by staff).

Table 10. Ranges of water quality parameters at Corinth, New York (1986-1992) (Source: USGS Internet data retrieval at www.water.usgs.gov, August, 2000)

Parameter	Units	Range 1986 through 1992
Temperature	°C	0.1 - 26.5
Turbidity	NTU	0.03 - 0.70
DO	mg/l	5.0 - 13.7
pH	Std. Units	6.28 - 8.7
Total N	mg/l	0.29 - 0.87
Total organic nitrogen	mg/l	0.07 - n0.48
Total nitrite	mg/l	ND - 0.010
Total ammonia	mg/l	ND - 0.260
Nitrate + nitrite	mg/l	<0.10 - 0.560
Total phosphorus	mg/l	ND - 0.050
Dissolved ortho-P	mg/l	ND - 0.016
Hardness	mg/l as $CaCO_3$	12 - 24
Total coliform	# /100 ml	<10 - 670
Fecal coliform	# /100 ml	4 - 720

Table 11. Range of general water quality parameters for Spier Falls, Sherman Island, and Feeder Dam impoundments--September 1988 (Source: NMPC, 1991a)

	Temperature (°C)	DO (mg/l)	Conductivity (μmhos/cm)	pH	Secchi depth (ft)
Spier Falls	18.3 - 19.5	6.9 - 11.8[a]	55 - 72	6.9 - 7.7	10.0 - 14.0
Sherman Island	18.6 - 19.1	8.3 - 10.4	58 - 65	6.9 - 7.6	9+ - 13.1
Feeder Dam	18.6 - 19.6	8.7 - 9.4	53 - 59	7.0 - 7.2	10.9 - 14.5

[a] A single reading of 14.0 mg/l was recorded but appears to be anomalously high and is probably erroneous.

(4) Feeder Dam Project

Water Quantity

Over a 59 year period of record (1931 to 1989) the average annual flow at the Feeder Dam Project varied from 3,902 (1988) to 6,654 cfs (1986) with an average flow of 4,955 cfs. The maximum recorded flow was 40,577 cfs and the minimum was 321cfs.

The Feeder Dam Project impoundment is operated by the New York State Thruway Authority to ensure a water supply to the Feeder Canal. Feeder Canal supports navigation in the Champlain Canal between Fort Edward and Lake Champlain. Impoundment storage has also historically been used to dampen upstream releases due to peaking hydropower operations, resulting in relatively constant daily releases from the Feeder Dam powerhouse. About 200 cfs is diverted from the Feeder Dam impoundment each year from May through November (the navigation season) to provide water for operation of the Champlain Canal. There are no industrial steam-electric plants, irrigation withdrawals, or other specialized water uses in the project area.

Outflows from the Feeder Dam Project discharge directly into the headwaters of the Glens Falls and South Glens Falls projects' impoundment.

Water Quality

The Hudson River is classified as Class B both upstream and downstream of Feeder Dam Project and is suitable for primary contact recreation and any other uses except as a drinking water source. Water quality data collected from the Feeder Dam impoundment in 1988 (table 11) indicates the project waters comply with water quality standards for DO and pH. We also reviewed water quality data for the Glens Falls impoundment, into which the Feeder Dam powerhouse discharges, presented in the Glens Falls license application (FPC, 1991). All reported DO values were greater than 8.0 mg/l, and pH ranged from 6.5 to 6.9. Water quality within and downstream of the Feeder Dam Project meets state water quality standards.

b. Environmental Effects and Recommendations

(1) E.J. West and District Project

Water Quantity

Erie and the District propose to reduce the depth of the winter drawdowns and phase in new operating rule curves for GSL (see section III.A of this MPEIS for a description of the proposed lake level management regime). Although the designated minimum level for winter drawdown is 735 ft, in current practice, GSL is typically drawn down only to elevation 745 ft (23 ft) from its top operating level of 768 ft. Ultimately, however, Erie and the District propose to raise the minimum lake level to 750 ft. Erie also proposes to develop a stream flow monitoring plan in consultation with the District, NYSDEC, FWS, and all other parties to the Settlement within 6 months of license issuance. The plan is proposed to be implemented within 12 months of license issuance. The District proposes to prepare and publish a report of daily GSL elevations, inflows to GSL, and flows of the Hudson River. The District would also notify the Commission, NYSDEC, NYRU, and licensees on the Hudson River if the Fort Edward USGS gage is out of operation for more than 2 weeks.

Frank Wozniak, by letter dated September 5, 2000, recommends that the minimum drawdown level be between elevation 752 and 754 ft, claiming that drawdowns below this level violate state and federal laws that prohibit draining of water from wetlands. He states that the loss of 2 ft of storage (the difference between the proposed elevation 750 ft and his recommended 752 ft) would prevent the draining of 700 acres of habitat, which he considers "a very important environmental factor."

The new GSL level curves were established to provide sufficient storage to maintain recreational opportunities from spring through fall, minimize energy losses to downstream hydro projects, provide flow augmentation during low flow periods for the maintenance of aquatic habitat and water quality, and to provide designated base flows in the Hudson River below the confluence with the Sacandaga River. A primary objective of GSL operation, to provide flood control by making a substantial amount of storage available by late March, would be maintained by adjusting the rule curve annually in keeping with measured meteorological conditions (particularly snow pack measurements and long-term weather forecasts).

By changing the maximum drawdown elevation of the lake from 735 ft to 750 ft, some of the storage volume historically available to capture high spring flow events (to minimize potential downstream flood damage), is being sacrificed in order to achieve habitat enhancements at GSL. This change in drawdown level has a slight chance of

increasing potential flooding along the Hudson River if there is an unforeseen high flow event caused by a major rain storm perhaps coupled with substantial snowmelt. The signatories to the Settlement deemed the remaining storage capacity (with the drawdown to 750 ft) to be adequate, however, to provide flood protection for "normal" meteorological conditions and that it struck an acceptable balance with the environmental benefits that would accrue with the proposed operating regime.

Since the District first began operating GSL, the ability to predict circumstances and events that could lead to flooding, have evolved considerably. This, combined with decades of operating experience, renders the previous degree of conservatism unnecessary. We agree with the signers of the Settlement that there is enough flexibility in the proposed operating procedures to accommodate most meteorological events. We are confident that the 15 ft reduction in maximum storage capacity and 5 ft reduction in storage from the current typical drawdowns to elevation 745 ft, would not jeopardize downstream properties or public safety and concur with the proposed GSL water level management regime.

The affected habitat between elevation 750 ft and Mr. Wozniak's recommended 752 ft is not wetland habitat but aquatic habitat. During every month of the year except early March, this habitat would be submerged by up to 23 ft of water. Consequently the state and federal laws pertaining to wetlands invoked by Mr. Wozniak do not apply to this portion of the drawdown zone. The proposed minimum elevation 750 ft GSL level is 5 ft higher than the current average drawdown to elevation 745 ft, resulting in substantially more submerged aquatic habitat.

We acknowledge that higher March lake levels, such as those recommended by Mr. Wozniak, would have incremental advantages to aquatic habitat (discussed further in section V.B.2.b, Aquatic Biota). However, we are not in favor of increasing the potential for damage to property and public safety. Restricting the minimum drawdown of GSL to elevation 752 ft would reduce flood storage volume by another 50,000 ac-ft. To raise the minimum water level even further to elevation 754 ft as Mr. Wozniak would prefer, would mean sacrificing 110,000 ac-ft of flood storage. We, therefore, recommend that the proposed GSL water level management regime be implemented.

The applicants' proposal to monitor GSL water surface elevations and project discharges are specified in the Settlement. We conclude that the provisions in sections 2.12, 2.13, and 2.16 of the Settlement present reasonable measures for monitoring project water surface elevations and discharges including calibration of equipment, record-keeping, and monthly reporting (including publishing or posting records on the internet). Therefore, we recommend that these measures be incorporated into any license issued for this project. We also recommend Erie provide the resource agencies, upon request,

access to the staff gages, and provide NYSDEC an opportunity to review and concur with the flow monitoring plan; however, final approval of a flow monitoring plan is reserved to the Commission.

Any drawdown changes in GSL or changes in flow releases would not offset the 200 cfs diverted from the Hudson River at the Feeder Dam impoundment during the summer and fall months for the Feeder Canal. Water quantity effects from the E.J. West and District Project on the tailwater and Sacandaga River are described below in our discussion of the Stewarts Bridge Project. Water leaving the tailrace of the E.J. West and District Project enters the Stewarts Bridge impoundment, and, essentially, there is no free-flowing river reach between the two projects.

Water Quality

The applicants do not make any specific recommendations that pertain directly to water quality. Erie states that the proposed canoe portage route would be designed and located to minimize the potential for soil erosion, and it proposes to design the Route 4 overlook in consultation with Saratoga County.

No major construction is proposed at the E.J. West Project. Some minor and short duration localized erosion and sedimentation could occur with any clearing and grading associated with construction of a new portage route around the dam and the paving of the Route 4 overlook near the Conklingville Dam. Erie provides examples of how construction of such facilities would be accomplished in a manner that would minimize erosion and sedimentation, including: the avoidance of steep slopes; minimization of soil disturbance; stabilization of exposed soils with mulch (using local materials where possible); and minimization of vegetation removal. The implementation of standard best management practices should limit the potential for water quality deterioration from these sources. We recommend that the final design for each facility include site-specific erosion and sedimentation control measures where ground-disturbing activities are proposed.

We conclude that with our recommended erosion and sedimentation control measures, there would be no long-term adverse effects on water quality in GSL. We conclude that periodic low DO values in GSL are primarily caused by thermal stratification, a natural phenomenon, and are unrelated to hydroelectric operations. Water quality effects of releases from the Conklingville Dam are discussed in the Stewarts Bridge section.

Shoreline Erosion and Sedimentation

Frank Wozniak, by letter dated September 5, 2000, recommends that the issue of shoreline erosion at GSL be addressed.

Mr. Wozniak makes no specific recommendations regarding what measures should be implemented to reduce any shoreline erosion that is currently occurring. There is some ongoing erosion along the shoreline of GSL, but its causes are not clearly definable. We examined the District's rip-rap placement records for the 60 year period from 1932 to 1992. Acknowledging that weather conditions vary enormously from year to year, there appears to be a downward trend in the annual volume of rip-rap placed by the District. This trend may indicate a gradual stabilization of the GSL shoreline or simply a reduction in the amount of shoreline stabilization work that the District is willing to support.

Future operation of GSL is proposed to include a reduction in the depth of winter drawdown (from 23 ft currently to about 18 ft by 2020). Some reduction in shore damage from ice scouring can be expected to the extent that under-ice drawdown is contributing to shoreline erosion. Other operational features potentially contributing to erosive agents are limited (power generation involves less than 1 inch of water level fluctuation on a daily basis) and are not proposed to change, with the exception of the operation for aggressive use of storage.

Our review of the available record indicates that any erosion occurring along the shore of GSL is not related to hydropower operations but mostly to activities associated with shoreline development for recreational purposes. The District's program of rip-rap placement at sites with active erosion would continue to minimize erosion to the extent practical and we recommend that this program continue but not be restricted to only using rip-rap to control erosion. Alternative measures, such as use of vegetative plantings and natural fiber mats, may be equally effective in controlling erosion depending on site-specific conditions.

The County of Saratoga, in its June 28, 2001, comments on the draft MPEIS (as amended by letter to the Commission dated September 14, 2001), indicates that there are many examples of existing severe shoreline erosion problems along the GSL shoreline. It indicates that these areas would experience additional shoreline erosion relating to high water elevations which would occur as the result of the implementation of an aggressive storage mode of hydroelectric operation of the E.J. West facility.

We reassessed existing and potential future GSL shoreline erosion in light of the provisions for aggressive use of storage contained in the Settlement. The volume between water surface elevation 768 and 771 ft NGVD historically has only been used for

storage of flood waters. The shoreline within this flood storage zone would only infrequently be exposed to innundation and wave action. Aggressive storage would allow GSL water surface to exceed the elevations shown on the level 3 curves of figures 3, 4, and 5 for short periods of time when the GSL water level is at its highest (typically June and July). In such instances, water would be released at a later time to better enable efficient hydroelectric generation at downstream projects. With aggressive storage, water could be stored in GSL between elevation 768 and 771 ft. Consequently, the shoreline within the zone between elevation 768 and 771 ft could be more frequently exposed to wave action and resultant erosive forces than under current conditions. Incremental erosion caused by aggressive storage, if it occurs, would be linked to hydropower operations, and we consider it appropriate to implement measures to prevent such erosion.

We, therefore, recommend that an erosion and sedimentation control plan for GSL be developed in consultation with Saratoga and Fulton counties, NYSDEC, and NYSOPRHP. The plan should specify the frequency of monitoring, the entities responsible for monitoring, the process that would be used to determine whether identified erosion sites are project-related, the process that would be used to establish the party responsible for funding remedial measures, and the process that would be used to establish post-remedial action inspections to ensure implemented measures are effective. The Commission would review the plan, modify it, as appropriate, and approve it.

(2) Stewarts Bridge Project

Water Quantity

The quantity of water reaching the Stewarts Bridge Project is controlled by natural flow availability and releases made by the E.J. West and District Project. Flow would be released from the E.J. West and District Project into the Stewarts Bridge impoundment, varying over the license of the project to meet target flow augmentation needs for the Hudson River below the confluence with the Sacandaga River, based on various rule curves (see table 2).

The operation of the Stewarts Bridge Project as proposed includes several flow modifications for aquatic habitat enhancement and for the improvement of whitewater boating. The rationale for these proposed flows is primarily based on aquatic habitat and recreational factors. We therefore discuss Stewarts Bridge flow issues in sections V.B.2.b (Aquatic Biota) and V.B.5.b (Recreational Resources) of this MPEIS. Erie proposes to develop a stream flow and water level monitoring plan in consultation with the District, NYSDEC, FWS, Fulton and Saratoga counties, and the other parties of the Settlement within 6 months of license issuance. The water level monitoring plan is proposed to be

implemented within 12 months of license issuance, and the base flow monitoring plan would be implemented on January 1, 2013.

Erie's proposal to monitor the Stewarts Bridge impoundment water surface elevations and project discharges are specified in the Settlement. We conclude that the provisions in sections 2.12, 2.13, and 2.16 of the Settlement present reasonable measures for monitoring project water surface elevations and discharges including calibration of equipment, record-keeping, and monthly reporting (including publishing or posting records on the internet). Therefore, we recommend that these measures be incorporated into any license issued for this project. We also recommend Erie provide the resource agencies, upon request, access to the staff gages, and provide NYSDEC an opportunity to review and concur with the flow monitoring plan; however, final approval of a flow monitoring plan is reserved to the Commission.

Water Quality

Erie does not make any specific recommendations that pertain directly to water quality although other proposals such as increasing base flows and stabilization of impoundment water levels would benefit water quality. Erie proposes to construct several recreational facilities in consultation with NYSDEC and ADK (e.g., the north side put-in parking area and the south side take-out facility). Erie's proposed improvements to the Stewarts Bridge impoundment recreation area would involve filling and regrading the road. Erie provides examples of how improvements to or construction of such facilities would be accomplished in a manner that would minimize erosion and sedimentation, including: avoidance of steep slopes; minimization of soil disturbance; stabilization of exposed soils with mulch (using local materials where possible); and minimization of vegetation removal.

The improvements proposed for the Stewarts Bridge impoundment recreation area would have only minor, short term, and local effects on impoundment water quality if standard best management practices are used. The construction of the north side put-in area parking area and trail link to the existing portage trail and the south side take-out area would entail localized soil disturbance and vegetation removal. The implementation of standard best management practices should limit the potential for water quality deterioration from these sources. We recommend that appropriate site-specific erosion and sedimentation control measures be incorporated into the final design of facilities that entail ground-disturbing activities, consistent with the conditions of the WQC.

The Stewarts Bridge impoundment receives direct discharge from the E.J. West tailrace (i.e., there is no intervening river reach). Measured water quality parameters

(table 9) show no exceedances of state standards in waters entering the Stewarts Bridge impoundment from the E.J. West powerhouse.

The Stewarts Bridge impoundment firmly stratifies during the summer, and this is reflected in reduced DO at the bottom. Immediately behind the dam, the impoundment is about 99 ft deep. Here, measured water quality profiles during several seasons from 1953 through 1996, showed a warm surface layer extending to a depth of about 40 ft with average high temperatures of about 24°C and DO levels of about 6.0 mg/l. The middle layer extends from about 40 to 50 ft below the surface, has average peak temperatures of about 17°C, and only about 3.0 mg/l DO. The water at depths below 50 ft is characterized by temperatures of about 10°C and DO at <2.0 mg/l.

The tailwaters below the Stewarts Bridge powerhouse had measured DO levels well above minimum DO standards throughout the year. The reason for this, based on our review of the intake configuration, is because the powerhouse intake draws from the top 25 ft of the Stewarts Bridge impoundment, where DO depletion does not occur. We therefore conclude that although the deep water of the Stewarts Bridge impoundment currently does not meet applicable water quality standards for DO (4.0 mg/l or more at all times), there are no practical alterations of project facilities or operations that would change the depleted DO conditions of the water in the deep portions of the impoundment.

The proposed project operations for Stewarts Bridge would eventually result in an increase in base flow releases from the project of from 300 to 350 cfs during periods of non-generation and an increase in flow releases for recreational boating purposes. These releases would continue to be drawn from the upper portion of the impoundment. We therefore conclude that the proposed modifications to project operations would continue to provide water in compliance with state water quality standards to the Sacandaga River downstream of the Stewarts Bridge powerhouse to its confluence with the Hudson River throughout the year.

Currently, during periods of non-generation, only leakage flows are provided to the 3-mile reach of the Sacandaga River from the Stewarts Bridge dam to the confluence with the Hudson River. This creates a series of isolated pools which could be subject to periodic low DO and abrupt temperature changes from atmospheric influences. Currently state water quality standards are being met in the 3-mile river reach below the Stewarts Bridge dam based on available data (see table 9), but it is unclear whether any parameters were measured specifically during periods of non-generation. However, the maintenance of base flows of from 300 to 350 cfs (see table 3) below the Stewarts Bridge dam would have a marginal positive influence on water quality by preventing stagnation and providing DO and temperature stability throughout the day and night. These flows would also affect aquatic habitat and are discussed further in section V.B.2.b (Aquatic Biota).

The scheduled whitewater releases during June through September (discussed in section V.B.4.b, Recreational Resources) would provide daily flushing of the reach, ensuring natural aeration. We make our recommendations regarding base flows and scheduled recreational whitewater releases in sections V.B.2.b and V.B.4.b, respectively.

The proposed year-round stabilization of impoundment water levels would limit shoreline erosion and subsequent sedimentation and encourage the development of stabilizing vegetation. This would enhance existing water quality.

(3) Hudson River Project

Water Quantity

Erie's proposed operation of the Hudson River Project would include several flow modifications that would primarily benefit aquatic habitat in the Sherman Island bypassed reach. We therefore discuss Hudson River Project flow issues in section V.B.2.b (Aquatic Biota) of this MPEIS.

Erie's proposal to monitor the water surface elevation of the Spier Falls and Sherman Island impoundments and project discharges are specified in the Settlement. Erie proposes to develop a stream flow and water level monitoring plan in consultation with the District, NYSDEC, FWS, Fulton and Saratoga counties, and the other parties of the Settlement within 6 months of license issuance. These plans are proposed for implementation within 12 months of license issuance.

We reviewed the provisions in sections 2.12, 2.13, and 2.16 of the Settlement and conclude that they represent reasonable measures for monitoring project water surface elevations and discharges including calibration of equipment, record-keeping, and monthly reporting for the Sherman Island and Spier Falls developments. Therefore, we recommend that these measures be incorporated into any license issued for this project. We also recommend Erie provide the resource agencies, upon request, access to the staff gages, and provide NYSDEC an opportunity to review and concur with the flow monitoring plan; however, final approval of a flow monitoring plan is reserved to the Commission.

Water Quality

Erie does not make any specific recommendations that pertain directly to water quality for the Hudson River Project, although other proposals, such as increased flows to the Sherman Island bypassed reach and stabilized impoundment water levels for both developments (which would be achieved, in part, by the installation of partial pneumatic

flashboards), would benefit water quality. Erie proposes to develop canoe portages around both dams, to develop island campsites at Sherman Island and shoreline campsites at Spier Falls developments, and to improve or construct several other facilities (e.g., improvements to the existing boat launches, the installation of partial pneumatic flashboards at the Sherman Island dam, and the construction of a weir between the islands immediately downstream of the Sherman Island development dam). Any of these activities could involve localized soil disturbance and vegetation removal. Erie provides examples of how improvements to or construction of such facilities would be accomplished in a manner that would minimize erosion and sedimentation, including: avoidance of steep slopes; minimization of soil disturbance; stabilization of exposed soils with mulch (using local materials where possible) and minimization of vegetation removal. We expect the total amount of sediment production to be minimal.

The implementation of standard best management practices should limit the potential for water quality deterioration from Erie's proposed measures. We recommend that appropriate site-specific erosion and sedimentation control measures be incorporated into the design of facilities that would entail ground-disturbing activities (including laydown areas for construction of the pneumatic flashboards and construction of the weir downstream of the Sherman Island dam to facilitate flow apportionment to both sides of the island).

Currently, when inflows to the Sherman Island impoundment are less than the hydraulic capacity of the powerhouse, only leakage flows are provided to the Sherman Island bypassed reach. This creates a series of isolated pools in the bypassed reach of the Hudson River, which could be subject to periodic low DO and abrupt temperature changes from atmospheric influences. We expect the maintenance of minimum flows below the Sherman Island dam (at least 100 cfs to the north channel and 150 cfs to the south channel year-round) to have a positive influence on water quality by preventing stagnation and by providing DO and temperature stability. The boulder and cobble dominated substrate in the bypassed reach would provide aeration when the minimum flows are implemented. We consider aquatic habitat values to be the primary factor in determining minimum flows to the Sherman Island bypassed reach and therefore make our recommendation regarding flows to the bypassed reach in section V.B.2.b, Aquatic Biota.

The proposed year-round stabilization of impoundment water levels would limit shoreline erosion and subsequent sedimentation and encourage the development of stabilizing vegetation. These measures would enhance existing water quality. We therefore recommend that Erie implement its proposed more stable impoundment water level management regime (limiting fluctuations to 1 ft during walleye spawning season and to 2 ft for the rest of the year) for the Hudson River Project.

(4) Feeder Dam Project

Water Quantity

Erie proposes to maintain a minimum average daily flow from the Feeder Dam Project of 1,760 cfs (with an instantaneous base flow of 1,500 cfs). In addition, Erie's proposal would not alter its commitment to provide historical flows of up to 200 cfs to the Feeder Canal from May through November for navigational purposes in the Champlain Canal system. Erie also proposes to monitor the water surface elevation of the Feeder Dam impoundment and project discharges as specified in the Settlement. Specifically, Erie proposes to develop a stream flow and water level monitoring plan in consultation with the District, NYSDEC, FWS, and the other parties of the Settlement within 6 months of license issuance. These plans are proposed for implementation within 12 months of license issuance.

Erie's proposed flow regime at Feeder Dam as well as at upstream hydroelectric projects, coupled with the reduction in the historic impoundment fluctuations, could adversely affect the ability of this project to re-regulate daily flow fluctuations. If flows downstream of the Feeder Dam Project experience substantial daily fluctuations, it could influence aquatic riverine habitat as well as the generation capabilities of downstream hydroelectric projects. We therefore discuss the cumulative aspects of alterations in reregulation capabilities in section V.B.1.c, Cumulative Effects, potential effects on aquatic habitat in section V.B.2.b (Aquatic Biota), and the ramifications on downstream hydroelectric projects in section VI. E (Developmental Analysis) of this MPEIS.

We reviewed the provisions in sections 2.12, 2.13, and 2.16 of the Settlement and conclude that they represent reasonable measures for monitoring project water surface elevations and discharges including calibration of equipment, record- keeping, and monthly reporting. Therefore, we recommend that these measures be incorporated into any license issued for this project. We also recommend Erie provide the resource agencies, upon request, access to the staff gages, and provide NYSDEC an opportunity to review and concur with the flow monitoring plan; however, final approval of a flow monitoring plan is reserved to the Commission.

Water Quality

The applicant does not make any specific recommendations that pertain directly to water quality although other proposals such as the stabilization of impoundment water levels (which would be achieved, in part, by the installation of partial pneumatic flashboards), would benefit water quality. Erie proposes to improve, construct, or assist in the construction of several facilities at the Feeder Dam Project (e.g., Overlook Park,

tailrace angler access, and the partial pneumatic flashboards). Any of these activities could entail localized soil disturbance and vegetation removal. Erie provides examples of how improvements to or construction of such facilities would be accomplished in a manner that would minimize erosion and sedimentation, including: avoidance of steep slopes; minimization of soil disturbance; stabilization of exposed soils with mulch (using local materials where possible) and minimization of vegetation removal.

The implementation of standard best management practices should limit the potential for water quality deterioration from Erie's proposed measures. We recommend that appropriate site-specific erosion and sedimentation control measures be incorporated into the design of facilities that would entail ground-disturbing activities (including laydown areas for construction of the pneumatic flashboards).

The proposed year-round stabilization of impoundment water levels would limit shoreline erosion and subsequent sedimentation and encourage the development of stabilizing vegetation. This would enhance existing water quality. We, therefore, recommend that Erie implement its proposed, more stable impoundment water level management regime (limiting fluctuations to 1 ft during walleye spawning season and to 2 ft for the rest of the year).

c. Cumulative Effects on Water Quantity and Quality

We identified water quantity and quality as potentially cumulatively affected resources. Licensing the four hydroelectric projects included in this MPEIS as proposed with additional staff-recommended measures would enable the two flow-related functions of the District's GSL operation (control of flood waters and low flow augmentation) to be retained and a likely overall improvement in water quality in project-affected stream reaches. Sufficient early spring storage would be retained in GSL to capture flows associated with predicted and most unforeseen high flow events. The eventual implementation of base flow releases from the Stewarts Bridge Project would enhance the assimilative capacity of the Hudson River downstream of the confluence of the Sacandaga River by increasing the volume of flow during periods of non-generation and increasing the DO from aeration in riverine sections during periods when little if any flows have traditionally been provided. Water quality would also improve in the bypassed stream reach below the Sherman Island development.

We have some concern that the ability of the Feeder Dam Project to re-regulate daily flow releases may be diminished under the applicant's proposal. Substantial increases in daily flow fluctuations in the Feeder Dam tailwaters could result in alteration in the flow available for downstream hydroelectric generation and, because the downstream hydroelectric projects are required to operate in a ROR mode (outflow from

the project equals inflow to the project), daily dewatering of shallow portions of aquatic riverine habitat downstream of the Glens Falls dam could occur. Whether altered releases from the Feeder Dam Project would result in adverse effects on hydroelectric generation or aquatic riverine habitat would be difficult to determine at the present time (prior to implementation of all the proposed measures for the four projects).

Consequently, we make a recommendation in section V.B.2.b (4) that Erie prepare a report that compares historic flow releases from the Feeder Dam Project with releases from the first 5 years under the newly licensed operating regime. We recommend that, after 5 years of operation under the proposed regime described here, Erie then consult with NYSDEC and potentially affected downstream hydroelectric project operators regarding the results of the comparative evaluation. If adverse effects are apparent on downstream flow regimes that are related to the four hydroelectric projects considered here and subsequently licensed, then appropriate corrective measures could be developed and filed with the Commission for approval.

d. Unavoidable Adverse Effects

Even with implementation of best management practices during and after construction, there still may be short-term, minor increases of sedimentation in project waters adjacent to ground-disturbing activities.

2. Aquatic Biota

a. Affected Environment

The fish community in the lower Sacandaga and upper Hudson rivers is primarily an assemblage of warmwater and coolwater species. Table 12 shows the fish species that were collected in fisheries surveys and entrainment studies conducted in various project waters.

The water bodies in the project area support fisheries of both regional and local importance. Productivity of the waters in the Sacandaga River is low due to the nutrient-poor soils and bedrock of the Adirondack region. Winter drawdown of GSL for flood control also adversely influences aquatic habitat. Reducing the extent of winter drawdowns in GSL has been identified as a high priority goal of the state and federal fisheries agencies. Aquatic habitat in other project waters is also affected by drawdown of impoundments for maintenance and daily fluctuations associated with peaking power production associated with the four projects. Large daily fluctuations in river flows influences the structure of the riverine aquatic community from the Stewarts Bridge to the Feeder Dam projects. Aquatic resources in the Sacandaga River and Hudson River upstream of the Troy dam benefit from flow augmentation during the summer months, when storage in GSL is used by the District to meet minimum flow targets downstream of the confluence of the Hudson and Sacandaga rivers.

(1) E.J. West and District Project

GSL is a large water body (25,950 acres) that supports a regionally important sport fishery for walleye, northern pike, and smallmouth bass. Since 1988, an annual multi-municipal funded fish stocking program has been conducted on GSL (at a total cost of $185,000) to enhance fishing opportunities (letter from A. Daly, Chairperson, Saratoga County Board of Supervisors, to the Commission, dated June 28, 2001). There are no anadromous or catadromous species known to be present in the lake.

Table 12. Species of fish collected in project waters (Source: Moreau, 1991; NMPC, 1991a, 1993, 1998; Acres, 1995; KA, 1995a, 1995b, 1997c, as modified by staff)

Common Name	Location Sampled IMP = impoundment, ENT = entrainment sampling, BYP = bypassed reach, TW = tailwater										
	GSL	EJ West	Stewarts Bridge			Spier Falls	Sherman Island			Feeder Dam	
		ENT	IMP	IMP	TW	IMP	IMP	ENT	BYP	IMP	ENT
American Eel										X	X
Blacknose dace		X		X				X			X
Bluntnose minnow			X			X	X	X		X	X
Common carp	X	X	X				X			X	X
Common shiner											
Creek chub				X					X		
Emerald shiner			X								X
Fallfish	X		X		X	X	X			X	X
Fathead minnow		X						X			
Golden shiner	X	X					X	X		X	X
Longnose dace					X		X		X		
Mimic shiner							X			X	
Spotfin shiner								X			
Spottail shiner	X	X	X	X				X			X
Northern hog sucker											X
Shorthead redhorse	X										
White sucker	X	X	X		X	X	X	X	X	X	X
Black bullhead							X			X	X
Brown bullhead	X	X				X	X	X		X	X
Channel catfish								X			X
Stonecat								X			
Yellow bullhead		X						X			X
Chain pickerel							X	X		X	X
Northern pike	X		X			X	X	X	X	X	X
Central mudminnow								X			
Rainbow smelt		X						X			X
Brook trout			X	X					X		X
Brown trout		X	X	X	X	X	X	X	X	X	X
Lake whitefish	X										
Rainbow trout		X	X					X	X		X
Banded killifish						X	X	X		X	
Slimy sculpin			X	X							
Black crappie	X	X									X
Bluegill sunfish		X			X			X	X		X
Largemouth bass	X	X				X		X	X	X	X
Pumpkinseed	X	X	X			X	X	X	X	X	X
Redbreast sunfish							X	X		X	X
Rock bass	X	X	X	X	X	X	X	X	X	X	X
Smallmouth bass	X	X	X		X	X	X	X	X	X	X
White crappie											X
Log perch	X	X			X	X		X			X
Tessellated darter						X	X	X		X	X
Walleye	X	X	X			X	X	X	X	X	X
Yellow perch	X	X	X		X	X	X	X	X	X	X
total species	17	20	16	7	9	15	20	28	14	21	32

Despite the lake's limited productivity (classified as oligomesotrophic), it is a popular angler destination due to its proximity to population centers, size, good access, and attractive setting. Outdoor Life Online lists GSL as a "hot" eastern northern pike fishing lake, citing it as the home of the North American record northern pike at 46 pounds, 2 ounces (Outdoor Life web page article accessed October 27, 2000 at http://fieldandstream.com/fishing/regional/east_pike.html). In statewide angler interviews, GSL was rated fifth in harvest for walleye. Most walleye spawning occurs in the Sacandaga River upstream from GSL, near Northampton, New York.

The E.J. West powerhouse discharges directly into the headwaters of the Stewarts Bridge impoundment (see table 7). Therefore, we address aquatic resources for this reach, including the tailwaters of the E.J. West powerhouse, below in our discussion of the Stewarts Bridge Project impoundment.

(2) Stewarts Bridge Project

Impoundment

The 3.5-mile-long, 480 acre Stewarts Bridge impoundment provides diverse littoral habitats including sand, gravel, and cobble shoals; stump and snag areas; rocky, boulder areas; and several small tributary inlets. Spawning habitat is abundant for centrarchid species and for yellow perch, but spawning habitat for walleye is limited. The tailrace of the E.J. West powerhouse and several tributaries provide the best spawning habitat for walleye spawning. Habitat conditions in the impoundment are affected by daily fluctuations of up to 1 ft and by annual drawdowns of up to 15 ft below normal pool, which are performed to facilitate maintenance at either the upstream E.J. West powerhouse or Stewarts Bridge Project facilities. The annual maintenance drawdowns normally occur when flow from GSL is restricted to allow the capture of spring runoff, which typically occurs for several weeks from late March to early May.

Walleye spawning surveys conducted by NMPC in the Stewarts Bridge impoundment found only 19 walleye, with the largest concentrations of fish in the mouths of tributary streams. The relatively small numbers of adult walleye that were collected were attributed to limitations in spawning habitat and the low primary productivity of the impoundment. A potential high quality spawning area is located in the tailrace of the E.J. West powerhouse, but this habitat is affected by periodic interruptions in flow caused by peaking operations and by cessation of the powerhouse operation in the spring. In the spring, no water is released from GSL to provide flood control by reducing Sacandaga River flows to the Hudson River during this period when flows in the Hudson River are high from spring runoff. Common game species collected in the impoundment during surveys conducted between 1953 and 1996 include smallmouth bass, rock bass, and

yellow perch. The project waters also support a number of forage fish and rough fish including common carp and various minnow species.

Tailwater

Downstream of the Stewarts Bridge dam, the Sacandaga River is free-flowing for 3 miles to its confluence with the Hudson River. Flows in this segment typically vary between leakage (35 to 50 cfs) and 4,000 cfs due to peaking operation of the Stewarts Bridge Project. During non-generation periods, habitats are reduced to intermittent pool areas connected by riffle-runs. Fisheries sampling conducted in the tailwater resulted in the collection of 27 fish of 9 species, with longnose dace and smallmouth bass being most abundant. Although the State does not classify the tailwater as "trout water (either T or TS)," trout occur in this reach of the Sacandaga River. The origin of the trout is unknown, but they could enter this reach from tributaries or from upstream stocking of GSL.

(3) Hudson River Project

Spier Falls

The Spier Falls impoundment is 638 acres in area, 4.5 miles long, and has an average width of 800 ft. The impoundment extends upstream to the base of the Palmer Falls dam (Curtis/Palmer Falls Project No. 2609). Aquatic vegetation is limited, in part due to 4-ft daily fluctuations in impoundment elevations. Drawdowns of up to 8 ft may occur for maintenance activities. Although the applicant does not state when maintenance drawdowns normally take place at the Spier Falls development , they typically would occur when inflow to the development is less than the hydraulic capacity of the turbines, which generally is during the summer and fall.

Fisheries surveys conducted for NMPC in the Spier Falls impoundment resulted in the collection of 11 species, dominated by banded killifish, bluntnose minnow, fallfish, and yellow perch. Another survey found 14 species, with collections dominated by bluntnose minnow, yellow perch, pumpkinseed, rock bass, and tesselated darter.

Outflows from the Spier Falls development discharge directly into the headwaters of the Sherman Island impoundment. Therefore, we address the aquatic resources for this reach, including the tailwaters of the Spier Falls powerhouse, below in our discussion of the Sherman Island impoundment.

Sherman Island Impoundment

The Sherman Island impoundment is 305 acres in area, 3.5 miles long, and has an average width of 650 ft. Maximum daily impoundment fluctuations are up to 3.7 ft from the top of flashboards when flashboards are present, but may extend another 4 ft (to 3.7 ft below the spillway crest) if some of the flashboards are not in place. The applicant does not state when maintenance drawdowns normally take place at the Sherman Island development, but they typically would occur when inflow to the development is less than the hydraulic capacity of the turbines, which generally is during the summer and fall. Although the majority of banks along the shoreline are steep and rocky, a number of coves and shallow areas located on the south side of the river, just upstream of the dam, offer potential spawning areas for sunfish and smallmouth bass.

Fisheries surveys conducted for NMPC in 1984 in the Sherman Island impoundment resulted in the collection of nine species, dominated by smallmouth bass, rock bass, yellow perch, pumpkinseed, white sucker, bullhead, and walleye. Another survey conducted in 1989 found 14 species, with collections dominated by bluntnose minnow and pumpkinseed.

Walleye spawning surveys (Beak, 1989) at the headwater of the Sherman Island impoundment (at the base of the Spier Falls dam and tailrace) found that during the pre-spawning period, walleye aggregated below the Taintor gates, but fish moved into the tailrace once spills ended. Walleye appeared to spawn along the shoreline washed by the station discharge. A total of 149 walleye were captured or seen in the survey, suggesting that the spawning population was not large.

Sherman Island Bypassed Reach

The bypassed reach at Sherman Island is 4,000 ft long, and consists of a 550 ft-long pool at the foot of the dam, 2,200 ft-long channels on the north and south sides of Sherman Island, and an 800-ft long combined channel (figure 7). The downstream Feeder Dam impoundment normally inundates a 500- to 600-ft-long section upstream of the Sherman Island powerhouse tailrace and bypassed reach. During periods of non-spillage, most of the flow from the pool at the foot of the dam drains into the north channel (see figure 6). There is currently no minimum flow release.

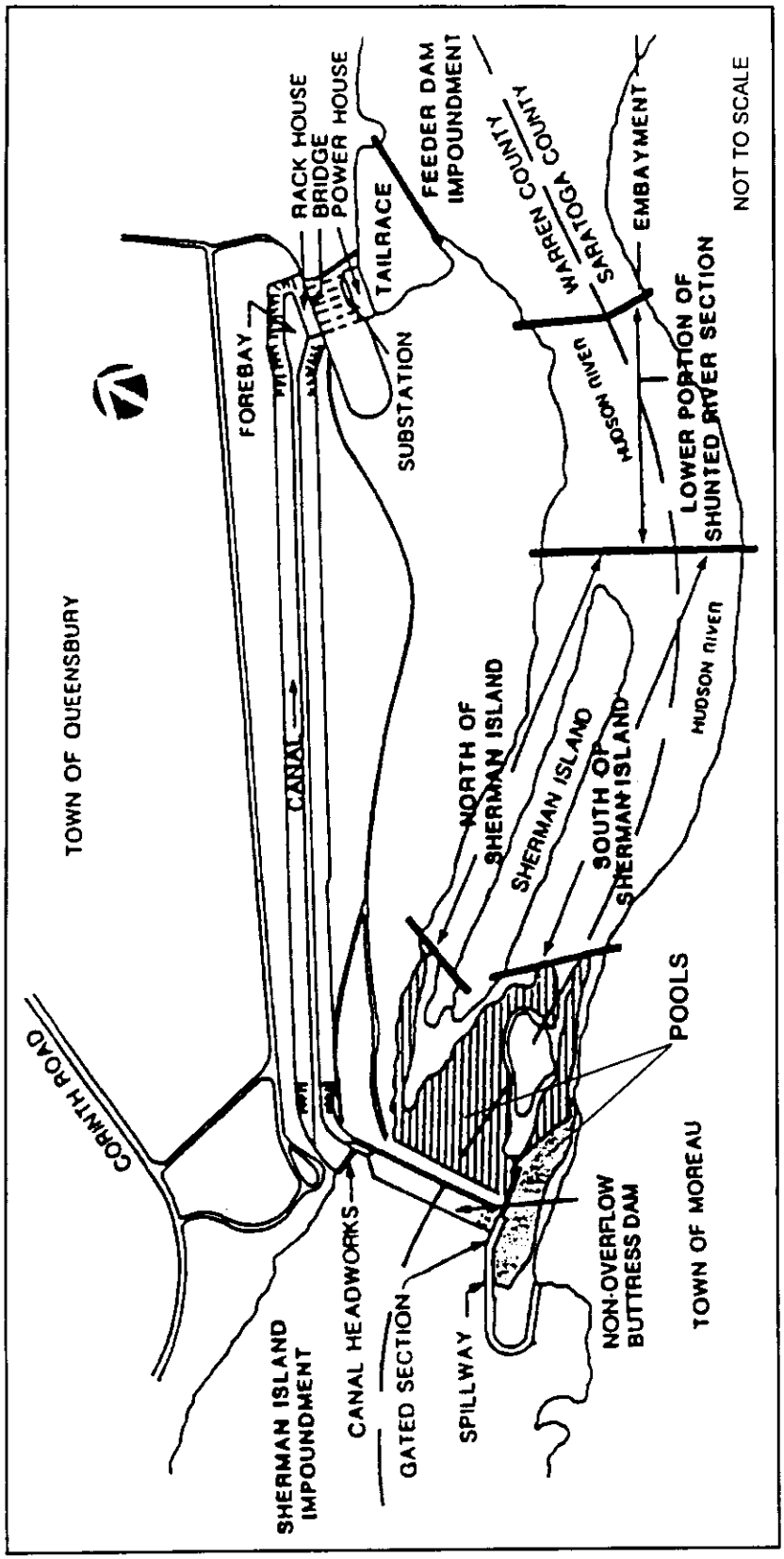

Figure 7. Sherman Island bypassed reach segments (Source: NMPC, 1991a, as modified by staff).

Fisheries surveys conducted for NMPC in 1984 in the Sherman Island bypassed reach resulted in the collection of 13 species, dominated by rock bass, smallmouth bass, yellow perch, longnose dace, pumpkinseed, and walleye. As discussed in the next section, spawning surveys conducted by Beak (1989) documented that the bypassed reach was also used for spawning by walleye from the Feeder Dam impoundment. Other species that were observed in the bypassed reach during the walleye spawning surveys included numerous small smallmouth bass, two large (18 to 20 inch) rainbow trout, and two brown trout.

The average daily flow at the Sherman Island development ranges from a minimum of 321 cfs to a maximum of 40,577 cfs, with a daily mean of 5,130 cfs based on a 54-year period of record. Outflows from the Sherman Island powerhouse discharge directly into the headwaters of the Feeder Dam impoundment (figure 7). Therefore, we address aquatic resources for this reach, including the Sherman Island tailrace, below in our discussion of the Feeder Dam impoundment.

(4) Feeder Dam Project

The 717-acre Feeder Dam impoundment is 6 miles long and has a width that generally varies from 500 to 1,000 ft (but exceeds 2,000 ft in some areas). Maximum daily impoundment fluctuations of up to 3 ft are used to reregulate flows discharged from the peaking projects located upstream. Drawdowns of up to 4 ft occur for maintenance activities. The impoundment has a very irregular bottom profile, and there are numerous coves, wetlands, and backwater areas. Aquatic vegetation occurs in patches throughout the impoundment, with some species occurring in relatively large beds.

Fisheries surveys conducted for NMPC in 1984 in the Feeder Dam impoundment resulted in the collection of 9 species, with collections dominated by smallmouth bass, yellow perch, pumpkinseed, rock bass, chain pickerel, and black bullhead. Another survey conducted in1989 found 15 species, with collections dominated by fallfish, banded killifish, unidentified sunfish, yellow perch, smallmouth bass, and tesselated darters.

Walleye spawning surveys conducted in 1989 (Beak, 1989) at the headwater of the Feeder Dam impoundment (Sherman Island bypassed reach, spillway, and tailrace) found that most spawning occurred in the Sherman Island tailrace, followed by the lower and upper ends of the Sherman Island bypassed reach. A total of 144 walleye were captured or seen in the survey, suggesting that the spawning population was not large. However, poaching has been reported in this area due to the concentration of fish during the spawning season (J. Timko, regional NYSDEC Conservation Officer, as cited in Beak, 1989).

Outflows from the Feeder Dam Project discharge directly into the headwaters of the Glens Falls and South Glens Falls projects' impoundment. Flow releases from the Feeder Dam Project generally range between 2,500 and 4,500 cfs, with a minimum release of about 1,000 cfs; however there is currently no requirement to release an instantaneous minimum base flow.

The fish community in the Glens Falls impoundment is a diverse mix of warm-, cool-, and coldwater species. A total of 27 species of fish were collected during fishery surveys in 1993 (FERC, 1999). The three most abundant fish species were rock bass (20 percent of the total catch), spottail shiner (16 percent of the total catch), and fallfish (15 percent of the total catch). Major game fish in the Glens Falls impoundment include large- and smallmouth bass and chain pickerel. Other sport and pan fish collected in the Glens Falls impoundment include brown trout, walleye, yellow perch, bullheads, rock bass, and various other sunfish (bluegill, redbreast, and pumpkinseed). Some of the species are relatively abundant (e.g., smallmouth bass and redbreast sunfish), and others are relatively uncommon (e.g., brown trout and bullheads).

The existing fish community in the Glens Falls impoundment appears balanced and stable. In addition to the game and predatory fish (e.g., pickerel and basses), a variety of forage fish are present in the project area and relatively common. About 40 percent of the fish (representing 12 species) collected during the 1993 fishery survey were minnows and darters. A range of fish sizes also were collected during the fishery survey, indicating natural reproduction and multi-year survival. Downstream fish passage is currently provided at the South Glens Falls Project, and NYSDEC characterizes the existing smallmouth bass fishery downstream of the Glens Falls dam as "exceptional" (letter from K. Kogut, Regional Manager, Bureau of Habitat, NYSDEC, Warrensburg, NY, to David Manny, Vice President, Finch, Pruyn & Company, Inc., Glens Falls, NY, dated December 2, 1998).

b. Environmental Effects and Recommendations

(1) E.J. West and District Project

Impoundment Fluctuations

Winter drawdown of GSL for flood control purposes (not related to hydropower production) limits aquatic macrophyte growth, forage production, habitat availability, and may encourage emigration of fish from the lake. The drawdown varies from year to year with an average drawdown of 23 ft and a maximum potential drawdown of 33 ft to 735 NGVD. The typical 23-ft drawdown exposes about 7,000 acres (27 percent) of the impoundment (GSL) bed, and the volume of the impoundment is reduced by 66 percent.

The maximum drawdown of 33 ft would expose about 13,500 acres (52 percent) of the impoundment bed, and the volume of the impoundment would be reduced by 87 percent. The effects of winter ice may extend the area of drawdown influence by freezing sediments to a level several feet below the minimum winter lake elevation.

Although not related to energy production, the applicants (Erie and the District) propose to manage GSL in accordance with the terms of the Settlement. The Settlement provides a transition in the annual guide curve (level curve 3) to a targeted elevation for maximum winter drawdown of elevation 748 ft NGVD at the time of license issuance (figure 3), raising this elevation by 1 ft to elevation 749 ft NGVD starting on June 2, 2010 (figure 4), and raising it another ft to elevation 750 ft NGVD starting on June 2, 2020 (figure 5). Drawdowns below these levels are expected to be infrequent, and would only be allowed in certain emergency situations, if required for maintenance, or if the results of the first March snow survey indicate a water equivalent of 8.6 inches or greater (indicating potential flood-producing high flow events). The applicants (Erie and the District) propose to consult with NYSDEC prior to drawdowns below the guide curve specified in figures 3, 4, and 5 (elevation 748, 749 or 750 ft NGVD, respectively), as agreed to in the Settlement.

NYSDEC supports establishing a minimum target elevation of 750 ft NGVD for GSL (letter from K. Kogut, Regional Manager, NYSDEC, Warrensburg, NY, to the Secretary, Federal Energy Regulatory Commission, dated February 11, 2000). Biological benefits cited by NYSDEC for increasing the minimum elevation from 735 to 750 ft NGVD include increased aquatic macrophytes, invertebrate production, habitat improvements, and reduced fish emigration. NYSDEC notes that raising the minimum elevation of GSL (or reducing the extent of drawdown) would: (1) increase its minimum volume from 13 to 46 percent of its volume at normal full pond; and (2) increase the inundated area from 48 to 80 percent of the area inundated at normal full pond. NYSDEC considers increased production of invertebrates in the permanently wetted area especially important, because production in deeper areas of GSL may at times be limited by low DO levels, and low nutrient levels limit plankton production that could otherwise serve as an alternative forage base. In support of its conclusion that reduced drawdown magnitudes would increase invertebrate production, NYSDEC cited a study conducted at Lake Francis Case, a Missouri River reservoir with similar characteristics to those of GSL, where the abundance of benthic invertebrates increased more than three-fold when the extent of drawdown was reduced from 33-39 ft to 20-23 ft (Benson and Hudson, 1975).

NYSDEC also cites studies conducted at other storage impoundments where winter drawdowns have been associated with emigration of fish from project impoundments (letter from K. Kogut, Regional Manager, NYSDEC, Warrensburg, NY, to

the Secretary, Commission, dated February 11, 2000). The studies were conducted at Allegheny Reservoir in western New York (Smith and Anderson, 1984), Tygart Lake in West Virginia (Jernejcic, 1986), Barren River Lake in Kentucky (Jacobs and Swink, 1983), and Enid Lake in Mississippi (Riecke, 1996). Drawing parallel conclusions from these studies means that reducing the extent of late winter drawdown could reduce the impetus for fish outmigration at GSL.

Frank Wozniak, by letter dated September 5, 2000, recommends that, instead of the minimum winter drawdowns specified in the Settlement, the minimum drawdowns of GSL should be no lower than elevation 752 to 754 ft. He indicates that the loss of 2 ft of GSL storage is equal to a gain of 700 acres of aquatic habitat.

Our analysis of the effects of the annual winter drawdown of GSL on aquatic habitat must be prefaced by the fact that the only reason for the annual drawdown is to reduce the degree of flooding of downstream properties that historically experienced routine flood damage, not for hydropower generation reasons. The ideal circumstances from strictly an aquatic habitat perspective would be to have little or no drawdown during any time of the year. We recognize that the annual water level guide curves developed during years of settlement discussions were developed by using extensive hydrologic modeling. We realize that the resultant guide curves that are presented in the Settlement represent a compromise between the signatories of the Settlement that balances the need to enhance aquatic habitat, among other resources, with the need to protect human health and property from flood damage.

We reviewed the studies cited by NYSDEC and agree that limiting the extent of winter drawdowns as proposed by the applicants would provide a substantial benefit to the aquatic resources in GSL by enhancing invertebrate production, increasing the amount of overwintering habitat, and reducing the potential for emigration of fish during periods of drawdown. The Benson and Hudson study (1975) is particularly relevant to our analysis of GSL, although the reduction in the range of winter drawdowns was greater in that study than would occur at GSL. Based strictly on the reduction in maximum drawdown, the potential increase in invertebrate production would be less than the three-fold increase noted by Benson and Hudson. However, by reducing the magnitude of a typical winter drawdown of 23 ft (to elevation 745 ft), to a minimum elevation of 750 ft, as eventually would occur under the proposed operating regime, at least an additional 1,600 acres of substrate would remain inundated during the winter compared to existing conditions. We conclude that this would enhance benthic invertebrate production because many of the organisms within this 5 ft band, when exposed to current declining winter water levels, are most likely too lethargic to move to deeper water and consequently freeze. For similar reasons, Mr. Wozniak's recommendation to limit the winter drawdown by another 2 to 4 ft would most likely result in an additional increase in

macroinvertebrate production. However, as previously mentioned, the aquatic habitat gained would be at the expense of flood control capacity needed by GSL for the District's purposes.

The reduction in the degree of maximum drawdown would obviously increase the amount of overwintering habitat available to resident fish. Available winter habitat can be a limiting factor for populations of fish, especially when the fish community is composed of many species that continue to actively forage during the winter, as is the case at GSL. We anticipate that the proposed water level regime would enhance populations of many fish because of increased overwintering habitat, in particular northern pike and walleye.

There currently are no data that support or refute whether substantive fish outmigration from GSL during the winter drawdown is occurring under current conditions. Entrainment sampling was not conducted during the winter by NMPC because of hazardous conditions. If there is an increase in winter outmigration that can be attributed to the annual drawdown, then the Jernejcic (1986) and Smith and Andersen (1984) publications are particularly germane to analyzing effects at GSL. These two studies document an increase in walleye outmigration when two impoundments were drawn down during the winter, and walleye is an important gamefish in GSL. Although these studies do not necessarily support the case that a reduction in the magnitude of drawdown would result in a reduction in the magnitude of outmigration (if it is occurring at GSL), this is a reasonable hypothesis.

We do not expect the proposed new water level management regime to result in a substantive change in aquatic macrophyte production. The most noticeable changes in drawdown patterns influences habitat that would be submerged by 18 to 23 ft of water during the normal growing season for aquatic plants (May through September). Little aquatic vegetation growth occurs at water depths greater than 9 ft because of limitations in light penetration in deeper water. Because GSL also is oligomesotrophic, water level fluctuations are not the only factor limiting plant growth and fish vitality. We conclude that the proposed GSL water management regime would benefit aquatic macroinvertebrate habitat and overwintering habitat for resident fish and could reduce the potential for winter fish outmigration. For these reasons, we recommend that the water surface management regime for GSL, specified in the Settlement, be implemented.

Fish Protection and Passage

NMPC conducted an entrainment study from November 1993 to October 1994 to estimate the numbers of fish entrained into the turbines of the E.J. West powerhouse and the number of fish that were killed during turbine passage. In the study, NMPC used

tailrace netting and hydroacoustic techniques to estimate entrainment. NMPC estimated turbine mortality rates based on the relative survival rates observed for treatment fish released into the project intake and control fish released into the tailrace net. Both groups were collected in the tailrace net and held for 48 hours to evaluate latent mortality.

The netting portion of the study resulted in a catch of 4,028 fish of 21 taxa, which was extrapolated into an annual estimated entrainment of 125,190 fish (KA, 1995a). Most of these (106,626) were small yellow perch. Other taxa commonly entrained included smallmouth bass (9,117), walleye (3,305), *Notropis* sp. (2,813), and rock bass (2,107). The total estimated annual turbine mortality was 58,799 fish. Again, most of these (52,228) were small yellow perch. The estimated annual turbine mortality for other commonly entrained taxa was: smallmouth bass, 2,580 fish; *Notropis* sp., 1,912 fish; walleye, 1,062 fish, and rock bass, 366 fish. Mortality rates for most species and size classes varied widely (ranging from 15 to 68 percent) but generally seemed to be more related to the sample size than the species of fish. NYSDEC, FWS, and others questioned the validity of these estimates. Most of their concerns related to a lack of winter sampling (omitted due to hazardous field conditions) and the occurrence of frequent tears in the sampling nets.

The applicants propose to install full overlays with 1-inch clear spacing on the trashracks at the E.J. West Project by December 31, 2002, regardless of license issuance date. The terms of the Settlement do not require the applicants to install downstream fish passage facilities or release flows from the project that would enhance downstream fish passage from GSL.

Our review of the entrainment study conducted at E.J. West indicated that it adequately fulfilled the intent of our information request. We concur with the agencies that the lack of winter sampling is a shortcoming, since the extent of emigration of gamefish from GSL may be increased during the winter months due to drawdown of the impoundment for flood control purposes. However, two things must be considered. First, the GSL drawdowns are not made for hydropower-related purposes and are, therefore, beyond the control of a hydropower license. Second, we question the accuracy of the fish mortality rates for some fish species. We conclude that fish mortality rates may have been overestimated for some species. Mortality rates estimated for some species approached or exceeded 50 percent but appear to be primarily related to small sample sizes rather than species of fish (in some cases, when the results were partitioned by species and size, the sample size was as small as one or two fish). Many of the tests at E.J. West were compromised by a high degree of stress caused by experimental procedures, as indicated by high and variable levels of control mortality. The turbines at E.J. West are relatively low speed (112.5 rpm), low head (63 ft) and large (2,450 cfs capacity), all factors that tend to contribute to higher rates of fish survival. Data from

other sites with relatively low speed Francis turbines (like the ones at the E.J. West powerhouse) indicates that mortality is typically less than 20 percent for all but very large fish (Winchell et al., 2000).

We also have reservations regarding the potential fisheries benefit that would accrue from the installation of 1-inch overlays on the existing trashracks at the E.J. West powerhouse. The trashrack dimensions given in the license application suggest that the approach velocity about 1 ft in front of the trashracks at the flow at the maximum gate setting (4,900 cfs) when GSL is at elevation 748 ft would be about 2.6 fps, and approach velocities at the efficient gate setting of 4,000 cfs would be about 2.1 fps. Such high velocities would exceed the swimming abilities of some fish that are expected to be entrained and may increase the incidence of fish becoming impinged on the trashracks. This could result in a greater number of fish being killed by impingement than are protected from turbine mortality from installing the trashrack overlay. Fish that are not impinged and do not pass through the 1-inch trashrack could have a difficult time swimming upstream against the relatively high velocity flow in the intake canal, which is about 1,000 ft long and relatively narrow, during periods of generation. We question whether fish that are unable to find low velocity refuge areas would be able to maintain their position in the E.J. West intake canal for up to 12 hour periods of generation. Those fish that could not maintain their position in the canal could ultimately become impinged or entrained. We recognize that this measure may be viewed as a key feature of the Settlement and represents the result of negotiations between the applicants and the other parties to the Settlement. However, resource agencies (e.g., NYSDEC) typically request that approach velocities be no greater than 2 fps in front of trashracks to protect fishery resources. Although these conditions would not be met when GSL is drawn down to elevation 748 ft, during most of the year, approach velocities should be less than 2 fps, and therefore offers protection to the fishery resources and is acceptable to us.

We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

The effects of project operations on fishery resources in the E.J. West tailrace are discussed below under the Stewarts Bridge Project.

(2) Stewarts Bridge Project

Impoundment Fluctuations

Daily impoundment drawdowns at Stewarts Bridge are limited to 1 ft below full pond for most of the year, but drawdowns of up to 15 ft are currently made for

maintenance purposes. Current drawdowns of up to 15 ft are likely to expose spawning habitat for yellow perch, walleye, and centrarchid species; could result in fish stranding; and could adversely affect aquatic vegetation and invertebrate production by killing the plants and the invertebrates.

Erie proposes to limit all normal daily fluctuations in the Stewarts Bridge impoundment to a maximum of 1 ft, as it does under current operations, and to discontinue the annual spring maintenance drawdown of approximately 15 ft upon license issuance and acceptance.

Erie concluded in its license application that drawdowns of 1 ft or less do not substantially affect aquatic resources in the impoundment, and NYSDEC concurred with this assessment in their comments on the license application (letter from T. W. Hall, Project Manager, NYSDEC, Warrensburg, NY, to the Secretary, Commission, dated November 30, 1998). In this letter, NYSDEC recommends that drawdowns of *more* than 1 ft be eliminated to protect benthic organisms, vegetative growth, fish spawning, and overall productivity of the littoral zone and the impoundment as a whole.

We reviewed the results of the Stewarts Bridge impoundment fluctuation study conducted by Kleinschmidt Associates (KA, 1997b) and agree with their findings that support the conclusion that 1-ft daily drawdowns should not substantially affect aquatic resources in the Stewarts Bridge impoundment. Of the centrarchid species present in the impoundment, only the pumpkinseed are known to spawn in depths of less than 1 ft. Since these species are known to spawn over a wide range of depths (0.5 to 4.5 ft or more), and transect measurements made during the study indicated that no extensive "flats" of potential spawning habitat would be exposed, only a small proportion of the available spawning habitat could be affected. Yellow perch prefer to spawn in areas deeper than 1 ft, and most potential walleye spawning habitat identified in the study was found at depths greater than 1 ft.

We also agree with the conclusions of the impoundment fluctuation study that discontinuation of maintenance drawdowns would substantially improve aquatic conditions. The study concluded that maintenance drawdowns potentially affected walleye and perch spawning habitat and egg incubation, and could cause stranding of fish and loss of submerged vegetation and benthic invertebrates. The study concluded that centrarchid species were not likely to be affected because the drawdowns are typically conducted in March and April, before spawning commences. We conclude that the impoundment water surface management regime proposed for the Stewarts Bridge impoundment would adequately protect resident fish species and recommend that it be included in any license issued for the project.

We also recommend, in the event that the need for scheduled maintenance drawdowns greater than 1 ft should become evident during the term of any new license issued for this project, that Erie notify the FWS, NYSDEC, the District, Saratoga County (to allow public notification and minimize the potential for boat stranding), and the Commission at least 30 days in advance of such a drawdown. Erie should implement such protective measures to minimize effects on aquatic biota as may be specified by the Commission.

Fish Protection and Passage

NMPC did not conduct an entrainment study at the Stewarts Bridge Project, but estimated entrainment rates using data from E.J. West and Sherman Island, and mortality from sites with similar turbine characteristics to those at the Stewarts Bridge powerhouse (KA, 1997c). Data from the E.J. West powerhouse were used to develop the entrainment estimate of 0.13 to 1.69 fish per million cubic ft of water passing through the powerhouse. Estimated mortality rates, based on data from sites with similar turbine characteristics, ranged from 9 to 40 percent depending on fish species and size (KA, 1997c). Annual entrainment was estimated at 9,000 to 111,000 fish depending on whether densities from E.J. West or Sherman Island are used. Based on the E.J. West data, a total of 21 taxa would be entrained, including yellow perch, smallmouth bass, walleye, and various minnows. Using the Sherman Island data as a basis for projections, 30 taxa would be entrained including various minnows, rock bass, pumpkinseed, smelt, yellow perch and smallmouth bass.

Erie proposes to install full overlays with 1-inch clear spacing on the trashracks at the Stewarts Bridge Project by the end of 2008. In addition, Erie proposes to install a fish bypass system that would consist of a modification of one of the Taintor gate sections such that 25 cfs would be released to facilitate downstream fish passage. Operation of this bypass system would begin at the time the trashrack overlays are installed.

The literature-based entrainment study appears to provide a reasonable estimate of the potential for entrainment and turbine mortality at the Stewarts Bridge Project based on several factors. Fish species known to occur in the Stewarts Bridge impoundment are similar to those that occur in GSL and in the Sherman Island impoundment, so the potentially affected populations are similar. Due to its location only a few miles upstream, entrainment rates observed at the E.J. West powerhouse are likely to be representative of the entrainment rates that occur at Stewarts Bridge Project. The estimated rates of entrainment mortality ranging from 9 to 40 percent for the Stewarts Bridge Project are well within the range that has been observed at other sites with similar turbine characteristics (EPRI, 1992; Winchell et al., 2000). The turbine at Stewarts

Bridge is relatively low speed (105 rpm), low head (102 ft) and large (4,000 cfs capacity), all factors that tend to contribute to lower rates of mortality.

We have reservations regarding the potential fisheries benefit that would accrue from the installation of 1-inch overlays on the existing trashracks at the Stewarts Bridge powerhouse. The trashrack dimensions given in the license application suggest that the approach velocity about 1 ft in front of the trashracks at the average normal operating flow of 4,000 cfs (efficient gate setting) would be about 2.0 fps, but would increase to 2.7 fps when the project is operated at its maximum capacity of 5,475 cfs (maximum gate setting). Such high velocities at the maximum flow gate setting would exceed the swimming abilities of some fish that are expected to be entrained and may increase the incidence of fish becoming impinged on the trashracks. This could result in a greater number of fish being killed by impingement than are protected from turbine mortality from installing the trashrack overlay. We recognize that the installation of 1-inch trashrack overlays may be viewed as a key feature of the Settlement and represents the result of negotiations between Erie and the other parties to the Settlement. However, resource agencies (e.g., NYSDEC) typically request that approach velocities be no greater than 2 fps in front of trashracks to protect fishery resources. Although under worst case conditions this approach velocity criteria would not be met, during most of the year approach velocities should be less than 2 fps and therefore offer protection to the fishery resources and is acceptable to us.

Unlike the intake at the E.J. West powerhouse, there is not a confined intake canal at the Stewarts Bridge powerhouse, providing some additional opportunities for fish to avoid impingement or entrainment. We concur that the 1-inch overlays should serve to reduce the entrainment of large fish, and some of these fish are likely to pass downstream using the downstream passage flow that would be provided via the modified Taintor gate. Many of those fish that do not pass downstream should be able to escape the approach velocities and return to the Stewarts Bridge impoundment.

We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section.

Base Flows

Peaking operations cause large fluctuations in streamflow to occur in the Sacandaga River below the Stewarts Bridge Project. Typical operations involve releases of 4,000 cfs during most daylight hours. When the project is not generating (typically all night and part of the day), only 35 to 50 cfs of leakage flow is released to the river. Flows are also limited to leakage during a period of about 3 weeks each spring when no water is

released from GSL to enable spring high flows to be captured in GSL for flood control purposes. As a result, habitat conditions in the 3-miles of the Sacandaga River downstream of the Stewarts Bridge project vary widely on a daily and seasonal basis. NYSDEC lists this section of the river as being impaired for meeting the state water quality classification for the designated use of fish propagation. Hydrologic modification is listed as the cause of the failure to meet state water quality standards.

Erie proposes to release base flows of from 300 to 350 cfs below the Stewarts Bridge Project starting on January 1, 2013, as specified in table 3. However, the base flow, released from the powerhouse, that would be implemented in 2013 would be reduced to 200 cfs any time that the flow of the Hudson River below the Sacandaga River confluence is greater than 25,000 cfs. The provision to reduce the base flow to 200 cfs during high Hudson River flows is specified in the Settlement, and we presume that this reduction in base flow is proposed to reduce flooding in the Hudson River downstream of the Sacandaga River.

NYSDEC and FWS recommended that a base flow be established in the Sacandaga River below Stewarts Bridge dam to provide more usable habitat in this reach and to protect aquatic resources from the effects of higher peaking flow releases. NMPC performed an instream flow incremental methodology (IFIM) study to address flow requirements in response to an additional information request issued by the Commission for the E.J. West Project. The results of a steady-flow IFIM model (IA, 1993) was filed in December 1993, and a dual flow analysis (IA, 1994) was filed in June of 1994. In addition, a flow demonstration study using a Delphi approach[14] to evaluate flow requirements for the same reach of the Sacandaga River was performed for the Stewarts Bridge Project (KA, 1997d).

The applicant's IFIM and flow demonstration studies support the conclusion that implementing a base flow below the Stewarts Bridge Project would improve aquatic habitat in the lower Sacandaga River. The steady-flow IFIM model results show that the amount of habitat available to most lifestages of the numerous fish and invertebrates evaluated at 350 cfs is substantially greater than that available at the current leakage flows of 35 to 50 cfs. Release of a base flow may also enable fish to better withstand the effects

[14] The Delphi approach consists of discussions between knowledgeable persons to establish reasonable criteria to evaluate a parameter, in this case flow, and reach a conclusion regarding a preferred regime. In this case, the criteria, which the team called "management objective attainment values," were used to evaluate different flow releases from the Stewarts Bridge Project. The outcome consists of a compilation of values that represent the collective best professional judgment of the Delphi team.

of high flows during generation. The IFIM results show that habitat available at 4,000 cfs is relatively low, and most of the riffle areas that are watered at leakage flows are subjected to large increases in velocity that could flush fish downstream. Providing a base flow would allow fish to occupy a wider range of habitats during low flow, affording better access to velocity refuges outside of the deepest part of the channel.

In the flow demonstration study, habitat conditions were assessed by a team of biologists at flows from 200 to 4,000 cfs. At each flow, five sites were visited and attainment of management objectives (defined by the Delphi team) was evaluated using depth, velocity, and substrate suitability criteria for 29 evaluation lifestages. The results of the study suggested that flows of 400 to 700 cfs attain all stated biological management objectives for the Sacandaga River, with an optimal flow in the vicinity of 700 cfs. Attainment values for each objective at the nominal 400 cfs demonstration flow (the actual measured flow was 380 cfs) are shown in table 13. The flow demonstration study was conducted as a steady-state analysis, and did not take into account the effects of generation flows and daily flow fluctuations, which was deferred for a second phase of the study. This second phase was not undertaken before settlement negotiations resumed. NYSDEC pointed out the potential adverse effects of high generation flows on aquatic resources in the lower Sacandaga River, but acknowledged the importance of the whitewater resource on this river segment and its dependence on daily generation flows (letter from T.W. Hall, Project Manager, NYSDEC, Warrensburg, NY, to the Secretary, Commission, dated November 30, 1998).

On page 6 of the written communication between T.W. Hall and the Secretary of the Commission, NYSDEC discusses the number of competing interests that are affected and must be considered in deciding on an appropriate base flow for the Sacandaga River below the Stewarts Bridge Project. These include: (1) augmentation of the natural flow of the Hudson River during low flow periods to improve water quality; (2) the desire of people living around GSL to maintain higher lake levels to enhance recreation; (3) flow releases to maintain the whitewater recreational resource that currently draws thousands of people to enjoy this unique, "family-type" whitewater boating; and (4) a base flow to ensure that the river meets state water quality standards and restores a functional ecosystem and fishery. All of these competing interests need to share the same water.

We conclude that establishing a base flow of 350 cfs at the Stewarts Bridge Project would substantially improve aquatic habitat compared to existing conditions. The base flow would increase the quantity of habitat that is available during both daily and seasonal (flood control) non-generation periods and should improve the ability of fish and invertebrates to withstand the large increases in flow that take place during generation periods. We also recognize the need for balancing resource concerns between the competing interests of anglers and whitewater recreationists.

Table 13. Management objective attainment values for each life stage of various fish species at five study sites on the Sacandaga River downstream of the Stewarts Bridge Project for the entire study area at a flow of approximately 400 cfs (Source: KA, 1997, as modified by staff)

Management Objectives	Species and life stage	Rating by Study Site [a]					Overall Score
		1	2	3	4	5	
walleye production	walleye spawning	2	2	0	2	3	2
	walleye fry	1	1	3	1	0	
walleye	walleye juveniles	2	1	3	2	1	low 2
	walleye adult	2	1	3	2	1	
white sucker production	sucker spawning	2	2	0	2-3	1	2
	sucker fry	2	2	2	2-3	1	
	sucker juveniles	2	2	2	2	1	
adult white sucker	sucker adult	2	2	3	2	1	2
fallfish production	fallfish spawning	2	2-3	0	2	1	2
	common shiner fry	2	2	0-1	2-3	2	
	common shiner juvenile	2	2	1	2	1	
adult fallfish	fallfish adult	2-3	2	2-3	2	2	high 2
longnose dace habitat	longnose dace spawning	2	2-3	0	2	2	high 2
	longnose dace fry	1	2	0	3	1	
	longnose dace juvenile	2-3	2-3	0	3	2	
	longnose dace adult	2-3	2-3	0	2	2	
smallmouth bass habitat	smallmouth spawning	1	2	3	2	0	2
	smallmouth fry	1	1	3	2	0	
	smallmouth juvenile	2-3	2-3	3	2	2	
	smallmouth adult	1	2	3	2	1	
trout habitat	brown trout spawning	1	2	0	1	1	2
	brown trout fry	2	2-3	1	< 1	1	
	brown trout juvenile	2	2-3	1	2	1	
	brown trout adult	2-3	2-3	3	2	1	
	rainbow trout spawning	1	2	0	1	1	
	rainbow trout fry	2-3	2-3	0	2	1	
	rainbow trout juvenile	2	2-3	0	2	2	
	rainbow trout adult	2	2-3	0	2	2	
macroinvertebrate production	macroinvertebrates	2-3	2	--	2-3	2-3	2-3
fish movement	fish movement	2	2	3	3	2	2-3

[a] Rating of 0 = objective not met; 1 = objective partially met; 2 = objective met; 3 = approaches optimal.

We make a preliminary recommendation that Erie should implement base flows of from 300 to 350 cfs (but with provisions for it to be reduced to 200 cfs under high flow conditions) to the Stewarts Bridge tailwaters in accordance with the schedule specified in the Settlement. We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section.

(3) Hudson River Project

Impoundment Fluctuations at Spier Falls

Daily impoundment drawdowns at Spier Falls are limited to 4 ft below the top of Taintor gates for most of the year, but drawdowns of up to 8 ft are currently made for maintenance purposes. Drawdowns of 4 to 8 ft would likely expose spawning habitat for yellow perch, walleye, and centrarchid species; could result in fish stranding from proposed daily drawdowns; and could adversely affect aquatic vegetation and invertebrate production.

Erie proposes to limit daily fluctuations at Spier Falls to a maximum of 1 ft during the spawning season for walleye and other fish (defined in Section III.C.2, existing and proposed operation of the Hudson River Project), and 2 ft during the remainder of the year. This means that the historic occurrence of 8-ft drawdowns would no longer occur except during an emergency and fish spawning and invertebrate habitat would not be exposed; stranding of fish would not occur; and production of aquatic vegetation, which serves as nursery habitat for many species of young fish, would be enhanced as discussed further in section V.B.3.b, Terrestrial Resources.

Based on the results of impoundment fluctuation studies conducted by the applicant in 1989 and a follow-up study conducted in 1993 to survey cove habitats (those areas most susceptible to changes in water levels) that were not included in the first study (KA, 1994), reducing the impoundment fluctuations to the proposed levels (1 or 2 ft) should have a substantial benefit for aquatic resources. The total acreage of shoreline habitat exposed during current daily operations was estimated at 24 acres during the current 4-ft daily drawdowns and 52.1 acres exposed during the current 8-ft maintenance drawdown. In comparison, the 1-ft drawdown proposed for the spawning period would expose only 5.2 acres of substrate, and the 2-ft drawdown that would be allowed outside of the walleye spawning season would expose only 9.2 acres of substrate. Walleye reproduction should also be enhanced by the reduction in magnitude of impoundment fluctuations, reducing the possibility of egg stranding in shallow water areas. The increase in drawdown from 1 to 2-ft in mid- to late-June has the potential to dewater some centrarchid nests that have been established within 2-ft of full pond. However, most

centrarchids are expected to spawn in deeper water, as we discussed in our analysis of Stewarts Bridge impoundment drawdowns (with the exception of pumpkinseeds, which spawn in shallower water than other centrarchids and therefore could be more susceptible to nest dewatering). We recommend that Erie implement its proposed impoundment water level management regime at the Spier Falls development.

We also recommend, in the event that the need for scheduled maintenance drawdowns in excess of the 1 or 2 ft proposed by Erie should become evident during the term of any new license issued for this development, that Erie notify the FWS, NYSDEC, the District, and the Commission at least 30 days in advance of such a drawdown. Erie should implement such protective measures to minimize effects on aquatic biota as may be specified by the Commission.

Impoundment Fluctuations at Sherman Island

Daily impoundment fluctuations at the Sherman Island development are limited to 3.7 ft below the top of flashboards when the flashboards are in place, or 3.7 ft below the top of the spillway crest when the flashboards are out. The flashboards are 3.7 ft in height, so the maximum annual fluctuation is 7.4 ft. The flashboards are typically in place from June through December. Drawdowns of 3.7 to 7.4 ft are likely to expose spawning habitat for yellow perch, walleye, and centrarchid species, and could adversely affect aquatic vegetation and invertebrate production and could result in fish stranding in exposed areas because of the rapid daily drawdowns.

Erie proposes to limit daily impoundment fluctuations at Sherman Island to a maximum of 1 ft during the spawning season for walleye (defined previously), and 2 ft during the remainder of the year. Within 18 months of license issuance, Erie would also install pneumatic flashboards on part of the spillway designed to allow the 9-year flood to pass the dam without causing the remaining wooden flashboard sections to fail. Also, Erie proposes to consult with NYSDEC regarding the scheduling of flashboard replacement, when necessary, to minimize effects on fish spawning.

Based on the results of impoundment fluctuation studies conducted by the applicant in 1989 and a follow-up study conducted in 1993 to survey cove habitats that were not included in the first study (KA, 1994), reducing the impoundment fluctuations to the proposed levels (1 to 2 ft) should have a substantial benefit for aquatic resources. The total acreage of shoreline habitat exposed daily during current operations was estimated at 19.8 acres during the typical 3.7-ft daily fluctuations and 41.8 acres are exposed in the seasonal fluctuations of 7.4 ft.

In comparison, the 1-ft drawdown proposed for the spawning period would expose only 5.4 acres of substrate, and the 2-ft drawdown that would be allowed outside of the walleye spawning season would expose only 10.5 acres of substrate. Walleye reproduction should also be enhanced by the reduction in magnitude of impoundment fluctuations, reducing the possibility of egg stranding in shallow water areas. The increase in drawdown from 1 to 2-ft in mid- to late-June has the potential to dewater some centrarchid nests that have been established when the impoundment is within 2-ft of full pond. However, most centrarchids are expected to spawn in deeper water. The proposed installation of the partial pneumatic crest gates would enable Erie to have improved control of the flow of water over the dam and should eliminate the sudden drop in impoundment water surface elevation that occurs when the existing flashboards fail (which could be as much as nearly 6 ft, depending on which boards failed). Reducing the potential for flashboard failures during centrarchid spawning would enhance the spawning success.

We make a preliminary recommendation that Erie implement the impoundment water surface management regime at the Sherman Island impoundment in accordance with the terms of the Settlement and install the proposed partial pneumatic crest gates. We consider the effects these measures would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

We also recommend, in the event that the need for scheduled maintenance drawdowns in excess of 1 ft below the Sherman Island dam crest development should become evident during the term of any new license issued for this development, that Erie notify the FWS, NYSDEC, the District, and the Commission at least 30 days in advance of such a drawdown. Erie should implement such protective measures to minimize effects on aquatic biota as may be specified by the Commission.

Fish Protection and Passage at Spier Falls

NMPC did not conduct an entrainment study at Spier Falls, but estimated annual entrainment rates by extrapolating from the entrainment rates measured at Sherman Island and mortality rates measured at the Minetto development of the Oswego River Project (FERC No. 2474), which was selected because its turbine design characteristics are similar to those of Spier Falls (KA, 1995b). This approach resulted in an estimate of 25,397 fish of 33 taxa being entrained per year at Spier Falls (KA, 1995b). They estimated that taxa commonly entrained at Spier Falls would include *Notropis* sp. (7,430), rock bass (6,946), rainbow smelt (2,179), pumpkinseed (1,784), yellow perch (1,245), tessellated darter (1,172), and smallmouth bass (1,044). The total estimated annual turbine mortality for Spier Falls was 5,679 fish. The estimated annual turbine mortality

for commonly entrained taxa was: rock bass, 2,351 fish; *Notropis* sp., 1,336 fish; pumpkinseed, 323 fish; smallmouth bass, 256 fish; yellow perch, 221 fish; tessellated darter, 211 fish; and rainbow smelt, 206 fish. Mortality rates for most species and size classes ranged from 9 to 17 percent but the mortality rates generally seemed to be more related to the sample size than to the species of fish. NYSDEC questioned the use of turbine mortality data from the Minetto site, and also expressed concern over the lack of winter entrainment sampling at the Sherman Island development.

Erie proposes to install full overlays with 1-inch clear spacing on the trashracks at the Spier Falls development before the end of 2010. To afford fish a route of downstream passage other than through the turbines and over the spillways, a flow of 25 cfs would be discharged through modifications to the existing trash sluice, beginning at the time overlays are installed.

We agree with NYSDEC that the mortality data from Minetto may not provide a very good representation of fish survival rates for the turbines at Spier Falls. The turbines at Minetto operate at a low head (17.3 ft) and are relatively low in speed (72 revolutions per minute [rpm]), while the turbines at Spier Falls operate at a higher head (Unit 8 operates at 80 ft and Unit 9 operates at 81 ft) and higher in speed (Unit 8 is 163.6 rpm and Unit 9 operates at 81.8 rpm). However, we would not expect mortality rates to be much higher than those reported at Minetto (9 to 17 percent), because data from other sites with relatively low speed (<250 rpm) Francis turbines indicates that mortality is typically less than 20 percent for all but very large fish (Winchell et al., 2000).

We have reservations regarding the potential fisheries benefit that would accrue from the installation of 1-inch overlays on the existing trashracks at Unit 9 of the Spier Falls powerhouse. The trashrack dimensions given in the license application suggest that the approach velocity about 1 ft in front of the trashracks at the flow at the maximum gate setting (7,590 cfs) would be about 3.0 fps, and the approach velocity at the flow at efficient gate setting (6,490 cfs) would be about 2.6 cfs (the top of the trashracks is at least 10 ft below the water surface elevation and therefore unaffected by impoundment fluctuations). Such high velocities would exceed the swimming abilities of many fish that are expected to be entrained and may increase the incidence of fish becoming impinged on the trashracks. This could result in a greater number of fish being killed by impingement than are protected from turbine mortality from installing the trashrack overlay. We recognize that the installation of 1-inch trashrack overlays may be viewed as a key feature of the Settlement and represents the result of negotiations between Erie and the other parties to the Settlement. However, resource agencies (e.g., NYSDEC) typically request that approach velocities be no greater than 2 fps in front of trashracks to protect fishery resources.

We do not have the same concern that the proposed 1-inch trashrack overlays would substantially increase impingement at Unit 8 of the Spier Falls powerhouse. We estimate that the approach velocity at the flow at maximum gate setting (1,380 cfs) would be about 1.2 fps in front of the Unit 8 trashracks (within typical agency guidelines), and the approach velocity at efficient gate (1,005 cfs) would be about 0.9 fps. Most fish should be able to avoid impingement at these low velocities. We conclude that at Unit 8 installation of 1-inch trashrack overlays should effectively reduce entrainment of fish through this unit.

Unlike the intake at the E.J. West powerhouse, there is no confined intake canal at the Spier Falls powerhouse intake, and the approach velocities are less than at E.J. West, providing some additional opportunities for fish to avoid impingement or entrainment. We concur that the 1-inch overlays at both units should serve to reduce the entrainment of large fish, and some of these fish are likely to pass downstream using the downstream passage flow that would be provided via the modified trash sluice. Many of those fish that do not pass downstream should be able to return to the Spier Falls impoundment.

We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

Fish Protection and Passage at Sherman Island

NMPC conducted an entrainment study from April to December of 1994 to estimate the numbers of fish entrained into the turbines at Sherman Island and the number of fish that were killed during turbine passage. In the study, tailrace netting was conducted to estimate entrainment and turbine mortality was estimated using rates measured at the Minetto development of the Oswego River Project.

The netting portion of the study resulted in a catch of 1,799 fish of 30 species, which was extrapolated into an annual estimate of 24,862 fish being entrained. The extrapolated data indicated that the most common entrained taxa were *Notropis* sp. (8,077), rock bass (6,151), pumpkinseed (1,940), rainbow smelt (1,662), yellow perch (1,191) and smallmouth bass (1,091). The total estimated annual turbine mortality was 5,494 fish. The estimated annual turbine mortality for commonly entrained taxa was: rock bass, 2,048 fish; *Notropis* sp., 1,453 fish; pumpkinseed, 351 fish; smallmouth bass, 262 fish; yellow perch, 214 fish, and rainbow smelt, 161 fish. Mortality rates for most species and size classes ranged from 6 to 38 percent.

Erie proposes to install full overlays with 1-inch clear spacing on the trashracks at the Sherman Island development by the end of 2006. Erie also proposes to afford a route

of downstream passage by providing a flow of 25 cfs through modifications to the existing ice sluice located adjacent to the powerhouse, beginning at the time overlays are installed.

We have reservations regarding the potential fisheries benefit that would accrue from the installation of 1-inch overlays on the existing trashracks at the Sherman Island powerhouse. The trashrack dimensions given in the license application suggest that the approach velocity about 1 ft in front of the trashracks at the flow at the maximum gate setting (6,600 cfs) would be about 2.2 fps, and the approach velocity at the flow at efficient gate setting (5,240 cfs) would be about 1.7 cfs (the top of the trashracks is at least 10 ft below the water surface elevation and therefore unaffected by impoundment fluctuations). Such high velocities at maximum flow would exceed the swimming abilities of some fish that are expected to be entrained and may increase the incidence of fish becoming impinged on the trashracks. This could result in a greater number of fish being killed by impingement than are protected from turbine mortality from installing the trashrack overlay. Fish that are not impinged and do not pass through the 1-inch trashrack could have a difficult time swimming upstream against the relatively high velocity flow in the intake canal, which is about 3,100 ft long and relatively narrow, during periods of generation. The presence of the intake canal could enhance the effectiveness of the modified ice sluice to become a downstream passage conduit for fish, because those fish that cannot swim upstream would seek alternative routes of exit from the intake canal. We recognize that the 1-inch trashrack overlay may be viewed as a key feature of the Settlement and represents the result of negotiations between the applicants and the other parties to the Settlement. However, resource agencies (e.g., NYSDEC) typically request that approach velocities be no greater than 2 fps in front of trashracks. Although under worst case conditions this approach velocity criteria would not be met, during most of the year approach velocities should be less than 2 fps, and therefore offer protection to the fishery resources and is acceptable to us.

We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

Bypassed Reach Minimum Flows at Sherman Island

Of the four projects being evaluated in this MPEIS, Sherman Island is the only development that has a bypassed reach. During non-spill periods, seepage from the dam delivers approximately 12 cfs into the bypassed reach, of which 2 cfs enters the south channel and 9 cfs enters the north channel.

Erie proposes to release the following minimum flows to the Sherman Island bypassed reach beginning within 18 months of license issuance: (1) a year-round minimum flow of 100 cfs to be delivered into the north channel; (2) a year-round flow of 150 cfs to be delivered into the south channel; and (3) a total flow of 675 cfs (both channels combined) to be provided during the walleye spawning season (defined previously). Erie proposes to consult with FWS and NYSDEC prior to the first walleye spawning season following license issuance to determine the location(s) for monitoring water temperatures to be used to define the beginning and end of the walleye spawning season. Erie would release the proposed minimum flows from the current intake structure at the south end of the buttress dam, non-overflow section. We interpret this to mean that minimum flows could be released through bay No. 2 which was previously modified to act as the intake structure for the once proposed minimum flow unit. Erie would design the minimum flow facility to limit injury to fish passing through it. Although Erie has not yet designed the minimum flow release system, factors that are typically considered to reduce injury to fish include the roughness of the surface that fish would be passing over and the presence of a plunge pool at the base of the dam that is sufficiently deep to prevent fish from falling on the substrate. Erie would divert the minimum flow from bay No. 2 through the north and south channels by the use of a submerged weir that would be constructed and placed across the present north channel where most of the spillage currently flows (see figures 6 and 7). The weir design and exact location would be dependent on the design of the minimum flow release system.

Interior recommends that minimum flows consistent with those proposed by Erie be provided to the bypassed reach to enhance habitat conditions for walleye spawning, smallmouth bass, and various forage species (letter from W.R. Taylor, Director, Office of Environmental Policy and Compliance, Interior, Washington, DC, to the Secretary of the Commission, dated September 5, 2000). Interior also recommends that Erie consult with FWS and NYSDEC prior to the first walleye season from license issuance, to determine the appropriate location for monitoring water temperature to define the beginning and end of the walleye spawning season.

To address the issue of the appropriate minimum flow that should be provided to the bypassed reach , NMPC performed a habitat enhancement study (Beak, 1988). This study used IFIM techniques to evaluate alternative minimum flows and channel modifications that could be used to alter the distribution of flows between the north and south channels or otherwise enhance habitat conditions. NMPC also conducted walleye spawning surveys that served to identify habitat in the bypassed reach that was used by spawning walleye and to verify the depth and velocity criteria used in the IFIM analysis (Beak, 1989). In response to an additional information request issued by the Commission, NMPC later re-ran the IFIM models using alternative smallmouth bass

habitat suitability curves that were recommended by FWS and NYSDEC. NMPC filed the revised analysis for smallmouth bass in November 1993.

Although the IFIM models did not simulate habitat conditions for flows as low as those that currently exist during non-spill conditions, we concluded by reviewing the trends over the lowest flows modeled in the IFIM study that the minimum flows proposed by Erie would result in substantial increases in habitat for the majority of species and lifestages of concern. Large gains in habitat were especially prominent for forage species. For game species, habitat also generally increased with flow in the south and combined channels, although the results are less consistent in the north channel. The original smallmouth bass habitat suitability curves showed decreases in fry and adult habitat between 50 and 100 cfs, but the revised curves showed increased habitat for adult smallmouth bass and little change in habitat for fry. Habitat for walleye fry also decreases with flow, but habitat is available for walleye fry at any flow. However, upon hatching, walleye fry would be expected to drift downstream and use the Feeder Dam impoundment as rearing habitat. Model results indicate that the 675 cfs flow proposed by Erie for the Sherman Island development for the walleye spawning season should result in large increases in spawning habitat, since habitat in all three areas (the north, south and combined channels) show strong increases over the entire range of modeled flows. Habitat usage data collected during the walleye spawning surveys supported the validity of the habitat suitability curves used in the IFIM analysis, which increases the level of confidence that can be placed in the results of habitat modeling performed for this species.

We conclude that Erie's proposed flow releases from the Sherman Island dam would serve to enhance habitat conditions in the Sherman Island bypassed reach for walleye, smallmouth bass, and various forage species. Walleye reproduction should also be enhanced by the reduction in magnitude of impoundment fluctuations at the Feeder Dam impoundment (discussed in the following section), reducing the possibility of egg stranding in shallow water areas.

We make a preliminary recommendation that Erie implement the bypassed reach flow regimes as specified in the Settlement. We consider the effects this measure would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

The beginning and end of the walleye spawning season, as described in section III.C.2, Hudson River Project Existing and Proposed Operations, is defined by water temperature. The point where the temperature is measured could, therefore, have a bearing on when flows that are conducive to walleye spawning would be released to the

bypassed reach (as well as when the previously discussed 1-ft limitation on daily impoundment fluctuations would be implemented). We consider it to be important to ensure that the point of temperature measurement to determine the walleye spawning season be as representative as possible, and representatives of the regional fish and wildlife agencies would be well-suited to help with this determination. Consequently, we recommend that Erie implement Interior's recommendation that Erie consult with FWS and NYSDEC prior to the first walleye season from license issuance to determine the appropriate location for monitoring water temperature. We further recommend that Erie provide the temperature monitoring site to the Commission for approval prior to implementation of water temperature monitoring.

(4) Feeder Dam Project

Impoundment Fluctuations

The current impoundment daily drawdowns of up to 3 ft, and periodic maintenance drawdowns of up to 4 ft are likely to expose spawning habitat for yellow perch, walleye, and centrarchid species, could result in fish stranding in exposed areas, and could adversely affect aquatic vegetation and invertebrate production.

Erie proposes to limit daily fluctuations in the Feeder Dam impoundment to a maximum of 1 ft from April 1 through June 15 to facilitate fish spawning, and 2 ft during the remainder of the year in accordance with section 7.1 of the Settlement. Within 18 months of license issuance, Erie also proposes to install a pneumatic flashboard on part of the spillway designed to allow the 10-year flood to pass the dam without causing the remaining wooden flashboard sections to fail. Also, Erie proposes to consult with NYSDEC regarding the scheduling of flashboard replacement, when necessary, to minimize effects on fish spawning.

We conclude that reducing the impoundment fluctuations to the proposed levels should have a substantial benefit for aquatic resources. Measurements made during studies conducted for NMPC at 14 transects extending from the shoreline into the impoundment indicated that an average of 14.0 linear ft was exposed by a 2.3 ft drawdown. Although this study did not provide information on the area of shoreline habitat that is exposed by other drawdown levels, this can be estimated from the impoundment area/capacity curve provided in the license application. By this method, it appears that the 1 ft fluctuation proposed for the fish spawning season would expose approximately 36 out of 717 acres of the substrate in the impoundment, and the 2 ft drawdown proposed for the remainder of the year would expose up to 72 acres of substrate. Current drawdown levels to 3 ft below the top of flashboards expose approximately 108 acres of the impoundment substrate, and a 3 ft drawdown that occurs

when the boards are out can expose approximately 200 acres of the impoundment substrates. Walleye, centrarchid, and cyprinid reproduction should be enhanced by the reduction in magnitude of impoundment fluctuations, reducing the possibility of egg stranding in shallow water areas. The increase in drawdown from 1- to 2-ft in mid- to late-June has the potential to dewater some centrarchid nests should they be established within 2 ft of full pond. However, most centrarchids are expected to spawn in deeper water.

The proposed installation of the partial pneumatic crest gates would enable Erie to have improved control of the flow of water over the dam and should eliminate the sudden drop in impoundment water surface elevation that occurs when the existing flashboards fail (which could be as much as nearly 6 ft, depending on which boards failed). Reducing the potential for flashboard failures during the centrarchid spawning would enhance the spawning success.

We make a preliminary recommendation that Erie implement the Feeder Dam impoundment level management regime in accordance with the terms of the Settlement and install its proposed partial pneumatic crest gates. We consider the effects these measures would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

We also recommend, in the event that the need for scheduled maintenance drawdowns in excess of 0.5 ft below the dam crest should become evident during the term of any new license issued for this project, that Erie notify the FWS, NYSDEC, the District, and the Commission at least 30 days in advance of such a drawdown. Erie should implement such protective measures to minimize effects on aquatic biota as may be specified by the Commission.

Base Flows

Erie proposes to provide an instantaneous base flow of 1,500 cfs and a minimum average daily flow of 1,760 cfs below the Feeder Dam Project. Erie also proposes to implement three measures that would affect the ability of the Feeder Dam Project to re-regulate flows delivered from the upstream projects: (1) operate under narrower limits of fluctuation in the Feeder Dam impoundment; (2) alter the timing and volume of water entering the Feeder Dam impoundment based on proposed flow and water level management at upstream hydroelectric projects and GSL; and (3) install partial pneumatic flashboards.

The proposed limit on impoundment fluctuations of 1 to 2 ft at the Feeder Dam impoundment would limit the capacity of the project to re-regulate flows delivered from upstream projects, and could result in increased daily fluctuations in outflows from the Feeder Dam project compared to past operations. However, the proposed instantaneous base flow is relatively large compared to natural river flows (approximately 30 percent of the 4,955 cfs mean annual flow at Feeder Dam), so it is likely to provide a reasonable degree of protection to downstream areas from excessive changes in water levels or flow velocities. Currently, there is no instantaneous base flow requirement, which means that hypothetically, releases from the Feeder Dam Project could reach zero during parts of the day (although this has never occurred), as long as sufficiently high flows are released later in the day to achieve the average daily flow target (which is typically 3,000 cfs). Although this would not have a substantial influence on aquatic biota in the Glens Falls impoundment, into which the Feeder Dam Project directly discharges, it could have a cumulative effect on downstream riverine habitat since the downstream projects are operated in a ROR mode. We, therefore, consider the implementation of the proposed instantaneous base flow of 1,500 cfs to represent an important enhancement over existing conditions because it would provide a definitive minimum flow to downstream aquatic habitat. We consider instantaneous flow to be more limiting to fish populations than average daily flows and, therefore, the proposed change in the average daily flow from an average daily target flow of about 3,000 cfs to a minimum average daily flow of 1,760 cfs should not result in adverse fish population affects. In addition, installation of partial pneumatic flashboards, as proposed by Erie, should provide better control of outflows during high flow events, and should eliminate sudden changes in flow that currently occur when the flashboards fail.

We recognize that the reduction in impoundment fluctuation, implementation of an instantaneous base flow, and modification of the average daily flow from the Feeder Dam Project (from a targeted average daily flow of approximately 3,000 cfs in the Hudson River, as measured downstream of Hadley, to an instantaneous base flow of 1,500 cfs and a minimum average daily flow of 1,760 cfs as measured downstream of Feeder Dam) represent a balancing of habitat enhancement at the Feeder Dam impoundment and accommodation of upstream alterations in the flow regime to enhance habitat and recreational opportunities while retaining flood control and flow augmentation capabilities at the E.J. West and District Project. Accordingly, we make a preliminary recommendation that Erie implement the base flow and average daily flow provisions of the Feeder Dam Project in accordance with the terms of the Settlement.

Although the 1,500 cfs instantaneous base flow and 1,760 cfs average minimum daily flow may be adequate to protect aquatic resources, the complexity of upstream project operations could result in unforeseen changes in the ability of the Feeder Dam Project to reregulate incoming daily flows. Because the hydroelectric projects that are

downstream of Feeder Dam operate in a ROR mode, any daily pulsed flows from the Feeder Dam Project could translate to similar pulsing of flow to the downstream projects, possibly altering the timing of generation availability at these projects. We recommend that Erie develop and implement a plan to evaluate outflows from the Feeder Dam Project after the first 5 years following issuance of the license and implementation of the new impoundment fluctuation limits. The plan should be developed in consultation with NYSDEC, the District, and AHDC and filed within 6 months of Commission approval of Erie's proposed flow monitoring plan, for Commission approval. This evaluation should use the results of the flow monitoring program proposed by Erie and discussed further in section V.B.1.b (4) of this MPEIS. The product of the evaluation should consist of a report that compares the results of the 5 years of flows from Feeder Dam under the new regime to historic Feeder Dam releases. The report should discuss the biological, water quality, and energy ramifications of any changes that are documented and describe any proposed follow-up actions. The report should be developed in consultation with NYSDEC, the District, and downstream hydroelectric project licensees that are a party to this proceeding. We recommend that if an increased frequency or magnitude of flow fluctuations is observed, Erie should consult with NYSDEC and the District to evaluate potential effects on downstream aquatic habitats and potential corrective measures and the need for subsequent flow evaluations or changes, if necessary. The final report would be submitted to the Commission for approval.

Fish Protection and Passage

Moreau (the owner of the project before Erie) conducted an entrainment study from October 1993 to November 1994 to estimate the numbers of fish entrained at the Feeder Dam Project and the number of fish that were killed during turbine passage. In the study, tailrace netting was used to estimate entrainment, and turbine mortality rates were estimated based on the relative survival rates observed for treatment fish released into the project intake (the "experimental" fish) and control fish released into the tailrace net. Both groups were collected in the tailrace net and held for 48 hours to evaluate latent mortality.

The netting portion of the study resulted in a catch of 2,300 fish of 32 species, which was extrapolated into an annual estimate of 56,092 fish being entrained. The extrapolated data indicated that the most common entrained taxa at the Feeder Dam Project were redbreast sunfish (9,723), rock bass (7,782), pumpkinseed (5,518), yellow bullhead (5,365), *Lepomis* sp. (4,635), golden shiner (3,511), and yellow perch (3,379). The total estimated annual turbine mortality was 4,820 fish. The estimated annual turbine mortality for these commonly entrained taxa was: redbreast sunfish, 821 fish; rock bass, 687 fish; yellow bullhead, 468 fish; pumpkinseed, 410 fish; yellow perch, 375 fish;

Lepomis sp., 246 fish; and golden shiner, 60 fish. Mortality rates for taxa and size classes ranged from 1 to 50 percent (Acres, 1995).

Erie proposes to install full overlays with 1-inch clear spacing on the existing trashracks. Erie also proposes to provide an alternate route of downstream passage, by releasing a flow of 25 cfs through modifications to the existing trash sluice, beginning at the time the 1-inch trashrack overlays are installed.

Because approach velocities upstream of the trashracks are relatively low at Feeder Dam (about 2.0 fps at the flow at maximum gate setting, which is within typical agency guidelines), we conclude that the risk of causing increased impingement with installation of the overlays would be minimal. We concur that the overlays should serve to reduce the entrainment of large fish, and some of these fish are likely to pass downstream using the downstream passage flow that would be provided via the ice sluice. Those fish that do not pass downstream should be able to return to the Feeder Dam impoundment because there is not a confined intake channel at the Feeder Dam powerhouse, and approach velocities are relatively low.

We make a preliminary recommendation that the trashrack overlays and downstream passage flows proposed for Feeder Dam be implemented in accordance with the terms of the Settlement. We consider the effects these measures would have on project economics in the Developmental Analysis section and make our final recommendation in the Comprehensive Development and Recommended Alternatives section of this MPEIS.

c. Cumulative Effects on Aquatic Riverine Habitat

We identified aquatic riverine habitat as a potentially cumulatively affected resource. As we discussed in section, V.B.1.c and V.B.2.b, Erie's proposal could result in a reduction in the ability of the Feeder Dam Project to reregulate downstream flows. Because the hydroelectric projects that are downstream of Feeder Dam operate in a ROR mode, any daily pulsed flows from the Feeder Dam Project could translate to pulsed flows from downstream projects. When aquatic riverine habitat, such as riffles or runs, receive pulsed flows, some dewatering of near-shore habitat could occur. This could also result in stranding of fish and invertebrates, although we consider it unlikely that fluctuations would be sudden enough to cause substantial stranding. About 3 miles of such habitat exist between the Glens Falls dam and the Hudson Falls Project, and other such habitat likely exists further downstream. Erie's proposal and our recommended instantaneous base flow of 1,500 cfs should prevent substantial dewatering of aquatic riverine habitat. Our recommended evaluation of flows from the Feeder Dam Project after the first 5 years of operation under the conditions of the new license, would enable

an assessment of whether there is an increase in pulsed flows and, if so, whether corrective actions would be needed to minimize effects on aquatic riverine habitat, as well as other flow-related issues (such as hydroelectric generation).

Other measures proposed in this MPEIS would provide substantial cumulative benefits to aquatic riverine resources compared to existing conditions. These include implementing a base flow in the Sacandaga River below the Stewarts Bridge Project, and implementing minimum flows in the bypassed reach at the Sherman Island Project.

d. Unavoidable Adverse Effects

Even with the proposed installation of 1-inch clear spaced trashrack overlays, some entrainment and turbine mortality of fish would continue to occur. Where approach velocities are likely to be high under the proposed scenario of 1-inch trashrack overlays (i.e., at the E.J. West, Stewarts Bridge, Spier Falls Unit 9, and Sherman Island intakes), some increased impingement mortality of larger fish may also occur.

3. Terrestrial Resources

a. Affected Environment

The four hydroelectric projects lie in the Lowland Adirondacks, the transition zone of the Hudson lowlands from forested, mountainous terrain to the agricultural and more populous settings to the south and east in the Hudson-Champlain Valley. Two of the four projects, E.J. West and Stewarts Bridge, occur within the southeastern portion of the six-million- acre Adirondack State Park. This area consists of low mountain ranges with numerous small lakes and tributaries providing a diverse array of habitat types for the variety of wildlife species that utilize the region.

The vast majority of the region surrounding GSL and the Stewarts Bridge impoundment remains undeveloped forest with a small number of areas existing in agricultural production. The Sacandaga River projects, (E.J. West and District and Stewarts Bridge) located in the southeastern portion of the Adirondack State Park, occur entirely in the Oak-Northern Hardwood Zone. The impoundment shorelines are, generally, moderately to extremely steep with very little development, excluding a mix of seasonal and permanent shoreline residences. Upland forest communities dominate the overall vegetative makeup in this area of the project along the Sacandaga River. These cover types typically consist of deciduous (hardwood) or coniferous (softwood) species, or a mixture of both groups. Coniferous forests dominate the lower slopes near the river, while deciduous forests are more prevalent at the higher elevations. Typical deciduous forest tree, shrub, and groundcover species include sugar maple, beech, oak, bracken fern,

shadbush, black cherry, raspberry, Virginia creeper, and poison ivy. Typical coniferous forest tree, shrub, and groundcover species include white pine, hemlock, partridge berry, witch hazel, bracken fern, winterberry, and white birch.

Downstream on the Hudson River, lying in the foothills of the Adirondacks, the Hudson River and Feeder Dam facilities occupy the transition zone of the Hudson lowlands. Like the Sacandaga River projects upstream, the botanical resources found in the Hudson River project areas include forests, successional lands, developed sites, wetland trees and shrubs, and emergent vegetation. These projects occur in the Pine-Oak-Northern Hardwood Zone and, therefore, consist of the same species as those projects upstream but with a greater prevalence of pine species.

The steep terrain and sandy soils limit the extent of expansive wetlands on all the project sites; however, wetlands are present throughout the region in the protected coves and along the shoreline of the impoundments, providing viable habitat to an array of wildlife species in the region. In addition, successional lands, including abandoned fields and transmission line corridors, are scattered throughout the project area along the Sacandaga and Hudson rivers. Gray birch, quaking aspen, black cherry, staghorn sumac, sweetfern, and herbaceous species such as broom beardgrass, sheep sorrel, whorled loosestrife, bush clover, and tick trefoil characterize the majority of successional areas.

With the variety of habitat types found in the area, a diverse assemblage of wildlife is found on or near the project waters. Mammalian species found in the region include black bear, white-tailed deer, coyote, river otter, mink, fisher, beaver, raccoon, opossum, bobcat, and several species of bats, rodents, and rabbits. Reptile and amphibian species include wood frog, redback salamander, ringneck snake, wood turtle, and American toad. Reportedly, greater than 200 avian species occur in the region.

Rare, Threatened, and Endangered Species

The federally and state listed bald eagle has been documented in and within the vicinity of the Stewarts Bridge Project area. NYSDEC has monitored the Stewarts Bridge impoundment for wintering bald eagles since 1979. Open water created by the E.J. West tailrace attracts bald eagles, providing a wintering location. In addition, NYSDEC has noted the presence of eagles, osprey, and other raptors along the river corridor of the Hudson River Project, and the Feeder Dam Project. However, the presence of these species along the river corridor appears to be transient in nature.

By letter dated March 24, 2000, FWS states that the Karner blue butterfly, a federally endangered species, may occur in the vicinity of the Feeder Dam and Hudson River projects due to the presence of its host plant, blue lupine (*Lupinus perennis*). The

Karner blue butterfly became a federally-listed endangered species in 1994, following the application submittal for the Hudson and Feeder Dam projects. The transmission line corridors, occurring within the vicinity of the Feeder Dam and Hudson River projects reportedly contain blue lupine. Transmission line corridors exist within the Stewarts Bridge Project vicinity as well, though evidence of blue lupine has not been reported (letter from D.A. Stilwell, Field Supervisor, FWS, Cortland, NY, to R. Feller, Chief, Land Resources Section, Commission, Washington, D.C., March 24, 2000).

(1) E.J. West and District Project

Botanical

Terrestrial upland habitat in the vicinity of the E.J. West and District Project is largely wooded and as described in the regional description for the Sacandaga River projects. Approximately 605 acres of vegetated wetland habitat exist within protective coves along the shoreline of GSL. Vegetated wetland development has been limited to these areas due to the steep terrain and sandy soils surrounding the lake. Scrub/shrub wetlands comprise the majority of the wetland types and include species such as silver maple and black willow saplings, red-osier dogwood, winterberry, alders, eastern Joe-Pye weed, money wort, reed canary grass, wild basil, and monkey flower. The existing forested wetland cover types are dominated by red maple, silver maple, arrowwood, tamarack, black willow, eastern cottonwood, sneezeweed, monkey flower, aster species, and sensitive fern. The few emergent wetlands tend to be sparsely vegetated with species such as Canada rush, soft rush, wild basil, sedges, monkey flower, and reed canary grass.

Wildlife

The E.J. West and District Project, with its abundant water, forested land, and rural character, offer a wide variety of habitat types for wildlife. Small mammals utilizing this area include red squirrel, fisher, deer mouse, southern boreal redback vole, northern flying squirrel, and snowshoe hare. Larger species include coyote, black bear, bobcat, and white-tailed deer. Red fox, raccoon, mink and river otter are known to inhabit the wetland habitats in GSL. Reptile and amphibian use is restricted to species such as wood frog, redback salamander, American toad, northern dusky salamander, painted turtle, and snapping turtle. A variety of avian species may be found in the vicinity of GSL.

(2) Stewarts Bridge Project

Botanical

Terrestrial upland habitat in the vicinity of the Stewarts Bridge Project is as described in the regional description of the Sacandaga River projects. Relatively few vegetated wetlands (less than 7 acres) exist on the Sacandaga River in the vicinity of the Stewarts Bridge Project due to the steep shoreline slopes and the lack of major tributary streams and associated shallow nearshore areas. The APA has delineated only four vegetated wetlands in the Stewarts Bridge impoundment, totaling 4.61 acres. Total emergent wetland vegetation area in the four wetlands is approximately 2.82 acres, aquatic bed and open water habitat account for approximately 0.16 acres, and scrub/shrub comprise the remaining 1.63 acres with only a minor amount consisting of forested wetlands. Primary wetland species occurring in the impoundment wetlands include cattail, bulrush, and spike rush.

Wildlife

The variety of wildlife in the Stewarts Bridge Project area is similar to that described in the E.J. West and District Project area.

(3) Hudson River Project

Botanical

The Hudson River Project occurs in the heavily forested Pine-Oak-Northern Hardwood Zone. Dominant conifers include red pine, white pine, scotch pine, and hemlock. Deciduous species common to the upland forests include beech, paper birch, sugar maple, and red and white oak. Common understory species consist of striped maple, lowbush blueberry, mapleleaf viburnum, honeysuckle, pink lady's slipper, wild lily-of-the-valley, starflower, partridgeberry, and immature canopy species. Successional lands exist in the vicinity of the Hudson River Project. Common species occurring within these abandoned fields and transmission line corridors include shade-intolerant species such as gray birch, quaking aspen, black cherry, staghorn sumac, sweetfern, dewberry, goldenrod, bracken fern, bush clover, St. Johns wort, tick trefoil, whorled loosestrife, and broom beardgrass.

There is limited wetland habitat associated with Spier Falls development due to the steep banks and rocky substrate in this area. Spier Falls wetlands consist primarily of emergent wetland habitat scattered throughout the impoundment near the shoreward limit

of the drawdown zone. The pockets where wetland vegetation occurs typically include emergent wetland species such as wild celery and arrowhead.

The Sherman Island impoundment has a more diverse wetland assemblage than Spier Falls, including some forested wetland systems (e.g., on the south side of the impoundment, just upstream of the dam at the current boat barrier anchor point). Emergent wetlands in the Sherman Island impoundment, the majority of which occur upstream of the boat launch and near the coves and islands on the south side of the impoundment, just upstream from the dam, are dominated by pondweed, common elodea, arrowhead, and waterlily. Dominant canopy species include red maple, ash, American elm, and yellow birch. Understory species include woody and herbaceous plants such as alder, witch hazel, silky dogwood, arrowwood, immature canopy species, skunk cabbage, jewel weed, horsetail, sensitive fern, and royal fern.

Wildlife

The Hudson River Project provides suitable habitat for the same faunal species listed for the E.J. West District and Stewarts Bridge projects. NYSDEC documented a deer wintering area above the south shore of the Sherman Island impoundment, beginning at the Spier Falls substation and following the transmission line northeasterly to the top of Palmertown Mountain. This area is designated a Significant Habitat Unit by NYSDEC.

(4) Feeder Dam Project

Botanical

Terrestrial upland habitat in the Feeder Dam Project area is similar to that described for the Hudson River Project.

Nine NYSDEC-designated wetlands, totaling 398 acres, exist along the Feeder Dam impoundment. Eight additional wetlands, totaling approximately 57 acres, were identified by the applicant during field investigations. Forested wetlands are prevalent within the Feeder Dam Project area. Dominant species include silver maple, red maple, ash, and American elm. Portions of these wetlands contain substantial areas of emergent vegetation and submerged aquatic vegetation. Emergent vegetation found in the area includes sedge species, manna grass, burreed, rushes, purple loosestrife, and horsetail. Submerged aquatics include pondweed, hornwort, and waterweed in areas where the water ranges from 2 to 4 ft in depth. The emergent wetlands in the Feeder Dam impoundment typically occur in the coves and backwater areas and the embayment area where a NYSDEC-designated significant habitat and wetland exists. This wetland is considered a valuable stopping area for migratory geese, important habitat for birds and

other wildlife, and plant life (including bog plants such as cranberry, cardinal flower, jack-in-the-pulpit, and orchids).

Wildlife

Wildlife usage of the forested and wetland habitats existing in the Feeder Dam Project area are similar to those species which use the upstream project areas.

b. Environmental Effects and Recommendations

(1) E.J. West and District Project

Erie, the District, and no other entity make specific proposals or recommendations that pertain directly to terrestrial resources at the E.J. West and District Project. However, Frank Wozniak, by letter dated September 5, 2000, recommends that the Commission address shoreline erosion at GSL. Substantive shoreline erosion could influence riparian vegetation. We address the issue of shoreline erosion in section V.B.1(b)(1), Water Quality and Quantity. Based on our analysis of shoreline erosion and proposed operating curves for GSL (figures 3, 4, and 5), we conclude that the proposed operating regime of GSL is not likely to have a substantial effect on existing vegetated wetland and riparian habitat around the lake. The proposed lake level curves would result in GSL typically reaching full pool by May or early June followed by a gradual drawdown during the growing season. This regime is similar to current operations, although the proposed lake level under the new regime could be several ft higher at the end of the growing season (late September) than under current conditions. We conclude that this higher water level would represent a slight enhancement to vegetated wetlands.

Several recreational enhancements proposed in the Settlement could affect the terrestrial resources in the vicinity of this project: the construction of a canoe portage on the south end of the Conklingville Dam and improvements to the Route 4 overlook. These effects would consist of minor vegetation removal and displacement of wildlife during construction and possibly as a result of increased recreational use of these two areas. The development of the canoe portage put-in associated with the Conklingville Dam could also enable human encroachment on wintering bald eagles that use the upper reach of the Stewarts Bridge impoundment. We therefore recommend that access to the Conklingville Dam canoe put-in be restricted during the winter months. An existing gate should facilitate this access restriction. We conclude that, with our recommended protective measure, relicensing the E.J. West and District Project would have no effect on bald eagles. We also conclude that additional specific terrestrial resource measures at this project are not warranted.

(2) Stewarts Bridge Project

Erie proposes to continue protection of the bald eagle wintering habitat in the upper reach of the Stewarts Bridge impoundment. Erie proposes to ensure that potential perch trees or nesting sites are retained. Erie agrees to work with NYSDEC to restrict human access to the upper extent of the Stewarts Bridge impoundment during the winter months. In the past, this has consisted primarily of Erie placing an impassable cable across the access road to the Stewarts Bridge Impoundment Recreation Area. Erie currently consults with NYSDEC if requests for winter access are received. This approach has apparently been effective in the past. Unauthorized access to the day-use area during the winter months has not been reported in the past and we conclude that it should not occur in the future to the extent that it would disturb bald eagles. We conclude that, continued operation of the Stewarts Bridge Project with our recommended protective measures, would have no affect on bald eagles. We recommend that Erie continue to restrict human access to the upstream end of the Stewarts Bridge impoundment as it has in the past and include FWS in its consultation when requests for winter access are received.

Erie and no other entity make additional specific proposals or recommendations that pertain directly to terrestrial resources at the Stewarts Bridge Project. However, although Erie proposes to continue its current daily 1-ft impoundment fluctuations, it proposes to eliminate the current 5 to 15 ft maintenance drawdowns of the Stewarts Bridge impoundment.

The 1996 Impoundment Fluctuation Study found that daily fluctuations of 1 ft or less do not adversely influence the limited wetlands of the Stewarts Bridge impoundment (KA, 1997b). However, maintenance drawdowns of 5 to 15 ft may affect shoreline vegetation and influence the submerged aquatic component of the wetlands by exposing areas where submerged aquatic vegetation would occur. This is particularly detrimental during early spring when vegetation can be exposed to ice scour. The discontinuation of the spring 5 to 15 ft maintenance drawdown, as proposed in the Settlement, would benefit wetland and riparian habitat and the species that occupy this habitat, such as shoreline nesting birds and other riparian wildlife, by creating conditions that would foster growth of submergent and emergent vegetation in the former drawdown zone. We therefore recommend that the Commission approve Erie's proposed Stewarts Bridge impoundment level regime.

Proposed recreational measures associated with this project that have the potential to affect terrestrial resources include the following: development of the parking lot at the existing canoe portage site on the north side of the Stewarts Bridge dam and development of the former Hadley town beach as a take-out point for recreational boaters. These

effects would consist of minor vegetation removal and displacement of wildlife during construction and possibly as a result of increased recreational use of these two areas. We conclude that specific measures for the protection and enhancement of terrestrial resources at recreational facilities associated with this project (beyond those discussed to protect overwintering bald eagles) are not warranted.

(3) Hudson River Project

Erie proposes to reduce impoundment drawdowns on a seasonal basis at both developments (which currently can be as much as 7 to 8 ft for maintenance) and provide pneumatic flashboards on the Sherman Island dam. Impoundment fluctuations at the Spier Falls and Sherman Island impoundments would be limited to 2 ft during the year, except during the walleye spawning period when fluctuations would be limited to 1 ft. (Currently daily drawdowns of about 4 ft occur.) The installation of pneumatic flashboards on the Sherman Island dam would eliminate the sudden drop in impoundment level of up to 3.7 ft due to flashboard failures and the daily water surface fluctuations would be substantially reduced over current conditions. As discussed for the Stewarts Bridge impoundment, the proposed stabilization of impoundment levels should foster increased growth of submergent and emergent vegetation and improve wildlife habitat, especially for shoreline nesting birds and other riparian species. We recommend that Erie's proposed measures to stabilize impoundment water surface elevations be implemented.

Although no signatories to the Settlement propose surveys or plans for the protection of the Karner blue butterfly, a federally listed endangered species, FWS, by letter dated March 24, 2000, recommends that Erie conduct an evaluation to determine the presence or absence of Karner blue butterfly or its host plant, blue lupine, at the Hudson River Project. If this species is present, then FWS requests implementation of appropriate measures to protect this species and its habitat.

Some proposed activities associated with the Hudson River Project could require disturbance of herbaceous vegetation that could include blue lupine. Therefore, we recommend that Erie, in consultation with FWS, develop and implement a plan to survey for blue lupine at those areas associated with the Hudson River Project where earth-disturbing activity or vegetation removal is proposed or increased human activity is expected due to recreational measures. Areas to be surveyed could include: the proposed canoe portage routes around the Spier Falls and Sherman Island dams; the proposed island campsites at the Spier Falls and Sherman Island developments; the proposed measures at the Spier Falls and Sherman Island impoundment boat launches; the proposed angler access to the Sherman Island bypassed reach; and the proposed Queensbury boat launch at the Sherman Island impoundment. The construction staging area for the

proposed pneumatic flashboard installation at the Sherman Island dam should be located in areas that avoid potential blue lupine habitat. We recommend Erie consult with the FWS to develop a Karner blue butterfly and blue lupine plan which should be filed with the Commission for approval prior to implementing the plan. The plan shall include, but not be limited to: (1) identification of potential survey sites, (2) measures to be taken to protect the Karner blue butterfly and blue lupine if found in the survey sites, and (3) steps to be taken to insure implementation of appropriate protective measures. We conclude that relicensing the Hudson River Project, with our recommended measures, would have no affect on Karner blue butterflies.

The canoe portage proposed by Erie and described in the Settlement for the Sherman Island development would bisect NYSDEC wetland GF-7. NYSDEC maps wetlands that are under state regulatory jurisdiction, which are wetlands that are at least 12.4 acres in area (which is the case for wetland GF-7) or considered of unusual local importance. We observed this wetland in the field on June 29, 2000, and confirmed that the area affected by the proposed portage route is primarily a forested deciduous wetland with an emergent component in an adjacent small cove. Foot traffic through this habitat may cause some long-term, minor effects on the wetland vegetation. Furthermore, if the portage is wet enough, foot traffic could lead to off-trail effects if canoeists try to avoid mucky areas. The route could also serve to fragment the wetland habitat, which for some species of wildlife, diminishes its habitat value. We discuss this wetland further in section V.B.5.b (3), Recreational Resources, and make our recommendation pertaining to this wetland in that section.

At the other proposed sites listed previously for potential blue lupine and Karner blue butterfly surveys, there would also be minor vegetation removal and displacement of wildlife during construction and possibly as a result of increased recreational use of the recreational areas. We conclude that additional specific measures for the protection and enhancement of terrestrial resources at proposed facilities associated with this project are not warranted.

(4) Feeder Dam Project

Erie proposes to reduce daily impoundment drawdowns at the Feeder Dam Project (which currently are about 3 ft) and provide pneumatic flashboards on the Feeder Dam. Impoundment fluctuations would be limited to 2 ft during the entire year, except during the period of April 1 through June 15 when the impoundment fluctuation would be limited to 1 ft to facilitate fish spawning. The installation of pneumatic flashboards on the Feeder Dam should eliminate the sudden drop in impoundment level of up to 3 ft due to flashboard failures and the daily water surface fluctuations would be substantially reduced over current conditions. As discussed for the Stewarts Bridge impoundment, the

proposed stabilization of impoundment levels should foster increased growth of submergent and emergent vegetation and improve wildlife habitat, especially for shoreline nesting birds and other riparian species. We recommend that Erie's proposed measures to stabilize impoundment water surface elevations be implemented.

Although no signatories to the Settlement propose surveys or plans for the protection of the Karner blue butterfly, a federally listed endangered species, FWS, by letter dated March 24, 2000, recommends that Erie conduct an evaluation to determine the presence or absence of Karner blue butterfly or its host plant, blue lupine, at the Feeder Dam Project. If this species is present, then FWS requests implementation of appropriate measures to protect this species and its habitat.

Some proposed activities associated with the Feeder Dam Project could require disturbance of herbaceous vegetation that could include blue lupine. Therefore, we recommend that Erie develop and implement a plan to survey for Karner blue butterflies or blue lupine, in consultation with FWS, of those areas associated with the Feeder Dam Project where earth-disturbing activity or vegetation removal is proposed or increased human activity is expected due to recreational measures. Areas to be surveyed could include the proposed development of the new parking facilities at the Feeder Dam Overlook Park and the proposed angler access area. Proposed construction staging areas for the proposed pneumatic flashboard installation at the Feeder Dam should be located in areas that avoid potential blue lupine habitat. In summary, we recommend Erie consult with the FWS to develop a Karner blue butterfly and blue lupine plan which should be filed with the Commission for approval prior to implementing the plan. The plan should include, but not be limited to: (1) identification of potential survey sites, (2) measures to be taken to protect the Karner blue butterfly and blue lupine, and (3) steps to be taken to insure implementation of appropriate protective measures. We conclude that relicensing the Feeder Dam Project, with our recommended measures, would have no affect on Karner blue butterflies.

At the sites listed previously for potential blue lupine and Karner blue butterfly surveys, there would also be minor vegetation removal and displacement of wildlife during construction and possibly as a result of increased recreational use of the recreational areas. We conclude that additional specific measures for the protection and enhancement of terrestrial resources at proposed facilities associated with this project are not warranted.

c. Unavoidable Adverse Effects

Construction of the proposed recreational facilities would result in clearing of small amounts of vegetation. This would result in a long term but minor adverse effect

on wildlife habitat. During construction, some wildlife would be displaced by construction activities, representing a short term, minor effect. If increased recreational use should result from any of the proposed recreational facilities, the increased human present could permanently displace certain species of wildlife, representing a long term, minor effect.

4. Aesthetic Resources

a. Affected Environment

Rugged and mountainous terrain dominates the visual character of the Adirondack Region. Numerous peaks rise to elevations of 3,000 to 5,300 ft NGVD surrounded by undeveloped woodlands with small cities and hamlets located in the valleys.

(1) E. J. West and District Project

The E.J. West and District Project is located near the western boundary of the town of Hadley within Adirondack Park (see figure 2). The eastern end of the project is undeveloped and comprised primarily of woodlands on steep slopes.

Because of steep topography, roads accessing the eastern end of the project area generally follow the shoreline, providing dramatic views of the lake and hillsides. In contrast, at the flatter western end of GSL, roads are located further inland and, therefore, provide relatively few views of the lake. The best views of the lake are enjoyed by residents of shoreline homes, shoreline recreationists, and boaters.

Historically, the maximum winter drawdown of GSL to elevation 735 ft by late March, exposes about 9,000 acres of substrate in the zone between the normal full pool at elevation 768 ft and the minimum pool elevation. In a typical year ice covers the drawdown zone such that the substrate remains invisible during most of the drawdown period. The substrate becomes visible to local residents and off-season tourists when the ice begins to melt in late March or early April.

(2) Stewarts Bridge Project

Most of the impoundment shoreline is undeveloped forestland. The presence of forest overstory on the hillsides generally blocks views of the impoundment from secondary roads that parallel the impoundment shoreline. Views of small sections of the impoundment with mountains in the background are available at Erie's Stewarts Bridge impoundment recreation area and at the commercial Stewarts Pond campsites. Views

from the water are generally of remote, primitive, undeveloped shoreline with dense forest cover.

From County Route 7 at the dam, one can view a 2,200-foot stretch of Sacandaga River whitewater. The downstream whitewater put-in area offers a more dramatic view of more prominent rapids with rocky shores and forested hills in the background. About 1.6 miles downstream of the dam is a wide quickwater area with minimal gradient that offers views of steep forested banks. The last third of this river reach features a steep gradient and high velocity channel, which may be viewed from county routes 1 and 4 and the Sacandaga River Manager's Headquarters.

(3) Hudson River Project

Steep, forested banks characterize the shorelines at both developments. Unobstructed views of the river are limited to a segment of Spier Falls Road east of the Spier Falls dam and from the public boat launch areas on each impoundment. There are no officially designated scenic highways near the Hudson River Project area.

(4) Feeder Dam Project

The shoreline of the Feeder Dam impoundment consists primarily of undeveloped land within the 100-year flood plain that is subject to periodic flooding. Wooded hillsides, low mountains, wetlands, and diverse riverine habitats dominate the views of the river in the project area. The forested terrain limits public views of the river from most roads. However, particularly beautiful views may be seen from Butler Road east of the Northway (I-87). Boaters on the impoundment generally would view undeveloped forested hillsides.

b. Environmental Effects and Recommendations

(1) E.J. West and District Project

Erie's proposal to reduce the maximum early spring drawdown to elevation 750 ft by the year 2020 would reduce the amount of exposed shoreline substrate by about 6,000 acres as compared to existing conditions. However, because the exposed substrate would be under ice cover in typical weather years, the reduced drawdown would represent a minor visual enhancement benefitting shoreline residents and off-season tourists. The benefit would be greater during unseasonably warm winter seasons.

The construction of the proposed take-out landing area, canoe portage, and put-in area as described in section V.C.5.b, Recreational Resources, would have minimal short-

term aesthetic effects during construction periods. The type of proposed facilities would be compatible with the existing aesthetic environment and would have no negative long-term aesthetic effects on the project area. Improvement of the Route 4 scenic overlook would slightly increase public viewing opportunities at the eastern end of GSL.

(2) Stewarts Bridge Project

The proposed increase in base flow from current leakage of 35 to 50 cfs to base flows from 300 to 350 cfs would have a positive effect on the project's aesthetic resources by providing higher flows when the project is not generating during the tourist and recreation seasons. Provision of additional scheduled daytime whitewater flows during the recreation season would enhance views of the Sacandaga River downstream of the Stewarts Bridge Project by creating bank-full conditions that resemble an unregulated river. The releases would be scheduled to correspond to peak boating demand and would enhance tourist viewing during these times of peak whitewater usage. Elimination of maintenance drawdowns would also enhance the visual quality of the shoreline for shoreline residents by reducing the amount of exposed substrate during the late winter and spring (between mid-March and early May).

(3) Hudson River Project

Erie's proposed reduction in the daily fluctuation of the impoundment could affect the project's aesthetic resources. A reduction in the fluctuation of impoundment levels at both the Sherman Island and Spier Falls developments from 3.7 ft and 4 ft, respectively, to 1 ft during walleye spawning season and 2 ft the remainder of the year, would reduce by 12 to 19 acres, and 21 to 18 acres, respectively, the amount of exposed shoreline substrate that could be viewed from roads along the shoreline, boat launch and canoe portage areas, and by boaters. We conclude that a reduction in impoundment fluctuation would benefit the project's aesthetic resources. The positive effect would be realized primarily by boaters and those using the shoreline recreational facilities, as views of the impoundment from roads are limited.

The construction of the proposed canoe portage and campsites would result in only minor disturbance of vegetation along the shoreline and would not detract from the available views of the river, bypassed reach, and project facilities; thereby minimizing effects on aesthetics.

(4) Feeder Dam Project

Erie's proposed reduction in impoundment fluctuation and construction of recreational facilities at the Feeder Dam Project could affect the project's aesthetic

resources. Erie's proposed reduction in impoundment fluctuation from 3 ft to 1 ft during walleye spawning season and 2 ft the remainder of the year, would reduce the amount of exposed shoreline substrate that could be viewed from roads along the shoreline, from the recreational facilities, and by boaters on the water. Therefore, we conclude that a reduction in fluctuation would benefit the project's aesthetic resources.

The construction of the proposed car-top boat launch, parking area, and canoe portage would result in only minor disturbance of vegetation along the north shoreline of the river and would not detract from the views of the impoundment, bypassed reach, and project facilities. Erie proposes to maintain buffer vegetation, to minimize the amount of vegetative disturbance, and to provide a screen of plantings between the new facilities and the river. Provision of additional parking for angler access to the tailrace on the south side of the river would have no effect on land use or aesthetic resources.

c. Unavoidable Adverse Effects: None.

5. Recreational Resources

a. Affected Environment

The Adirondack Region of New York State offers an abundance of year-round recreational opportunities. Located in the northeastern corner of the state, the region features Adirondack Park, which encompasses 2.5 million acres of public land and 3.5 million acres of private land holdings spanning five mountain ranges. The E.J. West and District and Stewarts Bridge projects are located on a portion of Adirondack Park. Adirondack Park offers flatwater boating, canoeing, whitewater rafting, hiking, skiing, fishing, camping, golfing, and other outdoor activities. The public lands within Adirondack Park contain more than 40 state-operated campgrounds, 2,000 miles of hiking trails, hundreds of miles of canoe routes, and 42 peaks above the 4,000 ft elevation (www.adirondacks.org/overview, accessed on December 14, 1999). A segment of the Hudson River immediately upstream of the town of Hadley, within Adirondack Park, has been designated as a Recreational River within the New York State Wild, Scenic and Recreational River System (NMPC and EDR, 1992). Table 14 shows the major recreational facilities, including those within Adirondack Park, located within 30 miles of the four projects included in this MPEIS.

Table 14. Major recreational facilities located within 30 miles of the E.J. West, Stewarts Bridge, Hudson River, and Feeder Dam projects (Source: Moreau, 1991; NMPC, 1991a, 1993, and 1998, as modified by staff)

Facility name	Facilities available	Public or private	City or Town	Fee
Crandall Park	Snowmobile trails	Public	Glens Falls	No
Hadley Picnic Area	Picnic tables, fire places	Public	Hadley	No
River Road Campground	Camping area, water access	Private	Corinth	Yes
Corinth Cooperative Fishing Area	Fishing	Public	Corinth	No
Rustic Barn Campground	Camping	Private	Corinth	Yes
Camp Skyward	Girl Scout Camp, cabins, swimming	Private	Corinth	Yes
Alpine Lake Campground	Camping, fishing, boating, tennis, playground	Private	Corinth	Yes
Pagenstetcher Park	Day-use area, picnic tables	Public	Corinth	No
Corinth Boat Launch	Water access	Public	Corinth	No
Corinth Beach	Beach	Public	Corinth	No
Hudson Grove Beach	Beach	Public	Lake Luzerne	No
Hudson River Boat Launch	Water access	Public	Lake Luzerne	No
Hudson River Picnic Area	Camping, picnic tables	Quasi-public	Lake Luzerne	No
Luzerne Heights Beach	Multi-purpose park and beach	Public	Lake Luzerne	No
Nick's Beach	Park, beach, boating	Public	Lake Luzerne	No
Camp Peniel	Camping	Private	Lake Luzerne	Yes
Luzerne Music Center	Beach	Private	Lake Luzerne	Yes
Swiss Trail Campground	Camping	Private	Lake Luzerne	Yes
Luzerne Campground	Camping, water access	Public	Lake Luzerne	Yes
KOA Campground	Camping	Private	Lake Luzerne	Yes

Facility name	Facilities available	Public or private	City or Town	Fee
Lake Luzerne Recreation Area	Picnic tables, car-top boat launch, bike trails, scenic views, snowmobile trails	Public	Lake Luzerne	No
Sacandaga River Whitewater Recreation Area	Whitewater rafting, tubing, kayaking	Public	Hadley	Yes
Moreau Lake State Park	Camping, swimming, hiking, skiing, boating, hunting	Public	Moreau	Yes

The Adirondack Region offers numerous paddling and canoe touring opportunities along its 2,800 lakes and ponds and 1,200 miles of rivers fed by 30,000 miles of brooks and streams. Local guidebooks list over 100 discrete routes for paddling and portaging the headwater lakes and rivers of Adirondack Park (McMartin, 1995; Proskine, 1993). In the Lake George region and project vicinity, excellent paddling opportunities are available at the Feeder Canal Park, below Spier Falls, and on the Stewarts Bridge impoundment (ADK, 1999). The Feeder Canal offers a 5-mile tour from Richardson Street in Glens Falls, New York, to Boat Basin Park in Hudson Falls, New York.

In addition to the specific facilities at each project described below, Erie allows primitive camping on all of its lands, except where specifically prohibited because of public safety concerns (NMPC and EDR, 1992).

(1) E. J. West and District Project

Because of its size (25,940 surface acres), GSL is a popular summer recreation area. A wide variety of recreational facilities exist along the lake shoreline including 3 public boat launches, 23 commercial boat launches, 5 municipal beaches, 1 public beach, 1 commercial beach, 1 state campground, 35 private beach clubs, 6 commercial campgrounds, 3 private boating clubs, 15 marinas, and 22 commercial boat docks or moorings (other than marinas). Most of the recreational facilities adjacent to GSL operate from May through mid-October and then close for the winter. The District owns the lands around the entire impoundment up to elevation 778 ft and issues over 4,200 private residential and 60 commercial annual permits for docks and piers that provide access to the water.

As indicated in section V.B.2.a (1), Aquatic Biota, GSL supports a regionally important sport fishery for walleye, northern pike, and smallmouth bass. NMPC reported the results of a 1984 survey indicating that, of recreational users of GSL, 71 percent engaged in fishing on a regular basis, second only to swimming. No information is available on how much, if any, of the fishing is ice fishing, although shifting water levels are expected to keep the number of winter anglers low.

GSL typically fluctuates 23 ft during the year, reaching its maximum normal elevation of 768 ft in May after the spring run-off and its lowest elevation in March when the District draws down GSL to enable the capture of spring high flows and minimize the potential for downstream flooding. From Memorial Day to Labor Day, the District regulates flows from the impoundment to maintain a target elevation above 756 ft. During this period, the lake level typically only fluctuates about 1 inch daily. The District also maintains a target minimum daily average flow of 3,000 cfs in the Hudson River below its confluence with the Sacandaga River.

The District maintains a canoe take-out at a formal shaded roadside stop on the southwestern side of the dam. The take-out area provides a scenic view of the dam and informal parking for about 9 vehicles. The District permits shoreline fishing and picnicking at this location, but not trailered boat launching or overnight camping.

(2) Stewarts Bridge Project

Erie operates the Stewarts Bridge impoundment recreation area and provides canoe portage around the dam as part of the Stewarts Bridge Project. Five recreational facilities operated by other entities are located within the immediate vicinity of the Stewarts Bridge Project (see table 15).

The Stewarts Bridge impoundment recreation area is closed during the winter. Erie places an impassable cable across the access road to prevent persons from accessing the upper impoundment, thereby protecting bald eagle wintering habitat (see section V.B.3, Terrestrial Resources).

NMPC conducted a recreational use study of the Stewarts Bridge Project area (KA, 1997e), which indicated that approximately 63,600 recreation days[15] occurred in the study area for day-time use and 1,745 for night-time use. Whitewater use of the

[15] A recreation day is defined as each visit by a person to a development for recreational purposes during any portion of a 24-hour day.

Table 15. Recreational facilities at the Stewarts Bridge Project (Source: NMPC, 1998, as modified by the staff)

Site	Facilities available	Operator	Public or private	Fee
Canoe take-out and put-in portage trail	Information, signs, 0.4 mile trail to put-in below the dam, trail registration box	Erie	Public	No
Stewarts Bridge impoundment recreation area	14 acre day-use area, trailered gravel boat ramp, 11 picnic tables, 21 grills, privies (summer only), informal ball field, 2 gravel parking areas for about 50 vehicles	Erie	Public	No
Town of Hadley recreation area	Trailered gravel boat launch, beach, roadside parking for about 8 vehicles	Town of Hadley	Public	No
Stewarts Pond Campsites	65-acre campground with 48 campsites, trailered gravel boat launch, beach, overnight camping, toilets with showers, water, docks, swimming, ball field	Private	Private	Yes
Raft launch area (south side put-in)	Toilets, information signs, raft launch areas	Sacandaga River Manager	Public	Yes
Raft take-out area (north side take-out)	Take-out area for river craft, privies, and changing rooms, information, concession, picnic tables, rental services, shuttle services	Sacandaga River Manager	Public	Yes
Hadley town beach	Beach	Closed, used informally		No

Sacandaga River below Stewarts Bridge contributed 35,600 recreation days; about 28,000 recreation days were attributable to all other day-use activities in the study area, including 35 percent attributed to motor boating on the impoundment (with some participants most likely fishing), 22 percent attributed to picnicking, 15 percent attributed to sightseeing, 9 percent attributed to shoreline and ice fishing, and 7 percent each attributed to swimming and canoeing. Only an estimated 52 of the 2,525 recreation days attributed to shoreline and ice fishing were associated with fishing on the impoundment during the winter.

NMPC notes that, although some ice fishing may occur on the impoundment near the dam and on the downstream bay at the confluence of the Sacandaga and Hudson rivers, ice elsewhere on the impoundment and the Sacandaga River typically is not thick or wide enough to support ice fishing. Some angling undoubtedly occurs along the Sacandaga River downstream of the Stewarts Bridge Project, but no estimates are available. The predominantly boulder substrate and variable flows would limit the attractiveness of this reach to anglers.

Projections of non-whitewater boating recreation use to the year 2010 show an expected increase of 3 percent--from 28,000 to 29,000 recreation days. NMPC compared the projected increase in recreational users to the capacity of each existing recreation facility and concluded that the existing facilities would meet the projected demand except for picnic facilities and parking for boat launching uses.

Downstream from the project, a popular and regionally significant reach of Class II-III[16] whitewater exists on the Sacandaga River. The reach consists of 3 miles of free-flowing river from the dam to the confluence with the Hudson River. The reach includes two sets of rapids separated by a 1.1-mile-long quickwater segment: a 2,200-foot-long segment that occurs immediately downstream of the tailrace; and a 1,600-foot-long segment about 1.6 miles further downstream, beyond the quickwater. The rapids feature wide channels, steady drops, and sizable standing waves. The lack of waterfalls or chutes and other obvious hazards make this reach attractive to paddlers who prefer a Class II-III experience. Current summer flows of 4,000 cfs during 12-hour daylight periods make the reach attractive to more experienced paddlers as well.

NMPC completed an assessment of whitewater opportunities in its hydropower system. The report concludes that the Sacandaga Whitewater Recreation Area is the number one priority site for whitewater recreation management within the hydropower system. Further, it is the only segment in the hydropower system where whitewater recreation was deemed the best use of water resources (NMPC and EDR, 1992). NMPC based this conclusion on the heavy use, existing license agreement with commercial rafters, and the very limited fisheries resources in this segment of the river. As a result of the assessment, NMPC worked with local groups to develop improved procedures and facilities for whitewater access. These include the construction of a new raft launch site to be located on the south side of the river about 1,200 ft downstream of the dam, and the

[16] The international scale for whitewater difficulty defines Class II as Novice with straightforward rapids with wide, clear channels and Class III as Intermediate with moderate rapids and irregular waves which can swamp an open canoe (NMPC, 1991b).

improvement of the existing raft take-out site on the north side of the river near the confluence with the Hudson River.

As a result of the assessment, Erie currently provides access to whitewater rafting activities on this segment of the Sacandaga River through licensing arrangements with several commercial rafting outfitters. Further, Erie has hired a River Manager who now offers shuttle services from the north side take-out to the upstream put-in. Erie provides parking at the raft launch site to private boaters and tubers.

(3) Hudson River Project

Spier Falls

Erie operates the Spier Falls boat launch area located 1 mile upstream from the dam, on the south shore of the impoundment, in the town of Corinth. This facility, which is accessed from Spier Falls Road (County Route 24), includes a concrete boat launch and public parking, adjacent to the impoundment, for about 9 vehicles. There are no estimates of the use of this facility. Swimming, picnicking, and camping are prohibited at the boat launch. Users of the facility are responsible for carrying out any trash they generate. The Spier Falls impoundment supports a recreational fishery (NMPC and EDR, 1992), but no further information on angling use at this location is available.

Sherman Island

Erie operates the Sherman Island boat launch area located upstream of the dam on the south shore of the impoundment, in the town of Moreau. This facility, which is accessed from Spier Falls Road, includes a gravel parking area for 9 vehicles, a gravel boat launch, and picnic tables. The area is available for day-use only. Recreational fishing undoubtedly occurs on the Sherman Island impoundment and may occur, to a limited extent, in the bypassed reach and tailrace. No information on the nature of angler use of Sherman Island waters is available; however, as discussed in the Feeder Dam aquatic biota discussion, walleye poaching has been reported in this area.

(4) Feeder Dam Project

No data are available on recreational use of the project area, although boating, swimming, and fishing are known to occur on the Feeder Dam impoundment. Similar activities occur on the Glens Falls impoundment, into which the Feeder Dam powerhouse discharges.

Upstream of the Feeder Dam Project, the town of Queensbury operates the Hudson River Park. Completed in 1998, this facility includes parking areas, a boat launch, picnic tables, a pavilion, and playground. The Nolan Road boat launch provides public access to the south side of the impoundment in the town of Moreau. Further upstream, the town of Queensbury and the Open Space Institute maintain the Hudson Pointe Nature Preserve. Located immediately downstream of the Sherman Island powerhouse adjacent to the project tailrace, this 83-acre reserve, donated by NMPC, includes parking and interpretive trails. The preserve is open to the public during daylight hours for non-motorized recreation.

Feeder Canal Park, operated by the Feeder Canal Alliance, affords a variety of recreational activities, including canoeing, bicycling, fishing, jogging, hiking, and picnicking. A 7-mile towpath, which begins just downstream of the dam, provides limited opportunities for biking, jogging, and hiking. (We discuss the Feeder Canal in section V.B.7, Cultural Resources.)

Haviland's Cove Park, on the Glens Falls Project impoundment, downstream from Feeder Dam, is the only formal recreation site that exists adjacent to the Feeder Canal. The park contains a beach on the Hudson River, a softball field, a volleyball court, a picnic area, a hiking and biking trail of decomposed granite, restrooms, and public parking. The park is open from 9:00 a.m. until dusk during the recreation season and on weekends from noon until dusk from May 1 through June 30, and then for the first three weeks in September. The park is closed the remainder of the year. The city of Glens Falls Recreation Department manages the park (Feeder Canal Alliance, 1990). Sand Bar Beach is across the impoundment from Haviland's Cove Park, in the village of South Glens Falls (FPC, 1991). This recreational area features a bathing beach and boat launch and is managed by the town of Moreau.

Extensive summer camp and second home development exists along the Feeder Dam impoundment. These provide a substantial amount of private boat access and water-based recreation (Feeder Canal Alliance, 1990; NMPC and EDR, 1992).

b. Environmental Effects and Recommendations

(1) E.J. West and District Project

Erie proposes to: (1) improve the Route 4 scenic overlook by paving the existing pull-off and installing interpretive signage in consultation with Saratoga County;[17] (2) provide a 1,800-foot-long canoe portage around the south side of Conklingville Dam linking GSL with the Stewarts Bridge impoundment, which would include portage signs and three canoe rests; and (3) continue to operate the project in a manner consistent with the operation of GSL by the District to meet its obligations for flood protection and seasonal flow augmentation for the Hudson River.

We describe the proposed operation of GSL in section III.A. Consistent with the Settlement, the District proposes a target elevation for GSL of 760 ft on October 15 in accordance with a level curve 3 to facilitate lake recreation through Columbus Day. However, downstream flow obligations to provide seasonal flow augmentation would take precedence over this target elevation. To enhance whitewater recreation, the District proposes to operate GSL to provide the daily volume of water, if available, needed to sustain the whitewater demand flow in the Sacandaga River below Stewarts Bridge dam. We discuss the whitewater releases as part of the Stewarts Bridge Project.

Paving and installation of interpretive signage at Saratoga County's Route 4 scenic overlook would expand and improve the existing informal pull-off. This pull-off is at a bend in the highway with signage viewable from both directions to caution motorists.

The proposed canoe portage around the Conklingville Dam would be relatively flat, except for the initial segment from GSL to the highway, and would feature several rest stops along the way. Both the take-out and put-in areas would be easily accessed by boaters. The preliminary design seems reasonable and efficient. We conclude that the proposed canoe portage is well-designed and affords boaters the shortest and flattest route available from GSL to the Stewarts Bridge Project impoundment, and recommend that it be developed in accordance with the Settlement.

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[17] Ownership and maintenance of the pull-off and overlook would remain with Saratoga County, and the Route 4 overlook would not be included in the project boundary.

(2) Stewarts Bridge Project

Erie proposes to improve two existing recreational facilities and to develop two new facilities in support of the whitewater program. Specifically, Erie proposes to: (1) make improvements to the Stewarts Bridge impoundment recreation area, including road work, better maintenance, signage, and picnic tables that are accessible to the physically disabled; and (2) provide a canoe portage trail from the east side of the Stewarts Bridge impoundment to the north side of the Sacandaga River for both canoe and whitewater access with directional signage for both the trail and parking area.

The proposed and recently completed (the picnic tables are already installed) improvements to the Stewarts Bridge impoundment recreation area would enhance access for persons with physical disabilities to this stretch of the Stewarts Bridge impoundment. A small cemetery on a slightly elevated parcel near the water's edge is enclosed by a rail fence to prevent people from walking or driving on the grave sites. We conclude that this measure is sufficient to protect the cemetery from inadvertent disturbance by recreationists. Erie would continue to close the Stewarts Bridge impoundment recreation area during the winter and place an impassable cable across the access road to prevent people from accessing the upper impoundment, and protecting bald eagle wintering habitat (see section V.B.3, Terrestrial Resources).

Erie completed the canoe portage trail on the impoundment side of County Route 7 in 1999. The portage signs installed by Erie mark both the take-out and put-in trails, provide information to users, and discourage boaters from using the Erie maintenance road for portage. Erie proposes to provide signage along County Route 4 indicating that parking along the road is for angler access to the river and directing whitewater boaters to the north side put-in parking area. The use of directional signage would reduce parking conflicts between site users (anglers and boaters) and local traffic. Erie also proposes to make improvements to the portage trail on the tailrace side of County Route 7. We conclude that the canoe portage, as proposed, would provide improved access to the project waters for boating and fishing. Implementation of the proposed base flow regime is likely to substantially enhance fisheries habitat in the Sacandaga River downstream of the Stewarts Bridge dam, as discussed in section V.B.2.b (2), Aquatic Biota. This, in turn, would enhance the suitability of this reach for anglers. We recommend that Erie's proposed recreational enhancements, described above, be implemented as detailed in the Settlement.

Whitewater Program

Erie proposes a whitewater program consisting of: (1) scheduled whitewater releases; (2) establishment of a toll-free telephone number and Internet web site providing

flow release information, including information on flow forecasts and pre-scheduled releases; (3) continued operation of the existing south side put-in and north side take-out areas through the River Manager Program; and (4) development of new north side put-in and new south side take-out areas.

Erie proposes to provide the existing level of whitewater releases of 4,000 cfs for a guaranteed number of hours each day contingent on the elevation of GSL. The releases would be based on the Sacandaga River whitewater demand schedule contained in the Settlement as shown in table 16. Generally, the higher the lake elevation, the longer the duration of whitewater flows. Erie would provide releases, on an uninterrupted continual basis, scheduled to include the core hours of 11:00 a.m. to 2:00 p.m. Erie also would provide pre-scheduled releases for late afternoon and early evening whitewater opportunities on one Tuesday in June, two Tuesdays in July, and one Tuesday in August, from 11:00 a.m to 6:00 p.m., and on four Saturdays during the period July 1 through August 31, from 11:00 a.m. to 5:30 p.m. Water availability permitting, the pre-scheduled releases would override the whitewater demand schedule.

Table 16. Sacandaga River whitewater demand schedule (Source: Settlement, 2000)

June 1 - June 22 Weekends only		June 23 - September 8 Daily		September 9 - September 23 Weekends only	
GSL level curve (figures 3, 4, and 5)	hours	GSL level and elevations	WW hrs	GSL level and elevations	WW hrs
1.00 -1.19	None	1.00 - 1.19	None	1.00 - 1.19	None
1.20	4 hours	1.20	5 hours	1.20	3 hours
2.00	5 hours	2.00	7 hours	2.35	3 hours
2.75 and above	6 hours	2.35 and above	8 hours	3.00 and above	6 hours

Erie proposes to provide information on flow forecasts and pre-scheduled releases via a toll-free or local phone number. Forecasts would be provided on a day-ahead basis and provisionally on a two-day-ahead basis over the phone. Flow information would be made available one week in advance over the phone. Erie would post information on flow forecasts and pre-scheduled releases on a web site a minimum of two weeks in advance of the release.

Erie would continue to operate and maintain the existing south side put-in area and the north side take-out area commercial facilities through the River Manager Program. The River Manager Program is an independent, self-supporting private business that coordinates and manages the commercial whitewater rafting activities on the Sacandaga River. Erie reserves the right to sell or otherwise transfer either one or both facilities to a

private whitewater entity. The Settlement provides New York State with a right of first refusal should Erie propose to sell either facility to an entity other than a license transferee or a private whitewater entity. These two facilities, although owned by Erie, are not within the current project boundary.

Erie also proposes to develop a new non-commercial north side put-in area and south side take-out area. Erie would construct both facilities subject to funding limits of $50,000 for both. A portion of the north side put-in area is currently within the project boundary and the south side take-out area is not. Upon completion of construction, Erie proposes to convey the improved facilities to New York State; subsequently this entity would control access and operate the facilities. Operation of these facilities would not begin until after the transfer to the State is completed. Erie indicates that it would request an amendment to license for removal of the north side put-in area from the project boundary once a license is issued for the project.

The proposed north side put-in area, located on the north side of the Sacandaga River immediately east of County Route 7, would consist of a parking area for 25 vehicles, a trail that would connect with the recently completed canoe portage trail, and signage. The signage would include information to: (1) direct boaters to the designated north side whitewater access site; (2) advise boaters of the availability of a shuttle service; and (3) provide whitewater boating safety information to potential users. The Settlement intends that this parking area would be used by whitewater boaters and would eliminate the current practice of whitewater boaters parking along the roadway. Erie would request that Saratoga County post road signs prohibiting whitewater boating parking along County Route 4. Parking along County Route 4 would be reserved for anglers.

The proposed south side take-out area would occupy the site of the former Hadley town beach on the right bank of the Hudson River just downstream from its confluence with the Sacandaga River. Development of the site would include improvements to the gravel access road and parking spaces for 12 to 15 vehicles designed to be screened from the river. Consistent with the Settlement, Erie would consult with NYSDEC on the design of the facilities.[18]

The proposed scheduled whitewater releases would provide enhanced whitewater boating opportunities at the Stewarts Bridge tailwaters during the recreation season from June 1 through the end of September, consistent with the System-wide Whitewater Recreation Plan (NMPC, 1991b) and the Proposed Sacandaga River Whitewater

[18] Under the terms of the Settlement, NYSDEC would coordinate consultation with other parties to the Settlement, including ADK.

Recreation Program (NMPC and EDR, 1992). The flow notification system would provide information on the timing and amount of the scheduled whitewater flow releases, and access would be ensured to the tailwaters reach for the whitewater boaters.

The proposed non-commercial whitewater program facilities (north side put-in and south side take-out) would enhance whitewater boating opportunities in this stretch of the Sacandaga River by providing formal public access to the river. Provision of formal parking for boaters and informal roadside parking for anglers, along with safety and directional signage, would help to alleviate conflicts with local traffic on County Routes 4 and 7, and promote safe use of the recreational facilities. Erie proposes, in accordance with the Settlement, to transfer to New York State the north side put-in, the parking area, and access trail to the canoe portage. However, the entire canoe portage route would remain in the project boundary thus ensuring public access to project waters.

Transfer of the developed non-commercial facilities to New York State would ensure continued public access only so long as the state is willing and able to provide this access. However, in the event that the state was unwilling or unable to do so, the Commission's practice is to hold licensees ultimately responsible for providing project-induced recreation facilities, including public access.

(3) Hudson River Project

At the Spier Falls development, Erie proposes to: (1) improve the existing Spier Falls boat launch facility; (2) develop canoe portage around the north side of the dam; and (3) provide two campsites on the impoundment with water access to them.

Erie proposes the following improvements to the Spier Falls boat launch facility to make the facility accessible to people with physical disabilities: (1) a parking space for persons with disabilities; (2) a low angle access trail to the picnic area and the water's edge for wheelchair use; and (3) at least one picnic table accessible to wheelchair use.

Erie proposes to develop a canoe portage trail around the north side (left bank) of the dam as proposed in NMPC's November 1993 response to the Commission's August 28, 1992, request for additional information. Canoeists would take-out just upstream of the existing boat barrier and portage about 400 ft through the woods, about 300 ft along an abandoned dam construction road, about 250 ft along a segment of a skidder trail, and finally along an existing trail that descends to the river. Portions of the trail that would need to be improved contain mature trees, high canopy, and minimal underbrush. Erie would develop the portage trail in consultation with NYSDEC and would design the trail to minimize ground disturbance and the potential for erosion. Erie would place signs on both sides of the impoundment and at the take-out area to notify boaters of the portage.

Consistent with the Settlement, Erie proposes to provide two campsites on the impoundment for water access as described in NMPC's November 1993 response to the Commission's request for additional information. Erie's design concept for these sites includes minimal ground disturbance, location of a fire ring, and canoe pull-out area at the water's edge. Erie would develop the final design in consultation with NYSOPRHP.

At the Sherman Island development Erie proposes the following recreational measures: (1) improvements to the existing Sherman Island boat launch; (2) development of canoe portage around the south side (right bank) of the dam; (3) development of two primitive campsites; and (4) development of parking area for fishing access to the bypassed reach.

Erie proposes improvements to the Sherman Island boat launch facility that would improve the traffic flow and make the facility accessible to people with physical disabilities. Erie would add a parking space for disabled persons and a low angle access trail to the picnic area and the water's edge for wheelchair use. Erie also would expand the picnic area and include at least one picnic table accessible to wheelchair use. Privies would be installed at the boat launch on a trial basis.

Erie proposes to develop a canoe portage on the south side (right bank) of the Sherman Island dam as described in NMPC's November 1993 response to the Commission's request for additional information (figure 8). Boaters would take out in a small cove located just upstream of the existing boat barrier, follow a short trail, paddle across another small cove, follow an existing path for about 500 ft, follow an existing dam maintenance road for about 200 ft, and then follow a woods road for about 900 ft until it intersects with another dam maintenance road in the vicinity of the transmission line corridor. At this point, boaters would use one of two routes depending on the flow conditions. During low flow periods, boater would continue down an abandoned dam construction road about 300 ft to the edge of the bypassed reach and then follow painted rocks to a second pool in the north channel of the bypassed reach and then to the confluence with the tailrace (figure 8). When there is spillage over the dam resulting in high flows in the bypassed reach, boaters would follow a trail for about 1 mile to a safe put-in point below the convergence of the bypassed reach and the tailrace (figure 8).

Erie proposes to clear both the initial segment from the take-out and the last segments from the transmission corridor to the water's edge and to cover the trail with mulch to provide an even walking path. To alleviate safety concerns, Erie would place a boat barrier across the second small cove to separate it from the nearby horseshoe section of the spillway. Erie would provide signage indicating the portage facility at trail locations and along the banks of the impoundment.

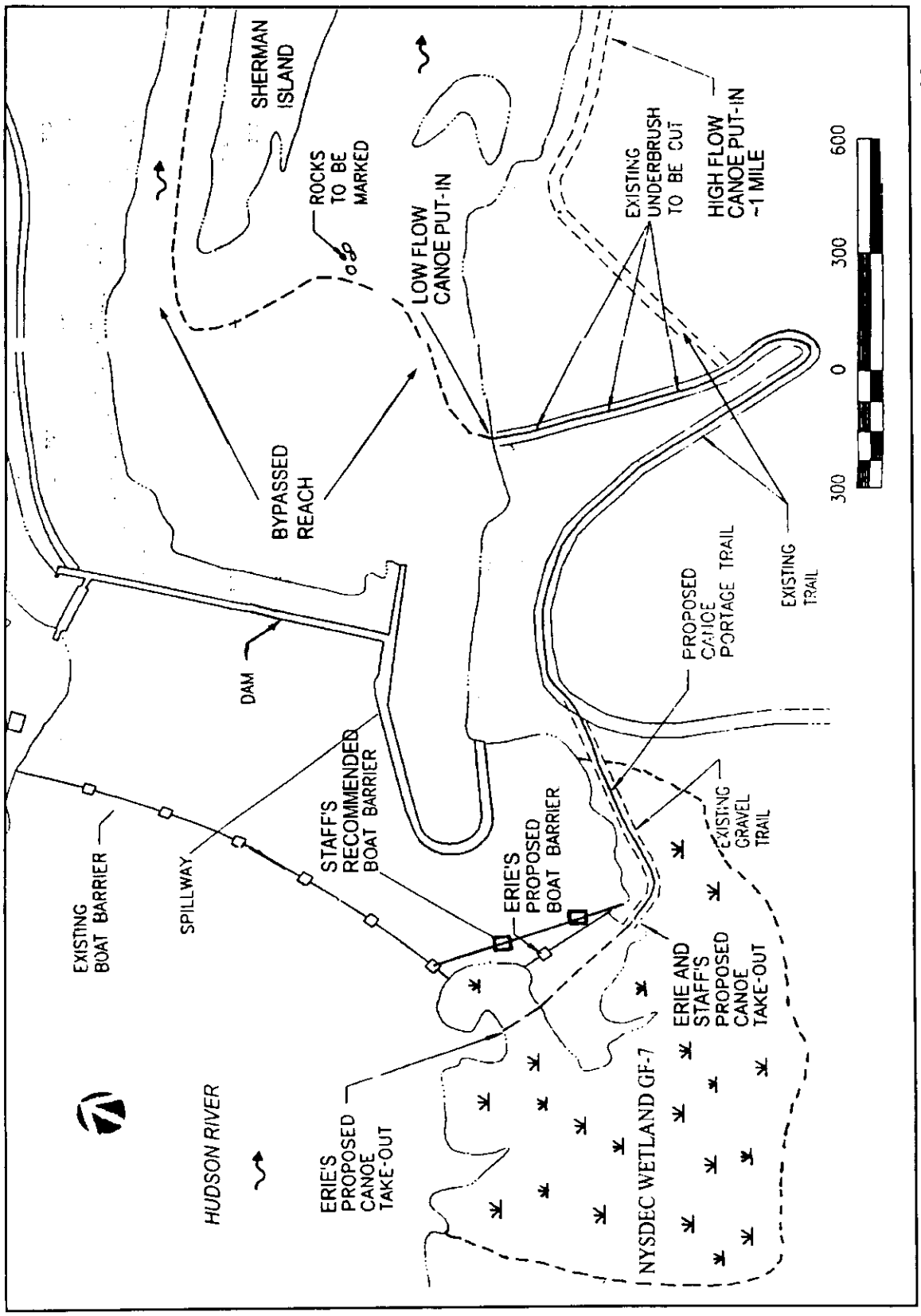

Figure 8. Erie's proposed take-out at Sherman Island and staff's recommended alternative (Source: NMPC, 1993, as modified by staff).

Erie proposes to provide two island campsites on the impoundment for water access (as described in NMPC's November 1993 response to the Commission request for additional information). Erie's design concept for these sites includes minimal ground disturbance, location of a fire ring, and canoe pull-out area at the water's edge. Erie would develop the final design in consultation with NYSOPRHP.

To provide angler access to the Sherman Island bypassed reach, Erie proposes to develop a parking area for four cars off Potter Road with a foot trail leading along the existing maintenance road to the south side (right bank) of the bypassed reach. Depending on whether or not a non-project related residential development along Potter Road is developed, the parking would be located either next to Erie's maintenance road gate, or along the existing Potter Road entrance, in which case the access trail would be extended to the parking area.

Erie also proposes to lease land to the town of Queensbury for the development of a new boat launch on the north side (left bank) of the Sherman Island impoundment. Consistent with the Settlement, this new facility would not be included in the project boundary.

Improvements to the existing Spier Falls and Sherman Island boat launch facilities would enhance public recreation access for persons with physical disabilities at these facilities. Assisting the town of Queensbury with the development of a boat launch facility on the north side of the river would enhance access for boaters by providing a second formal access point. Currently, the only access for trailered boats is on the south side of the middle portion of the impoundment (the Sherman Island boat launch facility). The Queensbury site would offer access to the lower portion of the impoundment and enable boaters coming from the north to avoid the substantial drive required to access the current launch site. Provision of water-accessible campsites at both developments would provide limited public access for camping in this relatively undisturbed area. Consultation with NYSOPRHP in the design of these campsites would ensure development of a passive recreation experience that meets the needs of campers while avoiding any unnecessary harm to cultural properties.

The preliminary siting of the proposed canoe portage around the Spier Falls dam minimizes land and vegetation disturbance through the use of existing access roads and trails. The route is relatively level and would provide formal portage where none now exists. We conclude that the proposed design would meet the need for canoe portage around the Spier Falls dam and recommend that it be implemented.

The preliminary siting of the proposed canoe portage around the Sherman Island dam also uses existing access roads and trails where possible. However, unlike those at

the other three projects, this portage route crosses a wetland (see section V.B.3) at the take-out location. The route also necessitates two take-outs and put-ins. A review of the plan suggests that an alternative route along the edge of the water (as shown on figure 7) would avoid most of the wetland area (thus eliminating potential adverse effects) and would eliminate the need to take-out and put-in twice. This alternative route would require that Erie realign the existing boat barrier to provide access along the shoreline. The modified alignment of the boat barrier would at no point be closer to the dam than the closest point of the existing boat barrier, thereby meeting the Commission's safety guidelines. Therefore, we recommend that Erie, in consultation with NYSDEC, reconsider the proposed canoe portage prior to filing the final siting and detailing of the facility in the recreation plan. In our opinion, minor refinements to the canoe portage route intended to avoid a known wetland would not be inconsistent with the terms of the Settlement.

The downstream portion of the canoe portage route to the location of the proposed put-in also would provide access for anglers to the bypassed reach. The proposed parking would enhance angler use of the bypassed reach. We anticipate that the proposed minimum flow regime for the Sherman Island bypassed reach would enhance habitat for gamefish, as discussed in section V.B.2.b (3), Aquatic Biota. This, in turn, would enhance the suitability of the bypassed reach for anglers.

(4) Feeder Dam Project

Erie proposes to provide the following recreational measures for the Feeder Dam Project: (1) continued informal angler access to the tailrace with a single parking space; and (2) canoe portage, parking, and picnic facilities, and a car-top boat launch as part of the proposed Overlook Park.

Erie proposes to cooperate with the Feeder Canal Alliance and the town of Queensbury to develop an Overlook Park along Richardson Street and Haviland Avenue. Erie would provide the following recreational facilities as part of this collaborative effort: (1) a canoe portage including a put in on the Hudson River and a take-out at the proposed Richardson Street boat launch; (2) parking and picnic facilities including space for 16 cars, access trails leading to the car-top boat launch and to the Feeder Canal, and two cement picnic tables; and (3) a car-top boat launch on the south side (left bank) just upstream of the dam and the entrance to the Feeder Canal with signage and post and rail fencing that would limit access by cars with trailers. Upon completion of these facilities, Erie would enter into a no-fee agreement with the town of Queensbury for the use of Erie lands and maintenance of the entire Overlook Park. Erie would seek an amendment of license in the future to revise the project boundaries to exclude lands occupied by these facilities

Provision of a parking space at the Feeder Dam tailrace would enhance the existing informal angler access to the tailrace fishery.

The proposed canoe portage route from the proposed Richardson Street take-out just upstream of the Feeder dam and boat barrier to the put-in downstream just below the Feeder dam provides a relatively short and efficient portage around the dam with the option for put-in to either the Feeder Canal or the river.

Provision of car-top boat launch facilities and parking designed for car-top boating usage would improve safe access to the river at this location by eliminating parking along the road and segregating the formal parking from the portage route and boat launch. Public access to these facilities would be ensured as long as the town of Queensbury is willing and able to provide this access. However, as noted previously for the Stewarts Bridge Project, in the event the town of Queensbury is unwilling or unable to continue to provide this public access to the project impoundment and other project-induced recreation facilities, the Commission's practice is to hold licensees ultimately responsible for providing public access. This point is particularly relevant here because Overlook Park would provide the only public access put-in and take-out sites currently controlled by Erie on the Feeder Dam impoundment.

We anticipate that, with the proposed flow regime at the upstream Sherman Island development, additional gamefish may become available to anglers at the Feeder Dam impoundment. In particular, the walleye population in the Feeder Dam impoundment is likely to be substantially enhanced. This could increase the attractiveness of this impoundment for anglers, increasing the importance of ensuring public access to project waters.

We also note that the canoe put-in at the beginning of the Feeder Canal is also an option under consideration by FPC to provide canoe portage around the Glens Falls dam. Boaters could take their boats out of the Glens Falls impoundment near Feeder Dam and canoe downstream in the Feeder Canal. However, the preferred option for the canoe portage route around Glens Falls dam would establish a take-out point at Murray Street, about 2 miles downstream of Feeder Dam. The Feeder Canal would still be used to allow boaters to circumnavigate the Glens Falls Project (FERC, 1999). Should either option be selected for the Glens Falls Project, then the Glens Falls project boundary would need to be modified to include this access point. Under either scenario, public access to the river downstream of the Feeder Dam Project would be ensured and under Commission jurisdiction, although the Murray Street access point would not readily facilitate a canoe portage route around Feeder Dam.

In summary, the proposed recreational facilities at the four hydroelectric projects would provide long-term and enhanced recreational opportunities within the region and at the project. The proposed canoe portages at each project would allow for continuous, if in some case arduous, and enhanced canoe portage from GSL downstream to below the Feeder dam to the benefit of regional canoe touring opportunities. We recommend the proposed development of recreation plans that would include final siting and detailing of the proposed recreational facilities be conducted in consultation with NYSDEC to ensure the facilities would be designed and constructed consistent with the provisions of the Settlement, as approved by the Commission.

c. Cumulative Effects on Canoe Touring

We identified canoe touring as an activity that would be cumulatively affected by the proposed relicensing of the four projects under consideration in this MPEIS. The proposed canoe portage at the E.J. West and District Project and the existing portage at the Stewarts Bridge Project would provide access for canoe touring from GSL and upper portions of the Sacandaga River in Adirondack Park to the confluence with the Hudson River in the town of Hadley. Completion of the formal canoe portage at the E.J. West Project would allow access to both flatwater segments on the GSL and Stewarts Bridge impoundments as well as the whitewater run below Stewarts Bridge dam to the confluence with the Hudson River.

On the Hudson River, the recreation plan approved by the Commission in April 2000 for the Curtis/Palmer Falls Project located immediately upstream of the Hudson River Project includes the provision and maintenance of canoe portage from the Curtis dam to the Palmer Falls Project tailwaters. There is a canoe access point upstream of the dam, but no portage at the South Glens Falls Project. At the downstream Hudson Falls Project, there is a portage trail through Riverside Park with a take-out at the highway bridge. Implementation of canoe portage around the Spier Falls and Sherman Island developments of the Hudson River Project and around the Feeder Dam Project, therefore, would allow continuous regional canoe touring from locations upstream of the Curtis/Palmer Falls Project, in Adirondack Park, downstream to below the Glens Falls Project, and eventually as far downstream as Troy, just north of Albany, New York. Portage around the Glens Falls dam using the Feeder Canal is also an option discussed in the environmental assessment for the relicensing of the Glens Falls Hydroelectric Project, which is currently under review by the Commission.

d. Unavoidable Adverse Effects: None.

6. Cultural Resources

a. Affected Environment

In its applications, NMPC did not delineate an Area of Potential Effect (APE) for any of the projects. NMPC used the terms "study area" or "project area," which were not defined but appear to have included not only project lands but also some unspecified areas beyond project boundaries.

(1) E.J. West and District Project

Archeological Resources

Mapping on file at the State Historic Preservation Officer (SHPO) depicted 12 archeological "site areas" (a 1-mile-diameter circle within which a site is located) within or along the perimeter of GSL. Based on NMPC's Report on Erosion Due to Fluctuations in GSL, two of these site areas were found to exhibit some active erosion. NMPC stated that it would contact the SHPO to find out the precise location of archeological sites within those two site areas to determine if the archeological sites were in fact proximate to locations of active shoreline erosion, and to determine, in consultation with the SHPO, whether archeological investigations might be warranted. The record provides no further information on this issue.

Historical Resources

The SHPO has indicated its opinion that the Conklingville Dam and the E.J. West powerhouse are potentially eligible for listing in the National Register of Historic Places (NRHP). The Conklingville Dam was completed in 1930 as a state-sponsored flood control measure for the Hudson River. The project forced the relocation of nearly 1,100 residents from small logging and farming communities long established along the Sacandaga River, including Conklingville (Gormley, 2000). The E.J. West powerhouse was built in 1929-1930 by Adirondack Power & Light Co., to replace older generating facilities inundated by the Conklingville dam.

(2) Stewarts Bridge Project

Archeological Resources

No archeological sites listed in or eligible for listing in the NRHP have been identified within the project boundary. However, NMPC noted that the mainstem of the

Mohawk Indians' Sacandaga Trail, which originated at Lake George and followed the Sacandaga River to Daley Creek, may have crossed the project boundary.

Historical Resources

No historical resources have been identified in the project vicinity. The Stewart Bridge project's facilities, constructed in 1951-1952, have not been evaluated for eligibility for listing in the NRHP.

(3) Hudson River Project

Archeological Resources

No archeological resources within or in the vicinity of the Hudson River Project have been formally recorded in the files of the SHPO. The Saratoga County Planning Board has identified two "sites of historical note" in the vicinity: (1) the site of a former bridge across the Hudson River near Folts Road built ca. 1840 by the Clothier family; and (2) a Native American samp mortar (a rock outcropping used to grind corn) near Fenton Road. In a letter dated September 16, 1985, the SHPO did note that the vicinity of the Hudson River Project was "archeologically sensitive." The letter provided no further information concerning this sensitivity assessment or the need to conduct archeological studies.

Historical Resources

NMPC prepared a NRHP nomination form for the Spier Falls dam and powerhouse, constructed in 1903. The completed nomination form included the dam, forebay, 1903 powerhouse, and 1930 powerhouse addition. The nomination form described the Spier Falls dam and powerhouse as significant surviving examples of large scale engineering and electric power transmission projects of the early years of the 20th century. The development is also significant for its association with Eugene Lionel Ashley, an attorney and developer from Glens Falls, New York, who built pioneering electric power systems in eastern New York, South Carolina, and Georgia. The Hudson River Project's Sherman Island development, constructed in 1923, has not been evaluated for eligibility for listing in the NRHP.

(4) Feeder Dam Project

Archeological Resources

No archeological resources have been recorded within or in the vicinity of the Feeder Dam, nor have any surveys have been undertaken to identify such resources. In a letter dated September 16, 1985, the SHPO did note that the vicinity of the Feeder Dam Project was "archeologically sensitive." The letter provided no further information concerning this sensitivity assessment or the need to conduct archeological studies.

Historical Resources

The powerhouse at the south end of the Feeder Dam (built in 1923-24) has not been formally evaluated to determine its eligibility for listing in the NRHP. The Feeder Canal, which begins at the north end of the dam, was listed in the NRHP in 1984 as part of a multiple resource nomination. The canal, built between 1824 and 1832, extends seven miles along the north side of the Hudson River from Queensbury, through Glens Falls and Kingsbury, to its terminus at the Champlain Canal in Fort Edward. Contributing elements include the canal right-of-way, intact portions of the canal towpath, and thirteen stone navigation locks with adjacent concrete bypass sluices. The Feeder Dam was constructed in 1914 (Johnson, 1980) under the auspices of New York State to provide water to the Champlain Canal between the St. Lawrence and the Hudson rivers. The Moreau Manufacturing Company was established by Adirondack Power & Light, the International Paper Company, and FPC for the purposes of generating electric power from excess water at the Feeder Dam, most of this power being transmitted for use by the paper mill industry at Glens Falls.

b. Environmental Effects and Recommendations

A Programmatic Agreement (PA) among the Commission and the SHPO, with NMPC, Moreau Manufacturing Company and Beebee Island Corporation concurring, was executed on July 19, 1996, for managing historic properties that may be affected by licenses issuing for the continued operation of 14 hydroelectric projects in New York State, including the four Upper Hudson River hydroelectric projects: E.J. West, Stewarts Bridge, Hudson River, and Feeder Dam. The PA commits the licensee to prepare a CRMP for each project in consultation with the SHPO, within 1 year of the Commission's issuance of a license for that project. The PA also provides interim procedures to consult with the SHPO prior to commencing any project-related land-clearing or land-disturbing activities, or embarking on any other project-related activities that could affect historic properties, such as NRHP eligible project facilities.

In the Settlement (Appendix B.3), Erie stated its commitment to develop a CRMP for the E.J. West, Stewarts Bridge, and Hudson River projects in accordance with the PA. The Settlement does not include a commitment to develop a CRMP for the Feeder Dam Project. In this regard, Erie notes in the Settlement that the SHPO has said there are no NRHP properties in the Feeder Dam Project area, and that redevelopment of this project would have no effect on historic or archeological resources.

The Settlement contains a number of proposals for project modifications and recreational measures that could affect historic properties. Erie proposes to install partial pneumatic flashboards at the Sherman Island development and the Feeder Dam Project. Erie also proposes to develop or improve canoe portages at Stewarts Bridge, Spier Falls, Sherman Island, and Feeder Dam. It also proposes to develop two campsites at Spier Falls and two more at Sherman Island, and scenic overlook facilities at the Feeder Dam and E.J. West projects (see section V.B.5.b for more detail on proposed recreational measures).

As indicated at the beginning of this section, the applicant did not delineate an APE for any of the projects. It utilizes the term "study area" which is not defined in the record but appears to have included not only project lands but also some unspecified areas beyond project boundaries. For purposes of this discussion and our analysis, we define the APE for each project as all lands within project boundaries and all areas outside project boundaries where project operations or project-related recreational development or other measures may cause changes in the character or use of historic properties. For the E.J. West and District Project, the APE would include the Route 4 overlook and entire canoe portage trail and landings. For the Stewarts Bridge Project, the APE would include the north side put-in, south side take-out, south side put-in, and north side take-out. For the Hudson River Project, the APE would include the town of Queensbury boat launch location. For the Feeder Dam Project, the APE would include Overlook Park and its associated canoe portage, parking, picnic, and launch facilities.

Continued operation of the E.J. West and District Project and Hudson River Project would maintain the historic facilities at E.J. West and the Spier Falls development in productive use for the purpose for which they were originally designed and built, and would, therefore, be beneficial to these NRHP-eligible resources. The Stewarts Bridge, Sherman Island development and Feeder Dam projects have not been evaluated for their eligibility for listing in the NRHP. However, given their dates of construction, the possibility exists that one or more of these project facilities could be determined eligible for the NRHP in the future. Thus, continued operation of these projects in productive use would be beneficial in the event that they were determined NRHP eligible.

Historic project facilities would require maintenance, repair and possibly alteration to meet changing circumstances over the license period. For example, Erie proposes to install pneumatic flashboards in place of sacrificial wooden flashboards at the Sherman Island development and Feeder Dam Project. Appropriate provisions within a CRMP prepared in consultation with the SHPO would ensure that potential adverse effects to historic properties resulting from such future actions would be avoided or satisfactorily mitigated.

Recreation measures proposed by the licensee in the Settlement may also affect historic properties. Development of plans for these measures in consultation with the SHPO would ensure that potential adverse effects on historic properties resulting from enhancement of recreational facilities would be avoided or satisfactorily mitigated.

The 1996 PA requires the licensee to prepare a CRMP, in consultation with the SHPO, for each of the four projects, including the Feeder Dam Project. The U.S. Department of the Interior, Bureau of Indian Affairs (Bureau) indicates that it and the St. Regis Mohawk Tribe have specific interest in the four projects evaluated in this MPEIS (letter from W.R. Taylor, Director, Office of Environmental Policy and Compliance, Interior, to the Commission, dated July 13, 2001). Given that the SHPO considers the area of the Feeder Dam Project to be archeologically sensitive, that the project facilities, constructed in 1923-24, have not been evaluated for NRHP eligibility, and that the licensee proposes to develop canoe portage, parking and picnic facilities, and a boat launch in immediate proximity to the Feeder Canal, we recommend that Erie prepare CRMPs, in consultation with the SHPO, the St. Regis Mohawk Tribe, and the Bureau, for the Feeder Dam Project as well as for the Stewarts Bridge, E.J. West, and Hudson River projects. Preparation of the CRMPs and their implementation, would ensure that appropriate actions to identify, evaluate, and preserve historic properties at each of the projects would be taken by the licensee over the terms of the new licenses.

Conklingville Dam and its associated impoundment, GSL, are not currently part of the licensed E.J. West Project; nor was the District a party to the 1996 PA. The only aspect of hydroelectric project operation involving GSL is the typical 1-inch daily impoundment fluctuation associated with the release of peaking flows from the E.J. West powerhouse. Under certain circumstances, this 1-inch fluctuation zone may increase with the implementation of the aggressive storage provisions of section 3.6 of the Settlement. All other aspects of the District's operations are related to its flood control and low-flow augmentation function, which predates the construction of the E.J. West powerhouse. Any separate license issued to the District for project-related operation of Conklingville Dam and GSL, would include conditions requiring the District to prepare, in consultation with the SHPO, the St. Regis Mohawk Tribe, and the Bureau, a CRMP. The CRMP would be consistent in content with CRMPs prepared under the 1996 PA, for all historic

properties currently known or that might be identified in the future within the APE of the District's portion of the project over the term of the license, specifically the zone of hydroelectric project-related fluctuation of GSL. The license would require that the CRMP contain principles and procedures to address identification, continued use, and protection of historic properties; mitigation of unavoidable adverse effects; compliance with laws and regulations governing human remains; and discovery of previously unidentified resources. By imposing development and implementation of an approved CRMP as a condition of the license, the Commission would ensure that any adverse effects on historic properties associated with project-related operation of the District's licensed dam and impoundment would be avoided.

c. Unavoidable Adverse Effects: None.

7. No-action

Under the no-action alternative the four projects would continue to operate under annual licenses. GSL would be managed as it is currently. No base flows would be provided downstream of the Stewarts Bridge Project or to the Sherman Island bypassed reach. Fish protection would not be provided at any project, and downstream passage flows would not be provided at Stewarts Bridge, Hudson River, or Feeder Dam projects. No new recreational facilities would be constructed. Formal canoe portage would not be available at the E.J. West, Hudson River, or Feeder Dam projects. Improved flows and public access points for whitewater boating below Stewarts Bridge would not be realized. Erie's proposed action and our additional staff-recommended measures would not be implemented.

C. Relationship to Laws and Policies

Commission regulations require applicants to obtain, under Section 401 of the Clean Water Act,[19] either a WQC or a waiver of certification by the appropriate state agency. NYSDEC is expected to issue a WQC that is consistent with the terms of the Settlement.

As required by the Fish and Wildlife Coordination Act,[20] the Commission has consulted with the FWS and NYSDEC on preventing loss or damage to fish and wildlife resources and on developing and improving water resources.

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[19] 33 U.S.C. §1341.

[20] 16 U.S.C. §661 *et. seq.*

In accordance with the Endangered Species Act (ESA),[21] FWS indicates that there are two federally listed species known to occur or that could occur in the project area: the threatened bald eagle and the endangered Karner blue butterfly. This draft MPEIS serves as our biological assessment under the ESA. We conclude that relicensing the four hydroelectric projects with the applicant's proposed and our recommended measures would have no effect on the bald eagle and Karner blue butterfly.

In addition, Section 10(a) of the FPA[22] 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. Erie and its predecessor company, NMPC, have conducted appropriate consultation with the agencies.

Moreover, the Commission, the SHPO, and the Advisory Council have executed a PA for protecting historic properties associated with the Stewarts Bridge, Hudson River, Feeder Dam, and Erie's portion of the E.J. West projects. Any separate license issued to the District for project-related operation of Conklingville Dam and GSL at the E.J. West and District Project, would include conditions requiring the District to prepare, in consultation with the SHPO, the St. Regis Mohawk Tribe, and the Bureau, a CRMP. These measures would satisfy the Commission's obligations under Section 106 of the National Historic Preservation Act (NHPA).[23]

D. Irreversible and Irretrievable Commitment of Resources

Continued operation of the existing four projects would continue to commit the lands and waters previously developed for energy production. Effects on habitat changed due to construction of recreational facilities at the projects would diminish in time with proper soil erosion and revegetation techniques.

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[21] 16 U.S.C. §1531 as amended.

[22] 16 U.S.C. §803(a).

[23] 16 U.S.C. §470(f).

E. Relationship between Short-term Uses and Long-term Productivity

Our recommended operating alternative for the four projects is expected to provide at least, an average of about 641.1 gigawatt hours of energy each year locally and to the region. This long-term productivity would extend at least as long as the duration of the new licenses. Our recommendations are designed to minimize or avoid, in certain cases, long-term decreases in biological productivity of the system, as well as enhance aquatic habitat and local and regional recreational opportunities.

If the four projects were to operate solely to maximize hydroelectric generation, there would be a loss of long-term productivity of the river fisheries due to decreases in habitat availability. Moreover, efforts to enhance recreational opportunities at the projects would be foregone.

With our proposed action with additional staff-recommended measures, the projects would continue to provide a low-cost, environmentally sound source of power. Moreover, the projects would further the many goals and objectives identified by the agencies and other interested parties for managing the resources of the Upper Hudson River Basin.

VI. DEVELOPMENTAL ANALYSIS

In this section, we analyze the project's use of the water resources of the Sacandaga and Hudson rivers to generate hydropower, estimate the economic benefits of the E.J. West and District, Stewarts Bridge, Hudson River (Spier Falls and Sherman Island developments), and Feeder Dam projects, and estimate the cost of various environmental measures and the effects of these measures on project operations.

A. Power and Economic Benefits of the Proposed Actions

Under the Commission's approach to evaluating the economics of hydropower projects, as articulated in Mead Corporation, Publishing Paper Division,[24] the Commission employs an analysis that uses current costs to compare the costs of the project and likely alternative power with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. The Commission's economic analysis provides a general estimate of the potential power benefits and costs of a project and reasonable alternatives to project power. The estimate helps to support an informed decision concerning what is in the public interest with respect to a proposed license.

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[24] 72 FERC ¶ 61,027 (July 13, 1995).

The replacement energy and capacity values used in our analysis were provided by Erie in their July 9, 2001, comments on the draft MPEIS..

To determine the effects of operational changes at these peaking projects, we modeled generation and annual power benefits, taking into account peak versus off-peak generation and power value rate. Generation values were derived from the Settlement.

For our economic analysis of the alternatives, we use the assumptions, values, and sources shown in table 17. The proposed action consists of the operation of the E.J. West and District, Stewarts Bridge, Hudson River (Spier Falls, Sherman Island developments), and Feeder Dam projects with Erie's proposed environmental measures.

Table 17. Staff's assumptions for economic analysis of the E.J. West and District, Stewarts Bridge, Hudson River (Spier Falls and Sherman Island developments), and Feeder Dam projects (Source: Staff)

Assumption		Value
On-peak energy value[a] (2001)		49.83 mills/kWh
Off-peak energy value[a] (2001)		31.25 mills/kWh
On-peak capacity value[a] (2001)		$12.00/kW-yr
Period of analysis		30 years
Interest/discount rate[b]		10 percent
Cost of money[b]		10 percent
Bond/debt ratio[c]		0.5
Federal tax rate		34 percent
Local tax rate		3 percent
Insurance rate		0.25 percent of cost of construction
Term of financing		20 years
Operation & maintenance (O&M) costs (2001$)[d,e]	E.J. West and District	$1,732,000
	Stewarts Bridge	$1,185,000
	Spier Falls	$2,837,000
	Sherman Island	$1,268,800
	Feeder Dam	$377,200
Additional O&M due to proposed unit upgrades (2001$)[f]	Spier Falls	$1,280
	Sherman Island	$4,580
Net investment (2001$)[g,h]	E.J. West and District	$2,878,200

Assumption		Value
	Stewarts Bridge	$4,782,100
	Spier Falls	$3,243,6000
	Sherman Island	$6,691,200
	Feeder Dam	$700,100
Capital investment for proposed unit upgrades (2001$)[f]	Spier Falls	$174,370
	Sherman Island	$604,410
Escalation rate		0 percent

[a] Energy and capacity values provided by Erie in their July 9, 2001, comments on the draft MPEIS.

[b] Discount rate of 10 percent is typical for this type of analysis and reflects the average cost of debt financing.

[c] Assuming 50 percent of project capital costs would be financed, while remainder would be paid for out of internal capital.

[d] Erie provided operation and maintenance cost data for E.J. West and District for years 1964-1989; Stewarts Bridge for years 1985-1996; Spier Falls and Sherman Island for years 1969-1989; and Feeder Dam for years 1987-1990. Where possible, staff escalated the most recent ten years of data to 2001 dollars and averaged the results. Property tax data provided by Erie in their July 9, 2001, comments on the draft MPEIS have also been included. Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001.

[e] Annual FERC fees were assumed to be accounted for in the annual O&M cost.

[f] Erie provided updates to capital and O&M costs associated with the unit upgrades to Unit 8 at Spier Falls and to Units 2, 3 and 5 at Sherman Island in their July 6, 2000, Additional Information Request (AIR) response.

[g] The following project net investment values were provided by Erie in Exhibit D of the license applications; E.J. West and District - $1,456,227 (12/31/90); Stewarts Bridge - $5,531,000 (12/31/96); Spier Falls - $1,555,294 (12/31/90); Sherman Island - $10,454,174 (12/31/90); and Feeder Dam - $516,548 (12/31/90). These values were depreciated by staff to 2001 values using the double-declining balance method, assuming a 20-year life, no salvage value and no capital expenditures after the date of the initial net investment value provided by Erie.

[h] Erie provided license application cost data in their July 9, 2001, comments on the draft MPEIS. These costs have been included in the net investment values.

It should be noted that the costs in these tables include only capital costs and annual costs associated with operation and maintenance activities for each proposed environmental measure. They do not include any costs associated with potential gains or losses in annual generation resulting from implementation of the proposed measures. In Erie's August 24, 2000, response to our AIR for a breakdown of expected annual energy for each development, Erie referred to Appendix D, Table D1 of the Settlement, which summarizes the interrelated cumulative energy effects of a number of measures affecting Erie's hydroelectric developments. These measures include: changes in operating levels at GSL; impoundment drawdown limitations at Stewarts Bridge, Spier Falls, Sherman Island, and Feeder Dam; trashrack overlays at all five powerhouses; downstream fish passage flows at Stewarts Bridge, Spier Falls, Sherman Island, and Feeder Dam; base flows at Stewarts Bridge and Feeder Dam; minimum bypassed reach flows at Sherman Island; installation of partial pneumatic flashboards at Sherman Island and Feeder Dam; and the implementation of aggressive use of storage to help offset generation losses downstream. Table D1 of the Settlement also includes energy gains associated with proposed upgrades to Unit 8 at Spier Falls and Units 2, 3, and 5 at Sherman Island.

Although Erie provided incremental estimates of energy gains and losses associated with these measures in its AIR response, Erie prefaced them by stating that:

> "Because of the complex interrelated influence that the respective measures have on energy effects, it is impossible to separately estimate the individual energy effects of each measure and expect the net annual energy summed from the individual energy effects to equal the net totals shown in Tables 6.1 and 6.4 (of the AIR response)."

We agree with Erie's statement. Therefore, we do not provide a breakdown of energy losses or gains and the associated costs of each environmental measure in this section. However, in section VI.D, Economic Comparison of Alternatives, we provide the total change in energy of Erie's proposed action presented in Appendix D of the Settlement, and the corresponding power value. The energy estimate for the no-action alternative reflects the baseline energy provided by Erie in Appendix D of the Settlement. Since we have not recommended any measures in addition to those proposed by Erie that affect annual energy, the energy and power value of the proposed action with additional staff-recommended measures is the same as for Erie's proposed action.

Based on the assumptions in table 17 and the costs of proposed measures shown in table 18, we estimate that the annual cost of Erie's proposed E.J. West and District Project would be about $2,292,250 (32.65 mills/kWh), or about $905,070 (12.89

mills/kWh) less than the annual power value of $3,197,320 (45.54 mills/kWh). The estimated annual output of the project would be 70,200 MWh.

Based on the assumptions in table 17 and the costs of proposed measures shown in table 19, we estimate that the annual cost of Erie's proposed Stewarts Bridge Project would be about $2,128,490 (17.84 mills/kWh), or about $3,395,390 (28.46 mills/kWh) less than the annual power value of $5,523,880 (46.30 mills/kWh). The estimated annual output of the project would be 119,300 MWh.

Table 18. Summary of environmental measures, costs, and annual costs of the currently proposed E.J. West and District Project (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)[a]	Cost of O&M (2001$)	Annual cost (2001$)
Prepare a flow monitoring plan[b]	$3,120	$0	$470
Install full trashrack overlays with 1-inch clear spacing[c]	$596,390	$22,210	$113,170
Improve scenic overlook on Route 4 with signage	$20,640	$0	$3,150
Provide canoe portage and trail[d,e]	$26,100	$520	$4,500
Totals	$646,250	$22,730	$121,290

[a] Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001. Besides the measures listed here, Erie also proposes to prepare a CRMP for its portion of the project; we assume that the cost of doing so would be incidental and included in its existing administrative costs.

[b] Although Erie has proposed to prepare a flow monitoring plan for all of the Upper Hudson River facilities, no cost was proposed. Staff estimates the plan would cost about $15,600, which would be allocated at $3,120 per development. We assume that the incremental cost of preparing and publishing GSL elevations and inflows would be incidental to the District.

[c] Costs provided by Erie in their August 24, 2000, AIR response.

[d] Cost taken from revised license application dated April 1993, page E.5-51.

[e] Staff included $520 for operation and maintenance of the canoe portage.

Based on the assumptions in table 17 and the costs of proposed measures shown in table 20, we estimate that the annual cost of Erie's proposed Spier Falls development

would be about $3,513,850 (14.50 mills/kWh), or about $7,359,480 (30.37 mills/kWh) less than the annual power value of $10,873,330 (44.87 mills/kWh). The estimated annual output of the project would be 242,300 MWh.

Based on the assumptions in table 17 and the costs of proposed measures shown in table 21, we estimate that the annual cost of Erie's proposed Sherman Island development would be about $2,868,920 (16.11 mills/kWh), or about $4,904,080 (27.54 mills/kWh) less than the annual power value of $7,773,000 (43.64 mills/kWh). The estimated annual output of the project would be 178,100 MWh.

Table 19. Summary of environmental measures, costs, and annual costs of the currently proposed Stewarts Bridge Project (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)[a]	Cost of O&M (2001$)	Annual cost (2001$)
Prepare a flow and water level monitoring plan[b]	$5,050	$0	$770
Provide and monitor instantaneous base flows of 300 or 350 cfs at base of dam[c]	$310,510	$12,490	$59,850
Install full trashrack overlays with 1-inch clear spacing[c]	$583,550	$17,100	$106,100
Provide and monitor 25 cfs fish movement flow through modified Taintor gate section[c]	$142,630	$14,580	$36,330
Improve impoundment recreation area (access roads, interpretive signage, ADA facilities, picnic tables)[d,e]	$52,790	$1,040	$9,090
Improve canoe portage and trail and whitewater access and add signage[d,e]	$5,280	$1,040	$1,840
Provide signage along Route 4 regarding fishing access and parking[e,f]	$520	$100	$180
Totals	$1,100,330	$46,350	$214,160

[a] Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001. Besides the measures listed here, Erie also proposes to prepare a CRMP; we assume that the cost of doing so would be incidental and included in its existing administrative costs.

[b] Although Erie has proposed to prepare a flow monitoring plan for all of the Upper Hudson River facilities, no cost was proposed. Staff estimates the plan would cost about $15,600, which would be allocated at $3,120 per development. Based on comments from Erie on the draft MPEIS, we have increased the cost for Stewarts Bridge to $5,050 for future modifications that would be necessary to reflect flow release changes in 2013 and 2020.

[c] Costs provided by Erie in their August 24, 2000, AIR response.

[d] Cost taken from license application, page E.5-26.

[e] Staff included $1,040 for O&M of the impoundment recreation area, $1,040 for O&M of the canoe portage, and $100 for O&M of the signage.

[f] Staff included $520 for new signage, since Erie provided no costs.

Table 20. Summary of environmental measures, costs, and annual costs of the currently proposed Spier Falls development (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)[a]	Cost of O&M (2001$)	Annual cost (2001$)
Prepare a flow and water level monitoring plan[b]	$3,120	$0	$480
Install full trashrack overlays with 1-inch clear spacing[c]	$608,610	$16,660	$109,480
Provide 25 cfs fish movement flow through modified trash sluice[c]	$193,240	$8,330	$37,800
Improve existing boat launch (ADA parking, picnic tables, launch regrading)[d]	$11,550	$0	$1,760
Develop canoe portage trail[e]	$8,110	$0	$1,240
Design and develop two campsites at the impoundment[e]	$23,170	$0	$3,530
Totals	$1,022,170	$26,270	$154,290

[a] Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001. Besides the measures listed here, Erie also proposes to prepare a CRMP; we assume that the cost of doing so would be incidental and included in its existing administrative costs.

[b] Although Erie has proposed to prepare a flow monitoring plan for all of the Upper Hudson River facilities, no cost was proposed. Staff estimates the plan would cost about $15,600, which would be allocated at $3,120 per development.

[c] Costs provided by Erie in their August 24, 2000, AIR response.

[d] Cost taken from original license application, pages E.5-16 through 18.
[e] Cost taken from response to AIR #9 dated November 1993.

Based on the assumptions in table 17 and the costs of proposed measures shown in table 22, we estimate that the annual cost of Erie's proposed Feeder Dam Project would be about $723,100 (23.17 mills/kWh), or about $597,400 (19.15 mills/kWh) less than the annual power value of $1,320,500 (42.32 mills/kWh). The estimated annual output of the project would be 31,200 MWh.

Table 21. Summary of environmental measures, costs, and annual costs of the currently proposed Sherman Island development (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)[a]	Cost of O&M (2001$)	Annual cost (2001$)
Prepare a flow and water level monitoring plan[b]	$3,120	$0	$480
Install pneumatic flashboards on section of spillway	$1,269,870	$8,950	$202,620
Provide and monitor minimum bypass flows from intake structure[d]	$197,810	$17,700	$47,870
Install full trashrack overlays with 1inch clear spacing[d]	$323,190	$133,270	$182,560
Provide and monitor 25 cfs fish movement flow through modified ice sluice[d]	$133,270	$9,370	$29,690
Improve existing Sherman Island boat launch (parking area, picnic tables, regrading trails, toilets)[e]	$30,560	$0	$4,660
Develop canoe portage path, and signage[f]	$17,380	$5,540	$8,440
Design and develop two island campsites within 18 months[f]	$3,480	$0	$530
Develop parking area for fishing access to bypassed reach[e]	$39,500	$0	$6,020
Totals	$2,622,590	$179,660	$482,870

[a] Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001. Besides the measures listed here, Erie also proposes to prepare a CRMP; we assume that the cost of doing so would be incidental and included in its existing administrative costs.

[b] Although Erie has proposed to prepare a flow monitoring plan for all of the Upper Hudson River facilities, no cost was proposed. Staff estimates the plan would cost about $15,600, which would be allocated at $3,120 per development.

[c] Erie provided an updated cost in their July 6, 2000, AIR response.

[d] Costs provided by Erie in their August 24, 2000, AIR response.

[e] Cost taken from original license application, pages E.5-19 through 21.

[f] Cost taken from response to AIR #9 dated November 1993.

Table 22. Summary of environmental measures, costs, and annual costs of the currently proposed Feeder Dam Project (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)[a]	Cost of O&M (2001$)	Annual cost (2001$)
Prepare flow monitoring plan[b]	$3,120	$0	$480
Install pneumatic flashboards on portion of spillway	$614,240	$5,210	$98,890
Provide instantaneous base flow of 1,500 cfs below dam and average daily flow of 1,760 cfs[c]	$10,410	$0	$1,590
Install full trashrack overlays with 1-inch clear spacing	$614,240	$10,410	$104,090
Provide 25 cfs fish movement flows through modified trash sluice	$98,9000	$7,290	$22,370
Provide single parking space for tailrace fishing access[d]	$31,230	$0	$4,760
Establish canoe portage with access to both the Hudson River and Feeder Canal as part of Overlook Park development[d]	$5,210	$0	$790
Provide cartop boat launch[e] and parking for 16 cars, two concrete picnic tables as part of Overlook Park development	$16,800	$3,590	$6,150
Totals	$1,394,150	$26,500	$239,120

[a] Escalation factors were based on Gross Domestic Product Implicit Price Deflators from www.economagic.com, September 2001.

[b] Although Erie has proposed to prepare a flow monitoring plan for all of the Upper Hudson River facilities, no cost was proposed. Staff estimates the plan would cost about $15,600, which would be allocated at $3,120 per development.

[c] Costs provided by Erie in their August 24, 2000, AIR response.

[d] Capital costs estimated by staff.

[e] Cost taken from response to AIR #9 dated November 1993.

B. Proposed Actions with Additional Staff-recommended Measures

In this section, we present the annual costs of the proposed actions with additional staff-recommended measures. Tables 23, 24, 25, and 26 present summaries of the environmental measures and costs recommended by staff and others.

Based on the assumptions in table 17 and the costs of the measures shown in tables 18 and 23, we estimate that the annual cost of the E.J. West and District Project proposed action with additional staff-recommended measures, would be $2,302,270 (32.80 mills/kWh), or about $895,050 (12.74 mills/kWh) less than the annual power value of $3,197,320 (45.54 mills/kWh). The estimated average annual output of the project would be 70,200 MWh.

Based on the assumptions in table 17 and the costs of the measures shown in table 19, we estimate that the annual cost of the Stewarts Bridge Project proposed action with no additional staff-recommended measures, would be $2,128,490 (17.84 mills/kWh), or about $3,395,390 (28.46 mills/kWh) less than the annual power value of $5,523,880 (46.30 mills/kWh). The estimated average annual output of the project would be 119,300 MWh.

For the Hudson River Project the following costs of environmental measures applies. Based on the assumptions in table 17 and the costs of the measures shown in tables 20 and 24, we estimate that the annual cost of the Spier Falls development proposed action with additional staff-recommended measures, would be $3,514,120 (14.50 mills/kWh), or about $7,359,210 (30.37 mills/kWh) less than the annual power value of $10,873,330 (44.87 mills/kWh). The estimated average annual output of the project would be 242,300 MWh. Based on the assumptions in table 17 and the costs of the measures shown in tables 21 and 25, we estimate that the annual cost of the Sherman Island development proposed action with additional staff-recommended measures, would be $2,869,190 (16.11 mills/kWh), or about $4,903,810 (27.53 mills/kWh) less than the

annual power value of $7,773,000 (43.64 mills/kWh). The estimated average annual output of the project would be 178,100 MWh.

Based on the assumptions in table 17 and the costs of the measures shown in tables 22 and 26 we estimate that the annual cost of the Feeder Dam Project proposed action with additional staff-recommended measures, would be $728,920 (23.36 mills/kWh), or about $591,580 (18.96 mills/kWh) less than the annual power value of $1,320,500 (42.32 mills/kWh). The estimated average annual output of the project would be 31,200 MWh.

Table 23. Summary of staff-estimated costs and current annual costs of additional staff- and agency-recommended or required environmental measures for the E.J. West and District Project (Source: Staff)

Environmental measures	Capital Cost of environmental measures (2001$)	Cost of O&M (2001$)	Annual cost (2001$)
Develop a Soil and Erosion Control Plan for GSL.	$20,000	$3,000	$6,050
Develop a CRMP for Conklingville Dam and GSL[a]	$26,030	$0	$3,970

[a] We estimate the cost to prepare the plan to be $20,000 and the cost to implement the plan at sites affected by hydro project operation to be $3,000 per year.

[b] Staff estimates the cost to prepare the plan to be $15,620 with an additional $10,410 in implementation costs.

Table 24. Summary of staff-estimated costs and current annual costs of additional staff- and agency-recommended or required environmental measures for the Spier Falls development (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)	Cost of O&M (2001$)	Annual cost (2001$)
Perform field survey for Karner blue butterfly and blue lupine[a]	$1,770	$0	$270

[a] This cost was estimated by Erie in their July 9, 2001, comments on the draft MPEIS.

Table 25. Summary of staff-estimated costs and current annual costs of additional staff- and agency-recommended or required environmental measures for the Sherman Island development (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)	Cost of O&M (2001$)	Annual cost (2001$)
Perform field survey for Karner blue butterfly and blue lupine[a]	$1,770	$0	$270

[a] This cost was estimated by Erie in their July 9, 2001, comments on the draft MPEIS.

Table 26. Summary of staff-estimated costs and current annual costs of additional staff- and agency-recommended or required environmental measures for the Feeder Dam Project (Source: Staff)

Environmental measures	Capital cost of environmental measures (2001$)	Cost of O&M (2001$)	Annual cost (2001$)
Perform flow evaluation of downstream effects 5 years after license issuance[a]	$31,230	$0	$4,760
Perform field survey of Karner blue butterfly and blue lupine[b]	$1,770	$0	$270
Prepare a CRMP[c]	$5,210	$0	$790
Total for all measures recommended by staff only	$38,210	$0	$5,890

[a] This cost is estimated by staff.
[b] This cost was estimated by Erie in their July 9, 2001, comments on the draft MPEIS
[c] Staff estimates the cost to prepare the plan to be $5,210.

C. No-action

With no-action, the projects would continue to operate under their current mode of operation, and no new environmental measures would be implemented.

The annual cost of no-action for the E.J. West and District Project would be about $2,170,960 (32.40 mills/kWh). The estimated average annual output of the project would be 67,000 MWh. This would provide an annual power benefit of $3,058,970 (45.66

mills/kWh). The resulting annual net benefit for the no-action alternative would be about $888,010 (13.25 mills/kWh).

The annual cost of no-action for the Stewarts Bridge Project would be about $1,914,320 (14.54 mills/kWh). The estimated average annual output of the project would be 131,700 MWh. This would provide an annual power benefit of $6,133,180 (46.57 mills/kWh). The resulting annual net benefit for the no-action alternative would be about $4,218,860 (32.03 mills/kWh).

The annual cost of no-action for both Hudson River Project Developments are as follows: The no-action for the Spier Falls development would be about $3,331,690 (13.88 mills/kWh). The estimated average annual output of the project would be 240,000 MWh. This would provide an annual power benefit of $10,929,420 (45.54 mills/kWh). The resulting annual net benefit for the no-action alternative would be about $7,597,730 (31.66 mills/kWh). The annual cost of no-action for the Sherman Island development would be about $2,289,280 (12.41 mills/kWh). The estimated average annual output of the project would be 184,400 MWh. This would provide an annual power benefit of $8,027,450 (43.53 mills/kWh). The resulting annual net benefit for the no-action alternative would be about $5,738,170 (31.12 mills/kWh).

The annual cost of no-action for the Feeder Dam Project would be about $483,970 (15.56 mills/kWh). The estimated average annual output of the project would be 31,100 MWh. This would provide an annual power benefit of $1,340,840 (43.11 mills/kWh). The resulting annual net benefit for the no-action alternative would be about $597,400 (19.15 mills/kWh).

D. Economic Comparison of the Alternatives

Tables 27, 28, 29, and 30 present a summary of the current annual net benefits for the proposed actions, the proposed actions with additional staff-recommended measures, and no-action for the E.J. West and District, Stewarts Bridge, Hudson River (which consists of the Spier Falls and Sherman Island Developments) and Feeder Dam Projects, respectively.

Table 27. Summary of the current annual net benefits for the proposed action, the proposed action with additional staff-recommended measures, and no-action for the E.J. West and District Project (Source: Staff)

	Proposed action	Proposed action with staff-recommended measures	No action
Installed capacity (MW)[a,b]	20.0	20.0	20.0
Annual generation (MWh)[a,b]	70,200	70,200	67,000
Annual power benefit:			
(thousands $)	$3,197	$3,197	$3,059
(mills/kWh)	45.54	45.54	45.65
Annual cost:			
(thousands $)	$2,292	$2,302	$2,171
(mills/kWh)	32.65	32.80	32.40
Annual net benefit:			
(thousands $)	$905	$895	$888
(mills/kWh)	12.89	12.74	13.25

[a] Erie stated in its license application that the installed capacity is 20.0 MW and the average annual generation is 65,864 MWh (based on data from 1963-1988).

[b] In the Settlement, and Erie's August 24, 2000, response to our additional information request, Erie estimated that the existing project would produce 67,000 MWh year, and the proposed project would produce 70,200 MWh year.

Table 28. Summary of the current annual net benefits for the proposed action, the proposed action with additional staff-recommended measures, and no-action for the Stewarts Bridge Project (Source: Staff)

	Proposed action	Proposed action with staff-recommended measures	No action
Installed capacity (MW)[a,b]	30.0	30.0	30.0
Annual generation (MWh)[a,b]	119,300	119,300	131,700
Annual power benefit:			
(thousands $)	$5,524	$5,524	$6,133
(mills/kWh)	46.30	46.30	46.57

	Proposed action	Proposed action with staff-recommended measures	No action
Annual cost:			
(thousands $)	$2,129	$2,129	$1,914
(mills/kWh)	17.84	17.84	14.54
Annual net benefit:			
(thousands $)	$3,395	$3,395	$4,219
(mills/kWh)	28.46	28.46	32.03

[a] Erie stated in its license application that the installed capacity is 30.0 MW and the average annual generation is 118,678 MWh (based on data from 1986-1996).

[b] In the Settlement, and Erie's August 24, 2000, response to our AIR, Erie estimated that the existing project would produce 131,700 MWh per year, and the proposed project would produce 119,300 MWh per year.

Table 29. Summary of the current annual net benefits for the proposed action, the proposed action with additional staff-recommended measures, and no-action for the Hudson River Project Spier Falls development (Source: Staff)

	Proposed action	Proposed action with staff-recommended measures	No action
Installed capacity (MW)[a,b]	45.42	45.42	44.4
Annual generation (MWh)[a,b]	242,300	242,300	240,000
Annual power benefit:			
(thousands $)	$10,873	$10,873	$10,929
(mills/kWh)	44.87	44.87	45.54
Annual cost:			
(thousands $)	$3,514	$3,514	$3,331
(mills/kWh)	14.50	14.50	13.88
Annual net benefit:			
(thousands $)	$7,359	$7,359	$7,598
(mills/kWh)	30.37	30.37	31.66

[a] Erie stated in its license application that the installed capacity of the Spier Falls development is 44.4 MW and the average annual generation is 214,372 MWh (based on data from 1963-1988).

[b] In the Settlement, and Erie's August 24, 2000, response to our AIR, Erie estimated that the existing project would produce 240,000 MWh per year, and that the proposed project would produce 242,300 MWh per year. This includes Erie's proposed upgrade to Unit 8 at Spier Falls.

Table 30. Summary of the current annual net benefits for the proposed action, the proposed action with additional staff-recommended measures, and no-action for the Hudson River Project Sherman Island development (Source: Staff)

	Proposed action	Proposed action with staff-recommended measures	No action
Installed capacity (MW)[a,b]	34.2	34.2	28.8
Annual generation (MWh)[a,b]	178,100	178,100	184,400
Annual power benefit:			
(thousands $)	$7,773	$7,773	$8,027
(mills/kWh)	43.64	43.64	43.53
Annual cost:			
(thousands $)	$2,869	$2,869	$2,289
(mills/kWh)	16.11	16.11	12.41
Annual net benefit:			
(thousands $)	$4,904	$4,904	$5,738
(mills/kWh)	27.53	27.53	31.12

[a] Erie stated in its license application that the installed capacity of the Sherman Island development is 28.8 MW and the average annual generation is 144,452 MWh (based on data from 1963-1988).

[b] In the Settlement, and Erie's August 24, 2000, response to our AIR, Erie estimated that the existing project would produce 184,400 MWh per year, and that the proposed project would produce 178,100 MWh per year. This includes Eries's proposed upgrade of Units 2, 3, and 5 at Sherman Island.

Table 31. Summary of the current annual net benefits for the proposed action, the proposed action with additional staff-recommended measures, and no-action for the Feeder Dam Project (Source: Staff)

	Proposed action	Proposed action with staff-recommended measures	No action
Installed capacity (MW)[a,b]	6.0	6.0	6.0
Annual generation (MWh)[a,b]	31,200	31,200	31,100
Annual power benefit:			
(thousands $)	$1,320	$1,320	$1,341
(mills/kWh)	42.32	42.32	43.11
Annual cost:			
(thousands $)	$723	$729	$484
(mills/kWh)	23.17	23.36	15.56
Annual net benefit:			
(thousands $)	$597	$591	$857
(mills/kWh)	19.15	18.96	27.55

[a] Erie stated in its license application that the installed capacity is 6.0 MW and the average annual generation is 25,019 MWh (based on data from 1963-1989).

[b] In the Settlement, and Erie's August 24, 2000, response to our AIR, Erie estimated that the existing project would produce 31,100 MWh per year, and that the proposed project would produce 31,200 MWh per year.

The additional measures proposed by Erie for the E.J. West and District Project would increase annual costs by $121,290 and increase annual power benefits by $138,350 for a total decrease in annual net benefits of $17,060. The annual generation would increase from 67,000 MWh to 70,200 MWh.

The additional measures proposed by Erie for the Stewarts Bridge Project would increase annual costs by $214,160 and decrease annual power benefits by $609,300 for a total decrease in annual net benefits of $823,460. The annual generation would decrease from 131,700 MWh to 119,300 MWh.

The additional measures and unit upgrade proposed by Erie for the Hudson River Project Spier Falls development would increase annual costs by $182,160 and decrease

annual power benefits by $56,090 for a total decrease in annual net benefits of $238,250. The annual generation would increase from 240,000 MWh to 242,300 MWh.

The additional measures and unit upgrades proposed by Erie for the Hudson River Project Sherman Island development would increase annual costs by $579,630 and decrease annual power benefits by $254,460 for a total decrease in annual net benefits of $834,090. The annual generation would decrease from 184,400 MWh to 178,100 MWh.

The additional measures proposed by Erie for the Feeder Dam Project would increase annual costs by $239,120 and decrease annual power benefits by $20,340 for a total decrease in annual net benefits of $259,460. The annual generation would increase from 31,100 MWh to 31,200 MWh.

Our recommended measures for the E.J. West and District Project would increase annual costs by $10,020 above Erie's proposed action for a total decrease in annual net benefits of $10,020. Staff's recommended measures would not affect annual generation.

Staff recommends no additional measures beyond those proposed by the applicant for the Stewarts Bridge Project.

Our recommended measures for the Hudson River Project Spier Falls development would increase annual costs by $270 above Erie's proposed action for a total decrease in annual net benefits of $270. Our recommended measures for the Hudson River Project Sherman Island development would increase annual costs by $270 above Erie's proposed action for a total decrease in annual net benefits of $270. For the Hudson River Project (Spier Falls and Sherman Island developments), additional staff-recommended measures would produce a decrease in annual net benefits of $540. Staff's recommendations would not affect annual generation.

Our recommended measures for the Feeder Dam Project would increase annual costs by $5,890 above Erie's proposed action for a total decrease in annual net benefits of $5,890. Staff's recommended measures would not affect annual generation.

E. Energy Implications of Proposed Operations on Erie's and Other Hydroelectric Projects

There are several other hydroelectric facilities on the Hudson River that would be affected by the proposed operation of the four hydroelectric projects that are the subject of this analysis. These projects are as follows:

1. The Curtis/Palmer Falls Project (FERC No. 2609), owned and licensed to the International Paper Company and located downstream of Erie's Stewarts Bridge Project.

2. The Glens Falls Project (FERC No. 2385), owned and licensed to the Finch, Pruyn & Company and located downstream of Erie's Feeder Dam Project.

3. The South Glens Falls Project (FERC No. 5461) owned and licensed to the South Glens Falls Limited Partnership and NMPC, and located at the Glens Falls dam, and the Hudson Falls Project (FERC No. 5276) projects, owned and licensed to Northern Electric Power Company, L.P., and NMPC, and located downstream of the Glens Falls Project. AHDC is the managing general partner of both of these projects.

4. There are several other projects located downstream of the Hudson Falls Project; however, they were not evaluated as part of the Settlement. These include the Fort Miller (FERC No. 4226), Stillwater Lock and Dam (FERC No. 4684), Mechanicville Upper and Lower (FERC Nos. 6032 and 2934), and Green Island (FERC No.13) projects. In addition, there are two licensed, but currently undeveloped, projects downstream of the Hudson Falls Project: Northumberland (FERC No. 4244) and Waterford (FERC No. 10648).

These projects all operate (or would be operated) essentially in a ROR mode, thus they are totally dependent on the magnitude and timing of discharges from the four Erie projects under analysis in this MPEIS. A discussion of the potential effects of the four Erie projects on the Curtis/Palmer Falls, Glens Falls, South Glens Falls, and Hudson Falls projects is presented below.

Erie performed an energy analysis using the HEC5 1P computer model, which simulates impoundment operations for a series of hydroelectric facilities based on a set of operating rules and parameters. Because the proposed operation of the Erie projects is scheduled to change over the expected license term, the potential effect on downstream projects is expected to change as well. The changes result from agreements reached in the Settlement regarding the minimum impoundment level for GSL (E.J. West and District Project) and other downstream flow release requirements, including base flows,

minimum bypassed reach flows, and whitewater releases. The minimum level would be raised from its current limit of elevation 735.0 ft NGVD to 748.0 ft in 2000, elevation 749.0 ft in 2010, and elevation 750.0 ft in 2020. The limit would remain at elevation 750.0 ft through the end of the license term. The net effect on each of the downstream projects varies from project to project. Table 32 was reproduced from data provided in Appendix D of the Settlement. The data includes the change in average on-peak and total annual energy that each owner can expect from their respective projects.

Table 32. Incremental change in annual on-peak and total (on-peak plus off-peak) energy production at various facilities based on proposed operational changes at GSL (data derived from Appendix D, Settlement [2000])[a]

Minimum lake level at GSL	(2000-2010) El. 748.0	(2010-2013) El. 749.0	(2013-2020) El. 749.0	(2020- 2042) El. 750.0
International Paper Co. (Curtis/Palmer Falls Projects)				
On-peak (MWh)	-700	-1,500	-1,700	-2,500
Total (MWh)	+400	-900	-1,400	-2,800
FPC (Glens Falls Project)				
On-peak (MWh)	+200	+100	0	-100
Total (MWh)	+1,000	+800	+700	+500
AHDC (South Glens Falls/Hudson Falls projects)				
On-peak (MWh)	+300	0	-400	-900
Total (MWh)	+3,100	+2,300	+1,900	+1,000
Erie (5 developments)				
On-peak (MWh)	-6,100	-7,000	-17,100	-18,400
Total (MWh)	+1,400	-500	-11,200	-13,100

[a] This table does not use the same sign convention (plus and minus) used in the Settlement; energy values are incremental changes in annual energy values; therefore, positive values represent a gain in energy, while negative values represent a loss in energy.

International Paper Company

Compared to current average annual generation, total annual generation for the Curtis/Palmer Falls Project would increase by 400 MWh for the period June 2000 to June 2010, decrease by 900 MWh for June 2010 to June 2013, decrease by 1,400 MWh for June 2013 to June 2020, and decrease by 2,800 MWh after June 2020 because of the proposed altered releases from the E.J. West powerhouse and the Stewarts Bridge Project. Annual on-peak generation would decrease by 700, by 1,500, by 1,700 and by 2,500 MWh per year respectively for each of the periods listed above.

The data in table 32 show that the Curtis/Palmer Falls Project is expected to lose approximately 65,900 MWh over the expected term of the license for Erie's projects. This represents approximately a 0.52 percent loss based on the current annual average generation of the projects of 310,250 MWh.

Finch, Pruyn & Company

Compared to current average annual generation, total annual generation for the Glen Falls Project would increase by 1,000 MWh for the period June 2000 to June 2010, increase by 800 MWh for June 2010 to June 2013, increase by 700 MWh for June 2013 to June 2020, and increase by 500 MWh after June 2020 because of the proposed altered releases from the Feeder Dam Project. Annual on-peak generation would increase by 200 MWh in 2000 and by 100 MWh in 2010, would remain at current values from 2013 to 2020, and decrease by 100 MWh after 2020.

The data in table 32 show that the Glens Falls Project is expected to gain approximately 27,550 MWh over the expected term of the license for Erie's developments. This represents approximately a 1.45 percent gain based on the current annual average generation of the projects of 47,074 MWh.

Adirondack Hydro Development Corporation

Compared to current average annual generation, total annual generation for the AHDC projects would increase by 3,100 MWh for the period June 2000 to June 2010, increase by 2,300 MWh for June 2010 to June 2013, increase by 1,300 MWh for June 2013 to June 2020, and increase by 1,000 MWh after June 2020 because of the proposed altered releases from the Feeder Dam Project. Annual on-peak generation would increase by 300 MWh until 2010, be consistent with current generation until 2013, decrease by 400 MWh until 2020, and decrease by 900 MWh after 2020.

The data in table 32 show that the South Glens Falls and Hudson Falls projects are expected to gain approximately 71,700 MWh over the expected term of the license for Erie's developments. This represents approximately a 0.82 percent gain based on the current annual average generation of the projects of 217,121 MWh.

Erie

Compared to current average annual generation, total annual generation for the Erie projects would increase by 1,400 MWh for the period June 2000 to June 2010, decrease by 500 MWh for June 2010 to June 2013, decrease by 11,200 MWh for June 2013 to June 2020, and decrease by 13,100 MWh after June 2020 because of the proposed altered releases from the E. J. West powerhouse, the Stewarts Bridge Project, the Hudson River Project, and the Feeder Dam Project. Annual on-peak generation would decrease by 6,100 MWh until 2010, by 7,000 MWh until 2013, by 17,100 MWh until 2020, and by 18,400 MWh after 2020.

The data in table 32 show that the five Erie developments are expected to lose approximately 334,450 MWh over the expected term of the license for Erie's developments. This represents approximately a 1.45 percent loss based on the current annual average generation of the projects of 568,415 MWh.

Conclusion

The previous discussion shows that the proposed operations would produce a slight shift from on-peak to off-peak. This would increase or decrease the annual generation of other hydroelectric facilities on the river by approximately 1.0 to 1.5 percent.

F. Greenhouse Gas Effects

By producing hydroelectricity, the four projects included in this MPEIS displace the need for other power plants, primarily fossil-fueled facilities, to operate, thereby avoiding some power plant emissions and creating an environmental benefit. If the electric generation capacity of the project were replaced with other fossil fuels, greenhouse gas emissions could potentially increase by 129,500 metric tons of carbon per year.

VII. STAFF'S CONCLUSIONS

Sections 4(e) and 10(a) of the FPA require that Commission to give equal consideration to all uses of the waterway on which the projects are located. When we review a hydropower project, we consider the water quality, fish and wildlife, recreational, cultural, and other nondevelopmental values of the involved waterway equally with its electric energy and other developmental values. In determining whether, and under what circumstances to license a project, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

A. Cumulative Effects Summary

Water quantity, water quality, aquatic riverine habitat, and canoe touring may potentially be affected in a cumulative manner by relicensing the four projects.

By raising the minimum drawdown elevation of GSL compared to historical operations, there would be a slight increase in the risk that the storage in the impoundment would not be sufficient to control an unforeseen flood event. However, given the current increased predictive capabilities of potential flood events and the habitat gains that would accrue from the lesser drawdown, we consider the increased risk to be inconsequential.

The re-regulation of Hudson River flows by the Feeder Dam Project may be influenced by the proposed decrease in impoundment fluctuation and by establishing an instantaneous base flow of 1,500 cfs. If previously, relatively constant daily flows from the Feeder Dam Project should become more pulsed under the conditions of the new licenses for all four projects, the quantity of water available to downstream hydroelectric projects may experience a temporal shift. This could result in accompanying shifts in revenues depending on the project flows during periods of peak or off-peak demand. Potential effects could be either positive or negative.

We consider the establishment of the proposed base flows from the Stewarts Bridge Project to represent a positive cumulative effect on water quality. These flows would cause reaeration of water in the lower Sacandaga River during periods that historically experienced only leakage flows. The enhanced flow regime would also increase the assimilative capacity of the Hudson River from the confluence of the Sacandaga River to the Feeder Dam Project. We consider it unlikely that the influence of the Stewarts Bridge base flow would extend downstream of the Feeder Dam Project. We expect the continued operation of GSL to retain its function for low flow augmentation,

the influence of which would extend downstream to the tidal portions of the Hudson River.

Shifts in the re-regulation capability of the Feeder Dam Project could also influence downstream aquatic riverine habitat. If there is increased pulsing of flows to the Glens Falls and South Glens Falls project impoundment, these pulsed flows would be passed downstream because of the ROR operation of these projects. Daily fluctuations of flow could cause dewatering of riverine riffle habitat, which is considered to be highly productive for macroinvertebrates that serve as food for many fish. Rapid changes in flow (which we consider extremely unlikely under the conditions of the Settlement) could strand fish in shallow water areas. This potential effect could be carried downstream to all unimpounded riverine habitat upstream of the Troy dam.

Because of the degree of uncertainty regarding future flow re-regulation and its potential environmental and economic consequences, we consider it prudent to develop and implement a plan to evaluate discharges from the Feeder Dam Project under the operating regime of the new licenses. The plan would be developed by Erie, in consultation with NYSDEC, the District, and AHDC. The evaluation report would be developed in consultation with NYSDEC (which would be able to address any potential concerns about aquatic riverine habitat, unexpected changes in water quality, and flood control performance), the District (which would need to continue its state-mandated flood control and low flow augmentation responsibilities), and the downstream hydroelectric project licensees that are a party to this proceeding (providing a forum to document any potential negative influences on their generating facilities). If the need for corrective action should become evident (which we consider unlikely), the consultation associated with our recommendation would also enable constructive proposals to be developed and forwarded to the Commission for approval.

Each of the four projects would develop new or enhance existing canoe portages around the five dams associated with these projects. Coupled with canoe portage requirements at the recently licensed Curtis/Palmer Falls Project and the proximity of the Feeder Dam Project to the Feeder Canal and a proposed canoe portage at the Glens Falls dam, the relicensing of these projects would have a definite cumulative benefit to canoe touring. With implementation of these canoe portages, a major step in allowing the public to experience and extended trip from the Adirondack Mountains to the Albany/Troy metropolitan area would be taken.

B. Comprehensive Development and Recommended Alternatives

Based on our independent review and evaluation of the proposed actions (which follow the Settlement [2000]), the proposed actions with the additional staff-recommended measures, and no-action, we select the proposed actions with the additional staff-recommended measures as the preferred alternative.

We recommend this alternative because: (1) issuance of licenses would allow Erie to continue to operate the four projects as dependable sources of electric energy; (2) continued operation of the projects would avoid the need for an equivalent amount of fossil-fuel-fired electric generation and capacity, continuing to help conserve these nonrenewable energy resources and reduce atmospheric pollution; and (3) the recommended environmental measures would improve water quality, protect and enhance fish and terrestrial resources, improve public use of recreational facilities and resources, improve multiple use and management of project lands, and maintain and protect historic and archeological resources within the area affected by the operations of the projects.

We recommend including the following environmental measures in any licenses issued for the four projects included in this MPEIS.

1. Proposed Actions

a. E.J. West and District Project

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities.
- Develop, in consultation with NYSDEC, NYSOPRHP, and Saratoga and Fulton counties, and implement an erosion and sedimentation control plan for GSL that specifies shoreline monitoring frequencies; the entities responsible for monitoring; and the processes that would be used to determine if erosion is project-related, the party responsible for funding remedial actions, and post-remediation monitoring.
- Continue to stabilize the GSL shoreline where active erosion is currently evident using appropriate techniques.
- Implement the operation regime and schedule for GSL as described in section 3 of the Settlement.
- Develop a stream monitoring flow plan in consultation with the District, NYSDEC, and FWS within 6 months of license issuance, and implement the monitoring plan within 12 months of issuance in accordance with section 2.12 of the Settlement.

- Prepare and publish a report of daily GSL elevations, inflows to GSL, and flows of the Hudson River in accordance with section 2.13 of the Settlement; the District would also notify the Commission, NYSDEC, NYRU, and licensees on the Hudson River if the Fort Edwards USGS gage is out of operation for more than 2 weeks.
- Install full 1-inch maximum clear spacing trashrack overlays by the end of the year 2002 in accordance with sections 2.8 and 4.2 of the Settlement.
- Reserve the Commission's authority to require fishways that may be prescribed by Interior, consistent with section 2.3 of the Settlement.
- Improve the informal overlook on Rt. 4 within 18 months of license issuance in accordance with section 4.3.1 of the Settlement.
- Provide portage around the Conklingville Dam and trail to link GSL to Stewarts Bridge impoundment within 18 months of license issuance in accordance with section 4.3.2 of the Settlement.
- Restrict access to the canoe put-in site during the winter to avoid disturbing bald eagles that use the upper Stewarts Bridge impoundment consistent with section 5.4 of the Settlement.
- Develop a CRMP for the E.J. West powerhouse and associated structures within 1 year of license issuance in accordance with the executed PA for the E.J. West Project and section B.3 of the Settlement in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe.
- Prepare a CRMP that encompasses Conklingville Dam and GSL in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe.

b. Stewarts Bridge Project

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities.
- Limit all normal daily impoundment drawdowns to a maximum of 1 ft consistent with section 5.1 of the Settlement.
- If scheduled maintenance drawdowns of the impoundment in excess of 1 ft are required, notify FWS, NYSDEC, the District, Saratoga County, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures.
- Install full 1-inch maximum clear spacing trashrack overlays for fish protection by the end of the year 2008 in accordance with section 5.2 of the Settlement.
- Provide 25 cfs continually for downstream passage, year-round, beginning in the year 2008 in accordance with section 5.2 of the Settlement.

- Provide instantaneous base flows below the dam in accordance with the provisions of section 5.3 of the Settlement (flows would range from 300 to 350 ± 1 cfs, depending on schedule and GSL water elevation).
- Reserve the Commission's authority to require fishways that may be prescribed by Interior, consistent with section 2.3 of the Settlement.
- Implement whitewater boating releases of 4,000 cfs and other whitewater measures in accordance with section 5.5.1 of the Settlement.
- Develop a streamflow monitoring plan in consultation with the District, NYSDEC, FWS, Fulton County, and Saratoga County within 6 months of license issuance and implement the monitoring plan (with the exception of monitoring base flows) within 12 months of issuance in accordance with section 2.12 of the Settlement. Implementation of monitoring base flow at Stewarts Bridge would be commensurate with implementation of the base flow on January 1, 2013.
- Implement recreational measures in accordance with section 5.4 of the Settlement.
- Develop a CRMP in accordance with the executed PA and section B.3 of the Settlement in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe.

c. Hudson River Project

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities.
- Limit all normal fluctuations of both impoundments to 1 ft during the walleye spawning season and 2 ft during the rest of the year in accordance with sections 6.1.1 and 6.1.2 of the Settlement.
- Install partial pneumatic flashboards on the Sherman Island dam in accordance with section 6.1.2.1 of the Settlement.
- If flashboards fail, maintain a maximum daily drawdown of 0.5 ft below the crest of the dam until flashboard replacement begins in accordance with section 6.1.2.1 of the Settlement.
- If scheduled maintenance drawdowns of the Spier Falls impoundment in excess of the daily fluctuations of 1 or 2 ft proposed by Erie, or in excess of 1 ft below the Sherman Island dam crest are required, notify FWS, NYSDEC, the District, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures.
- Install full 1-inch maximum clear spacing trashrack overlays at both developments for fish protection (by the end of the year 2010 at Spier Falls

and 2006 at Sherman Island) in accordance with section 6.2 of the Settlement.

- Provide 25 cfs continually at both developments for downstream fish passage, year-round, (by the end of 2010 for Spier Falls and 2006 at Sherman Island) in accordance with section 6.2 of the Settlement.
- Reserve the Commission's authority to require fishways that may be prescribed by Interior, consistent with section 2.3 of the Settlement.
- Implement the minimum flow regime at the Sherman Island bypassed reach as described in section 6.3.2 of the Settlement.
- Design, in consultation with FWS and NYSDEC, and construct a minimum flow release structure at the Sherman Island dam and a weir structure to facilitate distribution of flows into the north and south channels of the Sherman Island development bypassed reach as described in section 6.3.2 of the Settlement.
- Consult with FWS and NYSDEC prior to the first walleye season from license issuance to determine the appropriate location for water temperature monitoring that would determine the beginning and end of the walleye spawning season as described in section 6.3.2.3 of the Settlement; submit documentation of the location to the Commission for approval prior to implementing any water temperature monitoring.
- Develop and implement a streamflow monitoring plan in consultation with the District, NYSDEC, and FWS within 6 months of license issuance, and implement within 12 months of license issuance in accordance with section 2.12 of the Settlement.
- Conduct a survey for the endangered Karner blue butterfly or its obligate host, blue lupine, prior to earth-disturbing activities or vegetation removal associated with the proposed project.
- Provide recreational measures as described in section 6.4 of the Settlement but consider adjusting the Sherman Island canoe portage route.
- Develop a CRMP for the Hudson River Project in accordance with the executed PA and section B.3 of the Settlement in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe.

d. Feeder Dam Project

- Include site-specific erosion and sedimentation control measures in the final design of proposed actions that entail ground disturbing activities.
- Limit all normal fluctuations of the impoundment to 1 ft from April 1 through June 15 to facilitate fish spawning, and 2 ft during the rest of the year, in accordance with section 7.1 of the Settlement.

- Install partial pneumatic flashboards in accordance with section 7.1.1 of the Settlement.
- If flashboards fail, maintain a maximum daily drawdown of 0.5 ft below the crest of the dam until flashboard replacement begins in accordance with section 7.1.1 of the Settlement.
- If scheduled maintenance drawdowns of the impoundment in excess of 0.5 ft below the dam crest are required, notify FWS, NYSDEC, the District, and the Commission at least 30 days prior to the drawdown, explain the need for the drawdown, and implement appropriate protective measures.
- Provide an instantaneous base flow of 1,500 cfs, "generation on" lights for each generating unit that can be viewed from outside the powerhouse as a method to visually verify that the 1,500 cfs flow is being provided, and a minimum average daily flow of 1,760 cfs in accordance with section 7.3 of the Settlement.
- Develop a streamflow monitoring plan in consultation with the District, NYSDEC, and FWS within 6 months of license issuance, and implemented within 12 months of license issuance, in accordance with section 2.12 of the Settlement.
- Develop, in consultation with NYSDEC, the District, and AHDC, within 6 months of Commission approval of the streamflow monitoring plan, and implement a plan to conduct a comprehensive flow analysis after the first 5 years of operation, under the new impoundment and base flow regime to ensure that downstream riverine habitat and hydroelectric generation is not adversely influenced.
- Install full 1-inch maximum clear spacing trashrack overlays at both developments for fish protection by the end of the year 2004 in accordance with section 7.2 of the Settlement.
- Provide 25 cfs continually for downstream fish passage, year-round, by the end of 2004, in accordance with section 7.2 of the Settlement.
- Reserve the Commission's authority to require fishways that may be prescribed by Interior, consistent with section 2.3 of the Settlement.
- Conduct a survey for the endangered Karner blue butterfly or its obligate host, blue lupine, prior to conducting earth-disturbing or vegetation removal activities associated with the proposed project.
- Provide recreational facilities as described in section 7.4 of the Settlement.
- Develop a CRMP to ensure the protection of historic properties in accordance with the executed PA in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe.

Implementation of these measures would protect and enhance fisheries, cultural, and recreational resources in the project areas, and provide for the best use of the waterway.

2. Proposed Actions with Additional Staff-Recommended Measures

The costs of some of the measures that we recommend be implemented would reduce the net benefit of the projects. Specifically, our recommendations that would require incremental costs over the measures proposed in the Settlement include: (1) develop and implement an erosion and sedimentation control plan for GSL; (2) perform a flow evaluation of downstream effects of releases from the Feeder Dam Project; (3) conduct Karner blue butterfly surveys at the Hudson River and Feeder Dam projects; and (4) develop CRMPs for Conklingville Dam and GSL, as well as for the Feeder Dam Project. We discuss our rationale for each below.

a. Develop and Implement an Erosion and Sedimentation Control Plan for GSL

We have determined that the existing shoreline erosion that is evident at some locations along the shoreline of GSL is not related to hydroelectric project operations. However, under the terms of the Settlement, the storage between elevation 768 and 771 ft NGVD that has traditionally been used as a buffer zone to absorb unexpected high flow events could now be used for aggressive storage to enable more efficient use of available flows by downstream hydroelectric projects. Consequently, the shoreline above elevation 768 ft NGVD may be more frequently exposed to erosive forces associated with wave action and more frequent soil inundation. Currently, there is ambiguity about the causes of the erosion at existing sites and the party that should be responsible for funding remedial actions. With the implementation of aggressive storage, the causes and responsibility for implementing remedial measures could be further obscured. A proactive plan that would establish procedures for monitoring shoreline erosion, establish the likely primary cause of the erosion, and identify the entity responsible for implementing any needed stabilization measures, including follow-up monitoring, would minimize the chances that erosion and sedimentation along the shoreline would go unchecked. We do not expect Erie or the District to be responsible for correcting all existing or future shoreline erosion sites at GSL, only that erosion attributed to hydroelectric project operations. We estimate that the total annual cost to develop and implement our recommended erosion and sedimentation control plan would be about $6,050, which includes a spaceholder annual cost of $3,000 to stabilize erosion sites that could be attributed to hydroelectric operations (the District already funds shoreline stabilization at GSL that is attributed to implementing its mandates). Actual costs that

may be needed to correct future erosion problems cannot be predicted at this time. We consider the costs of developing and implementing this plan to be warranted because it avoids uncertainty about responsibility for correcting, as appropriate, existing and potential future erosion and sedimentation problems.

b. Evaluate Flows Downstream of the Feeder Dam Project

The terms of the Settlement specify that Erie should reduce the historical Feeder Dam impoundment fluctuations and provide a minimum base flow of 1,500 cfs and a minimum average daily flow of 1,760 cfs downstream of the Feeder Dam Project. These measures may influence this project's historical function of re-regulating the pulsed flows from upstream projects. NYSDEC, in response to our revised SD1, questioned the ability of the Feeder Dam Project to effectively re-regulate flows (i.e., provide relatively constant flows to downstream reaches over a 24 hour period) under current conditions. NYSDEC states that if releases from the Feeder Dam Project are pulsed, it could adversely influence downstream riverine habitat (potentially dewatering riffles during low flow pulses) or downstream hydroelectric project generation (by shifting flows to off-peak periods). Our recommended flow evaluation after 5 years of operation under the terms of the new license would provide an opportunity for Erie to consult with NYSDEC, the District, and downstream hydroelectric project licensees that are parties to this proceeding to ensure that flows from Feeder Dam are being effectively re-regulated. Our recommended evaluation would primarily make use of existing hourly discharge data presented in a "before and after" format. We do not envision the need to conduct field work as part of this evaluation unless flow fluctuations downstream of Feeder Dam are greater than expected. It is appropriate to establish the framework for this evaluation in the form of a plan, prior to new data acquisition. Erie would develop the plan in consultation with NYSDEC, the District (which has an overall interest in ensuring effective flood flow regulation and low flow augmentation), and AHDC (representing downstream hydroelectric project licenses). We do not consider it appropriate to develop this plan until after the flow monitoring plan described in the Settlement is finalized (scheduled for 6 months from license issuance). We therefore recommend that this plan be filed for Commission approval within 6 months of Commission approval of Erie's proposed streamflow monitoring plan. The annualized cost for this evaluation would be about $4,760, which does not include the cost of any follow-up measures that may result from the evaluation. We consider this relatively small cost to be warranted to ensure that unforeseen adverse outcomes do not result from the conditions of the new licenses.

c. Conduct Karner blue butterfly surveys at the Hudson River and Feeder Dam projects

FWS, by letter dated March 24, 2000, states that the Karner blue butterfly may occur in the vicinity of the Hudson River and Feeder Dam projects. This federally listed endangered species only occurs in areas where blue lupine is established. FWS requested that the Commission require surveys to be conducted for this species or its habitat. If it is found or likely to occur, FWS requested that Erie consult with them regarding appropriate protective measures. This species was declared endangered in 1994, after the license applications for both projects were filed and shortly before settlement discussion began. Consequently, no surveys were conducted for the potential presence of this species. Without a survey for this species, or blue lupine (which are both known to occur in the general area), we cannot conclude that relicensing both of these projects would have no effect on this species. We consider it likely that an initial screening of areas where vegetation disturbance is likely to occur could rule out many sites from further consideration based on the habitat commonly occupied by blue lupine. Surveys for blue lupine presence, if conducted during late May or early June when this species flowers, are not likely to be costly. We estimate that the annualized cost for our recommended surveys to be about $540 at the Hudson River Project and $270 at the Feeder Dam Project. We consider this small cost to be warranted to verify that the measures recommended in the Settlement do not adversely influence this protected species.

d. Develop CRMPs for Conklingville Dam and GSL and the Feeder Dam Project

Erie's revised license application for the E.J. West Project indicates that a review of SHPO files shows that two mapped cultural sites may be in proximity of the shoreline of GSL. An executed PA is in place for the E.J. West powerhouse, intake structures, and appurtenant facilities that requires that a CRMP be developed within 1 year of license issuance. However, the dam and GSL are part of the unit of development for the proposed E.J. West and District Project. Therefore, pursuant to Section 106 of the NHPA, measures need to be in place to protect cultural resources associated with the entire project. A CRMP, developed in consultation with the SHPO, Bureau, and St. Regis Mohawk Tribe, would provide a means to ensure the protection of cultural resources is in place. Our estimated total cost for this is $26,030, which would include a minimal effort to prepare the plan (we assume that the Erie template could be used), consultation with appropriate parties, and minimal follow-up activities. The annualized cost for this measure would be about $3,970.

In Appendix B of the Settlement, Erie indicates that the SHPO stated that there are no NRHP properties in the Feeder Dam Project area and that redevelopment of the project would have no effect on historic or archeological resources. As we note in our cultural analysis, section V.B.7, the SHPO indicated that this project is in an "archaeologically sensitive area." The Feeder Canal (which abuts the Feeder Dam and is in proximity to several proposed recreational facilities) is listed on the NRHP, and the Feeder Dam Project has not been evaluated for eligibility for listing on the NRHP. We consider it appropriate for Erie to develop a CRMP for this project to ensure the protection of cultural resources. The Feeder Dam Project is listed as one of the Erie projects covered by the multi-project PA that was executed in 1996, which requires the development of a CRMP within 1 year of license issuance. We estimate the annualized cost for this measure to be about $790, and consider this cost to be justified.

VIII. CONSISTENCY WITH COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal and state comprehensive plans for improving, developing, and conserving waterways affected by a project. Under section 10(a)(2), federal and state agencies filed a total of 29 qualifying comprehensive plans of which we

identified 9 New York and 2 federal to be applicable.[25] We did not find any inconsistencies.

IX. RECOMMENDATIONS OF FISH AND WILDLIFE AGENCIES

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

Interior filed 45 recommendations for the four projects on September 7, 2000. Tables 33 through 36 summarize the recommendations from Interior subject to 10(j), and whether or not the staff is recommending them for adoption. We determined that of the 45 recommendations (25 recommendations with an additional 20 subparts) made by

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[25] (1) Fish and Wildlife Service. Canadian Wildlife Service. 1986. North American Waterfowl Management Plan: A Strategy for Cooperation. U.S. Department of the Interior and Environment Canada. Washington, D.C. May 1986. 19 pp. (2) Fish and Wildlife Service. Undated. Fisheries USA: the Recreational Fisheries Policy of the U.S. Fish and Wildlife Service. Washington, D.C. 11 pp. (3) Adirondack Park Agency. 1985. Adirondack Park state land master plan. Ray Brook, New York. January 1985. 78 pp. (4) Adirondack Park Agency. Undated. New York State wild, scenic, and recreational rivers system field investigation summaries. Albany, New York, 21 reports. (5) New York State Department of Environmental Conservation. 1979. Hudson River Basin water and related land resources; level B study report and environmental impact statement. Albany, New York. September 1979. 148 pp. and map. (6) New York State Department of Environmental Conservation. 1985. New York state wild, scenic and recreational river system act. Albany, New York. March 1985. 22 pp. (7) New York State Department of Environmental Conservation. 1986. Regulations for administration and management of the wild, scenic, and recreational rivers system in New York excepting the Adirondack Park. Albany, New York. March 26, 1989. 27 pp. (8) New York State Executive Law. 1981. Article 27 - Adirondack Park Agency Act. Albany, New York. July 15, 1981. 65 pp. (9) New York State Parks, Recreation, and Historic Preservation. State Comprehensive Outdoor Recreation Plan. 1994. (10) New York State Office of Parks, Recreation, and Historic Preservation. 1983. People, resources, recreation. Albany, New York. March 1983. 353 pp. and appendices. (11) State of New York Hudson River Regulating District. 1923. General plan for the regulation of the flow of the Hudson River and certain of its tributaries. Albany, New York. June 7, 1923. 63 pp.

Interior, 27 are within the scope of Section 10(j), and we recommend adopting all 27 of these measures. NYSDEC did not file 10(j) recommendations for the four projects.

We are making a preliminary determination that 18 of Interior's recommendations are outside the scope of Section 10(j) because they are not specific measures for the protection of fish and wildlife. We do not adopt 8 of these 18 recommendations (two identical recommendations made for each of the four projects). The 8 recommendations that were not adopted involve two recommendations requiring: (1) the Commission approve all measures in the Settlement in their entirety and without modification in any license issued for each of the projects; and (2) the licensee seek approval from Interior for any extension of time for developing a flow monitoring plan before submitting the plan to the Commission. The Commission retains its regulatory authority in issuing hydropower licenses and determines which measures in a settlement agreement, if any, should be included in any licenses issued for the projects. Similarly, the Commission determines whether extensions of time requested by a licensee, for any license condition, should or should not be granted. The concern raised by the extension of time issue raised here as a 10(j) issue, would be adequately addressed by the conditions of the license articles pertaining to the development of a flow monitoring plan, which would typically require the licensee to consult with the resource agency in developing the plan.

The remaining 10 non-10(j) recommendations have been considered under Section 10(a) of the FPA, have been adopted, and are addressed in the specific resource sections of this document.

Table 33. Analysis of Interior's recommendations for the E.J. West and District Project (Source: Staff)

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
1. All measures included in the Settlement, except those that are specifically flagged by the signatories as not to be included in the license, shall be included in their entirety, without modification, as numbered license articles in any license issued by the Commission and shall be enforceable by the Commission. (Applies to Erie and the District.)	No[a]	$0	No; the Commission determines which, if any, conditions of the Settlement shall be included in any license issued on a case-by-case basis.
2. Limitation of GSL winter drawdowns to elevation 748 ft at license issuance and then, regardless of initial license date, limit winter drawdowns to elevation 749 ft starting June 2, 2010[b], and elevation 750 ft from June 1, 2020[b], for the remainder of the license. (Applies to the District.)	Partially[c]	$0	Yes
3. Maintain an elevation of 760 ft in GSL until October 15 each year except to augment the flow of the Hudson River consistent with the Settlement, to maintain base flows in the Sacandaga River, to maintain whitewater demand schedule, or to address specific conditions requested by NYSDEC. (Applies to the District.)	Yes	$0	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4. Provide adequate flows to maintain instantaneous base flow of 1,500 cfs below Feeder Dam and to maintain a 1,750 cfs average daily flow in the Hudson River below the confluence with the Sacandaga River as described in section 7.3 of the Settlement. The minimum average daily flow may be altered under certain conditions as described in section 3.4 of the Settlement.(Applies to the District.)	Yes	$0	Yes; the Settlement (section 7.3) calls for maintaining an average daily flow of 1,760 cfs downstream of Feeder Dam, which is below the confluence of the Sacandaga River
5a. As described in section 5.3 of the Settlement, provide adequate volume and timing of flows to ensure the implementation of the specified flow regime in the Sacandaga River below Stewarts Bridge. The flow regime varies from 299 to 351 cfs depending on the year and GSL elevation. The flow release structure should be designed so that the nominal flow is released at the midpoint of the impoundment fluctuation range. (Applies to Erie and the District.)	Yes	$0	Yes
5b. Three other conditions apply to the base flow regime: (1) if the Hudson River flow below the Sacandaga River confluence is greater than 25,000 cfs, then the base flow that must be achieved by release is 200 cfs; (2) inflow is measured at the Hope USGS gage and adjusted for drainage area only, using a drainage areas factor of 2.13. Inflow shall not be adjusted for evaporation; and (3) the date of implementation is not affected by the date of license issuance unless the license in not issued before January 1, 2013.[b] (Applies to Erie)	Partially[c]	$0	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
6a. Develop a flow monitoring plan in consultation with all signatories to the Settlement within 6 months of license issuance. The flow monitoring plan should include gages and equipment to monitor: Sacandaga and Hudson River flows and stages, all project flows including flows through the turbines, gates, weirs, and any other bypass/diversion flows, and project headpond and tailwater elevation. Permanent staff gages should be installed and visible to the public to allow independent verification of headpond and tailwater elevations. All gaging equipment shall be installed and calibrated within 12 months of license issuance.[b]	Partially[c]	$470	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
6b. NYSDEC shall review and concur with flow monitoring plan.	No[a]	$0	Yes, under Section 10(a), except concurrence aspect; section 2.12 of the Settlement indicates that this plan would be developed in consultation with NYSDEC (as well as others), which would give NYSDEC an opportunity to concur with the plan; the Commission retains authority to approve the flow monitoring plan.
6c. Access to staff gages will be provided to the FWS and NYSDEC	No[a]	$0	Yes, under Section 10(a)
6d. The licensee should notify the FWS and request that the FWS provide any comments and approve any request for extension to comply with the requirement to develop a flow monitoring plan, before such request is submitted to the Commission. (Applies to Erie.)	No[a]	$0	No; requests for extension of time are matters between the licensee and the Commission
7. Preparation and publishing of GSL elevations, GSL inflow, and Hudson River flows on a monthly basis. (Applies to the District.)	No[a]	$0	Yes, under Section 10(a)

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
8. As described in section 4.2 of the Settlement, provide fish protection measures including a physical barrier with a maximum 1-inch clear spacing at existing trashracks by December 31, 2002[b], regardless of license issuance date. (Applies to Erie.)	Partially[c]	$113,170	Yes

[a] Not a specific measure to protect fish and wildlife resources. The text of footnote "a" is the same for the following three tables (tables 34, 35, and 36).

[b] The implementation schedule described in sections 2.1 and 2.4 of the Settlement provides a process for modifying the schedule for those measures for which any rehearing or court appeal is pending. We assume that Interior's implementation dates also would be adjusted if the license conditions are subject to rehearing or court appeal except for recommendations where it is specifically stated that modifications be made regardless of license issuance date (i.e., GSL drawdown limitations to elevations 749 and 750 ft; base flows at Stewarts Bridge; downstream fish passage flows at Stewarts Bridge, Hudson River, and Feeder Dam; and fish protection via trashrack overlays). The text of footnote "b" is the same for the following three tables (tables 34, 35, and 36).

[c] The timing, and in some cases requiring agency consultation, as specified in Interior's recommendation is outside the scope of Section 10(j). The text of footnote "c" is the same for the following three tables (tables 34, 35, and 36).

Table 34. Analysis of Interior's recommendations for the Stewarts Bridge Project (Source: Staff)

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
1. All measures included in the Settlement, except those that are specifically flagged by the signatories as not to be included in the license, shall be included in their entirety, without modification, as numbered license articles in any license issued by the Commission and shall be enforceable by the Commission.	No[a]	$0	No; the Commission determines which, if any, conditions of the Settlement shall be included in any license issued on a case-by-case basis.
2. As described in section 5.1 of the Settlement, limit the daily drawdown to a maximum of 1 foot (as measured from below the permanent dam crest); drawdown limitation shall begin upon license issuance.[b]	Yes[c]	$0	Yes
3a. As described in section 5.3 of the Settlement, provide adequate volume and timing of flows to ensure the implementation of the specified flow regime in the Sacandaga River below Stewarts Bridge. The flow regime varies from 299 to 351 cfs depending on the year and GSL elevation. The flow release structure should be designed so that the nominal flow is released at the midpoint of the impoundment fluctuation range. (Applies to Erie and the District.)	Yes	$59,850	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
3b. Three other conditions apply to the base flow regime: (1) if the Hudson River flow below the Sacandaga River confluence is greater than 25,000 cfs, then the base flow that must be achieved by release is 200 cfs; (2) inflow for determining the release from the Stewarts Bridge Project is measured at the Hope USGS gage and adjusted for drainage area only, using a drainage areas factor of 2.13. Inflow shall not be adjusted for evaporation; and (3) the date of implementation is not affected by the date of license issuance unless the license in not issued before January 1, 2013.[b] (Applies to Erie)	Partially[c]	$0	Yes
4a. Develop a flow monitoring plan in consultation with all signatories to the Settlement within 6 months of license issuance. The flow monitoring plan should include gages and equipment to monitor: Sacandaga and Hudson River flows and stages, all project flows including flows through the turbines, gates, weirs, and any other bypass/diversion flows, and project headpond and tailwater elevation. Permanent staff gages should be installed and visible to the public to allow independent verification of headpond and tailwater elevations. All gaging equipment shall be installed and calibrated within 12 months of license issuance.[b]	Partially[c]	$770	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4b. NYSDEC shall review and concur with flow monitoring plan.	No[a]	$0	Yes, under Section 10(a), except concurrence aspect; section 2.12 of the Settlement indicates that this plan would be developed in consultation with NYSDEC (as well as others), which would give NYSDEC an opportunity to concur with the plan; the Commission retains authority to approve the flow monitoring plan.
4c. Access to staff gages will be provided to the FWS and NYSDEC	No[a]	$0	Yes, under Section 10(a)
4d. The licensee should notify the FWS and request that the FWS provide any comments and approve any request for extension to comply with the requirement to develop a flow monitoring plan, before such request is submitted to the Commission. (Applies to Erie.)	No[a]	$0	No; Requests for extensions of time are matters between the licensee and the Commission.

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
5. As described in section 5.2 of the Settlement, provide fish protection and downstream movement measures, including: a physical barrier with a maximum 1-inch clear spacing at existing trashracks at Stewarts Bridge before December 31, 2008;[b] a structure for downstream fish passage installed no later than December 31, 2008[b]; and a minimum conveyance flow of 25 cfs via modified sections of the Taintor gates. The conveyance structure shall be developed in consultation with FWS and NYSDEC and will include measures to reduce spillway roughness, dispersion across the spillway face and an adequate plunge pool of no less than 1 foot of depth for every 4 ft of drop. The 25 cfs fish movement flow will be released continually year round and will be considered part of the base flow discharge during non-generation periods.	Partially[c]	$142,430	Yes
6. Restrict access to the upper end of the Stewarts Bridge impoundment during winter to protect bald eagle wintering habitat.	Yes	$0	Yes

Table 35. Analysis of Interior's recommendations for the Hudson River Project (Source: Staff)

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
1. All measures included in the Settlement, except those that are specifically flagged by the signatories as not to be included in the license, shall be included in their entirety, without modification, as numbered license articles in any license issued by the Commission and shall be enforceable by the Commission.	No[a]	$0	No, the Commission determines which, if any, conditions of the Settlement shall be included in any license issued on a case-by-case basis.
2a. As described in section 6.1 of the Settlement, limit the daily impoundment fluctuations of Sherman Island and Spier Falls to a maximum of 2 ft from June 16 through the commencement of walleye spawning season (approximately March 15), and to a maximum of 1 foot (from top of flashboads) from the beginning of walleye spawning season through June 15. Impoundment drawdowns shall be limited to 6 inches below the crest of the dam when flashboards are not present, but may be drawn down up to 1 foot below the crest during flashboard installation.	Yes	$0	Yes
2b. A partial pneumatic flashboard system shall be installed at Sherman Island within 18 months of license issuance[b].	Partially[c]	$202,620	Yes
3a. For Sherman Island maintain a minimum flow of 100 cfs (±1 cfs) in the northern channel of the bypassed reach and 150 cfs (± 2 cfs) in the southern channel of the bypassed reach except during walleye spawning.	Yes	$47,870	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
3b. For Sherman Island, maintain a combined minimum flow of at least 675 cfs (±3 cfs) in the north and south channels of the bypassed reach during walleye spawning and ending no earlier than June 15. This flow regime shall begin during the first walleye spawning season after license issuance. The licensee will consult with FWS and NYSDEC prior to the first walleye spawning season following license issuance to determine the appropriate location for monitoring water temperature to define the beginning and end of walleye spawning season.	Partially[c]	(Included in 3a)	Yes
3c. The weir structures shall be made of durable materials that will direct appropriate flows to each channel, and the design must be approved by the FWS and NYSDEC. The weirs shall be maintained for the life of the license.	Partially[d]	(Included in 3a)	Yes, partially; the approval of the final design of the weir is the Commission's responsibility.
3d. The flow release structure should be designed to pass the appropriate flows at the midpoint of the impoundment fluctuation range. All structures constructed to ensure appropriate flows shall be in place and fully functional within 18 months of license issuance[b]. The release structure should be approved by the FWS.	Partially[c]	(Included in 3a)	Yes, partially; the approval of the final design of the release structure is the Commission's responsibility.

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4a. Develop a flow monitoring plan in consultation with all signatories to the Settlement within 6 months of license issuance. The flow monitoring plan should include gages and equipment to monitor: Hudson River flows and stages, all other project flows including flows through the turbines, gates, weirs, and any other bypass/diversion flows, and project headpond and tailwater elevation. Permanent staff gages should be installed and visible to the public to allow independent verification of headpond and tailwater elevations. All gaging equipment shall be installed and calibrated within 12 months of license issuance[b].	Partially[c]	$960	Yes
4b. NYSDEC shall review and concur with flow monitoring plan.	No[a]	$0	Yes, under Section 10(a), except concurrence aspect; section 2.12 of the Settlement indicates that this plan would be developed in consultation with NYSDEC (as well as others), which would give NYSDEC an opportunity to concur with the plan: the Commission retains authority to approve the flow monitoring plan.

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4c. Access to staff gages will be provided to the FWS and NYSDEC	No[a]	$0	Yes, under Section 10(a)
4d. The licensee should notify the FWS and request that the FWS provide any comments and approve any request for extension to comply with the requirement to develop a flow monitoring plan, before such request is submitted to the Commission. (Applies to Erie.)	No[a]	$0	No, requests for extensions of time are matters between the licensee and the Commission.
5a. As described in section 6.2 of the Settlement, provide fish protection and downstream movement measures, including: a physical barrier with a maximum 1-inch clear spacing at existing trashracks at Sherman Island powerhouse before December 31, 2006[b]; a structure for downstream fish passage installed no later than December 31, 2006[b]; and a minimum conveyance flow of 25 cfs via the existing ice sluice adjacent to powerhouse with the design of the sluiceway to be developed in consultation with FWS and NYSDEC and will include measures to reduce spillway roughness, dispersion across the spillway face and an adequate plunge pool of no less than 1 foot of depth for every 4 ft of drop. The 25 cfs fish movement flow will not be considered part of the bypassed reach flow discharged from the Project.	Partially[c]	$212,250	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
5b. As described in section 6.2 of the Settlement, provide fish protection and downstream movement measures, including: a physical barrier with a maximum 1-inch clear spacing at existing trashracks at Spier Falls powerhouse before December 31, 2010[b]; a structure for downstream fish passage installed no later than December 31, 2010[b]; and a minimum conveyance flow of 25 cfs via the existing trash sluice adjacent to powerhouse with the design of the sluiceway to be developed in consultation with FWS and NYSDEC and will include measures to reduce spillway roughness, dispersion across the spillway face and an adequate plunge pool of no less than 1 foot of depth for every 4 ft of drop. The 25 cfs fish movement flow will not be considered part of the bypassed reach flow discharged from the Project.	Partially[c]	$147,280	Yes

[d] The type of material and approval of agencies is outside the scope of Section 10(j).

Table 36. Analysis of Interior's recommendations for the Feeder Dam Project (Source: Staff)

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
1. All measures included in the Settlement, except those that are specifically flagged by the signatories as not to be included in the license, shall be included in their entirety, without modification, as numbered license articles in any license issued by the Commission and shall be enforceable by the Commission.	No[a]	$0	No, the Commission determines which, if any, conditions of the Settlement shall be included in any license issued on a case-by-case basis.
2a. As described in section 7.1 of the Settlement, limit the daily impoundment fluctuations to a maximum of 2 ft from June 16 through March 31, and a maximum of 1 foot (from top of flashboards) from April 1 through June 15. Impoundment drawdowns shall be limited to 6 inches below the crest of the dam when flashboards are not present, but may be drawn down up to 1 foot below the crest during flashboard installation.	Yes	$0	Yes
2b. A partial pneumatic flashboard system shall be installed at Feeder dam within 18 months of license issuance[b].	Partially[c]	$98,890	Yes
3. As described in section 7.3 of the Settlement, provide instantaneous base flow of 1,500 cfs and an average daily flow of 1,760 cfs below Feeder dam. [There is a difference of 10 cfs between this recommendation and recommendation 4 above for the E.J. West Project, i.e., 1,750 vs. 1,760 cfs. We recommend a minimum average daily flow below Feeder dam of 1,760 cfs, following the specifications of section 7.3 of the Settlement.]	Yes	$1,590	Yes

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4a. Develop a flow monitoring plan in consultation with all signatories to the Settlement within 6 months of license issuance. The flow monitoring plan should include gages and equipment to monitor: Hudson River flows and stages, all other project flows including flows through the turbines, gates, weirs, and any other bypass/diversion flows, and project headpond and tailwater elevation. Permanent staff gages should be installed and visible to the public to allow independent verification of headpond and tailwater elevations. All gaging equipment shall be installed and calibrated within 12 months of license issuance.[b]	Partially[c]	$480	Yes
4b. NYSDEC shall review and concur with flow monitoring plan.	No[a]	$0	Yes, under Section 10(a), except concurrence aspect; section 2.12 of the Settlement indicates that this plan would be developed in consultation with NYSDEC (as well as others), which would give NYSDEC an opportunity to concur with the plan; the Commission retains authority to approve the flow monitoring plan.

Recommendation	Within scope of Section 10(j)	Annual cost of measure	Staff recommending adoption?
4c. Access to staff gages will be provided to the FWS and NYSDEC	No[a]	$0	Yes, under Section 10(a)
4d. The licensee shall install lights which are visible to the general public on the dam to indicate which units are operating.[d]	No[a]	$0	Yes, under Section 10(a)
4e. The licensee should notify the FWS and request that the FWS provide any comments and approve any request for extension to comply with the requirement to develop a flow monitoring plan, before such request is submitted to the Commission. (Applies to Erie.)	No[a]	$0	No; extensions of time are matters between the licensee and the Commission.
5. As described in section 7.2 of the Settlement, provide fish protection and downstream movement measures, including: a physical barrier with a maximum 1-inch clear spacing at existing trashracks at Feeder Dam Project before December 31, 2004[d]; a structure for downstream fish passage installed no later than December 31, 2004[d]; and a minimum conveyance flow of 25 cfs via the existing trash sluice adjacent to powerhouse with the design of the sluiceway to be developed in consultation with FWS and NYSDEC and will include measures to reduce spillway roughness, dispersion across the spillway face and an adequate plunge pool of no less than 1 foot of depth for every 4 ft of drop. The 25 cfs fish movement flow will not be considered part of the bypassed reach flow discharged from the Project.	Partially[c]	$126,460	Yes

[d] Interior specifies in its recommendation that the lights be installed on the dam whereas section 7.3 (page 75) of the Settlement only specifies that the lights be visible from outside the powerhouse. We recommend that the lights be visible from outside the powerhouse as specified in the Settlement.

X. CONCLUSION

We conducted an independent review and evaluation of the record for the proposed actions for the E.J. West and District, Stewarts Bridge, Hudson River, and Feeder Dam projects, as presented in the Settlement, the proposed actions with additional staff-recommended measures, and no-action. Under sections 4(e) and 10(a) of the FPA, we recommend issuing new licenses for the continued operation of the four projects in accordance with the conditions of the Settlement and our additional staff-recommended measures.

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APPENDIX A

APPENDIX A
COMMENTS ON THE UPPER HUDSON RIVER DRAFT MULTIPLE PROJECT ENVIRONMENTAL IMPACT STATEMENT

The Commission sent its draft multiple project Environmental Impact Statement (MPEIS) for the proposed relicensing of the E.J. West and District, Stewarts Bridge, Hudson River, and Feeder Dam projects to the U.S. Environmental Protection Agency (EPA) on May 18, 2001, and EPA issued it on May 25, 2001. The Commission requested that comments be filed within 45 days from the issuance date (by July 9, 2001). The following entities filed comments pertaining to the draft MPEIS. In this appendix, we summarize the comments received, provide responses to those comments, and indicate where we have modified the text of the final MPEIS. The comments are grouped by topic for convenience.

Entity	Date of Letter
Adirondack Mountain Club (ADK)	June 24, 2001
County of Saratoga, Board of Supervisors (County of Saratoga)	June 28, 2001
Adirondack Hydro Development Corporation (AHDC)	June 28, 2001
Hudson River-Black River Regulating District (District)	June 29, 2001
New York State Department of Environmental Conservation (NYSDEC)	July 3, 2001
U.S. Department of the Interior (Interior)	July 5, 2001
Erie Boulevard Hydropower, L.P. (Erie)	July 9, 2001
U.S. Environmental Protection Agency (EPA)	July 13, 2001
U.S. Department of the Interior (Interior)	July 13, 2001
County of Saratoga	September 14, 2001

Procedural and General

Comment: Interior objects to our rejection of its recommendations that the Commission must adopt, without modification, as numbered license articles, all measures included in the Settlement (in tables 33, 34, 35, and 36 of the draft MPEIS). Interior claims that a settlement has no value if the Commission can pick and choose which portions to accept.

Response: When the Commission issues licenses for hydroelectric projects under its jurisdiction, it must ensure that the license conditions are consistent with the Federal Power Act (FPA). The Commission, by National Environmental Policy Act (NEPA) regulation, must also conduct an independent analysis of the proposed action (i.e., licensing the projects under the applicable terms of the Settlement).

Comment: ADK suggests modifications to section I.E that more accurately reflect the language in the Settlement that pertain to provisions for adjusting the implementation schedule for proposed measures. Interior makes a similar comment for footnote "b" in tables 33, 34, 35, and 36 and points out that certain measures (i.e., installation of trashrack overlays) are not tied to the date of license issuance.

Response: We modified the text of section I.E and footnote "b" in tables 33, 34, 35, and 36 to more accurately reflect the language in the Settlement.

Comment: Erie comments that our draft MPEIS does not specifically mention that the Settlement stipulates a 40-year license term for the new license for these projects.

Response: The Commission makes its determination regarding the terms of new licenses in the orders issuing those licenses, not in the NEPA document. This determination is based on consideration of a number of factors, which in this case would include section 2.2 of the Settlement, where the parties to the Settlement agree that the term of the licenses should be 40 years, as well as other factors, such as the amount of new construction.

Comment: EPA indicates that because our analysis relies heavily upon the provisions of the Settlement, the final MPEIS should include the Settlement, WQCs for the projects, and any details that are available regarding our recommended environmental measures. Saratoga County recommends that the Settlement be attached to all licenses issued for the subject projects.

Response: The complete Settlement, as are most filings on Commission proceedings, can be reviewed electronically on the Commission's Records Information Management System (RIMS). The Settlement is nearly 200 pages long and not readily appended to the MPEIS. Only one WQC has been issued so far for the subject projects (on May 25, 2001, for the Stewarts Bridge Project). The remaining three are expected soon, but issuance of our final MPEIS is not dependent on whether or not the remaining WQC's are issued. As with the Settlement, the Stewarts Bridge WQC can be viewed by interested parties on RIMS, as can the remaining three WQC's when they are issued and filed with the Commission. For license orders that are heavily dependent on the provisions of a settlement, the Commission may elect to attach the settlement to the license orders. Because the terms of WQCs are mandatory, the Commission also attaches the WQCs to the license orders.

Comment: ADK comments that, for our list of acronyms, AWA is now AW, American Whitewater.

Response: We recognize that the American Whitewater Affiliation has shortened its name to American Whitewater. However, since the organization represents the same constituents and numerous filings were made under the name of the American Whitewater Affiliation (AWA), rather than changing the abbreviation to AW, we prefer to explain in the list of acronyms and abbreviations that the American Whitewater Affiliation is also known as American Whitewater.

Comment: ADK and Erie indicate a number of "typographical problems" and, in one case, Interior and ADK note our transposition of the P and R in NYSOPRHP, with the draft MPEIS.

Response: We corrected the typographical errors in the final MPEIS indicated by commentors.

Comment: The District and Erie note that the District also owns the spillway weir and concrete canal at the E.J. West Project, in addition to the dam, GSL outlet, log boom, and control house that we indicated in the draft MPEIS.

Response: We modified section III.A.1.a of the MPEIS to reflect the information provided by the District and Erie.

Comment: Erie requests that we place a higher emphasis on the importance which the parties to the Settlement place on the need for separate licenses for the District and Erie for the E.J. West Project. In addition, Erie reiterates its intention to prepare a CRMP for its portion of the E.J. West Project and agrees with our recommendation that the District be responsible for preparing a CRMP for its portion of the project.

Response: We added text to section I.E of the MPEIS to reflect Erie's sentiment about the importance of two separate licenses. However, the Commission will make its ruling on how this matter will be determined in its order pertaining to this proceeding.

Comment: The District rejects all of our recommendations in the draft MPEIS that pertain to GSL and Conklingville Dam that are under the jurisdiction of the District.

Response: The District's comments raise legal issues that are appropriately resolved in a Commission order or orders acting on the license applications. This response also addresses Erie's concern about the District's responsibility for developing a CRMP for the Conklingville Dam and GSL.

Comment: ADK indicates that we did not list it as a commenting entity on the Hudson River REA notice.

Response: We changed APA to ADK in section IV.A.3. of the MPEIS to correct this typographical error regarding entities that commented in response to our REA notice.

Comment: ADK suggests that we add language to section III.D.1.a to indicate that the transmission line for the Feeder Dam Project is separately licensed to Erie as FERC Project No. 2641.

Response: We added the suggested language to section III.D.I.a of the MPEIS.

Comment: AHDC requests that we clarify the owners of the South Glens Falls Project and the Hudson Falls Project.

Response: We modified section VI.E of the MPEIS to reflect the ownership information provided by AHDC.

Comment: AHDC believes that all downstream beneficiaries be afforded the same rights to intervention and relief as those signatories of the Settlement.

Response: AHDC's comments raise legal issues that would be appropriately considered in a Commission order.

Cumulative Effects

Comment: Saratoga County suggests that we add to the list of cumulatively affected resources all GSL water-related recreational activities such as swimming, fishing, sailing, and boating.

Response: The Commission issued an SD1 and revised SD1 that indicated our view of the resources that could be cumulatively affected by the proposed relicensing of the E.J. West Project. We did not receive any comments from Saratoga County to change the resources specified for cumulative analysis. We consider effects on GSL swimming, fishing, sailing, and boating that can be attributed to hydroelectric operations to be site-specific, not cumulative, effects.

Comment: Interior reiterates its previous objections to the Glens Falls Project being deleted from this MPEIS and claims that the draft MPEIS generally fails to address the cumulative effects of the Glens Falls Project. Interior considers our reference to the Glens

Falls Project in the executive summary and in the Recreational Resources section to be inappropriate.

Response: Interior provides no specific information about how the draft MPEIS failed to address the cumulative effect of the Glens Falls Project. The NYSDEC issued a WQC for the Glens Falls Project by letter to FPC dated May 5, 1995 (when the WQCs for the four projects included in this MPEIS were still pending), which, at the time, was the Commission's reason for separating the Glens Falls relicensing proceeding from the relicensing proceedings of the four subject projects. We reference the Glens Falls Project in this MPEIS to provide either site-specific or cumulative perspective to the reader. We have addressed a cumulative concern for the Glens Falls Project by evaluating the re-regulating aspect of the Feeder Dam Project as provided by the terms of the Settlement, and thus, how project operations of the Feeder Dam Project could affect downstream riverine habitat below Glens Falls dam. Our recommendation to monitor flow conditions during 5 years of operation under the terms of a new license for the Feeder Dam Project should ensure consideration of biological resources at or below the Glens Falls Project and the economics of other downstream hydropower projects.

We agree that our reference to the Glens Falls Project in the executive summary adds little to the summary of our findings in the MPEIS and therefore we deleted it. However, we continue to reference the Glens Falls Project throughout the main body of the MPEIS, as appropriate.

Our reference to the Glens Falls Project that Interior refers to in Recreational Resources (section V.B.5.b (4) of the MPEIS) is intended to document that although the Settlement specifies that all of the features of the proposed Overlook Park at the Feeder Dam Project (which includes a canoe take-out and put-in) would be deleted from the Feeder Dam project boundary upon completion (and thus no longer subject to Commission jurisdiction), access to the Feeder Dam tailwaters (the Glens Falls impoundment) would still be under Commission jurisdiction through the Glens Falls license.

The Commission issued a draft Environmental Assessment (EA) for the Glens Falls Project in May 1999 and a final EA in September 2001. None of our recommendations in either the Glens Falls EA or this MPEIS would have changed if the Glens Falls Project had not been separated from this MPEIS.

Water Quality and Quantity

Comment: ADK indicates that we did not mention that section 2.12 of the Settlement requires that staff gages visible to the general public be installed at all four projects.

Response: We reference in the MPEIS all of Erie's proposed measures for monitoring flow and water level that are specified in section 2.12 (without specifying the two pages of details contained in the Settlement text). This would include staff gage placement, visible to the general public at appropriate locations. However, it may be determined, during the development of the flow monitoring plan, that tailwater staff gages are not appropriate at each development, specifically at those powerhouses where the tailwater discharges directly into an impoundment (i.e., E.J. West, Sherman Island, and Feeder Dam). Therefore, we consider it most appropriate for the details of how flow and water level are to be monitored, including staff gage placement, to be worked out in the plan that would be developed by Erie, in consultation with the District, NYSDEC, and FWS, within 6 months of license issuance, as specified in section 2.12 of the Settlement.

Comment: Interior interprets our comments in tables 33, 34, 35, and 36 of the draft MPEIS, pertaining to our conclusions regarding whether the timing of the implementation of the flow monitoring plans at all four projects and the installation of partial pneumatic flashboards at Sherman Island and Feeder Dam, as a rejection of the time frames specified in the Settlement.

Response: Our recommendations in section VII.B.1 of the MPEIS specify that developing and implementing flow monitoring plans and the installation of partial pneumatic flashboards at Sherman Island and Feeder Dam should be in accordance with sections 2.12, 6.1.2.1, and 7.1.1 of the Settlement, respectively. Because the schedules for these measures are specified in these sections of the Settlement, we recommend that the Commission approve the schedules that were developed during the settlement negotiations and specified in Interior's Section 10(j) recommendations. Our comments in the right hand column of the referenced Section 10(j) tables do not indicate rejection of these elements of Interior's recommendations, just which elements are outside the scope of Section 10(j). We modified these tables to clarify this issue. All of the Section 10(j) recommendations that were within the scope of Section 10(j) are recommended for adoption by the staff; and most of those recommendations outside Section 10(j) were adopted by staff.

Comment: Saratoga County objects to our "assumption" in the draft MPEIS that releases from GSL provide a degree of control over brackish water intrusion in the tidally influenced portion of the Hudson River or that such releases are responsible for improved freshwater availability for downstream communities along the Hudson River. Saratoga County requests that all text based on this premise be deleted until NYSDEC can provide documentation of the validity of this "assumption."

Response: The fact that increased freshwater flow in a tidal river can control brackish water intrusion by restricting its upstream progress is not an "assumption" but a well documented scientific phenomenon. For example, Englert and Sugarman (1988; pages 160

and 161) document the location of the salt front in the Hudson River and its relationship to freshwater flows at Green Island, upstream of the Troy dam (i.e., the salt front moves downstream with increased freshwater flow at Green Island). General oceanography text books also document this phenomena (e.g., Kennett, 1982; pages 290-292). We make no judgment in the MPEIS on how much control over brackish water intrusion releases from GSL exert; the effectiveness of the District in meeting its low flow augmentation mandate is not a topic of the MPEIS. However, in response to Saratoga County's comments, we modified section II.B.2.a of the MPEIS to indicate that low flow augmentation could reduce, rather than prevent, the encroachment of brackish water into the upper reaches of the tidally influenced Hudson River.

Likewise, the fact that increased flows can enhance the assimilative capacity of rivers is not an assumption but a well proven phenomenon. Increased river flows from augmentation during the summer can enable municipal and industrial facilities to withdraw and discharge more water than under non-augmented conditions. However, in response to Saratoga County's comments, we modified section III.A.1.b of the MPEIS to indicate that low flow augmentation provides more stable, rather than improved, freshwater availability for downstream communities along the Hudson River.

Comment: Erie indicates that the Settlement filed with the Commission in April 2000 inadvertently omitted from section 3.0 information on the aggressive use of GSL storage and that Erie was consulting with specific parties to the Settlement to enable appropriate corrections to be filed with the Commission. Once the corrections are filed with the Commission, Erie requests that we modify table 2 of the MPEIS to reflect this additional information.

Response: Erie filed the modifications of the Settlement pertaining to aggressive storage at GSL by letter dated July 23, 2001. We added appropriate additional information to table 2 of the MPEIS.

Comment: Saratoga County disagrees with our conclusion that the existing shoreline erosion at GSL is not related to hydroelectric project operations and states that future use of GSL for aggressive hydroelectric storage, as specified in the Settlement, would expose portions of the GSL above elevation 768 feet to additional erosive forces that should be addressed, including monetary compensation by the licensees to shoreline property owners for erosion damage caused by the aggressive use of storage.

Response: Saratoga County provides no basis for how the historical 1-inch daily fluctuation in GSL water level that could be attributed to hydroelectric project operation has contributed to existing shoreline erosion. However, we reassessed whether the proposed use of GSL to accommodate "aggressive storage" for more efficient downstream

hydroelectric project operations could increase erosive forces on the GSL shoreline. We concluded that there is the potential for increased shoreline erosion above elevation 768 ft from the use of GSL for aggressive storage, but that this effect is only expected to occur during rare occasions when lake levels are at the highest point (typically during June and July). Consequently, we now recommend in section V.B.1.b (1) of the MPEIS that an erosion and sedimentation control plan be developed for GSL that includes monitoring for erosion, identification of actively eroding sites, and remediation for effects attributable to "aggressive storage" operations.

Comment: Saratoga County suggests that the District be required to examine its existing erosion control policies for shoreline permit holders and amend them accordingly to encourage and enable permit holders to more easily conduct erosion control activities at GSL.

Response: The GSL erosion and sedimentation control plan that we now recommend would be developed in consultation with Saratoga and Fulton counties, as well as the NYSDEC and NYSOPRHP. During this consultation, Saratoga County would be free to suggest methods by which shoreline permit holders could more easily conduct erosion control activities for non-project related erosion in a controlled manner.

Comment: NYSDEC and ADK suggest that our recommendation in the Comprehensive Development section of the draft MPEIS that Erie develop a stream flow monitoring plan at the Stewarts Bridge Project should have specified that this recommendation would be implemented within 12 months of license issuance, consistent with section 2.12 of the Settlement.

Response: We modified the text of section VII.B.1.b of the MPEIS as suggested by NYSDEC and ADK.

Comment: ADK indicates that we should have included the benefit of reduced impoundment fluctuations on shoreline nesting birds in sections V.B.1.b (2), V.B.1.b (3), and V.B.1.b (4) of the Water Quantity and Quality section of the MPEIS.

Response: You are correct. We acknowledge that the stabilization of the impoundment water surface elevations would benefit riparian habitat. This would include shoreline nesting birds and other riparian wildlife that use this habitat. We pointed this out on pages 102, 103, and 105 of the draft MPEIS (section V.B.3.b, Terrestrial Resources). We added text to this section of the final MPEIS to clarify that riparian habitat benefits would be realized by shoreline nesting birds and riparian wildlife.

Comment: Erie objects to our recommendation in the draft MPEIS that NYSDEC, FWS, the District, and the Commission be notified 30 days in advance of any scheduled maintenance drawdowns at the Stewarts Bridge, Hudson River, or Feeder Dam projects. Erie recommends any notification requirement concerning maintenance drawdowns should follow the WQC for the projects, which Erie expects to be similar for all projects as compared to the recently issued WQC for the Stewarts Bridge Project that addresses this issue. Erie recommends it be required to consult in advance only with the NYSDEC, following the WQC provisions. Erie claims that this 30 day notification recommendation could unnecessarily delay the replacement of flashboards (at the Hudson River and Feeder Dam projects). Erie suggests that a 14 day advance notification of the NYSDEC (with an informational notification of the Commission, but no other entities) prior to drawdowns exceeding normal operating fluctuations, as specified in the WQC for the Stewarts Bridge Project (dated May 25, 2001) should be sufficient. Erie states that there is no need to notify the District at all, beyond Erie's daily coordination of its hydroelectric project discharges. Interior comments that under the terms of the Settlement, maintenance drawdowns of the Stewarts Bridge impoundment would be eliminated, yet we recommended in the draft MPEIS that Erie should consult with FWS and others in the event that maintenance drawdowns are needed. Interior states that avoiding drawdowns at Stewarts Bridge is highly preferable to the existing maintenance drawdowns.

Response: Under the Settlement, Erie would discontinue the annual spring maintenance drawdown of about 15 ft at Stewarts Bridge (leaving the door open for future drawdowns on a less frequent basis), and would restrict normal impoundment fluctuations at the Hudson River and Feeder Dam projects to 1 or 2 ft (thus eliminating routine maintenance drawdowns of up to 7 or 8 ft at the Hudson River Project and 4 ft at the Feeder Dam Project). We consider the avoidance of deep drawdowns of the impoundments to be an environmental enhancement and the Settlement suggests that such drawdowns would occur infrequently, if at all, in the future. However, we can envision circumstances where it may be necessary to schedule maintenance drawdowns of the impoundments at some time during the term of the new licenses (although we expect such occurrences to be rare).

Our 30 day notification recommendation is intended to provide the Commission and resource agencies (FWS and NYSDEC) with an opportunity to concur that the drawdown is needed and, if so, what protective measures should be taken (e.g., scheduling the drawdown to avoid sensitive ecological time frames, downramping at specific rates that would minimize fish stranding potential). We do not consider 14 days sufficient to enable options to the drawdown or protective measures to be evaluated and discussed with Erie. Drawdowns below the dam crest could only occur when the inflow to the project, which is controlled on a daily basis by the District, is less than the hydraulic capacity of the turbines at the powerhouse. We therefore consider it appropriate that the District be notified prior to such drawdowns to ensure that its mandated flow augmentation responsibilities could be

ensured when flows to the impoundment would need to be restricted. We consider the replacement of flashboards to be a part of the routine operation of the project, rather than an operation that requires a scheduled maintenance drawdown, and have adjusted our recommendation in sections VII.B.1.c and d of the final MPEIS to exclude minimal drawdowns for flashboard replacement from the 30 day notification recommendation.

Comment: Interior suggests modifying our description of the provision in the Settlement to reduce the base flow in the Sacandaga River to 200 cfs when flows in the Hudson River exceed 25,000 cfs (section V.B.2.b (2) of the MPEIS), to indicate that the base flow of 200 cfs would be released from the Stewarts Bridge powerhouse. Interior points out that the flows measured downstream in the river would likely be greater than 200 cfs due to runoff and other factors.

Response: We modified section V.B.2.b (2) to clarify that the 200 cfs base flow release under high Hudson River flow conditions would be released from the Stewarts Bridge powerhouse.

Comment: Erie indicates that the text on page 59 of the draft MPEIS that indicates that it is unclear whether temperature and DO were measured during periods of non-generating (section V.B.1.b (2) of the MPEIS) is inconsistent with the text on page 48 (section V.B.1.a (2) of the MPEIS), which indicates no DO problems during non-generation periods.

Response: We reviewed the record and found no evidence that DO was measured during periods of non-generation (which would generally be at the end of the day or at night). We modified the text in section V.B.1.a (2) to indicate that there were no measured violations of the state water quality standards downstream in Sacandaga River "despite daily non-generation periods."

Comment: Interior indicates that it appears that we are rejecting its recommendations pertaining to type of material used to construct the weir, timing, and agency approval associated with the minimum flow release structure and weir proposed for the Sherman Island bypassed reach, based on table 35, items 3c and 3d in the draft MPEIS. Interior points out that the timing of installation of these structures is a key measure included in the Settlement, and approval by the agencies of the weir structure is critical to the success of the negotiated minimum flow regime.

Response: Interior misconstrues our comment that the timing and weir material are outside of the scope of Section 10(j) as a rejection of these measures. In section VII.B.1.c of the MPEIS, we recommend that minimum flows and associated structures should be implemented in accordance with section 6.3.2 of the Settlement. This section specifies that the weir should be constructed of durable material and the timing of when structures

required to release minimum flows to the Sherman Island bypassed reach should be in place. We agree with both of these elements of the Settlement and recommend that the Commission include these measures in any license issued for the Hudson River Project. We modified table 35 to make this clear. The Settlement does not specify that the Sherman Island minimum flow release structure and associated weir should be approved by FWS or NYSDEC, as Interior specifies in its recommendations. However, we consider consultation with NYSDEC and FWS during the design of both structures to be appropriate and have modified section VII.B.1.c accordingly. The Commission has always retained authority to approve the design and installation schedule for project facilities.

Comment: ADK suggest modifying our description of flows to the Feeder Canal in the Feeder Dam Project affected environment text because this canal provides the only source of water to the Champlain Canal, between locks 8 and 9, the highest elevation of the canal.

Response: We modified section V.B.1.a(4) of the MPEIS to indicate that the Feeder Canal "provides water", rather than "provides supplementary water," to the Champlain Canal.

Comment: ADK suggests that we change the wording of sections V.B.1.b(4) and VII.B.2.a to indicate that Erie proposed to maintain a "minimum average daily flow" of 1,760 cfs from the Feeder Dam Project, rather than a 1,760 cfs "minimum average flow," to be consistent with the language in the Settlement.

Response: We made the suggested change in several locations in the final MPEIS to be consistent with the language shown on page 75 of the Settlement.

Comment: AHDC and EPA agree with our recommendation that Erie conduct an evaluation of flows released from the Feeder Dam Project after 5 years of operating under the flow regime specified in any new licenses issued for the four projects that are the subject of the MPEIS. AHDC also recommends that Erie develop a mutually acceptable study plan prior to license issuance. This study plan would include a detailed operating plan that identifies the operating regime of each project and control structure upstream of the Feeder Dam Project, including the pond level operation and flow release for each hour of the day for each flow condition up to the maximum capacity of Spier Falls. AHDC further states that the evaluation should include the identification of the effects on peak power during the critical peak load periods. AHDC specifies that the flow evaluation plan should include verification procedures available to all parties involved with the plan and address the need for the District to develop a formal monitoring program that includes published reports on the operation of GSL.

Response: We acknowledge that developing a plan that establishes the framework for our recommended flow evaluation would avoid the potential for unfulfilled expectations when the evaluation report is distributed for review and approval. We modified our recommendation accordingly in sections V.B.2.b (4), VII.B.1.d, and VII.B.2.b of the MPEIS. However, AHDC provides no justification of why this plan should be developed prior to license issuance. We consider it most appropriate to develop this plan after the flow monitoring plan described in sections 2.12 and 2.13 of the Settlement has been developed (which would be 6 months from license issuance). The flow monitoring plan, as specified in section 2.12 of the Settlement, would provide an appropriate means of verification of base flows by the NYSDEC, FWS, and the public. Section 2.13 of the Settlement specifies that the District would monitor daily flows into and out of GSL, as well as daily GSL levels. The District would publish this information on a monthly basis. As we indicate in Section VII.B.1 of the MPEIS, we recommend implementation of sections 2.12 and 2.13 of the Settlement, thus addressing AHDC's concerns about independent verification of flows and the District's reporting obligations.

We expect our recommended flow evaluation to primarily make use of data that would be produced by our recommended flow monitoring plan. Detailed operating plans for all of the projects and control structures upstream of the Feeder Dam Project are not particularly germane to the objective of our recommended flow evaluation, which is to ensure that aquatic habitat and generation capabilities (including peak power generation) downstream of the Feeder Dam Project are not unexpectedly compromised by the new operating regimes. Evaluation of operating regimes of all four projects included in this MPEIS could be a follow-up action recommended in the evaluation report, should flow fluctuations from the Feeder Dam Project have any adverse effects.

Comment: Erie disagrees with our recommendation to conduct an evaluation of flows from Feeder Dam after the first 5 years of operation under the terms of the new license and asks us to rescind this recommendation in the final MPEIS. Erie supports its conclusion with a quote from NYSDEC from section A.2.1.2.2 of the Settlement that indicates that the Upper Hudson water quality would be maintained with the proposed flow regime from the Feeder Dam Project. Erie further cites a personal communication with NYSDEC staff that indicates that no further flow studies below Feeder Dam are necessary, and that NYSDEC would file with the Commission a letter reflecting its conclusion in the near future. In addition, Erie indicates that our concern regarding potential energy effects on downstream hydroelectric projects did not properly consider the HEC5P model runs, summarized in Appendix D of the Settlement.

Response: We agree that the proposed Feeder Dam flow regime should adequately maintain the water quality of the Upper Hudson River. Our recommendation for an evaluation of flows from Feeder Dam after 5 years of operation under the new flow regime

is based on our desire to ensure that aquatic riverine habitat and downstream hydroelectric generation is not unexpectedly adversely influenced. Under certain conditions, pulsed flows from Feeder Dam could be more frequent than currently occur, even with the flow regime specified in the Settlement. We also considered the results of the HEC5P model runs in the draft MPEIS (as presented in section VI.E of the draft MPEIS). This is a predictive model and a purpose of the flow evaluation would be to verify that the flows that are predicted by the model appropriately mimic actual flows. Such verification is not possible until after the flow regimes at all projects that are specified in the Settlement, and included by the Commission in any licenses for these four projects, are implemented. We currently have no concrete facts to conclude that there would be any adverse ecological or generation effects downstream of Feeder Dam, but we consider it prudent to include our adaptive recommendation for a flow evaluation that would verify that the predicted positive outcomes of the new flow regime actually occur. AHDC and EPA also find our recommendation prudent. We have not yet received a letter from the NYSDEC that indicates disagreement with our recommended flow evaluation.

Comment: ADK suggests that we add language to section III.D.1.b to clarify that the Feeder Canal flow would not be included in the 1,500 cfs base flow at the Feeder Dam Project.

Response: We added the suggested language to section III.D.1.b of the MPEIS.

Comment: ADK indicates that the language of the recommendation specified in item 4.d of table 36 of the draft MPEIS is not consistent with the terms of the Settlement. This item pertains to Erie providing indicator lights as a means to verify the release of the base flow of 1,500 cfs from the Feeder Dam Project.

Response: We recognize that this language is not consistent with the terms of the Settlement. However, this table summarizes Interior's Section 10(j) recommendations for the Feeder Dam Project, not the terms of the Settlement. Interior specifies in its September 7, 2000, letter to the Commission, that the lights be installed "on the dam" to indicate which units are operating. Section 7.3 of the Settlement only specifies that the lights be visible from outside the Feeder Dam powerhouse. Because FWS was a signatory party to the Settlement, and Interior's item number 1 in this table specifies that the Commission should adopt all measures of the Settlement without modification, we interpret our recommendation to have the lights visible from the Feeder Dam powerhouse to be consistent with Interior's recommendation. We added a footnote to this table that points out the inconsistency of Interior's recommendation with the Settlement. We also added language to our list of recommendations for the Feeder Dam Project (section VII.B.1.d of the MPEIS) to specify the provision of "generation on" lights as specified in section 7.3 of the Settlement.

Fisheries and Aquatic Resources

Comment: Saratoga County comments that the historical depletion of fishery resources due to the large trashrack size at the E.J. West powerhouse and the presence of no anadromous or catadromous fish populations at GSL should preclude the need for any future fish bypass prescription considerations at the E.J. West Project.

Response: Our reservation of the Commission's authority to require such fishways that may be prescribed by Interior is consistent with section 7.2 of the Settlement and with long-standing Commission policy.

Comment: Interior questions our reservations regarding the potential fisheries benefits that would accrue from the installation of 1-inch trashrack overlays at the E.J. West, Stewarts Bridge, and Hudson River projects to reduce fish injuries and mortality from entrainment. Interior calculated approach velocities at these three projects and, in some cases, the values differed from those that we presented in the draft MPEIS. Interior claimed that in nearly all cases, the approach velocities would be less than or equal to 2 feet per second, which is considered by Interior to be the threshhold above which impingement on the trashracks could occur.

Response: As a result of Interior's comment, we reassessed our estimated approach velocities for the E.J. West, Stewarts Bridge, and Hudson River projects. Our findings are presented in the following table:

Estimated approach velocities at the E.J. West, Stewarts Bridge, and Hudson River projects under various operating conditions

Development	Efficient gate setting	Maximum gate setting
E.J. West		
GSL elevation 768 ft	1.39 feet per second	1.70 (1.88)[a] feet per second
GSL elevation 748 ft	2.08 feet per second	2.55 feet per second
Stewarts Bridge	2.00 feet per second	2.74 feet per second
Spier Falls, Unit 8	0.88 feet per second	1.21 feet per second
Spier Falls, Unit 9	2.57 (1.77)[a] feet per second	3.01 (2.07)[a] feet per second
Sherman Island	1.71 feet per second	2.16 (1.38)[a] feet per second

[a] When values presented by Interior differ from ours, Interior's values are in parentheses.

We consider it appropriate to assess approach velocities under worst-case conditions (maximum gate setting and minimum impoundment water surface elevation), but also agree that it is appropriate to indicate to the reader what the approach velocities would be under more typical operating conditions. Other factors, such as time of year of drawdown, water temperatures, fish species, and velocity refuges for fish in the power canals, are also important factors affecting the likelihood of entrainment and impingement caused by the 1-inch screen overlays. We modified the text of sections V.B.2.b (1), (2), and (3) to reflect what the approach velocities at efficient, as well as maximum, gate settings would be under the terms of the Settlement.

In the draft MPEIS, our worst-case scenario approach velocity at the E.J. West powerhouse was not representative of conditions that could be experienced if the terms of the Settlement were included in a new license for this project and we adjusted this value from 3.8 feet per second to 2.6 feet per second. However, we consider it particularly important to consider worst case and efficient gate approach velocities when GSL is drawn down to elevation 748 ft because this would typically occur during March and early April when the water temperature would still be relatively cold, and many fish could be more lethargic than when the water temperature warms up during the late spring and summer. It could be harder for them to avoid impingement under these cold water conditions.

Our estimates of approach velocity at Spier Falls, Unit 9, and the Sherman Island developments of the Hudson River Project differ from those calculated by Interior, and we stand by the values that we presented in the draft MPEIS. The top of the trashracks at both of these developments is about 10 ft below the normal water surface elevation and therefore not affected by any impoundment fluctuations. Interior's calculations seem to have been based on an assumption that the trashracks extended to the surface of the impoundments.

Although we acknowledge that impingement of fish on the proposed 1-inch trashrack overlays is not likely to be a problem for most of the year at the E.J. West, Stewarts Bridge, and Hudson River projects, our reservations remain that episodic impingement of fish could reduce or eliminate the benefit of reduced entrainment afforded by the 1-inch trashrack overlays at these projects. However, in summary, since the parties to the Settlement are in agreement that 1-inch overlay screens would be deployed over the trashracks at the E.J. West, Stewarts Bridge, and Hudson River projects, and we are not aware of all the trade-offs or compromises that were made among the parties to reach agreement on this particular issue, we recommend that the Commission approve the installation of 1-inch overlay screens at the four projects, as described in the Settlement.

Comment: Interior counters our concern that fish that enter the E.J West and Sherman Island intake canal might not be able to swim upstream and escape by pointing out that

both powerhouses operate in a peaking mode and during periods of non-generation, fish would be able to swim upstream and return to GSL or the Sherman Island impoundment. Interior also points out that District personnel have observed fish holding in low velocity refuge areas in the E.J. West intake canal during periods of generation.

Response: We agree that it is likely that some fish may be able to hold in low velocity refuge areas in both the E.J. West and Sherman Island intake canals, but there is no way of readily quantifying whether or not the available space in these holding areas is sufficient to hold all of the fish that may seek such refuge areas. We also agree that fish would only have a difficult time swimming out of both intake canals during periods of generation and added text to sections V.B.2.b (1) and (3) to reflect this. However, we question whether fish that are unable to find low velocity refuge areas would be able to maintain their position in the E.J. West intake canal for up to 12 hour periods of generation. Those fish that could not maintain their position in the canal could ultimately become impinged or entrained. We concluded in the draft MPEIS that at Sherman Island, the provision of a downstream fish passage option, as proposed by Erie, would reduce the potential for adverse effects on fish at this development (including fish in the intake canal), and Interior agreed with our conclusion.

Comment: ADK indicates that advocates of baseflow in the Sacandaga River below the Stewarts Bridge dam have included Trout Unlimited (TU), as well as FWS and NYSDEC, and that our text of section V.B.2.b (2) of the MPEIS should be modified to reflect enhanced baseflow as a TU recommendation, as well as a FWS and NYSDEC recommendation.

Response: Although TU provided comments on some of the instream flow studies that the applicant conducted on the Sacandaga River, a TU recommended increased base flow is not clearly evident on the record. If TU was an advocate of Sacandaga River baseflows during the confidential settlement negotiations, we cannot reference its advocacy in the MPEIS because staff that prepared the MPEIS are separated from staff that participated in the settlement proceedings.

Comment: Erie indicates that the sixth bullet on page 26 of the draft MPEIS, pertaining to proposed environmental measures for the Hudson River Project, should be deleted because it duplicates the fifth bullet.

Response: The sixth bullet on page 26 of the draft MPEIS pertains to the release of fish passage flows at the Sherman Island development whereas the fifth bullet pertains to the release of fish passage flows at the Spier Falls development. They are not duplicative, so we did not delete the sixth bullet.

Comment: NYSDEC suggests that we add the following text to our recommendation in section VII.B.1.c of the MPEIS pertaining to Erie consulting with FWS and NYSDEC prior to the first walleye season from license issuance to determine the appropriate location for water temperature monitoring: "The year-round minimum flows in the North and South Channels will be increased during walleye spawning season so that the combined flows are not less than 675 cfs. Walleye spawning flows will be discharged for the first walleye spawning season following license issuance and acceptance."

Response: The language that NYSDEC requests is already present, in slightly different form, in bullets 9 and 10, and appears in the text of section V.B.2.b (3) of the MPEIS. Our minimum flow recommendation is to implement the flow regime specified in section 6.3.2 of the Settlement. This includes the 100 cfs to the north channel (section 6.3.2.1), the 150 cfs to the south channel (section 6.3.2.2), and the walleye spawning flow language specified by NYSDEC (section 6.3.2.3). Our reference to this section in the MPEIS obviates the need to repeat the language of the Settlement.

Comment: ADK points out that our discussion of typical average existing daily flows (3,000 cfs) from the Feeder Dam Project versus the new average daily minimum flow specified in the Settlement (1,760 cfs) does not use comparable figures. ADK indicates that the average flow of 3,000 cfs represents a long-term average flow whereas the 1,760 cfs minimum daily flow would only be in place when water in GSL is at less than ideal levels (as defined by level 3 of the operating curves presented in figures 3, 4, and 5 of the MPEIS). ADK indicates that the future long-term average daily flow from the Feeder Dam Project would most likely be between 2,000 and 7,500 cfs.

Response: According to the Feeder Dam Project license application (page B-3), the long term average flow over the period of record is 4,955 cfs. However, as indicated on page E-I4 of the Feeder Dam license application, the District currently regulates flow in the Hudson River to target a daily average flow release of 3,000 cfs (except for Sunday), as measured downstream of Hadley. This average daily target flow would generally translate to a similar average daily release from the Feeder Dam Project. Our intent in making this comparison was to use available information to characterize existing and proposed average daily flows from the Feeder Dam Project. We recognize that the values are not totally comparable. We modified the text of section V.B.2.b (4) to better define the differences in the compared flows. Although we agree that the average daily flows from the Feeder Dam Project could be between 2,000 and 7,500 cfs, the actual average flow would depend on future hydrological conditions. Our recommended flow evaluation after 5 years of operation under the terms of the new licenses would enable confirmation of the daily and long-term average flows from the Feeder Dam Project.

Comment: NYSDEC noted that, in section VII.B.1.d of the MPEIS, we mischaracterized the period when Feeder Dam impoundment fluctuations would be restricted to 1 ft during the walleye spawning period. NYSDEC indicated that the impoundment fluctuation restriction at Feeder Dam was from April 1 through June 15, to encompass the walleye and centrarchid spawning season.

Response: We corrected our recommendation as suggested by NYSDEC to be consistent with the Settlement. However, the Settlement only specifies that the 1 ft restriction would facilitate fish spawning. We envision that this restriction would not only benefit walleye and centrarchids, but other species, such as cyprinids. Our analysis text in the draft MPEIS (sections V.B.2.b (4), Aquatic Biota, and V.B.3.b (4), Terrestrial Resources) correctly characterized the time frame during which the 1-ft impoundment fluctuation limitation would be in place.

Terrestrial Resources

Comment: EPA indicates that our discussions of existing wetlands in the project areas are only qualitative. Instead, EPA recommends that the MPEIS include a comprehensive assessment of wetland resources, including the mapped location and extent of existing wetlands, a description of the wetland delineation methodology used, the current function of the wetlands (including flood storage and water quality enhancement), and potential impacts. Further, EPA indicates that the MPEIS is unclear as to whether the proposed activities require the placement of fill into existing wetlands. If fill is required, EPA expects us to evaluate the need for a dredge and fill permit pursuant to Section 404 of the Clean Water Act, and include a discussion of this issue in the final MPEIS.

Response: The discussion of wetland resources, including maps and delineation methodologies, are contained in the license applications for the four projects that are the subject of this MPEIS, which are an integral part of the record for this proceeding. We rely on this information to conduct our analysis but do not duplicate all of it in our NEPA document. Until the final design of recreational facilities and other proposed and recommended facilities that could entail fill in wetlands is complete, which would occur during post-licensing, it is premature to assess the potential need for dredge and fill permits. We expect every effort to be made by Erie to avoid wetlands, and make a suggestion in our analysis of the canoe portage route for the Sherman Island development of how a wetland that could require some fill with Erie's proposed alignment, could be avoided. EPA supports our suggested alternative. This is the only potential area that could require a dredge and fill permit that we are aware of. Whether a dredge and fill permit is required is a matter between the U.S. Army Corp of Engineers and the licensee.

Comment: EPA requests that we move our discussion of wetlands from the terrestrial resources (section V.B.3) to the aquatic biota (section V.B.2) section of the final MPEIS, and clearly differentiate between wetlands and riverine habitat.

Response: We recognize that most wetlands have both an aquatic (submergent) and terrestrial (emergent) element, which could support the placement of the wetland discussion in either section of the MPEIS. However, consistent with other Commission NEPA documents, we chose to discuss wetlands in the terrestrial resources section.

Comment: ADK disagrees with our characterization, in section V.B.3.a of the MPEIS, of the shoreline of GSL as, generally, moderately to extremely steep with very little development except for a mix of seasonal and permanent residences. ADK indicates that the shoreline of GSL is nearly fully developed within the constraints of the regulations of the Adirondack Park Agency.

Response: Section V.B.3.a is the Terrestrial Resources section of the MPEIS. Our intent is to characterize the shoreline habitat that could be influenced by project-related activities. The constraints on development around GSL imposed by the Adirondack Park Agency are designed to retain the prevailing undeveloped nature of the shoreline. We consider our characterization of the shoreline in the Terrestrial Resources section of the draft MPEIS to be accurate.

Comment: ADK requests that the Feeder Dam Transmission Line Project (FERC No. 2641) be added to the scope of our recommended Karner blue butterfly survey at the Feeder Project. ADK indicates that the Environmental Assessment for the transmission line project was issued in September 1992, prior to the December 1992 federal listing of the Karner blue butterfly as endangered. Therefore the effects on this federally listed species were not considered in the order issuing the license for the Feeder Dam Transmission Line Project.

Response: There is no proposed action pending before the Commission with respect to the Feeder Dam Transmission Line Project. Absent such a proceeding, it is not appropriate to require Erie to conduct surveys for Karner blue butterflies or its obligate host plant, blue lupine, as part of this proceeding. Such surveys would have to be ordered in a separate proceeding for the Feeder Dam Transmission Line Project, if appropriate. We would not object if Erie extended its scope of our recommended survey on a voluntary basis to include the Feeder Dam Transmission Line Project.

Recreational Resources

Comment: ADK points out that our characterization of daily GSL fluctuations as 8 inches daily in section V.B.5.a (1), Recreational Resources, is inaccurate.

Response: We corrected this typographical error in the final MPEIS. Section V.B.1.b (1), Water Quantity and Quality, of the draft MPEIS correctly characterized the fact that power generation involves less than 1 inch of water fluctuation on a daily basis (page 56).

Comment: ADK suggests that, in table 15, which lists existing recreational facilities at the Stewarts Bridge Project, we change the word "toilets" to "privies" at both the Stewarts Bridge Recreation Area and the north side take-out and in describing the proposed recreational enhancements at the Sherman Island boat launch in section V.B.5.b (3) of the MPEIS.

Response: We made the suggested changes to table 15 and the text of section V.B.5.b (3) in the final MPEIS.

Comment: ADK indicates that our statement in section V.B.5.b (2) that the canoe portage at the Stewarts Bridge Project provides improved access is incorrect because, as constructed in 1994, the steepest section has deteriorated (due to springs) into a muddy morass and needs major reconstruction. ADK points out that correcting this problem was the intent of the Settlement language calling for an "improved path."

Response: Our staff have walked this portage trail and consider it accurate to state that it provides improved access to the tailwaters of the Stewarts Bridge Project. However, we did notice some seeps on the portage route in the vicinity of the transmission line right-of-way that could detract from the utility of the portage trail, especially during wet times of the year. We modified the text of section V.B.5.b (2) to indicate that Erie proposes to make improvements to the portage trail, which is consistent with the language in the Settlement.

Comment: Saratoga County requests that it be notified of any scheduled maintenance drawdowns of the Stewarts Bridge impoundment so that local residents can avoid having their boats stranded.

Response: We added Saratoga County to the list of entities that would be notified in the event that scheduled maintenance drawdowns of the Stewarts Bridge impoundment should be necessary (see section VII.B.1.b). However, we note that Erie proposes to discontinue the historical annual maintenance drawdowns of the Stewarts Bridge impoundment, so the need for such notifications should be infrequent (if at all).

Comment: NYSDEC indicates that our recommendation for the Stewarts Bridge Project (at VII.B.1.b) that Erie implement whitewater boating releases of 4,000 cfs and other measures in accordance with section 5.5.1 of the Settlement should be modified to reference section 5.5.1.1 of the Settlement.

Response: Our intent in this recommendation is twofold: to indicate that we agree that boating releases of 4,000 cfs should be implemented when available, which is specified in section 5.5.1.1 of the Settlement, and to indicate that we recommend the other four aspects that pertain to boating releases and specified in section 5.5.1 of the Settlement. Our recommendation referred to these as "other whitewater measures." These other four aspects pertain to core hours of whitewater releases (section 5.5.1.2), prescheduled releases (section 5.5.1.3), the whitewater demand schedule (section 5.5.1.4), and whitewater flow forecasting (section 5.5.1.5).

Comment: ADK indicates that our listing of proposed recreational measures for the Hudson River Project, in section III.C.1.c, mixes existing features with proposed features.

Response: We modified the language in section III.C.1.c to more clearly indicate the proposed recreational enhancements at the Spier Falls and Sherman Island boat launch areas.

Comment: ADK indicates that our references to proposed island campsites at both developments of the Hudson River Project as potential sources of sedimentation is only partially true, since shoreline campsites are proposed at the Spier Falls development.

Response: We modified the text of section V.B.1.b (3) to reflect the proposed shoreline campsites at the Spier Falls development.

Comment: ADK indicates that our statement in section V.B.5.a (3) that there is no information on angling use at the Spier Falls impoundment is not accurate because International Paper developed this information as part of the relicensing of the Curtis/Palmer Falls Project.

Response: The EA for the relicensing of the Curtis/Palmer Falls Project presents recreational use information for the Curtis/Palmer Falls Project and adjacent recreational facilities but does not include angler use data for the Spier Falls boat launch. We therefore still conclude that there is not angler use data for the Spier Falls impoundment.

Comment: ADK indicates that in section V.B.5.a (3) our statement that there is a boat launch below Feeder Dam on the south side of the river should be changed to indicate that the boat launch is upstream of the Feeder Dam at Nolan Road.

Response: The text in the draft MPEIS was accurate as written. We modified the text to clarify that this boat launch is part of the Sand Bar Beach recreational area that is managed by the town of Moreau. This information is presented in the Glens Falls Project license application (FPC, 1991). We also added the Nolan Road boat launch reference to the final MPEIS, as suggested by ADK, which provides public boat access to the south side of the Feeder Dam impoundment.

Comment: ADK indicates that Finch, Pruyn & Company's (FPC's) preferred canoe portage route would have a take-out point at Murray Street, about 2 miles downstream of Feeder Dam. This portage route would make use of the Feeder Canal to enable canoeists to pass around the Glens Falls dam.

Response: Although not directly stated, ADK's comment implies that if FPC's preferred canoe portage route is implemented, it would not serve as a portage route around Feeder Dam because the take-out point is too far downstream. Our primary purpose for pointing out that the Feeder Canal is also under consideration by FPC and the Commission as a canoe portage route around the Glens Falls dam is to document that, if Overlook Park is taken over by the town of Queensbury after completion and removed from the Feeder Dam project boundary, the Commission could still ensure public access to project waters (the tailwaters of the Feeder Dam Project) because the take-out point in the Glens Falls impoundment would be under Commission jurisdiction. The canoe take-out point could also serve as a car-top launching point for flatwater boaters. We modified the text of section V.B.5.b (4) to clarify that the purpose of the paragraph referred to by ADK is not necessarily relevant to canoe portage around Feeder Dam, but to documenting provisions for the Commission ensuring public access to project waters, as required by the FPA.

Comment: ADK provides additional information that illustrates how providing canoe portages at the four subject projects would provide a cumulative enhancement to existing canoe touring opportunities from the Adirondack Mountains to the tidal portions of the Hudson River.

Response: We incorporated the information provided by ADK into section V.B.5.c of the MPEIS, Cumulative Effects on Canoe Touring.

Cultural Resources

Comment: Interior, in its July 13, 2001, letter to the Commission, strongly objects to our treatment of cultural resources in the draft MPEIS because our analysis was not conducted in consultation with the St. Regis Mohawk Tribe. Interior states that the St. Regis Mohawk Tribe has identified the project areas as within the Mohawk aboriginal territory and as areas in which they attach religious and cultural significance. Interior also points out that

the Tribe was not consulted during the development of the PA, executed in 1996, or the Settlement. Consequently, Interior recommends that the St. Regis Mohawk Tribe should be consulted by Erie in the development of the CRMPs, in the development of the APEs, and in evaluating any potential effects of proposed recreational measures on the Tribe's archaeological and cultural resources. Interior further requests that its Bureau of Indian Affairs participate in these consultations. EPA concurs that Erie should consult with the Native American community in the development of the CRMPs for each project.

Response: Despite numerous opportunities to provide comment on these proceeding, the St. Regis Mohawk Tribe, or any other tribe, have not provided comments on the proposed relicensing of the four projects that are the subject of this MPEIS. Commission staff met with representatives of the St. Regis Mohawk Tribe, Erie, Interior, Bureau of Indian Affairs, the Advisory Council, NYSDEC, and others, on July 30 and 31, 2001, at the St. Regis Mohawk Tribe's reservation in Hogansburg, New York, in an effort to resolve cultural issues pertaining to Erie's Raquette River projects, as well as other projects included in the 1996 multi-project PA. The four projects included in this MPEIS are also included in the 1996 PA, and therefore the outcome of that meeting is relevant to this proceeding.

On September 10, 2001, the Commission staff issued a letter to the July 30 and 31 meeting participants spelling out our conclusions regarding compliance with Section 106 of the National Historic Preservation Act. Staff concludes that:

> As written, the existing PA contains sufficient procedural safeguards to protect Historic Properties, including those that are of religious and cultural significance to the Mohawk...Finally, the Cultural Resources Management Plans that the PA requires will address the identification, evaluation, and protection of historic properties in the project's area of potential effects. See stipulation I.C.1, of the 1996 PA. For these reasons, we find no need to amend ... the existing Programmatic Agreement...

The 1996 PA calls for the licensee to consult with the SHPO and interested persons in the development of the CRMPs for all projects covered by the PA. Because Interior has identified the St. Regis Mohawk Tribe and the Bureau as having specified interests regarding the four projects that are subject to this MPEIS, Erie (and, as applicable, the District) should include the St. Regis Mohawk Tribe and the Bureau in any consultations leading to the development of the CRMPs.

Developmental Resources

Comment: AHDC indicates that the installed capacity for the Hudson Falls Project listed in table 1 of the MPEIS should be 44.0 MW.

Response: We revised table 1 to reflect AHDC's comment.

Comment: AHDC requests that we add the Northumberland and Waterford hydroelectric projects to table 1. Both of these projects are licensed but undeveloped.

Response: Table 1 is a listing of existing projects along the mainstems of the Hudson and Sacandaga rivers. Although the two projects cited by AHDC are licensed, they do not yet exist. We therefore modified table 1 to include these two projects in a footnote.

Comment: ADK indicates that most people consider there to be only one powerhouse at the Spier Falls development.

Response: We modified the text of section III.C.1.a to indicate that the two powerhouses are conjoined.

Comment: Erie indicates that we should have used an installed capacity of 51 MW for the Spier Falls development and 30.0 MW for the Sherman Island development, consistent with the Settlement. ADK suggests that the ratings that we use for the Spier Falls development (unit 8 capacity: 6.8 MW; unit 9 capacity: 37.6 MW; and total capacity: 44.4 MW) are too low and not consistent with the Settlement.

Response: The ratings presented in the Settlement represent the maximum capability of the turbines under ideal operating conditions. The Commission uses the installed (nameplate) capacity to characterize the output of hydroelectric projects. We added the phrase "installed capacity" to section III, where appropriate, to clarify our turbine characterizations.

Comment: Erie indicates that the only values for annual average generation for the individual projects were presented on pages A-13, A-20, A-24, and A-27 of the Settlement. Erie cannot determine how we obtained our estimates of annual generation that we presented in footnote "b" of tables 27 through 31 of the draft MPEIS, claiming that such estimates may have been discussed during confidential settlement negotiations but are not on the public record for this proceeding. ADK indicates that the average annual production for the Sherman Island development, that we list as 184,400 MWh, should be 144,452 MWh, according to the license application and the Settlement.

Response: We indicated in footnote "a" of tables 27 through 31 of the draft MPEIS that Erie had provided the average annual generation values in the license applications and we specify the time frames used to develop these averages. These average annual generation values are consistent with those presented on pages A-13, A-20, A-24, and A-27 of the Settlement. However, Appendix D of the Settlement presents annual generation for the "status quo" projects and for the projects after implementation of the terms of the Settlement. These values were based on a computer simulation using 74 years of hydrological data. Because the time periods used for the energy estimates from the computer simulation do not correlate with the same time periods for the average annual generation values provided in the license applications, they cannot be compared.

In order to compare the incremental effects on annual generation at each development from various operational and environmental measures included in the Settlement, we requested a detailed breakdown of energy effects in our July 26, 2000, letter to Erie. Erie responded by letter dated August 24, 2000, saying that it was impossible to accurately separate the effects of each individual measure without a substantial effort and numerous additional computer runs; however, rough estimates of these effects were provided. Erie indicated that the summation of the estimates would not produce the summary values provided in the Settlement. In its August 24, 2000, reply, Erie also provided a summary breakdown of the energy for each development under each of the operating scenarios of the energy simulation used to support the Settlement. We used those values to compare the incremental difference between the status quo energy estimates and those energy estimates resulting from implementation of the terms of the Settlement. We did not try to estimate the incremental effects of each individual measure, instead we used only the summary value for each development, as provided by Erie.

We point out that our July 26, 2000, information request and Erie's August 24, 2000, response to our request are both on the public record for this proceeding and can be reviewed via RIMS. Commission staff that prepared the MPEIS have not had access to any confidential information that may have been developed during the settlement negotiations.

Comment: ADK indicates that there is uncertainty regarding the status of the proposed unit upgrades at Spier Falls and Sherman Island because these upgrades are not listed in the Settlement.

Response: The indicated upgrades are part of the license application for the Hudson River Project. There is nothing on the record for this proceeding that indicates that Erie has withdrawn its proposed unit upgrades. Consequently, the order issuing any license for this project would take into account the proposed unit upgrades.

Comment: ADK indicates that our reference to the New York Power Pool in section VI.A should be replaced with its successor organization, the New York Independent System Operator.

Response: We decided to use the replacement energy and capacity values that Erie provided in its comments on the draft MPEIS, in the final MPEIS. Consequently, we deleted the reference to the NYPP from section VI.A of the final MPEIS.

Comment: Erie objects to the Commission's policy of using zero escalation in its economic evaluation. ADK suggests that, because of the staggered introduction dates for some of the operating criteria and features in the Settlement, it is relevant to say what year was assumed in the financial calculations used to derive the dollar values presented in section VI.D of the MPEIS.

Response: As we stated in section VI.A of the draft MPEIS, the Commission's analysis uses current costs to compare the costs of the projects and likely alternative power, with no forecasts concerning potential future inflation, escalation, or deflation beyond the license issuance date. Although issued in the year 2001, most of the draft MPEIS was prepared in the year 2000, with all of the proposed and recommended costs escalated to the end of 1999, thus setting 1999 as the "current" year. In response to Erie's comment, we escalated costs in the final MPEIS to 2001, thus resetting the "current" year to be more reflective of existing conditions. Although the various measures proposed for the projects have staggered implementation dates, our analysis includes the costs as current year costs.

Comment: Erie provides alternative energy costs to those that we presented in table 17 of the draft MPEIS and suggests that these more recent costs should be used in our developmental analysis because they better reflect current conditions in the energy market in New York.

Response: We have modified the energy values in table 17, and the remainder of our developmental analysis in section VI of the final MPEIS to reflect the values provided by Erie.

Comment: Erie comments that we did not include the values that we used to estimate relicensing costs in our economic assumptions (table 17 of the draft MPEIS). Erie points out that in footnote "h" of this table, we state that we assumed that relicensing costs were included in the net investment costs specified in Exhibit D of the license applications for the four projects. Erie states that there are no relicensing costs included in Exhibit D, and provides its relicensing costs through December 2000 for each of the four projects.

Response: We realize that applicants are not required to include relicensing costs in Exhibit D, but the net investment cost for each project should have included the relicensing costs that were incurred at each project up until shortly before the license applications were submitted. We have no way of estimating Erie's relicensing costs after the license applications were filed with the Commission unless this information is provided by the applicant. Now that Erie has provided this information, we included the relicensing costs in our list of assumptions as a component of the net investment for each project.

Comment: Erie comments that although we included our estimated local tax rate of 3 percent as one of our assumptions in table 17 of the draft MPEIS, we did not include a separate listing of the local property taxes that we assumed for each development. Erie provided the most recent available information on local taxes for each development (year 2000-2001).

Response: The local tax rate of 3 percent pertains only to proposed new development at each hydroelectric project. We expect the local taxes associated with existing facilities to be included in the O&M costs for each development and included in Exhibit D of the license applications for the four projects included in this MPEIS. Erie's comment suggests to us that taxes on existing facilities are not included in its operating costs. We have no way of quantifying Erie's actual property tax for each development unless it is provided by the applicant. Now that Erie has provided this information, we included the local property tax costs at each development in our O&M costs listed in table 17 of the final MPEIS.

Comment: Erie provides alternative costs to those that we presented in tables 24, 25, and 26 of the draft MPEIS.

Response: Erie's estimated costs for Karner blue butterfly surveys ($1,700 per development) are very similar to ours (between $1,000 and $2,000 per development). Although not stated by Erie, we assume that Erie's estimated costs are in 1999 dollars to be comparable to ours. We consider Erie's proposed costs for our recommended surveys to be reasonable and incorporated them into tables 25 and 26 of the final MPEIS.

Erie provides an estimated cost of $3,600 per maintenance drawdown event to cover the cost of an operator and fisheries biologist for surveillance. We consider any need for maintenance drawdowns to be extremely infrequent. Our recommended consultation would not necessarily require Erie to expend any additional costs to implement protective measures. We do not specify in our draft MPEIS that surveillance by a fisheries biologist would be needed for any maintenance drawdowns that should be needed during the course of the new license term. Although there may be a cost associated with certain protective measures associated with scheduled maintenance drawdowns, until the frequency and nature of potential protective measures associated with the drawdowns is known, these

costs cannot be accurately estimated. We continue to not include costs for this measure in the final MPEIS.

Erie provides an estimated cost of $1,500 per site to develop erosion and sedimentation control plans for recreational enhancements for up to 19 sites. Although this may reflect the cost of developing site-specific erosion and sedimentation plans, this recommended measure is consistent with a standard condition in NYSDEC-issued WQCs. Erie, and its predecessor company NMPC, were aware of this standard condition and we expect that costs associated with it would be incorporated into the total costs for the recreational enhancements and other proposed measures that entail ground disturbing activities. Until the final recreational plans for each site are developed, as well as plans for other measures that may entail ground disturbing activities, the number of sites requiring erosion and sedimentation control measures cannot be accurately assessed. We therefore do not include additional costs for developing site-specific erosion and sedimentation control plans in the final MPEIS.

Erie indicates that the cost of developing the flow monitoring plan at the Stewarts Bridge Project would be higher than at the other three projects ($4,850 versus $3,000). The Settlement calls for the implementation of base flows from the Stewarts Bridge Project beginning in the year 2013, as well as development of a means to verify the flows that are released. This would result in additional costs in developing the flow monitoring plan for the Stewarts Bridge Project, and we agree that Erie's cost estimate is justified. We modified table 19 of the final MPEIS accordingly.

Erie indicates that the estimated cost to prepare a flow analysis after 5 years of operating under the new flow regime at the Feeder Dam Project is more likely to be $25,000, rather than the $10,000 that we presented in table 26 of the draft MPEIS. Our intention with this recommendation is to provide an opportunity to evaluate hourly flow information from the Feeder Dam Project before and after the implementation of the new flow regime to verify that re-regulation of Hudson River flows continues to occur in an acceptable manner under the conditions of the new license. We expect that this should be able to be accomplished by using data generated under the flow monitoring plan specified in the Settlement coupled with existing flow data (or generation data that could be equated to flow on an hourly basis). However based on Erie's comment that the NYSDEC does not think our recommended flow evaluation is needed, and AHDC's comment that a much more extensive plan than we envision should be required, we now consider it appropriate that a flow evaluation plan be developed prior to beginning data acquisition. Consultation during the development of the plan could lead to a more costly study than we originally anticipated, and we are willing to accept Erie's estimate of $25,000 for conducting this evaluation. In addition, since we now recommend the development of a plan prior to the

flow evaluation, we added an additional $5,000 to the cost of this measure to cover plan development. We modified table 26 of the final MPEIS accordingly.

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