72 FERC ¶62,204

UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Before Commissioners:

Northern States Power Company — Project No. 2417-001
Wisconsin

ORDER ISSUING SUBSEQUENT LICENSE
(Minor Project)

SEP - 1 1995

INTRODUCTION

On December 23, 1991, Northern States Power Company (Northern States) filed a subsequent license application 1/ under Part I of the Federal Power Act (FPA) 2/ to continue to operate and maintain the existing 168 kilowatt (kW) Hayward Hydroelectric Project located on the Namekagon River, in the City of ~~Hayward, Sawyer County~~, Wisconsin. The Namekagon River is a navigable waterway of the United States. 3/ The current license for this project expired on December 31, 1993. 4/

BACKGROUND

Notice of the application has been published. A motion to intervene in this proceeding was filed by the Wisconsin Department of Natural Resources (WDNR) to be a party to the proceeding. The U.S. Department of the Interior (Interior), although not requesting intervenor status, has filed comment. Issues raised in the intervention and comments received from interested agencies and individuals have been fully considered in determining whether to issue this license.

The Federal Energy Regulatory Commission (Commission) issued the Hayward Hydroelectric Project Draft Environmental Assessment (DEA) for comment on June 16, 1994. The Final Environmental Assessment (FEA) for this project is being issued at this time

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1/ A subsequent license is issued for a minor project whenever sections 14 and 15 of the FPA were waived in the project's original license. Northern States did not request that section 14 and 15 not be waived.

2/ 16 U.S.C. § 797(f).

3/ See 67 FERC 61,282

4/ 38 FPC 476 (1967)

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and is attached to and made part of the license. The FEA addresses the comments received on the DEA. We also prepared a Safety and Design Assessment (SDA) which is available in the Commission's public file for this project.

PROJECT DESCRIPTION

The existing and operating Hayward Project consists of a dam, an impoundment, an intake channel, a powerhouse containing one generating unit having an installed capacity of 168 kW, and appurtenant facilities. The average annual generation would be 1,448,000 kilowatt-hours (kWh).

APPLICANT'S PLANS AND CAPABILITIES

I evaluated Northern States' record as a licensee for these areas: (1) conservation efforts, and (2) compliance history and potential for complying with the subsequent license. I accept the staff's findings in each of these areas.

Here are the findings:

1. Section 10(a)(2)(C): Conservation Efforts

In response to our request for information describing its on-going and proposed programs designed to improve the consumption efficiency of electricity and to reduce the demand peaks, Northern States has submitted a comprehensive and detailed report which covers not only programs designed to improve the consumption efficiency and to reduce peak demands of metered customers but which also covers Northern States' effort to improve the efficiency of electricity generation and internal consumption.

I have reviewed the report and conclude that Northern States has made a good faith and a satisfactory effort to establish and maintain efficiency improvement and load management programs which comply with and support the objectives of the Electric Consumers Protection Act of 1986.

2. Compliance History and Potential for Complying with the Subsequent License

I have reviewed Northern States' compliance with the terms and conditions of the existing license. I find that Northern States' overall record of making timely filings and compliance with its license is satisfactory.

WATER QUALITY CERTIFICATION

The WDNR, by letter dated November 11, 1991, granted Section 401 water quality certification for the Hayward Project, pursuant

to the Clean Water Act. The water quality certificate for the project would require Northern States to consult with the WDNR in developing the project design and secure all necessary approvals prior to beginning the proposed shoreline restoration project.

This condition requires measures that would help to maintain water quality in the Namekagon River. Article 406 includes this condition, and requires the licensee to implement, in consultation with WDNR and the National Park Service (NPS), the measures described in its "Remediation Plan to Stabilize and Restore the Namekagon River Channel and Shoreline Downstream from the Hayward Dam Spillway," filed with the Commission on September 8, 1992, including any subsequent modifications.

COASTAL ZONE MANAGEMENT PROGRAM

The Wisconsin Department of Administration's Coastal Management Program (WCMP) is responsible for reviewing hydroelectric projects for consistency. However, the Hayward Project is not located in the coastal zone boundary designated by the WCMP (letter from Gary T. Shultz, Wisconsin Coastal Management Program, Department of Administration, Madison, Wisconsin, August 19, 1992). Therefore, no coastal zone consistency certification is needed for the Hayward Project.

SECTION 18 FISHWAY PRESCRIPTIONS

Interior requested reservation of authority to prescribe the construction, operation, and maintenance of fishways for the Hayward Project pursuant to Section 18 of the FPA (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., September 23, 1993).

Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways.5/ Although fish passage facilities may not be recommended by Interior at the time of project licensing, such as for the Hayward Project, the Commission should include a license article which reserves Interior's prescription authority.6/ We recognize that future fishway needs and management objectives can't always be predicted at the time of license issuance. Under these circumstances, and

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5/ Section 18 of the Federal Power Act provides: "The Commission shall require construction, maintenance, and operation by a licensee at its own expense ... such fishways as may be prescribed by the Secretary of Commerce or the Secretary of Interior as appropriate."

6/ Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

upon receiving a specific request from Interior, the Commission should reserve Interior's authority to prescribe fishways.

SECTION 4(E)

Interior provided final conditions for the Hayward Project (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., September 23, 1993). Interior's NPS purported to recommend nine conditions pursuant to Section 4(e) of the FPA and the Commission's Order No. 533 issued May 8, 1991.

In response to a letter from the Commission, dated December 15, 1993, Interior provided their basis for asserting authority to prescribe Section 4(e) conditions. Based on Section 10(c) of the Wild and Scenic Rivers Act, Interior maintains that it may utilize such general statutory authorities relating to areas of the National Park System for recreation and preservation purposes and for the conservation and management of natural resources, as deemed appropriate to carry out the purposes of the Wild and Scenic Rivers Act (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., March 4, 1994).

Section 4(e) applies to reservations, and under Section 3(2) of the FPA reservations are defined in part as land or interests in lands "owned by the United States." Although the Namekagon River is within the National Wild and Scenic Rivers System, administered by the NPS, the Hayward Project does not occupy any federal lands. Nor are there federal easements in the Hayward Project area. Therefore, we don't believe that Interior has 4(e) authority with respect to the Hayward Project.

We considered the NPS's purported 4(e) conditions under Section 10(a) of the FPA, and we made recommendations consistent with eight of the nine conditions. We don't recommend that Northern States conduct additional biological surveys (see condition no. 8 below) because the project area's existing biological resources are adequately protected with our recommended project operation measures. The NPS's conditions/recommendations are discussed in the environmental analysis section of the FEA, section V.C.

In summary, the NPS's recommended conditions under Section 4(e) of the FPA include:

(1) Operate the project in an instantaneous run-of-river mode for the protection and enhancement of recreation, fish, and wildlife resources of the Saint Croix National Scenic Riverway;

(2) Stabilize the canoe portage trail to reduce existing erosion by planting native vegetation and using other erosion control techniques as needed, while designing the access to meet the needs of the disabled;

(3) Stabilize the unimproved road associated with the canoe portage by erecting a gate to restrict vehicular traffic and reestablishing the area with native vegetation;

(4) Coordinate the drawdown management plan with the WDNR and the NPS Saint Croix National Scenic Riverway office;

(5) Send a sample of each source of ash to be used in the "cindering" process to the WDNR for annual analysis and submit the results to the WDNR for review;

(6) Cooperate with the resource agencies in implementing a plan to control the spread of purple loosestrife (Lythrum salicaria) when deemed appropriate by the agencies;

(7) Closely coordinate with the NPS Saint Croix National Scenic Riverway office any plan to stock Lake Sturgeon in the Namekagon River;

(8) Conduct a survey of the flowage to identify dragonfly, turtles, and salamanders and the potential impacts of the existing mode of operation on each species. The survey should also include potential impacts from project operations on bald eagles and a list of plant and animal species found around the flowage; and

(9) Invite the WDNR, the NPS, the FWS, and local agencies responsible for recreational facility planning to meet every five years in order to review and address existing recreation and land management issues.

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations provided by the federal and state fish and wildlife agencies for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources affected by the project. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations, some of which are inconsistent with those of the agencies.

Section 10(j) of the FPA states that whenever the Commission believes any fish and wildlife agency recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law, the Commission and the agencies shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agencies. Both the FWS and WDNR recommended license conditions pursuant to Section 10(j) of the FPA (*Table 8 of the FEA lists these recommended conditions*).

We determine that some of the federal and state fish and wildlife agencies' recommendations conflicted with the comprehensive planning and public interest standards of Sections 4(e) and 10(a) of the FPA. Specifically, we do not recommend requiring Northern States to implement the following three measures regarding Northern States' operational compliance plan: (1) installing additional continuously recording headpond and tailwater devices; (2) installing U.S. Geological Survey-type gaging stations, if needed in the future; (3) developing a flow rating curve (including calibration every two years). We found that requiring these measures would cost Northern States nearly $20,000 annually, further reducing the project's negative economic benefits. We concluded that the excessive costs of implementing these recommendations would significantly impact the project's economics and that the costs are more than the value of their potential benefits.

Moreover, we determine that the following agency recommendations are inappropriate fish and wildlife recommendations: (1) the FWS's and WDNR's recommendations concerning a re-opener clause to recommend additional facilities or modifications to project structures and operation; (2) WDNR's recommendation regarding the consistency of project operation with federal and state comprehensive plans; (3) WDNR's recommendation pertaining to recreation access; (4) WDNR's recommendation to comply with applicable state laws and permits; and (5) the FWS's project retirement fund recommendation. Under Section 10(j) of the FPA, these recommendations do not provide measures for the protection, mitigation of damages to, and enhancement of fish and wildlife resources.

Recommendations that we considered outside of the scope of 10(j) were considered under Section 10(a) of the FPA. With two exceptions, these recommendations are addressed in the specific resource sections of the FEA (*see section V.C of the FEA*). We have not addressed WDNR's recommendations which require compliance with Wisconsin State statutes and codes. The applicability of state law requirements to licensed projects is beyond the scope of this License order.

We also have not addressed the FWS's project retirement fund recommendation. The FWS recommended, under Section 10(j) of the

FPA, that the licensee establish a retirement fund for the Hayward Project. Specifically, the FWS recommends that within 1 year, and in consultation with the resource agencies, the licensee should estimate the costs of: (a) permanent non-power operation; (b) partial project removal; or (c) complete project removal at the Hayward Project. They further recommend that the licensee submit to the Commission, for approval, the cost estimates and a schedule for making payments to a trust fund. Within 5 years of license issuance the licensee should begin payments to the trust fund according to the approved schedule, and the State of Wisconsin should be the beneficiary.

The FWS's retirement fund recommendation is not a fish and wildlife recommendation pursuant to Section 10(j) of the FPA, in that it does not provide measures for the protection, mitigation of damages to, and enhancement of fish and wildlife resources. Furthermore, the statements made by the FWS in support of its recommendation provide no evidence that a trust fund is needed, and we conclude that it is an inappropriate recommendation. In our policy statement on Project Decommissioning at Relicensing, we stated that:

> The Commission will not generically impose decommissioning funding requirements on licensees. However, in certain situations, where supported by the record, the Commission may impose license conditions to assure that funds are available to do the job when the time for decommissioning arrives.....Further, even in situations in which the Commission does not impose a funding requirement at the time a project is relicensed, the licensee will ultimately be responsible for meeting a reasonable level of decommissioning costs if and when the project is decommissioned.7/

The federal and state recommendations subject to Section 10(j) and 10(a), and whether they are adopted under the staff alternative, are detailed in Table 8 of the FEA. We attempted to resolve the inconsistencies between our recommended resource enhancement measures and those of the federal and state agencies during a September 15, 1994, telephone conference.

During the Section 10(j) telephone conference, three 10(j) issues were discussed, including specific provisions of the reservoir drawdown management plan, the seasonal barrier net, and the impoundment fluctuation limit. We reached agreement on the seasonal barrier net and the impoundment fluctuation limit. Discussions in Sections V.C.1.b., V.C.2.c., and V.C.3.d., and in

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7/ III FERC Stats. & Regs., Regs. Preambles, ¶ 31,011 at p. 31,223 (1995).

our responses to comments on the reflect the outcome of discussions during the Section 10(j) telephone conference.

COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed a total of 63 comprehensive plans that address various resources in Wisconsin. Of these, we identified 12 plans relevant to the project.8/ No conflicts were found.

COMPREHENSIVE DEVELOPMENT

Section 4(e) and 10(a)(1) of the FPA, 16 U.S.C § 797(E) and 803(a)(1) , require the Commission, in acting on applications for license, to give equal consideration to the power and development purposes and to purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife, the protection of recreational opportunities, and the preservation of other aspects of environmental quality. Any license issued shall be such as in the Commission's judgment will

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8/ **Federal Plans:** St. Croix National Scenic Riverway final master plan, 1976, National Park Service; Land protection plan, 1984, St. Croix National Scenic Riverway, National Park Service; Land protection plan, 1984, Lower St. Croix National Scenic Riverway, National Park Service; Statement for management, St. Croix and Lower St. Croix National Scenic Riverways, 1986, National Park Service; Comprehensive master plan for the management of the upper Mississippi River system - Environmental report, 1986, National Park Service; North American waterfowl management plan, 1986, U.S. Fish and Wildlife Service and Canadian Wildlife Service; and Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service, Fish and Wildlife Service.

State Plans: St. Croix River Basin areawide water quality management plan, 1980, Wisconsin Department of Natural Resources; Statewide comprehensive outdoor recreation plan, 1991, Wisconsin Department of Natural Resources; Upper St. Croix management policy resolution, 1993, Upper St. Croix Management Commission; Wisconsin water quality assessment report to Congress, 1992, Wisconsin Department of Natural Resources; and An evaluation of the sedimentation process and management alternatives for the Trego flowage, Washburn County, Wisconsin, 1989, Wisconsin Department of Natural Resources.

be best adapted to a comprehensive plan for improving or developing a waterway or waterways for all beneficial public uses. The decision to license this project, and the terms and conditions included herein, reflect such consideration. For the reasons discussed below, we conclude that the Hayward Project does not conflict with any planned or authorized development and is best adapted to a comprehensive development of the waterway for beneficial public uses.

In determining whether a proposed project will be best adapted to a comprehensive plan for developing a waterway for beneficial public purposes, pursuant to Section 10(a)(1) of the FPA, 16 U.S.C § 803(a)(1), the Commission considers a number of public interest factors, including the projected economic benefits of project power. In making these determinations, we considered the project both with the applicant's enhancement proposals and with the Commission's enhancement proposals.

Under the Commission's new approach to evaluating the economics of a project, as recently articulated in Mead Corporation, Publishing Paper Division, 9/ a proposed project is economically beneficial so long as its projected cost is less than the current cost of alternative energy to any utility in the region that can be served by the project. To determine whether the project proposed is economically beneficial, we compared the cost of energy from the power in the East North Central region, with is 30.1 mills per kWh. Based on current economic conditions without future escalation of inflation, the proposed project, if licensed as Northern States proposes, would cost 63.1 mills per kWh. If licensed with the Commission's proposed enhancements, the cost would be 64.5 mills per kWh per kW-year. We estimate the cost of alternative capacity to be $109.33 per kW-year.

As we explained in Mead, supra, our economic analysis in perforce inexact, and project economic is, moreover, only one of the many public interest factors we consider in determining whether or not, and under what conditions, to issued a license. Based on our independent review and evaluation, we believe that the proposed project with the additional enhancements adopted will be best adapted to a comprehensive plan for developing the waterway, because it will provide needed energy while protecting the environment.

The project with the following adopted enhancement will protect of the environment:

- analyze annually the fly ash/cinders used to minimize leakage at the spillway;

9/ 72 FERC ¶ 61,027 (1995)

- operate the project in a run-of-river mode;
- maintain the impoundment at a target elevation of 1,187.4 feet, with an allowable fluctuation limit between 1,187.0 feet and 1,187.5 feet under normal flow conditions;
- develop and implement a plan to monitor the run-of-river mode of operation and minimum flow requirement;
- maintain the existing headwater and tailwater staff gages and renovate the existing headwater chart recorder, which would continuously monitor impoundment levels;
- develop a plan to ensure downstream flows during power outages;
- provide a continuous minimum flow of 8 cubic feet per second, or inflow, whichever is less, to the bypassed reach;
- implement a fish protection plan to include a barrier net designed to protect fish from turbine entrainment;
- finalize and implement Northern States' Remediation Plan to restore the stream habitat in the bypassed reach and improve the canoe portage;
- maintain the existing trashracks, which have 1.5-inch clear bar spacing, to minimize resident fish entrainment and impingement;
- maintain the project lands as fish and wildlife habitat with public access where permitted;
- develop and implement a plan to monitor purple loosestrife and cooperate with the WDNR to control purple loosestrife;
- develop and implement a drawdown management plan for the project impoundment, including appropriate ramping rates;
- preserve all suitable trees (e.g., all large white and red pines) on project lands as potential bald eagle nesting and perching trees;
- implement the provisions contained in the Wisconsin Statewide Programmatic Agreement to protect cultural resources; and
- monitor the adequacy of the recreation facilities over the license term.

Based on our review of the agency and public comments filed on this project, our review of staff's evaluation of the

environmental and economic effects of the proposed project and its alternatives, and our analysis pursuant to section 10(a)(1), I find that the Hayward Project, with the adopted enhancement measures, will be best adapted to the comprehensive development of the Namekagon River.

LICENSE TERM

Commission policy establishes thirty-year terms for projects proposing no new construction or capacity, forty-year terms for projects proposing a moderate amount of new development, and fifty-year terms for projects proposing a substantial amount of new development. 10/ Northern States proposes no redevelopment of existing project facilities and no changes in project operation. Accordingly, under our policy the new license for the Hayward Project would be for a term of thirty years.

However, about thirty miles downstream from the Hayward Project is Northern States's Trego Project No. 2711. The original license for the Trego Project expired on March 31, 1993, and the original license for the Hayward Project expired on December 31, 1993. Northern States has filed subsequent license applications for both Projects. In order to facilitate the Commission's future coordinated treatment of these two projects under the comprehensive development standard of the FPA, I will give the Hayward Project an expiration date of December 31, 2025 the same expiration date as the Trego Project. 11/

SUMMARY OF FINDINGS

Background information, analysis of impacts, support for related license articles, and the basis for a finding of no significant impact on the environment are contained in the attached FEA. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The project will be safe if constructed, operated, and maintained in accordance with the requirements of this license. Analysis of related issues is provided in the SDA prepared for the Hayward Project and available in the Commission's public files.

I conclude that the Hayward Project does not conflict with any planned or authorized development, and is best adapted to a plan for the comprehensive development of the Namekagon River for beneficial public uses.

10/ See Montana Power Company, 56 FPC 2008, 2011-13 (1976)

11/ 67 FERC at page 61966

The Director orders:

(A) This license is issued to the Northern States Power Company, effective the first day of the month in which this license is issued and to expire on December 31, 2025, to operate and maintain the Hayward Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and to the regulations the Commission issues under the provisions of the FPA.

(B) The project consists of:

(1) All lands, to the extent of the licensee's interests in those lands, as shown on exhibit G, FERC Drawing Number 2717-1003

(2) Project works consisting of:

(a) a dam with an overall length of 424 feet and a maximum height of about 18 feet, which is comprised of (i) a right earth embankment section which extends approximately 200 feet from the right bank to the concrete intake channel for the powerhouse; (ii) a middle earth embankment section which extends approximately 80 feet from the concrete intake channel for the powerhouse to the concrete spillway section; (iii) a concrete overflow spillway section approximately 120 feet long founded on rock-filled timber cribbing and which contains 10 stop-log bays separated by concrete piers; and (iv) a left earth embankment section protected by a concrete retaining/training wall;

(b) an existing reservoir with a surface area of about 247 acres and a gross capacity of less than 2,000 acre-feet at a normal water surface elevation of 1,187.4 feet mean sea level;

(c) an existing concrete intake channel about 42 feet long and varying in width from 8 feet to 13 feet, located between the right and middle embankment sections;

(d) an existing concrete and brick powerhouse, about 18 feet wide by 24 feet long, equipped with one vertical turbine with a hydraulic capacity of 178 cubic feet per second at a head of 17 feet, directly connected to a single generator rated at 168 kilowatts; and

(e) appurtenant equipment and facilities.

The project works described above are more specifically shown and described by those portions of exhibit A and F shown below:

Exhibit A - The following sections of exhibit A filed December 23, 1991: Section 1.1, page 8, describing the generator; Section 2.0, page 8, describing the turbine; and the additional mechanical and electrical equipment described elsewhere on pages 8 through 14 of the exhibit A.

Exhibit F - The following exhibit F drawings filed December 23, 1991, with revisions filed on September 23, 1992:

Exhibit	FERC No.	Showing
F-1	2417-1001	Plan, elevation, and section views of principal project works
F-2	2417-1002	Plan view of powerhouse floor

(3) All of the structures, fixtures, equipment, or facilities used to operate or maintain the project, all portable property that may be employed in connection with the project, and all riparian or other rights that are necessary or appropriate in the operation or maintenance of the project.

(C) Exhibits A, F and G described above are approved and made part of the license.

(D) The following sections of the FPA are waived and excluded from the license for this minor project:

Section 4(b), except the second sentence thereof; 4(e) insofar as it relates to approval of plans by the Chief of Engineers and the Secretary of the Army and to public notice; 6, insofar as it relates to public notice and to the acceptance and expression in the license of terms and conditions of the FPA which are hereinafter waived; 10(c), insofar as it relates to depreciation reserves; 10(d); 10(f); 14, except insofar as the power of condemnation is reserved; 15; 16; 19; 20; and 22.

(E) This license is subject to the articles set forth in Form L-9, (October 1975), entitled "Terms and Conditions of License for Constructed Minor Project Affecting Navigable Waters of the United States," and the following additional articles:

Article 201. The licensee shall pay the United States an annual charge, effective the first day of the month in which this license is issued, for the purpose of reimbursing the United States for the cost of administration of Part I of the FPA, as determined by the Commission. The authorized installed capacity for that purpose is 224 horsepower.

Article 202. Within 45 days of the date of issuance of the license, the licensee shall file an original set and two duplicate sets of aperture cards of the approved exhibit drawings. The set of originals shall be reproduced on silver or gelatin 35mm microfilm. The duplicate sets shall be copies of the originals made on diazo-type microfilm. All microfilm shall be mounted on type D (3-1/4' X 7-3/8") aperture cards.

Prior to microfilming, the FERC Drawing Number (2417-001 through 2417-003) shall be shown in the margin below the title block of the approved drawing. After mounting, the FERC Drawing Number shall be typed on the upper right corner of each aperture card. Additionally, the Project Number, FERC Exhibit (e.g., F-1, G-1, etc.), Drawing Title, and date of this license shall be typed on the upper left corner of each aperture card.

The original and one duplicate set of aperture cards shall be filed with the Secretary of the Commission, ATTN: DPCA/ERB. The remaining duplicate set of aperture cards shall be filed with the Commission's Chicago Regional Office.

Article 203. The licensee shall clear and keep clear to an adequate width all lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which result from maintenance, operation, or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of lands and disposal of unnecessary material shall be done with due diligence to the satisfaction of the authorized representative of the Commission and in accordance with appropriate federal, state, and local statutes and regulations.

Article 301. Within 90 days of completion of construction of the facilities authorized by this license, the licensee shall file for approval, revised Exhibits F and G, to show those project facilities as-built.

Article 401. At least 180 days from the date of issuance of this license, the licensee shall file with the Commission, for approval, a plan to monitor the fly ash/cinders used during the "cindering" process for sealing the stop-logs after replacement.

The purpose of this plan is to ensure that the fly ash/cinders used during the "cindering" process do not introduce significant levels of contaminants to the Namekagon River. The plan shall include provisions for: (1) identifying the trace metals and other elements to be analyzed; (2) analyzing the fly ash/cinders prior to use each year; (3) submitting the results of the analysis to the Wisconsin Department of Natural Resources (WDNR); and (4) the preparation of any reasonable enhancement measures developed in consultation with the WDNR and the National

Park Service (NPS) to minimize, to the extent possible, the levels of trace metals and other elements introduced to the Namekagon River, and developing a schedule for implementing any, or all, of the enhancement measures identified in the plan.

The licensee shall prepare the plan after consultation with the WDNR and the NPS. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 402. The licensee shall operate the project in a run-of-river mode for the protection of water quality, aquatic habitat, and other aquatic resource values in the Namekagon River. The licensee shall at all times act to minimize the fluctuation of the impoundment surface elevation by maintaining a discharge from the project so that, at any point in time, flows, as measured immediately downstream from the project tailrace, approximate the sum of inflows to the project impoundment. Under normal operating conditions, the licensee shall maintain the elevation of the Hayward Project impoundment at a target elevation of 1,187.4 feet National Geodetic Vertical Datum, with a fluctuation around the target elevation such that the impoundment is maintained between 1,187.5 feet and 1,187.0 feet. The licensee shall not operate the Hayward Project between the low end and high end of this operating range on a daily basis for peaking purposes.

Run-of-river operation may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon mutual agreement between the licensee, the Wisconsin Department of Natural Resources, the U.S. Fish and Wildlife Service, and the National Park Service. If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 403. At least 180 days from the date of issuance of this license, the licensee shall file with the Commission, for approval, a plan to monitor compliance with the run-of-river mode of operation and any flow requirements as required by Articles 402, 404, and 405.

The monitoring plan shall include provisions for maintaining the existing headwater and tailwater staff gages, modifying the existing headwater staff gage for public visibility, renovating the existing continuous recording headwater gage, and/or using other appropriate monitoring/control features, to determine instantaneous headpond and tailwater elevations, and flows over the dam, through the bypassed reach, and in the Namekagon River downstream of the project dam.

The plan shall include, but not be limited to, the proposed location, design, and calibration of the monitoring equipment, the method of flow data collection, and a provision for providing flow data to the Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (FWS), the National Park Service (NPS), and the U.S. Geological Survey (USGS) within 30 days from the date of the agency's request for the data.

The monitoring plan shall also include a schedule for:

(1) implementation of the program;

(2) consultation with the appropriate Federal and state agencies concerning the data from the monitoring; and

(3) filing the data, agency comments, and licensee's response to agency comments with the Commission.

The licensee shall prepare the plan after consultation with the WDNR, the FWS, the NPS, and the USGS. The licensee shall include with the plan documentation of consultation, copies of comments or recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agency comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 404. At least 180 days from the date of issuance of this license, the licensee shall file with the Commission, for approval, a plan to minimize extended periods without flow releases downstream from the project.

The purpose of this plan is to ensure that, during periods when the project is shutdown and the impoundment elevation is below the crest of the stop-logs, extended periods without flow releases below the project are minimized. The plan shall include

provisions for (1) the preparation of any reasonable enhancement measures developed in consultation with the Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS) to minimize, to the extent possible, extended periods without flow releases downstream of the project; (2) monitoring downstream flow releases (as required by Article 403 of this license); and (3) developing a schedule for implementing any, or all, of the enhancement measures identified in the plan.

The licensee shall prepare the plan after consultation with the WDNR, the FWS, and the NPS. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission.

Article 405. The licensee shall release from the Hayward Dam into the bypassed reach of the Namekagon River a continuous minimum flow of 8 cubic feet per second, as measured in the project's bypassed reach, or inflow to the project impoundment, whichever is less, for the protection of fish and wildlife resources and water quality in the bypassed reach of the Namekagon River.

This flow may be temporarily modified if required by operating emergencies beyond the control of the licensee, or for short periods upon agreement between the licensee, the Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). If the flow is so modified, the licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident.

Article 406. The licensee shall implement measures to enhance aquatic habitat in the bypassed reach of the Namekagon River and enhance the canoe portage at the Hayward Project dam, in accordance with the terms and provisions of the "Remediation Plan to Stabilize and Restore the Namekagon River Channel and Shoreline Downstream from the Hayward Dam Spillway," as developed in consultation with the Wisconsin Department of Natural Resources (WDNR), U. S. Fish and Wildlife Service (FWS), and the

National Park Service (NPS), and filed on September 8, 1992, including any subsequent modifications.

At least 180 days from the date of issuance of this license, the licensee shall file with the Commission, for approval, a finalized plan to enhance the aquatic habitat in the bypassed reach and enhance the canoe portage at the Hayward Project dam. The final plan shall include, at a minimum, detailed design drawings for any proposed environmental enhancement measures and a schedule for installing any, or all, of the enhancement measures.

The licensee shall prepare the aforementioned plan after consultation with the WDNR and NPS. The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission. The measures implemented shall be shown on the as-built drawings filed pursuant to Article 301 of this license.

Article 407. The licensee shall implement a fish protection plan to minimize entrainment of fish through the Hayward Project, in accordance with the terms and provisions of the cooperative arrangement between Northern States Power Company (licensee) and the Wisconsin Department of Natural Resources (WDNR), and as described in the licensee's September 27 and October 11, 1994, and WDNR's October 14, 1994, filings with the Commission.

At least 180 days from the date of issuance of this license, the licensee shall file with the Commission, for approval, a finalized plan to protect fish in Hayward Lake from entrainment through the project. The final plan shall include, at a minimum: (1) detailed design drawings of the proposed barrier net and support structure; (2) a description of the responsibilities of the licensee and WDNR regarding funding, annual installation and maintenance of the barrier net, and evaluation of the barrier net's effectiveness; and (3) a schedule for implementing the plan and protection measures.

The licensee shall make all reasonable efforts to consult with the WDNR regarding how the barrier net's effectiveness will be evaluated, including how the net's effectiveness will be

evaluated independent of any other fish management strategy implemented by the WDNR (i.e., stocking larger-size walleye, reservoir drawdowns, etc.). The licensee shall include in the fish protection plan, or shall file with the Commission at such time as the effectiveness study plan is available, the description of how the barrier net will be evaluated.

The licensee shall prepare the fish protection plan after consultation with the WDNR, the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS). The licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after the plan has been prepared and provided to the agencies, and specific descriptions of how the agencies' comments are accommodated by the plan. The licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the licensee does not adopt a recommendation, the filing shall include the licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the licensee shall implement the plan, including any changes required by the Commission. The proposed barrier net and associated support structure shall be shown on the as-built drawings filed pursuant to Article 301 of this license.

The licensee shall obtain the results of the effectiveness study from the WDNR, once completed, and to file the results of the study, including the benefits to be derived from the use of the barrier net, with the Commission. If the results of the study indicate that the barrier net is effective in reducing walleye entrainment, the Commission may direct the licensee to purchase additional replacement nets as become necessary, and continue providing funds to the WDNR for the annual installation and maintenance of the barrier net.

Article 408. Authority is reserved to the Commission to require the licensee to construct, operate, and maintain, or to provide for the construction, operation, and maintenance of such fishways as may be prescribed by the Secretary of the Interior.

Article 409. Within 1 year of the date of this license, the Licensee shall file with the Commission for approval a plan to manage the 23 acres of Licensee-owned project lands for wildlife habitat. The plan shall include provisions for, but not be limited to, the following: (1) maintaining the 23 acres of project lands as wildlife habitat with public access where permitted (i.e., areas that do not present safety hazards or that are not environmentally sensitive); (2) routine consultation with the Wisconsin Department of Natural Resources (WDNR) wildlife managers regarding decisions affecting wildlife management on

these lands; and, (3) consultation with the WDNR, the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS) on additions to or withdrawals from the project boundary of lands having the potential for wildlife management. Further, the plan shall provide for the development of a wildlife management plan for any new lands added to the project boundary.

The Licensee shall prepare the plan after consultation with the WDNR, FWS, and NPS. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies recommendations are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval the Licensee shall implement the plan, including any changes required by the Commission.

Article 410. Within 6 months of the date of this license, the Licensee shall file with the Commission for approval a plan to monitor the distribution and abundance of purple loosestrife (Lythrum salicaria) on the Hayward Project lands and waters, at least annually. The plan shall include, but not be limited to, the following: (1) a description of the monitoring method; (2) a monitoring schedule; and (3) a schedule for providing the monitoring results to the Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (FWS), and the Commission.

The Licensee shall prepare the plan after consultation with the WDNR and the FWS. The Licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' recommendations are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons based on project specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

If at any time during the period of the license the WDNR or the FWS deem it necessary, the Licensee shall cooperate with the

agencies to control or eliminate purple loosestrife at the Hayward project.

Article 411. Within 6 months of the date of this license, the Licensee shall file with the Commission for approval a drawdown management plan for the control of nuisance aquatic weed growth on Hayward Lake. The Licensee shall develop this plan based on the drawdown management plan for Hayward Hydro flowage developed by the Wisconsin Department of Natural Resources (WDNR) in the WDNR letter to the Commission dated October 1, 1993, but modified to include: (1) provisions for implementing management-based drawdowns, where the need for and the depth, timing and duration of such drawdowns are determined cooperatively with the WDNR, the U.S. Fish and Wildlife Service (FWS), and the National Park Service (NPS), and are based on documented fish and wildlife needs at the project; (2) a non-emergency drawdown ramping rate provision stipulating that the licensee would not lower the pond level more than 6 inches per 24 hours, which would occur at a rate of about 1 inch every 4 hours; (3) a cooperative agreement between the Licensee and the WDNR to monitor sediments and sensitive biological resources during drawdowns; (4) a schedule for implementing any planned drawdowns; (5) a strategy to evaluate the effectiveness of the management-based drawdowns; (6) cost estimates for implementing any drawdowns; and (7) comments from the resource agencies on the plan. Further, in lieu of an interim experimental drawdown as proposed in the WDNR's plan, the Licensee's plan should contain provisions for an initial test drawdown for a period of 5.5 months. The results of the initial test drawdown would be used to make modifications on any subsequent managed drawdowns (i.e., the plan shall incorporate provisions for adaptive management).

The Licensee shall prepare the plan after consultation with the WDNR, FWS, and NPS. The Licensee shall include with the plan documentation of consultation and copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' recommendations are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons based on project specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 412. The Licensee shall protect potential perch and nest trees on the 23 acres of project lands for the bald eagle (Haliaeetus leucocephalus), a federally listed threatened species in Wisconsin. To ensure the protection of bald eagle perch and

nest trees, the Licensee shall prohibit the cutting of large trees (diameter breast height [DBH] between 15 and 18 inches or greater) to include, but not limited to, white pines and red pines that presently occur or may grow in the future within 200 feet of the reservoir and river shorelines. Trees less than 15 inches DBH that extend above the over-all tree canopy shall also be considered for preservation. If needed, the Licensee shall consult with the U.S. Fish and Wildlife Service (FWS) and the Wisconsin Department of Natural Resources (WDNR) to obtain clarification on which trees to preserve.

The Licensee may remove felled, and standing disease-damaged or dead trees, which may affect public safety or project-related operation. Prior to removal of standing disease-damaged or dead trees, the Licensee shall consult with the FWS and WDNR.

If, during the term of the license, bald eagles begin perching and/or nesting on project lands, the Licensee shall file a plan with the Commission for monitoring perching and/or nesting activities and providing protective measures. Bald eagle protective measures shall include, but not be limited to, the guidelines in the FWS report entitled "Bald Eagle Management Guidelines". The Licensee shall file its plan with the Commission for approval within 120 days of confirmed bald eagle perching and/or nesting activities. Confirmation of bald eagle perching and/or nesting shall be determined by the FWS and/or WDNR, either independently or after notification by the Licensee.

If a plan is required, the Licensee shall prepare the plan after consultation with the WDNR and the FWS. The Licensee shall include with the plan documentation of consultation, copies of comments and recommendations on the completed plan after it has been prepared and provided to the agencies, and specific descriptions of how the agencies' recommendations are accommodated by the plan. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the plan with the Commission. If the Licensee does not adopt a recommendation, the filing shall include the Licensee's reasons, based on project-specific information.

The Commission reserves the right to require changes to the plan. Upon Commission approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 413. The Licensee shall implement the provisions of the "Programmatic Agreement Among The Federal Energy Regulatory Commission, The Advisory Council On Historic Preservation, The Wisconsin State Historic Preservation Officer, And The Michigan State Historic Preservation Officer For Managing Historic Properties That May Be Affected By New And Amended Licenses Issuing For The Continued Operation Of Existing Hydroelectric Projects In The State Of Wisconsin And Adjacent Portions Of The

State Of Michigan" that was executed on December 30, 1993. In the event that the Programmatic Agreement is terminated, the Licensee shall implement the provisions of its approved Cultural Resources Management Plan. The Commission reserves the authority to require changes to the Cultural Resources Management Plan at any time during the term of the license. If the Programmatic Agreement is terminated prior to Commission approval of the Cultural Resources Management Plan, the Licensee shall obtain Commission approval before engaging in any ground disturbing activities or taking any other action that may affect any historic properties within the Project's area of potential effect.

Article 414. The Licensee, after consultation with the Wisconsin Department of Natural Resources, the National Park Service, the U.S. Fish and Wildlife Service, and the city of Hayward's park and recreation department, shall monitor recreation use of the project area to determine whether existing recreation facilities are meeting recreation needs. Monitoring studies shall begin within 6 years of the issuance date of this license. Monitoring studies, at a minimum, shall include the collection of annual recreation use data.

Every 6 years during the term of the license, the Licensee shall file a report with the Commission on the monitoring results. The report shall include:

(1) annual recreation use figures;

(2) a discussion of the adequacy of the Licensee's recreation facilities at the project site to meet recreation demand;

(3) a description of the methodology used to collect all study data;

(4) if there is a need for additional facilities, a recreation plan proposed by the Licensee to accommodate recreation needs in the project area;

(5) documentation of agency consultation and agency comments of the report after it has been prepared and provided to the agencies; and

(6) specific descriptions of how the agencies' comments are accommodated by the report.

The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations prior to filing the report with the Commission.

Article 415. (a) In accordance with the provisions of this article, the licensee shall have the authority to grant permission for certain types of use and occupancy of project lands and waters and to convey certain interests in project lands and waters for certain types of use and occupancy, without prior Commission approval. The licensee may exercise the authority only if the proposed use and occupancy is consistent with the purposes of protecting and enhancing the scenic, recreational, and other environmental values of the project. For those purposes, the licensee shall also have continuing responsibility to supervise and control the use and occupancies for which it grants permission, and to monitor the use of, and ensure compliance with the covenants of the instrument of conveyance for, any interests that it has conveyed, under this article. If a permitted use and occupancy violates any condition of this article or any other condition imposed by the licensee for protection and enhancement of the project's scenic, recreational, or other environmental values, or if a covenant of a conveyance made under the authority of this article is violated, the licensee shall take any lawful action necessary to correct the violation. For a permitted use or occupancy, that action includes, if necessary, canceling the permission to use and occupy the project lands and waters and requiring the removal of any non-complying structures and facilities.

(b) The type of use and occupancy of project lands and water for which the licensee may grant permission without prior Commission approval are: (1) landscape plantings; (2) non-commercial piers, landings, boat docks, or similar structures and facilities that can accommodate no more than 10 watercraft at a time and where said facility is intended to serve single-family type dwellings; (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline; and (4) food plots and other wildlife enhancement. To the extent feasible and desirable to protect and enhance the project's scenic, recreational, and other environmental values, the licensee shall require multiple use and occupancy of facilities for access to project lands or waters. The licensee shall also ensure, to the satisfaction of the Commission's authorized representative, that the use and occupancies for which it grants permission are maintained in good repair and comply with applicable state and local health and safety requirements. Before granting permission for construction of bulkheads or retaining walls, the licensee shall: (1) inspect the site of the proposed construction, (2) consider whether the planting of vegetation or the use of riprap would be adequate to control erosion at the site, and (3) determine that the proposed construction is needed and would not change the basic contour of the reservoir shoreline. To implement this paragraph (b), the licensee may, among other things, establish a program for issuing permits for the specified types of use and occupancy of project lands and waters, which may be subject to the payment of

a reasonable fee to cover the licensee's costs of administering the permit program. The Commission reserves the right to require the licensee to file a description of its standards, guidelines, and procedures for implementing this paragraph (b) and to require modification of those standards, guidelines, or procedures.

(c) The licensee may convey easements or rights-of-way across, or leases of, project lands for: (1) replacement, expansion, realignment, or maintenance of bridges or roads where all necessary state and federal approvals have been obtained; (2) storm drains and water mains; (3) sewers that do not discharge into project waters; (4) minor access roads; (5) telephone, gas, and electric utility distribution lines; (6) non-project overhead electric transmission lines that do not require erection of support structures within the project boundary; (7) submarine, overhead, or underground major telephone distribution cables or major electric distribution lines (69-kilovolt or less); and (8) water intake or pumping facilities that do not extract more than one million gallons per day from a project reservoir. No later than January 31 of each year, the licensee shall file three copies of a report briefly describing for each conveyance made under this paragraph (c) during the prior calendar year, the type of interest conveyed, the location of the lands subject to the conveyance, and the nature of the use for which the interest was conveyed.

(d) The licensee may convey fee title to, easements or rights-of-way across, or leases of project lands for: (1) construction of new bridges or roads for which all necessary state and federal approvals have been obtained; (2) sewer or effluent lines that discharge into project waters, for which all necessary federal and state water quality certification or permits have been obtained; (3) other pipelines that cross project lands or waters but do not discharge into project waters; (4) non-project overhead electric transmission lines that require erection of support structures within the project boundary, for which all necessary federal and state approvals have been obtained; (5) private or public marinas that can accommodate no more than 10 watercraft at a time and are located at least one-half mile (measured over project waters) from any other private or public marina; (6) recreational development consistent with an approved Exhibit R or approved report on recreational resources of an Exhibit E; and (7) other uses, if: (i) the amount of land conveyed for a particular use is five acres or less; (ii) all of the land conveyed is located at least 75 feet, measured horizontally, from project waters at normal surface elevation; and (iii) no more than 50 total acres of project lands for each project development are conveyed under this clause (d)(7) in any calendar year. At least 60 days before conveying any interest in project lands under this paragraph (d), the licensee must submit a letter to the Director, Office of Hydropower Licensing, stating its intent to convey the interest and briefly describing

the type of interest and location of the lands to be conveyed (a marked exhibit G or K map may be used), the nature of the proposed use, the identity of any federal or state agency official consulted, and any federal or state approvals required for the proposed use. Unless the Director, within 45 days from the filing date, requires the licensee to file an application for prior approval, the licensee may convey the intended interest at the end of that period.

(e) The following additional conditions apply to any intended conveyance under paragraph (c) or (d) of this article:

(1) Before conveying the interest, the licensee shall consult with federal and state fish and wildlife or recreation agencies, as appropriate, and the State Historic Preservation Officer.

(2) Before conveying the interest, the licensee shall determine that the proposed use of the lands to be conveyed is not inconsistent with any approved exhibit R or approved report on recreational resources of an exhibit E; or, if the project does not have an approved exhibit R or approved report on recreational resources, that the lands to be conveyed do not have recreational value.

(3) The instrument of conveyance must include the following covenants running with the land : (i) the use of the lands conveyed shall not endanger health, create a nuisance, or otherwise be incompatible with overall project recreational use; (ii) the grantee shall take all reasonable precautions to insure that the construction, operation, and maintenance of structures or facilities on the conveyed lands will occur in a manner that will protect the scenic, recreational, and environmental values of the project; and (iii) the grantee shall not unduly restrict public access to project waters.

(4) The Commission reserves the right to require the licensee to take reasonable remedial action to correct any violation of the terms and conditions of this article, for the protection and enhancement of the project's scenic, recreational, and other environmental values.

(f) The conveyance of an interest in project lands under this article does not in itself change the project boundaries. The project boundaries may be changed to exclude land conveyed under this article only upon approval of revised exhibit G or K drawings (project boundary maps) reflecting exclusion of that land. Lands conveyed under this article will be excluded from the project only upon a determination that the lands are not necessary for project purposes, such as operation and maintenance, flowage, recreation, public access, protection of environmental resources, and shoreline control, including

shoreline aesthetic values. Absent extraordinary circumstances, proposals to exclude lands conveyed under this article from the project shall be consolidated for consideration when revised exhibit G or K drawings would be filed for approval for other purposes.

(g) The authority granted to the licensee under this article shall not apply to any part of the public lands and reservations of the United States included within the project boundary.

Article 502. If the Licensee's project was directly benefitted by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement during the term of the original license (including extensions of that term by annual licenses), and if those headwater benefits were not previously assessed and reimbursed to the owner of the headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for those benefits, at such time as they are assessed, in the same manner as for benefits received during the term of this new license.

(F) The Licensee shall serve copies of any Commission filing required by this order on any entity specified in this order to be consulted on matters related to that filing. Proof of service on these entities must accompany the filing with the Commission.

(G) This order is final unless a request for rehearing is filed within 30 days of the date of issuance of this order, pursuant to rule 385.813. The filing of a request for rehearing does not operate as a stay of the effective date of this order or of any other date specified in this order, except as specifically ordered by the Commission. The Licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Fred E. Springer
Director, Office of
Hydropower Licensing

Form L-9
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MINOR PROJECT AFFECTING NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands

of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may be mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 7. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 8. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission may direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 9. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and

utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 10. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 11. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 12. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the

project operation as may be reasonably prescribed by the Commission in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 13. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 14. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon the request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 15. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 16. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 17. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit

for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 18. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 19. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

FINAL ENVIRONMENTAL ASSESSMENT

FOR HYDROPOWER LICENSE

Hayward Hydroelectric Project

FERC Project No. 2417

Wisconsin

Federal Energy Regulatory Commission
Office of Hydropower Licensing
Division of Project Review
825 N. Capitol Street, NE
Washington, D.C. 20426

August 29, 1995

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY

On December 23, 1991, Northern States Power Company (Northern States), filed a subsequent license application for the existing Hayward Hydroelectric Project, FERC No. 2417. On September 3, 1992, and January 14, 1994, Northern States supplemented its application. Located on the Namekagon River in the City of Hayward, Sawyer County, Wisconsin, the Hayward Project would have an installed capacity of 168 kilowatt-hours and would generate about 1,448,000 kilowatt-hours of electric energy per year. The entire mainstem of both the Saint Croix River and the Namekagon River are included in Wild and Scenic Rivers System under the National Wild and Scenic Rivers Act, Public Law 90-542.

On November 11, 1991, the Wisconsin Department of Natural Resources (WDNR) issued the water quality certificate for the Hayward Project, as required by Section 401 of the Clean Water Act. The water quality certificate requires Northern States to consult with the WDNR in developing the project design and secure all necessary approvals prior to beginning Northern States' proposed shoreline restoration project.

The Federal Energy Regulatory Commission (Commission) issued a draft environmental assessment (EA) for the Hayward Project on June 16, 1994. In the draft EA, our preferred licensing alternative was licensing the Hayward Project with staff recommended protection and enhancement measures. Based on economic data filed by Northern States in letters dated September 23 and October 17, 1994, we reexamined the economic and environmental effects of our licensing alternative in comparison to a project retirement alternative. We considered project retirement to consist of the removal of generation equipment from the powerhouse and the electrical tie to the local power grid.

Based on the present economic data, our studies show that the staff's licensing alternative would result in negative net economic benefits of about $48,000 annually. Under the project retirement alternative, the negative net annual benefits, including our recommended conditions, are $13,600 more than the staff's licensing alternative.

Based on our consideration of all developmental and nondevelopmental resource interests related to the relicensing the Hayward Project, the Commission's staff recommend 16 environmental measures. These measures would protect and enhance fish and terrestrial resources, water quality, cultural resources, and recreational resources in the project area and are discussed in sections V.C. and summarized in section VII of the final EA.

Our independent review and evaluation of the project included the project as proposed by Northern States, the project with staff and agency recommendations, the project retirement alternative, and the no-action alternative. Based on our analysis, we have selected issuing a subsequent license for the Hayward Project, with our recommended protection and enhancement measures, as the preferred option. We recommend this option because: (1) continued project operation, with our recommended measures, would have minor environmental effects; (2) our recommended environmental measures would protect and enhance fish and wildlife resources, water quality, cultural resources, and recreational resources; (3) the economic costs of operating the project as conditioned in the staff's recommended licensing alternative are less than the costs of project retirement; and (4) the electricity generated from a renewable resource would reduce the use of fossil-fueled, steam-electric generating plants, thereby, conserving nonrenewable energy resources and reducing atmospheric pollution.

Section 10(j) of the Federal Power Act (FPA) requires the Commission to include license conditions for the protection, mitigation, and enhancement of fish and wildlife resources affected by the development, operation, and maintenance of the project. Generally, such conditions are based on recommendations from federal and state fish and wildlife agencies. In this final EA, we have addressed the concerns of the federal and state fish and wildlife agencies and under our staff's licensing alternative made recommendations consistent with most of those of the agencies.

On September 15, 1994, a telephone conference meeting with representatives from the Commission's staff, Northern States, WDNR, and U.S. Fish and Wildlife Service, was held in attempt to resolve inconsistencies between fish and wildlife recommendations and requirements under Section 10(j) of the FPA. We reached agreement on the impoundment fluctuation limit and the resource agencies' recommended seasonal barrier net.

We conclude in the final EA that our recommended project licensing alternative for the Hayward Project would not constitute a major federal action significantly affecting the quality of the human environment.

FINAL ENVIRONMENTAL ASSESSMENT
FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING, DIVISION OF PROJECT REVIEW

Hayward Hydroelectric Project
FERC Project No. 2417--Wisconsin

August 29, 1995

INTRODUCTION

The Federal Energy Regulatory Commission (Commission) issued the Hayward Hydroelectric Project Draft Environmental Assessment (DEA) for comment on June 16, 1994. In response, we received two comment letters. Those commentors are listed section IV.C., Comments on the DEA. All timely-filed comment letters were reviewed by the staff. The sections of the Final Environmental Assessment (FEA) that have been modified as a result of comments received are identified in the staff responses to the right of the letters of comment, in Appendix A.

I. APPLICATION

On December 23, 1991, Northern States Power Company (Northern States), filed a subsequent license application for the existing Hayward Hydroelectric Project, FERC No. 2417. The project is located on the Namekagon River in the City of Hayward, Sawyer County, Wisconsin. On September 3, 1992, and January 14, 1994, Northern States supplemented its application.

II. PURPOSE AND NEED FOR ACTION

A. Purpose of Action

This FEA assesses the effects associated with operating the existing project, alternatives to the proposed project, and makes recommendations on whether to issue a subsequent license, and if so, recommends terms and conditions to become a part of any license issued. The Federal Power Act (FPA) provides the Commission with the exclusive authority to license nonfederal water power projects on navigable waterways and federal lands.

In deciding whether to issue any license, the Commission must determine whether the project is best adapted to a comprehensive plan for improving or developing a waterway. In addition to the power and developmental purposes for which licenses are issued, the Commission must give equal consideration to the purposes of energy conservation, the protection, mitigation of damage to, and enhancement of fish and wildlife (including related spawning grounds and habitat), the protection of recreational opportunities, and the preservation of other aspects of environmental quality.

In this FEA, we, the Commission staff, assess the environmental and economic effects of continuing to operate the project (1) as proposed by Northern States and (2) with our recommended enhancement measures. We also consider the effects of project retirement and the no-action alternative.

B. Need for Power

The Hayward Hydroelectric Project would generate about 1,448,000 kilowatt-hours (kWh) of electric energy per year. Northern States would use the energy within its utility system to serve its customers in portions of the states of Wisconsin, Michigan, Minnesota, North Dakota, and South Dakota.

The project's single generator, with nameplate rating of 168 kilowatts (kW), was rewound in 1959 and is presently capable of producing a maximum of 200 kW. The average annual electric energy production of the project is about 1,448,000 kWh.

The Hayward Project has already established a need for the project's output by generating low-cost nonpolluting, hydroelectric power from a renewable primary energy resource for about 86 years.

The Hayward Project is located in the Mid-continent Area Power Pool (MAPP) reliability council region. According to the April 1, 1993, MAPP Department of Energy (DOE) Code IE-411 Report, the average annual growth rate in summer peak demand for the 9-year period from 1993 to 2002 is forecasted to be 2.8 percent. The average annual growth rate for total energy requirements, for the same period, is projected to be 2.3 percent. Considering these forecasts, the region would need about 383,000 kW of additional capacity each year over the 1993-2002 period in order to meet the summer peak demand and maintain adequate reserve margins.

The IE-411 Report also states that for the summer and winter seasons of the forecast period, 16 of 22 MAPP participating utilities would face one or more seasons in which the capacity levels would fall below the MAPP required fifteen percent reserve capacity.

The above figures show that the MAPP region can easily accommodate and use the 168 kW of capacity and the 1,448,000 kWh of annual energy.

III. PROPOSED ACTION AND ALTERNATIVES

A. APPLICANT'S PROPOSAL

1. Project Facilities The original dam on the Hayward site was built of logs in 1883 and powered a large sawmill located adjacent to the dam. The dam was subsequently destroyed by a flood in 1907 and a new dam of earth with a timber-crib spillway was constructed the same year. The spillway portion was surfaced with reinforced concrete in 1918, resurfaced in 1927, and again in 1980. The present powerhouse dates from between 1927 and 1933, with the exterior of its superstructure being altered since its original construction.

The project facilities (see figure 1) would consist of:

a. a dam with an overall length of 424 feet and a maximum height of about 18 feet, which is comprised of:

(i) a right earth embankment section which extends about 200 feet from the right bank to the concrete intake channel for the powerhouse,

(ii) a middle earth embankment section which extends about 80 feet from the concrete intake channel for the powerhouse to the concrete spillway section,

(iii) a concrete overflow spillway section about 120 feet long founded on rock-filled timber cribbing and which contains 10 stop-log bays separated by concrete piers, and

(iv) a left earth embankment section protected by a concrete retaining/training wall;

b. a reservoir with a surface area of about 247 acres and a gross capacity of less than 2,000 acre-feet (AF) at a normal water surface elevation of 1,187.4 feet mean sea level;

c. a concrete intake channel about 42 feet long and varying in width from 8 feet to 13 feet, located between the right and middle embankment sections;

d. a concrete and brick powerhouse, about 18 feet wide by 24 feet long, equipped with one vertical turbine with a hydraulic capacity of 178 cubic feet per second (cfs) at a head of 17 feet, directly connected to a single generator rated at 168 kW; and

e. appurtenant equipment and facilities.

The project power feeds directly into Northern States' local distribution system; hence, there is no transmission line

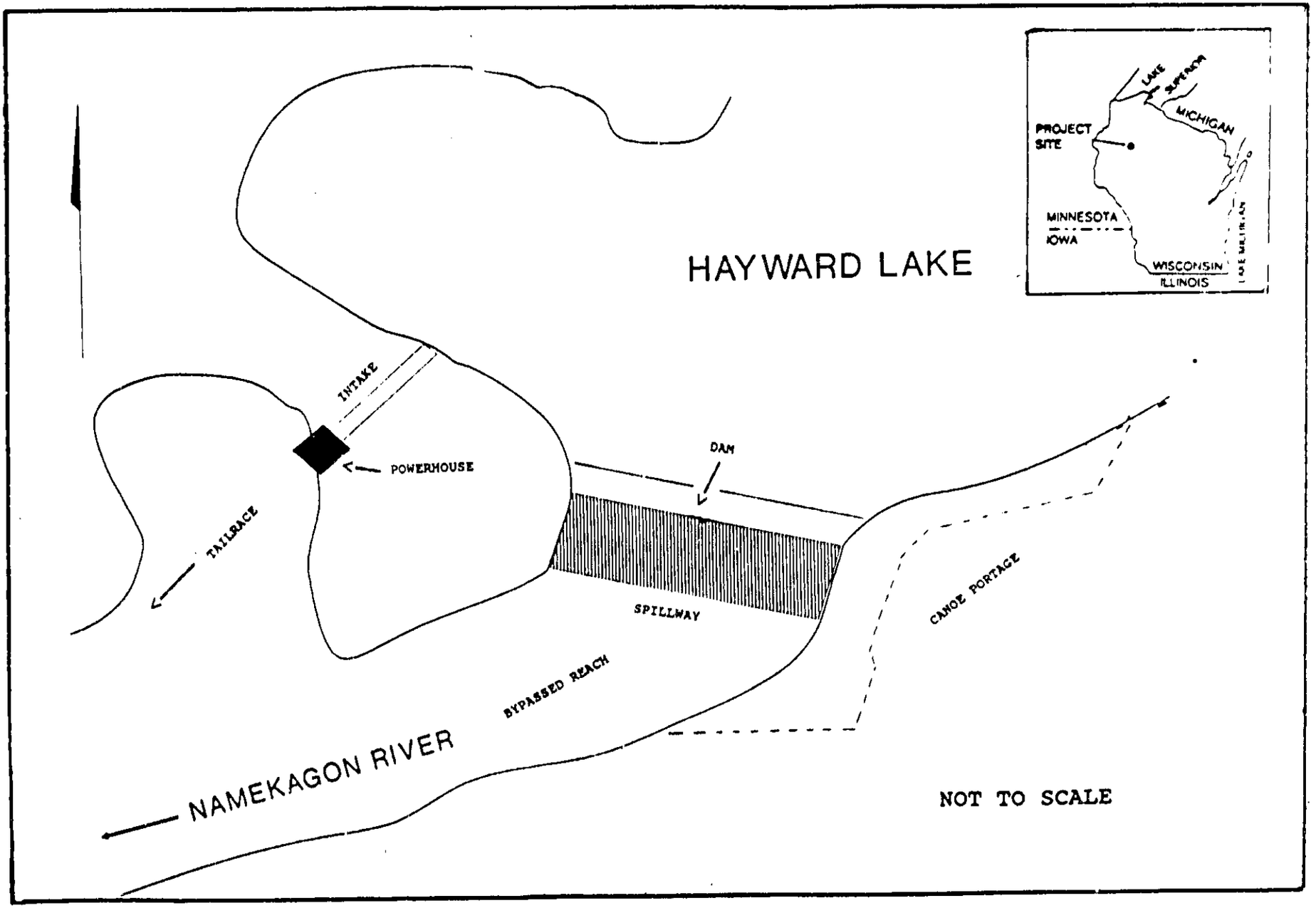

Figure 1. Location of the project features for the existing Hayward Hydroelectric Project, FERC No. 2417, Wisconsin (Source: Northern States Power Company, 1992, modified by staff).

included among the project facilities. A steel bulkhead gate located in the intake channel upstream of the powerhouse serves as an upstream cutoff for dewatering the powerhouse and replaces an earlier Taintor gate. Northern States has proposed no new capacity or construction, and the project would continue to operate in a run-of-river mode.

2. Proposed Environmental Measures

a. Construction None.

b. Operation Northern States proposes the following eight measures to enhance environmental resources: (1) continue operating the project in a run-of-river mode; (2) maintain the impoundment at a target elevation of 1,187.4 feet[1], with an allowable fluctuation limit between 1,187.0 feet and 1,187.5 feet under normal flow conditions; (3) maintain the existing headwater and tailwater staff gages and renovate the existing headwater chart recorder, which would continuously monitor impoundment levels; (4) provide a continuous minimum flow of 8 cfs, or inflow, whichever is less, to the bypassed reach; (5) maintain the existing trashracks, which have 1.5-inch clear bar spacing, to minimize resident fish entrainment and impingement; (6) develop and implement a drawdown management plan for the project impoundment, including appropriate ramping rates; (7) implement a remediation plan to improve the stream habitat below the project's spillway channel and improve the existing canoe portage; and (8) undertake bald eagle and osprey management practices on company-owned lands.

3. Mandatory Requirements

a. Federal Land Management Conditions The Department of the Interior (Interior) provided final conditions for the Hayward Project (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., September 23, 1993). Interior's National Park Service (NPS) purported to recommend nine conditions pursuant to Section 4(e) of the FPA and the Commission's Order No. 533 issued May 8, 1991. Interior's Fish and Wildlife Service (FWS) also recommended 11 separate license conditions under Section 10(j) of the FPA, which are listed in section VIII of this FEA (Consistency with Fish and Wildlife Recommendations).

In response to a letter from the Commission, dated December 15, 1993, Interior provided their basis for asserting authority to prescribe Section 4(e) conditions. Based on Section 10(c) of

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[1] The surface elevations shown are as measured from National Geodetic Vertical Datum (NGVD), the equivalent of mean sea level.

the Wild and Scenic Rivers Act, Interior maintains that it may utilize such general statutory authorities relating to areas of the National Park System for recreation and preservation purposes and for the conservation and management of natural resources, as deemed appropriate to carry out the purposes of the Wild and Scenic Rivers Act (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., March 4, 1994).

Section 4(e) applies to reservations, and under Section 3(2) of the FPA reservations are defined in part as land or interests in lands "owned by the United States." Although the Namekagon River is within the National Wild and Scenic Rivers System, administered by the NPS, the Hayward Project does not occupy any federal lands. Nor are there federal easements in the Hayward Project area. Therefore, we don't believe that Interior has 4(e) authority with respect to the Hayward Project.

In this FEA, we considered the NPS's purported 4(e) conditions under Section 10(a) of the FPA, and we made recommendations consistent with eight of the nine conditions. We don't recommend that Northern States conduct additional biological surveys (see condition no. 8 below) because the project area's existing biological resources are adequately protected with our recommended project operation measures. The NPS's conditions/recommendations are discussed in the environmental analysis section of this FEA, section V.C.

In summary, the NPS's recommended conditions under Section 4(e) of the FPA include:

(1) Operate the project in an instantaneous run-of-river mode for the protection and enhancement of recreation, fish, and wildlife resources of the Saint Croix National Scenic Riverway;

(2) Stabilize the canoe portage trail to reduce existing erosion by planting native vegetation and using other erosion control techniques as needed, while designing the access to meet the needs of the disabled;

(3) Stabilize the unimproved road associated with the canoe portage by erecting a gate to restrict vehicular traffic and reestablishing the area with native vegetation;

(4) Coordinate the drawdown management plan with the Wisconsin Department of Natural Resources (WDNR) and the NPS Saint Croix National Scenic Riverway office;

(5) Send a sample of each source of ash to be used in the "cindering" process to the WDNR for annual

analysis and submit the results to the WDNR for review;

(6) Cooperate with the resource agencies in implementing a plan to control the spread of purple loosestrife (Lythrum salicaria) when deemed appropriate by the agencies;

(7) Closely coordinate with the NPS Saint Croix National Scenic Riverway office any plan to stock Lake Sturgeon in the Namekagon River;

(8) Conduct a survey of the flowage to identify dragonfly, turtles, and salamanders and the potential impacts of the existing mode of operation on each species. The survey should also include potential impacts from project operations on bald eagles and a list of plant and animal species found around the flowage; and

(9) Invite the WDNR, the NPS, the FWS, and local agencies responsible for recreational facility planning to meet every five years in order to review and address existing recreation and land management issues.

b. Section 18 Fishway Prescription Interior requested reservation of authority to prescribe the construction, operation, and maintenance of fishways for the Hayward Project pursuant to Section 18 of the FPA (letter from Jonathan P. Deason, Director, Office of Environmental Affairs, Department of the Interior, Washington, D.C., September 23, 1993).

Section 18 of the FPA provides the Secretary of the Interior the authority to prescribe fishways.[2] Although fish passage facilities may not be recommended by Interior at the time of project licensing, such as for the Hayward Project, the Commission should include a license article which reserves Interior's prescription authority.[3] We recognize that future fishway needs and management objectives can't always be predicted at the time of license issuance. Under these circumstances, and upon receiving a specific request from Interior, the Commission should reserve Interior's authority to prescribe fishways.

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

[3] Lynchburg Hydro Associates, 39 FERC ¶ 61,079 (1987).

c. Water Quality Certificate Northern States requested Section 401 water quality certification (401 WQC), required by the Clean Water Act, on August 30, 1990. The WDNR issued the 401 WQC on November 11, 1991. The 401 WQC would require Northern States to consult with the WDNR in developing the project design and secure all necessary approvals prior to beginning the proposed shoreline restoration project (*see section V.C.2.b*).

d. Coastal Zone Management Program The Wisconsin Department of Administration's Coastal Management Program (WCMP) is responsible for reviewing hydroelectric projects for consistency. However, the Hayward Project is not located in the coastal zone boundary designated by the WCMP (letter from Gary T. Shultz, Wisconsin Coastal Management Program, Department of Administration, Madison, Wisconsin, August 19, 1992). Therefore, no coastal zone consistency certification is needed for the Hayward Project.

B. STAFF ALTERNATIVE

Under our alternative, the project would continue to operate as proposed and include the following protection and enhancement measures, in addition to the measures proposed by Northern States:

1. To protect water resources, we recommend that Northern States (a) analyze the fly ash/cinders used to minimize leakage at the spillway, (b) develop and implement a plan to monitor the run-of-river mode of operation and minimum flow requirement, and (c) develop a plan to ensure downstream flows during power outages.

2. To protect fishery resources from turbine entrainment, we recommend that Northern States implement a fish protection plan to include a barrier net.

3. To protect terrestrial resources, we recommend that Northern States (a) maintain the project lands as fish and wildlife habitat with public access where permitted, (b) develop and implement a plan to monitor purple loosestrife and cooperate with the WDNR to control purple loosestrife, and (c) preserve all suitable trees (e.g., all large white and red pines) on project lands as potential bald eagle nesting and perching trees.

4. To protect cultural resources at the Hayward Project, we recommend that Northern States implement the provisions of the Wisconsin Statewide Programmatic Agreement, executed on December 30, 1993, among the Commission, the Wisconsin State Historic Preservation Officer, the Michigan State Historic Preservation Officer, and the Advisory Council on Historic Preservation.

5. To improve recreation resources, we recommend that Northern States (a) implement their proposed canoe portage improvements, and (b) monitor the adequacy of the recreation facilities over the license term.

C. PROJECT RETIREMENT ALTERNATIVE

While we limited our analysis of project retirement in the DEA and while no participant has suggested that a project retirement alternative would be appropriate in this case, we analyzed project retirement at the Hayward Project in this FEA. We considered it prudent to analyze project retirement upon further review of economic data filed by Northern States in letters dated September 23 and October 17, 1994.

The project retirement alternative involves denial of the relicense application and surrender of the existing license with appropriate conditions. We consider project retirement to consist of the removal of generation equipment from the powerhouse and the electrical tie to the local power grid. Under this alternative the dam would remain in place and the Commission would seek an application for surrender of the project's original license. Northern States would continue to maintain the project dam with a non-power license until a new owner assumed the responsibilities of the project facilities. This scenario is approximate and subject to change. The environmental effects of project retirement are addressed in the Environmental Analysis section of this FEA, section V.D., and the development effects are addressed in the Developmental Analysis section of this FEA, section VI.B.

D. ALTERNATIVE OF NO ACTION

Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license. No changes to the existing physical, biological, or cultural components would occur in the project area. Also, we wouldn't require Northern States to implement any new environmental protection or enhancement measures. We use this alternative to establish the baseline environmental conditions for comparison with other alternatives. The no-action alternative is addressed in the environmental analysis section of this FEA, section V.E.

E. ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

We considered dam removal as an additional alternative to Northern States' relicensing proposal but eliminated it from detailed study because it is not reasonable in the circumstances of this case. Project retirement accomplished with dam removal would involve denial of the subsequent license application and

surrender or termination of the existing license with appropriate conditions.

Based on our economic evaluation of full project retirement (i.e., dam and powerhouse removal), we estimate that full project retirement would cost about $158,300 annually. This project retirement cost includes the undepreciated project debt costs ($18,600), relicensing costs to date ($7,300), dike stabilization costs ($4,600), and dam and powerhouse removal costs ($127,800).

No participant has suggested that dam removal would be appropriate in this case, and we have no basis for recommending it. Under the dam removal alternative, removal of the project dam and restoration of the site would return the section of the Namekagon River affected by the Hayward Project to its natural, freeflowing, state. Removing the Hayward dam is not reasonable because of the social and biological values of the Hayward Lake, both locally and regionally.

Specifically, the lake is a valuable recreational resource and an integral part of several national and international outdoor recreational events. Lake Hayward supports a high quality fishery and recreational use of the lake contributes substantially to the local economy. Also, about 75 percent of Lake Hayward's shoreline is privately developed, and tax revenue from these properties account for about 25 percent of the city's tax base (letter from Lucy Gunther, Clerk-Treasurer, City of Hayward, Wisconsin, February 17, 1995). Thus, based on the significant economic and environmental impacts of dam removal, we did not consider dam removal a reasonable alternative and we eliminated it from detailed study.

IV. AGENCIES AND ENTITIES CONTACTED

A. Agency Consultation

The following entities commented on the application by the October 4, 1993, deadline specified in our notice that the application is ready for environmental analysis.

Commenting agencies and other entities	Date of letter
U.S. Department of the Interior	09/23/93
Wisconsin Department of Natural Resources	10/01/93 10/05/93

Northern States responded to the agency comments by letter dated November 16, 1993.

B. Interventions

The following entities filed a motion to intervene in the proceeding.

Intervenor	Date of motion
Wisconsin Department of Natural Resource	07/17/92

C. Comments on the Draft Environmental Assessment

The following entities commented on the DEA issued June 16, 1994:

Commenting Entities	Date of Letter
Northern States Power Company	July 14, 1994
Wisconsin Department of Natural Resources	July 27, 1994
U.S. Department of the Interior, National Park Service	August 31, 1994

D. Section 10(j) telephone conference meeting

On September 15, 1994, the Commission's staff held a telephone conference meeting with representatives from Northern States, the WDNR, and the FWS (*see Section 10(j) meeting summary in the attached appendix*). The telephone conference meeting was held in attempt to resolve inconsistencies between fish and wildlife recommendations and requirements under Section 10(j) of the Federal Power Act.

The Section 10(j) issues discussed included the agencies' recommended: drawdown management plan for control of noxious weeds, a barrier net to deter walleye movement downstream of the Hayward Project dam, and the impoundment fluctuation limit. These recommendations were previously described in the DEA and are addressed in section V., Environmental Analysis, of this FEA.

V. ENVIRONMENTAL ANALYSIS

A. General Description of the Saint Croix River Basin (Source: Federal Energy Regulatory Commission, 1983 and 1993).

The Hayward Project is located on the Namekagon River, which is a tributary of the Saint Croix River (see figure 2). The Saint Croix River, located in northwestern Wisconsin and eastern Minnesota, is a tributary of the upper Mississippi River. The drainage area of the Saint Croix River Basin is 7,650 square miles. The river flows through rolling glacial terrain, including agricultural and forest land.

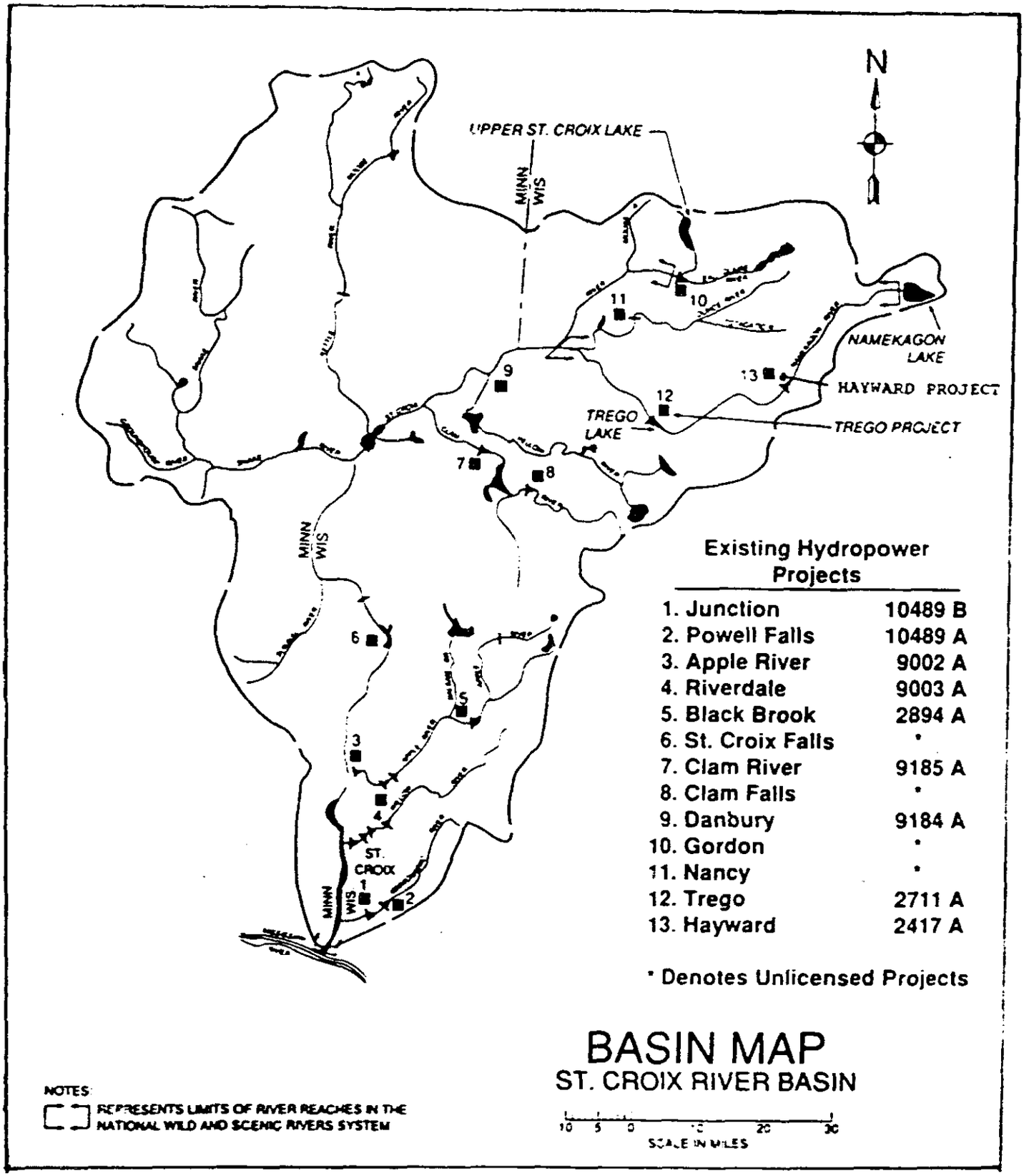

Figure 2. Location of the Hayward Hydroelectic Project in the Saint Croix River Basin (Source: Office of Electric Power Regulation Planning and Status Report, 1982, modified by staff).

The Namekagon River is the largest tributary of the Saint Croix River, with a drainage area of 488 square miles. The project is located about 60 miles upstream from the Saint Croix River confluence and 33 miles downstream from the river's origin at Lake Namekagon. The Namekagon River has a drainage area of about 206 square miles at the project site. One other licensed project, the Trego Project, FERC No. 2711-001, is located on the Namekagon River, about 30 miles downstream of the Hayward Project.

The entire mainstem of both the Saint Croix River and the Namekagon River are included in the Wild and Scenic Rivers System under the National Wild and Scenic Rivers Act, Public Law 90-542. The river reach on which the project is located is designated "scenic," which allows limited development along the river shoreline, including the shoreline of the project impoundment.

As of December 8, 1993, there are a total of 13 hydroelectric developments in the Saint Croix River Basin (see figure 2), including six operating minor projects licensed by the Commission (one of which has two developments), two operating projects with license exemptions, and four operating projects without a license or exemption.

B. Scope of Cumulative Effects Analysis

As part of our environmental analysis, we examined how the Hayward Project would affect all resource areas, including water resources, fish and wildlife resources, cultural resources, and recreation resources. Through the application and agency consultation, we've identified fishery resources and recreational resources that would be part of a cumulative effects analysis (CEA).

We emphasized fisheries resources as a CEA resource because the multiple hydroelectric developments within the Saint Croix River Basin could affect resident fisheries. Fish entrained in the Hayward Project's turbines would cumulatively add to fish entrainment and turbine mortality from other projects within the basin. Multiple hydroelectric projects could also cumulatively effect fisheries by reducing aeration, limiting fish movements, and limiting the reproductive potential of species. In this FEA, fishery resources are discussed in detail in section V.C.2.

We emphasized recreation resources as a CEA resource because the Hayward Project could cumulatively effect canoe touring along both the Namekagon River and the Saint Croix River. These rivers are designated National Wild and Scenic Rivers, due in part to their recreational values. Recreation resources are discussed in detail in section V.C.6.

Prior to reviewing the proposed project in relation to the environmental resources, we first considered the geographic and temporal scope of our analysis, as defined below.

1. The Geographic Scope of CEA Resources - The geographic scope of analysis defines the physical limits or boundaries of the proposed actions' effects on the CEA resources, i.e., fisheries and recreation resources. We considered the entire mainstem of the Namekagon River, and that portion of the Saint Croix River which is below the mouth of the Namekagon River, as our geographic scope of analysis. We considered this portion of the Saint Croix River Basin because the Hayward Project is located in the upper portion of the Namekagon sub-basin. When combined with the effects of other water developments, the Hayward Project could cumulatively effect environmental resources in the Namekagon River, as well as, resources in the Saint Croix River below its confluence with the Namekagon River.

The Hayward Project is also one of two hydroelectric projects located on the Namekagon River, which have historically influenced the social and physical environment along the entire Namekagon River. Finally, we considered the Namekagon and Saint Croix Rivers because of the their inclusion in the National Wild and Scenic Rivers System, and any action along these rivers could affect the rivers' outstanding environmental values.

2. The Temporal Scope of Analysis - The temporal scope of analysis includes a discussion of past, present, and future actions and their effects on the resources. Based on the subsequent license term, we considered the effects of reasonably foreseeable future actions on the resources over 30 - 50 years into the future. The historical discussion of CEA resources considers the effects of actions occurring over the past century and is presented in section V.C. We identified the present resource conditions based on the Northern States' license application for both the Hayward Project and the Trego Project.

C. Proposed Action and Other Recommended Environmental Measures (Source: Northern States Power Company, 1991 and 1992).

We have reviewed the proposed project in relation to the environmental resources in the project impact area, and only the affected resources are analyzed in detail in this FEA. Continuing to operate the Hayward Project wouldn't affect geological resources, aesthetic resources, or socioeconomics. We've excluded these resources from our detailed analysis for the following reasons:

a. Northern States proposes to continue operating the project in a run-of-river mode and proposes no new construction that would affect geological resources. However, the minor effects on geological resources related to Northern States'

proposed tailrace modifications and canoe portage enhancements are addressed in the recreation resource section V.C.6.

b. The aesthetic resources at the Hayward Project include the natural scenic setting. Northern States proposes to construct no new project operating facility that would obstruct the view shed. Also, no resource agency recommended any measures to improve the aesthetic quality at the project.

c. The project wouldn't affect the socioeconomics of the area because no major construction activities, with their associated effects on employment, business, infrastructure, and tax revenues, are proposed.

1. Water Resources

Affected environment:

Streamflow:

	cfs[4]	Flow Parameter
Low flow:	119 cfs	exceeded 90 percent of the time
High flow:	297 cfs	exceeded 10 percent of the time
Average flow:	195 cfs	average annual

Flow parameters for the Hayward Project are derived from the U.S. Geological Survey (USGS) records for stream gaging station No. 05332500 located on the Namekagon River in Trego, Wisconsin. We obtained flow data from the Trego station for a 46-year period of record; 1927-1970 and 1987-1990. Flows at the Hayward project were estimated by prorating the Trego gage data; flows recorded at Trego were multiplied by an area adjustment factor of 0.42.

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[4] cubic feet per second.

Our estimated flow duration data for the Hayward Project site is:

Percent Exceedence	Flow (cfs)	Percent Exceedence	Flow (cfs)
95	109	45	180
90	119	40	188
85	126	35	199
80	133	30	212
75	140	25	225
70	147	20	240
65	153	15	261
60	159	10	297
55	165	5	368
50	172		

Based on Hayward's flow duration curve, we estimate the project's hydraulic capacity (178 cfs) would be exceeded about 46 percent of the time. At the project's minimum capacity of 120 cfs, the project would be shutdown about 10 percent of the time due to insufficient streamflow.

Water quality:

Historical water quality data for the Namekagon River is limited. Although no documented information is available, the water quality of the Namekagon River, under historic predevelopment conditions, was probably excellent due to its unrestricted flow and the natural aerating effect of its many riffle areas. Hydroelectric development on the Namekagon River has restricted the river's flow. In addition to restricted flows, the City of Hayward's municipal waste discharge may have historically affected the river's water quality. The municipal waste discharges into the Namekagon River just downstream of the Hayward Project dam.

The Namekagon River and its flowages, in the vicinity of the Hayward Project, are classified by WDNR as they relate to water quality standards, for the protection and propagation of fish and other aquatic life. They are also classified for the provision of recreation in and on the waters. Further, the section of the Namekagon River which includes the project site is classified under Wisconsin regulations as an "outstanding resource water." Upstream and downstream of the project is Class II trout water.

The state standards for fish and aquatic life include the following numerical criteria: a minimum dissolved oxygen (DO) concentration of 5 milligrams per liter (mg/l) at all times, natural daily/seasonal water temperature fluctuations maintained with temperature not to exceed 89°F for warmwater fish, a pH

within the range of 6 to 9, and substance toxicity concentrations within the Environmental Protection Agency guidelines.

Water quality data for the Namekagon River and the Hayward impoundment, obtained by the USGS and the NPS from 1975 to 1983, show that the water quality in the project vicinity was good for most uses (Graczyk, 1986). Water temperature did not exceed 75.2°F and DO equalled or exceeded 8.1 mg/l. Based on a 1989-90 water quality monitoring study, the water quality in Hayward Lake and the Namekagon River is very good. DO exceeded the state standard of 5 mg/l (averaged 8.9 mg/l), with the exception of one case where water near the bottom of the flowage dropped to 4.8 mg/l. The maximum water temperature recorded was 80.6°F, which occurred in the flowage. Further, water temperature increased from upstream of the flowage to downstream of the project tailrace; the greatest difference was in August (12.2°F). Total phosphorus averaged 0.024 mg/l, total alkalinity averaged 71.6 mg/l, and total dissolved solids averaged 88.0 mg/l.

Testing for several organic compounds and trace metals indicates some contamination of the Hayward Lake sediments. Elevated levels of oil and grease were found in several sediment samples. In addition, arsenic, chromium, mercury, and lead were found to be above background levels for these trace metals. Northern States attributes the high metal concentrations, as well as the elevated levels of oil and grease, to either point-source discharges in the City of Hayward or the indirect discharge of contaminants from a leaking underground storage tank in close proximity to Hayward Lake.

Environmental impacts and recommendations:

a. Water quality: Because of the stop-log type spillway at the Hayward dam, leakage rates can vary significantly. The greatest amount of leakage occurs immediately after stop-log replacement. To minimize leakage through the stop-logs, Northern States uses a "cindering" process to seal small holes between stop-logs. WDNR states that introduction of toxic compounds or contaminants into the Namekagon River is detrimental to the ecology of the river. Further, the NPS says that dispersing fly ash into the water may introduce contaminants into the river.

To ensure that the material used for cindering contains no contaminants, WDNR and the NPS recommends analyzing annually a sample of each source of ash used in the "cindering" process and submitting the results to the WDNR for review. WDNR recommends analyzing for bulk chemistry of contaminants that may exceed either environmental guidelines or standards for water, sediments, or biota. WDNR indicates that they may restrict this practice if environmental harm is likely. WDNR further recommends that the analyses include the following (and any contaminants that may be identified in the future): arsenic,

cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, zinc, and any other potential contaminant that is associated with a particular source of ash.

Northern States indicates that the cinders used at the Hayward Project originated from a single source, and that the ash was analyzed in August 1992. The trace metals analyzed included aluminum, antimony, arsenic, barium, cadmium, chromium, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc. In addition to the trace metals, the analysis included chlorine, fluorine, sodium, calcium, potassium, and sulfur. The analysis indicates low trace metal concentrations, with some below the range of naturally occurring metals found in soils. The elements were also present in low concentrations.

Our recommendation: While we agree with Northern States that the ash used to cinder the gates is relatively inert and environmentally harmless, we also recognize that future dispersal of fly ash/cinders into the water may introduce contaminants into the Namekagon River. Such contaminants could effect the ecological resources of the Namekagon River. Therefore, the licensee should sample and analyze annually each source of ash used to "cinder" the spillway gates at the Hayward Project. The analysis should be for bulk chemistry of contaminants, and the Licensee should submit the results of the analysis to the WDNR, the NPS, and the FWS.

Monitoring the fly ash/cinders used at the Hayward Project would help minimize any potential effects on water quality in the Namekagon River. Northern States' proposed run-of-river mode of operation, minimum flow to the bypassed reach, and plans to develop a drawdown management plan, would also minimize any effects on water quality in the Namekagon River.

b. Project operation: Northern States currently operates and proposes to continue operating the Hayward Project in a run-of-river mode. Northern States would continue to maintain the headpond elevation at the target elevation of 1,187.4 feet under normal project operations, with a fluctuation between 1,187.0 feet and 1,187.5 feet. This fluctuation tolerance in the headwater is needed to account for emergency operating conditions such as droughts, heavy rainfall periods, ice jams, and unscheduled plant outages. An alarm sounds at Northern State's dispatch center should the impoundment level fall below 1,187.0 feet.

The FWS, the NPS, and WDNR recommend the project operate in a run-of-river mode, such that instantaneous outflow equals instantaneous inflow. The resource agencies recommend maintaining the impoundment elevation at a target elevation of 1,187.4 feet, with a fluctuation of ±0.25 feet. The FWS and WDNR state that Northern States may temporarily modify the recommended

run-of-river operation if required by operating emergencies beyond Northern States control.

Should Northern States temporarily modify the run-of-river operation, the FWS recommends that they take all practical steps to return the project to normal operations within the following 8-hour period. Should Northern States exceed the ±0.25-foot operating range for a period of 24 hours or more, the FWS recommends that Northern States notify WDNR and the Commission within 10 days of each occurrence. Further, the FWS recommends that Northern States submit quarterly reports to WDNR and the FWS identifying instances when the impoundment surface elevation exceeded the ±0.25-foot operating range, and should include an explanation for each deviation. WDNR also recommends that during drought events which require alteration of project operations, Northern States should consult with the WDNR, the FWS, and the NPS to determine the appropriate course of action.

Northern States concurs with the agencies' run-of-river recommendation. However, Northern States questioned the agencies' definition of run-of-river and disagreed with the agencies' recommended ±0.25-foot fluctuation around the target elevation.

The agencies' definition of run-of-river stipulates that project inflow and outflow are to be equal on an instantaneous basis. We consider this an unrealistic definition in that the "instantaneously equal" standard is likely never achieved, nor do we expect it to be. Further, because the Namekagon River flow is relatively stable, we expect that Northern States would continue to operate the project in such a way so as to maintain the impoundment level within a very narrow range, ensuring run-of-river operation.

We conclude that the agencies' recommended ±0.25-foot fluctuation limit is overly restrictive for two reasons. First, the project is currently operated manually by an operator from the downstream Trego Project (located 45 minutes from the Hayward Project). The Hayward Project is too small to support a full time on-site operator, and the operator visits the project on a near-daily basis to maintain impoundment levels within prescribed limits.

Second, there are many factors that can cause changes in reservoir elevation that are beyond Northern States control (even with an operator on-site). Wind tides (wind setup), ice jams, and floods are among these factors. Because the impoundment is about 2.25 miles long and has a maximum width of 0.30 miles, wind setup can cause different reservoir elevations at different points in the reservoir at the same time. As a result, Northern States shouldn't be penalized if, while making a good faith effort to remain within the normal operating range, they fail to

achieve restrictive target elevation objectives. During the Section 10(j) telephone conference, the FWS and WDNR subsequently agreed with Northern States' fluctuation tolerance in the headwater provided that Northern States does not use the variation for peaking operation.

Regarding the FWS's recommendation for restoring the headpond elevation to normal operating levels after emergency conditions, we expect that Northern States would make every reasonable effort to restore the impoundment to normal operating levels. The FWS's recommendations for documenting compliance with the headwater operating rules are discussed in the following section.

Northern States' run-of-river operation, as currently practiced, is not having any detrimental impact to the aquatic resources of Hayward Lake or the Namekagon River downstream. We conclude that the present mode of run-of-river operation would continue to minimize reservoir fluctuations. Also, the current project mode of operation would prevent large fluctuations in flows downstream of the project that would adversely effect aquatic resources by reducing or altering available habitat.

Northern States' proposed operation would maintain the natural volume and periodicity of streamflow downstream from the project. Because the project would not alter streamflow in the Namekagon River upstream or downstream, project operation would not affect fish and wildlife habitats, including any wetland areas. Further, the continued run-of-river mode of operation wouldn't contribute to any cumulative effects on DO concentrations and water temperatures in the river basin.

Our recommendation: To protect aquatic habitat, water quality, and other water resource values, we recommend that the licensee: (1) operate the project in a run-of-river mode such that instantaneous inflow to the project impoundment approximates instantaneous outflow from the impoundment; (2) maintain a stable impoundment level to the extent that operating conditions and equipment calibration permit; and (3) maintain an impoundment elevation of 1,187.4 feet, but allow for a fluctuation around the target elevation, such that the impoundment is maintained between 1,187.5 feet and 1,187.0 feet. The licensee should not operate the project between the low and high ends of this operating range on a daily basis for peaking purposes.

The licensee may modify these operational requirements for operating emergencies beyond the licensee's control, or for short periods of time, upon mutual agreement between the licensee, WDNR, the FWS, and the NPS.

c. Gaging: The FWS and WDNR recommend that Northern States develop and implement a plan to monitor the proposed run-of-river

operation, the target headpond elevation of 1,187.4 feet, and the proposed minimum flow release of 8 cfs (*as described in section V.C.2, Fishery Resources*). The monitoring plan would include provisions that would require the Northern States to:

1. install and maintain headwater and tailwater staff gages, and associated records (i.e., daily operator logs);

2. install, operate, and maintain automated equipment that continuously records reservoir and tailwater elevations;

3. install and maintain a staff gage upstream of the project in a location easily visible to the public;

4. develop a flow rating curve for the project, with calibration of flows checked at two-year intervals;

5. provide flow calibration data (for flow rating curve) and headpond and tailwater elevation data to the FWS and WDNR, and install, operate, and maintain USGS-type gaging stations upstream and downstream of the project if needed;

6. submit quarterly reports to the FWS and WDNR identifying instances the operating range is violated, including an explanation for each occurrence; and

7. develop an implementation schedule.

To monitor compliance with run-of-river operation at the Hayward Project, Northern States proposes to maintain the existing headwater and tailwater staff gages, modify the existing headwater staff gage for public visibility, and renovate an existing continuous recording headwater gage in 1994. Further, Northern States would provide daily records to the agencies for review upon request. However, there is no evidence to indicate that Northern States would monitor flows through the bypassed reach.

While we agree with the need for an operational compliance plan for the Hayward Project, we disagree with several aspects of the agencies' plan. Specifically, we disagree with requiring Northern States to: (1) install and operate automated equipment that continuously records reservoir and tailwater elevations, (2) install and operate a USGS-type stream gage, and (3) provided a flow rating curve. We find that these measures would cost Northern States nearly $20,000 annually and would significantly impact the project's economics (*see table 3, page 61*). We concluded, pursuant to Sections 4(e) and 10(a) of the FPA, that the costs associated with these three measures outweigh the value of their potential benefit.

To monitor the Hayward Project's mode of operation, Northern States proposes to renovate its current system that documents hourly headwater elevations on a continuous recording circular chart. In addressing the need for a flow rating curve for the Hayward Project, we note that Northern States has indicated that such a curve is currently available, and they would supply the agencies with the curve upon request. Further, the flow rating curve is based on flow through the turbine which has a very slow rate of wear. We conclude that Northern States' proposed operational measures would adequately monitor the project operation. WDNR and the FWS may request additional streamflow gaging measures in the future under the provisions of the standard articles included in any license issued for the Hayward Project.

Our recommendation: Impoundment and tailwater elevation monitoring is necessary to verify the operation of the Hayward Project and any flow requirements. We believe that Northern States' proposed operational monitoring measures would adequately monitor the proposed mode of operation for the Hayward Project, including the impoundment level requirements. Northern States should improve the existing headwater staff gage with the public visibility features suggested by the resource agencies. Further, gaging is needed in the project's bypassed reach in order to monitor compliance with the recommended minimum bypassed flow (*see section V.C.2.a, at page* 25).

Therefore, we recommend that the licensee, after consultation with WDNR, the FWS, and the USGS, develop a plan to monitor the operation of the project. The licensee should monitor the project operation using any existing, modified, and/or additional staff gages, located in appropriate locations, and by renovating the continuous recording headwater gage. The plan should include (1) methods of impoundment and tailwater elevation and flow data collection (including flows through the powerhouse, in the project's bypassed reach, and in the Namekagon River downstream of the project); (2) descriptions of the proposed location, design, and calibration of all monitoring devices; (3) an implementation schedule; and (4) a provision for providing elevation and flow data to the consulted agencies (i) within 30 days from the date of an agency's request for the data, or (ii) by submitting quarterly elevation and flow data reports to the FWS, WDNR, and the St. Croix National Scenic Riverway office of the NPS.

d. Flow continuation during power outages: The FWS recommends that Northern States pass river inflow through the project on an instantaneous basis, or within a few minutes, should the project go off line. The FWS says its recommendation is intended to avoid sudden interruption of flow below the dam, which could dewater aquatic habitat in the tailwater area and kill small fish and other aquatic life. We agree.

Northern States' proposed operation for the Hayward Project would allow a maximum impoundment level fluctuation of 0.5 feet below the top of the ungated spillway. In the event that the project goes off line while the impoundment is below the spillway crest, flows (except for the minimum bypassed flow) would not be released to the Namekagon River downstream from the project. This condition would continue until the dam operator manually removed the stop-logs from the spillway, or until the impoundment water level increased to a point where it would spill over the top of the spillway.

The Hayward Project has no storage capability. Based on the project's maximum hydraulic capacity and the project's annual flow duration curve, we estimate that spillage at this project would occur about 46 percent of the time. Extended periods without downstream flow would be detrimental to the fisheries and other aquatic resources downstream of the Hayward Project, particularly during the low-flow, high-temperature summer period. Therefore, Northern States should operate the Hayward Project such that periods of inadequate flow downstream of the project are minimized.

Our recommendation: It is unclear how Northern States would minimize periods of inadequate flow downstream of the project during scheduled or unscheduled project shutdowns. Therefore, we recommend that the licensee, in consultation with WDNR and the FWS, develop a plan that identifies any reasonable operating provisions that would minimize, to the extent possible, extended periods without flow releases downstream of the project when project shutdowns coincide with impoundment elevations below the crest of the spillway. The plan should also include a schedule for implementing any, or all, of the measures outlined in the plan. The licensee should submit the plan to the Commission for approval.

Unavoidable adverse impacts: None.

2. Fishery Resources

Affected environment: The fish community of Hayward Lake and the tailwaters of the dam was sampled in 1991, and on several occasions by WDNR during the 1980's. Early sampling records date back to 1944, 1965, and 1977. According to these surveys, the composition of the fish community in Hayward Lake has remained quite stable throughout the 45 years of sampling. Species that were present in 1991 but not documented during the 1944 or 1965 surveys include the muskellunge and chestnut lamprey, and a couple of species that may have been present but considered the same in the early surveys (i.e., bullhead spp. and redhorse spp.).

The Namekagon River is a clear, relatively fast flowing stream. The river has a generally wild character with numerous riffles and rapids that are formed as water flows over the rubble and gravel-lined bottom. Occasional shallow pools occur between the fast water runs and riffles.

Development of the Hayward and Trego Projects on the Namekagon River inundated about 8.25 miles, or about 8.5 percent, of the river. Hayward Lake is a 2.25 mile long, 247-acre impoundment. The lake has about 8.4 miles of shoreline, a maximum depth just upstream of the dam of 17 feet, and an average depth of only about 5 feet. The lake is narrow throughout its extent with maximum width of about 1,600 feet.

The Hayward Lake gamefish community is dominated by northern pike and largemouth bass, with lesser populations of walleye and muskellunge. Bluegill and yellow perch dominate the panfish community, with black bullhead and black crappie also present. Abundance, growth, and size structure statistics for these species generally are average to above average for the region. However, walleye recruitment and adult population density are lower than would be expected. In addition, a wide variety of forage fishes and other non-game species also reside in the Namekagon River, including shorthead redhorse, golden redhorse, white sucker, northern hogsucker, common shiner, blacknose and bluntnose minnows, trout-perch, hornyhead and creek chubs, central stoneroller, chestnut and southern brook lampreys, and numerous other species of minnows and shiners.

The Namekagon River below the dam to the Washburn County line is designated as Class II trout water and is known to support some carry-over brown and rainbow trout from one year to the next. This same stretch of river also supports a seasonal (i.e., winter months) population of migrant native brook trout.

Past fisheries management by WDNR has consisted of numerous surveys, stocking, habitat development, and access development. Walleye and muskellunge fingerlings are stocked in the lake on an alternate year basis. In addition, brown and rainbow trout are stocked in the river upstream from Hayward Lake and immediately downstream of the dam.

Hayward Lake has long held the reputation as a good bass/panfish lake. Over the years it has produced trophy walleye and muskellunge in numbers and sizes exceptional for a lake its size and in its region. Further, the tailwater section provides unusual angling opportunities for a diverse mix of warmwater, coolwater, and coldwater species. While the fishery is popular with local anglers, Hayward Lake is lightly fished by regional standards for lakes less than 500 acres in size (Pratt, 1993).

Environmental impacts and recommendations:

a. Instream flows in the bypassed reach: The bypassed reach between the Hayward dam and the powerhouse tailrace encompasses about 170 feet of the Namekagon River. By diverting water for power generation, the Hayward Project would continue to reduce flows over the crest of the project dam and into the bypassed segment of the Namekagon River.

Northern States agreed to work with WDNR during 1992 to quantify existing leakage, and to pass a comparable flow in the future. Based on the August 1992 joint flow-release exercise, Northern States and WDNR agreed that a continuous minimum flow of 8 cfs would be adequate to protect the instream habitat for fish and other aquatic organisms in the project's bypassed reach. Therefore, WDNR and the FWS recommend that Northern States continuously release a minimum flow of 8 cfs to the bypassed reach downstream of the Hayward flowage. To provide the minimum flow, they recommend that Northern States permanently remove one board measuring 11.5' x 6" from the fourth bay of the spillway as counted from the west edge of the spillway. Northern States indicated that this flow release would begin once they complete the habitat restoration project in 1994 (*see section V.C.2.b*).

The bypassed reach is composed of a short riffle area immediately below the dam, followed by shallow pool habitat. Because the shallow pool may provide refuge for fish during stressful low-flow, high-temperature periods, flow circulation within the pool is critical for maintaining the suitability of the pool refuge. Another important factor in determining the suitability of the pool refuge is the DO concentration within the pool during the critical time period.

Although Northern States would operate the project in a run-of-river mode, operation of the project without a minimum flow wouldn't provide sufficient flow reaeration critical to fish and other aquatic resources during periods when the project's hydraulic capacity is not exceeded (about 54 percent of the time), particularly during low-flow, high-temperature periods. A minimum flow of 8 cfs provides adequate aeration to maintain water quality (DO) in the bypassed reach, including the shallow pool and other downstream areas in the bypassed reach during the critical low-flow, high-temperature period.

Our recommendation: To protect fishery resources in the bypassed reach (including the value of the pool refuge), we recommend that the licensee provide a continuous minimum flow of 8 cfs, or inflow, whichever is less, from the project dam and into the bypassed reach. As recommended by WDNR and the FWS, the licensee should provide the flows by removing one board measuring 11.5' x 6" from the fourth bay of the spillway as counted from the west edge of the spillway. In addition, the licensee should

prepare a plan, for Commission approval, to monitor compliance with the 8-cfs minimum flow in the bypassed reach (*as previously described in section V.C.1., Water Resources*).

b. Stream habitat modifications: Recent spillway reconstruction and subsequent bank erosion has degraded the quality of aquatic habitat in the project's bypassed reach. Northern States has agreed to implement a habitat rehabilitation plan to stabilize and restore the bypassed reach of the Namekagon River. The rehabilitation plan was developed in consultation with the WDNR and the NPS to improve fish habitat, canoe portage access, and to enhance shoreline fishing opportunities.

Northern States submitted to the Commission the "**Remediation Plan to Stabilize and Restore the Namekagon River Channel and Shoreline Downstream from the Hayward Dam Spillway**" (Remediation Plan). The Remediation Plan addressed three strategies for improving fishing and recreational opportunities below the Hayward Project, including ■ correcting the existing bank erosion problem in the immediate spillway area, ■ stabilizing the canoe portage trail and the unimproved road, and ■ rehabilitating and stabilizing the pool area. The habitat rehabilitation measures included in the Remediation Plan, as agreed to by Northern States, WDNR, and the NPS, would include:

1. modifying the existing bypassed reach by installing a rock flow deflector which would narrow the river channel and increase velocities in the bypassed channel, and encourage scouring in the pool area;

2. excavating a limited amount of channel material from the pool area; and

3. placing several large "spotter" boulders in line with the deflector which would extend downstream to the pool area, and act as velocity breaks for any fish species that may use the bypassed reach during high flow periods.

Northern States indicates that they are working with WDNR and the NPS to finalize the plans for the habitat restoration project in the bypassed reach. Northern States proposed to do the work in 1994, once the plan is finalized and the necessary permits obtained. WDNR recommends that Northern States, under direction of the resource agencies, implement the Remediation Plan to optimize fish habitat and restore habitat lost/damaged due to the recent dam reconstruction.

Our recommendation: We agree that the measures identified to stabilize and restore the bypassed reach would improve the quality and quantity of aquatic habitat in the bypassed reach for fish and other aquatic organisms. Specifically, these measures would increase the depth and velocity of the bypassed reach,

provide velocity shelters during periods of high flow, and help to maintain suitable substrates in the bypassed reach.

Therefore, we recommend that the licensee implement the measures described in the Remediation Plan, including any subsequent modifications, to restore the aquatic habitat in the project's bypassed reach. The licensee should submit the final Remediation Plan to the Commission for approval, including design drawings for any enhancement measures and schedules for installing the enhancement measures.

c. Fish protection: Project operation would continue to affect the fishery resources by entraining fish into the project turbines that could cause injury and mortality. Mortality or injury could occur as a result of fish being struck by turbine blades, pressure changes, sheer forces in turbulent flows, and water velocity accelerations (Knapp et al., 1982; Cada, 1990).

Because of the high quality fishery in Hayward Lake, there is particular concern for protecting resident species from entrainment mortality, including northern pike, largemouth bass, walleye, muskellunge, and a number of panfish species. Recent studies of entrainment mortality indicates that the type of turbine used at the project can entrain, injure, or kill various warmwater/coolwater fish species (Electric Power Research Institute, 1992); average mortality for bluegill, largemouth bass, walleye, and northern pike approached 25 percent, but generally was less than 20 percent.

To minimize the potential for turbine mortality associated with the Hayward Project, Northern States proposes to maintain the existing trashracks, which have a 1.5-inch clear spacing between bars and intake velocity at full gate of 1.5 feet per second (fps). Northern States supports its proposal with the results of the 1991 Hayward Lake fish survey, which shows a high quality fishery exists in Hayward Lake under the current mode of operation for the Hayward Project.

Although the fish survey documented a very healthy fishery in Hayward Lake, walleye recruitment and adult population density were poor to fair by regional standards. Because entrainment is thought to be the cause, the FWS and WDNR recommended the installation of a barrier net to protect fish from turbine entrainment. WDNR says the barrier net is primarily intended to reduce entrainment of juvenile walleye, and recommend installing the net seasonally from May 1 to July 1 each year. During the Section 10(j) telephone conference, WDNR subsequently recommended installing the net from June 1 to July 31. WDNR recommends that Northern States install the net by 1995. WDNR would evaluate the net's effectiveness, with a report and recommendations provided by December 31, 2000. WDNR states that the evaluation standard

would be a sufficient number of young-of-year walleye to support an adult walleye standing stock of 3 per acre.

Table 1 shows the results of the 1991 Hayward Lake fish survey, relative to population density, growth, and size structure for selected species of management importance.

Table 1. Summary of species abundance, growth rates, and size structure indices for selected fish in Hayward Lake (Source: Pratt, 1993). Regional status is shown in parenthesis[1].

Species	Density (no./acre)	Mean Length (inches)	Size Structure[2] PSD
Northern Pike	5.1 (+)	16.2 (0)	0.27 (+)
Largemouth bass	3.5 (+)	14.1 (+)	0.87 (+)
Walleye	1.0 (-)	13.6 (-)	0.55 (+)
Muskellunge	<1.0 (0)	21.7 (+)	0.92 (+)
Bluegill	N/A (+)	6.8 (0)	0.79 (+)
Yellow perch	N/A (+)	5.9 (0)	0.11 (+)
Bullhead spp.	N/A (+)	7.9 (N/A)	0.20 (+)

[1]Hayward Lake's status relative to the regional average [0, comparable to region; +, above regional average; and -, below regional average].

[2]Size structure index (PSD, proportional stock density) as defined in Gablehouse (1984). PSD is a statistic that measures the number of stock size fish (size varies depending on the species) in the population relative to the entire population, and therefore, is a measure of a fishery's quality.

With the exception of walleye abundance and growth, the Hayward Lake fishery is comparable or above average for the region. Further, largemouth bass and muskellunge abundance and size structure, have increased in Hayward Lake relative to past surveys. Based on the results of the 1991 fish survey, WDNR concluded that, except for walleye, the Hayward Project, as currently operated, is having little, if any, discernable impact on the fish community in Hayward Lake.

There are many factors that could be affecting Hayward Lake's walleye population, including loss of juvenile walleye through the Hayward Project, the lake's habitat characteristics, and competition with other species.

Walleye loss from system - WDNR speculates that entrainment through the Hayward Project is contributing to the poor abundance of walleye in Hayward Lake. However, the report for the 1991 fish survey (Pratt, 1993) offers no definitive insights as to the Hayward Project's role in the lower than expected population density and growth for walleye in Hayward Lake.

The original range in Wisconsin rivers of several fish species, including walleye, is discussed by Becker (1983). Throughout the course of its life history, walleye may utilize large amounts of riverine habitat, resulting in extensive movement within a riverine system. Young-of-year walleye exhibit a natural tendency to disperse from the area where they were hatched, or stocked, which increases this life stage's vulnerability to either spillway escapement or passage through a project's turbine (Davin et al., 1989).

Jernejcic (1986) documented walleye (age 0 and age 1) movement out of an impoundment through Tygart dam in West Virginia from December through April. Jernejcic suggested that this movement was probably selective on the part of walleye, in that no other species exhibited similar movement patterns.

Tygart Lake differs from Hayward Lake in size, volume, and operation. However, juvenile walleye in Hayward Lake may exhibit movement patterns similar to that observed at Tygart dam, particularly since water spills over Hayward dam about 46 percent of the time and the volume of spillage is generally highest during the late spring and early summer. The agencies' and our recommended 8 cfs minimum flow over the spillway would also contribute to the downstream movement of walleye (*see section V.C.2.a*).

The FWS and WDNR suggest that walleye entrainment is having a detrimental effect on the walleye population in Hayward Lake. We agree that fish escapement is likely occurring at Hayward Lake, and that this loss may have a detrimental effect on the walleye population in Hayward Lake. Due to the flow patterns over the Hayward Project spillway, we also believe that the downstream walleye movement would continue even if a barrier net was installed at the project intake. However, recruitment of walleye from Hayward Lake into the Namekagon River downstream could provide benefits to the limited walleye fishery downstream. Jernejcic (1986) found walleye escapement from Tygart dam was important to maintaining the downstream walleye fishery; walleye fishing success (catch per unit effort) was higher in the tailwater than in the lake (0.56 vs. 0.32 fish caught per hour).

In its letter dated July 27, 1994, and during the Section 10(j) telephone conference, WDNR disagreed with our assessment in the DEA regarding walleye escapement from Hayward Lake and provided evidence to support its position. WDNR stated that

recent entrainment studies indicate that walleye entrainment through a hydroelectric project can be substantial. WDNR cites studies from the Crowley (FERC No. 2473) and Thornapple (FERC No. 2475) Projects on the Flambeau River. WDNR estimates that of the 69,439 fish entrained at Crowley, 41 percent (28,252 fish) were walleye. Most of these walleye were young-of-year; 93 percent were less than 3 inches in length and 69 percent were less than 2 inches long. At Thornapple, walleye comprised only 9 percent of the fish entrained, and were primarily young-of-year fish; 59 percent of all fish entrained were between 2.0 and 3.9 inches long. For both studies, walleye entrainment occurred in May, June, and early July.

We do not dispute the results of these studies, and concur with the findings relative to the extensive movement patterns exhibited by walleye. According to WDNR, 10,000 walleye fingerlings (2 inches in length) are stocked in Hayward Lake every other year. These fish are stocked during the months of June and July, and based on the Crowley and Thornapple study results, would be subject to escapement and/or entrainment during this period. Based on studies conducted by Lawler, et al. (1991), we conclude that the proposed 1.5-inch bar spacing would afford little, if any, protection to the 2-inch walleye stocked in the lake.

A barrier net with 3/8-inch mesh would provide a higher level of protection to walleye fingerlings than the existing trashrack with 1.5-inch bar spacing. The recommended barrier net would not, however, eliminate the problem, as walleye would continue to move over the crest of the dam during spill events. WDNR acknowledged the fact that walleye loss would continue to occur, but stated that the intent of the barrier net is to reduce, not eliminate, loss of walleye from the lake.

In the DEA, staff expressed concern regarding the effect of reduced escapement of walleye on the downstream fishery. WDNR stated that the Namekagon River between the Hayward and Trego Projects has a very limited walleye fishery. This segment of the river is characterized as transitional (from coolwater to warmwater), which would provide limited, and somewhat poor quality habitat for walleye. Although the quality of walleye habitat in the Namekagon River between Hayward and Trego is questionable, reduced walleye escapement from Hayward Lake would have some effect on the downstream fishery. Based on the quality of habitat in this segment of the river, we expect any effects on the downstream fishery to be negligible.

Hayward Lake habitat characteristics - WDNR, in the 1991 Hayward Lake fish survey, concluded that Hayward Lake's habitat characteristics suggest that the lake should support a better walleye fishery than currently exists. However, WDNR did not address the suitability of Hayward Lake's habitat. Northern

States suggested that the shallow, weedy habitat of Hayward Lake may be responsible for the low numbers of walleye.

In developing habitat suitability curves for walleye, McMahon, et al. (1984) summarized the habitat requirements of walleye. Walleye are generally most abundant in moderate-to-large lakes (>250 acres) or riverine systems characterized by cool temperatures, shallow to moderate depths, extensive littoral areas, moderate turbidities, extensive areas of clean rocky substrate, and mesotrophic "*moderately nourished*" conditions. Walleye are less abundant in eutrophic "well-nourished" systems (usually dominated by sunfish and bass), as eutrophication tends to significantly reduce habitat quality for walleye (McMahon, et al., 1984). Entz (1977) and Forney (1977) reported that walleye were most productive in waters classified as mesotrophic to slightly eutrophic.

Hayward Lake is a small (247 acres), relatively shallow (average depth of 5 feet), impoundment that generally does not exhibit DO or water temperature stratification. Northern States indicates that the lake is productive, as evidence by the total organic carbon level which varies from 9,100 to 310,000 mg/kg dry weight. Further, Hayward Lake is dominated by northern pike, muskellunge, largemouth bass, and bluegill. These characteristics of Hayward Lake, together with its watershed characteristics, suggest that Hayward Lake is a eutrophic system, and may not be suitable to support a large number of walleye.

During the Section 10(j) telephone conference, WDNR responded to staff's analysis of Hayward Lake's habitat characteristics. WDNR stated that aquatic vegetation is very prominent in Hayward Lake. WDNR also stated that aquatic vegetation in Hayward Lake is reaching a point where the fishery could be negatively affected; the predator-prey ratio would be altered. Further, WDNR states that very little natural reproduction of walleye occurs in Hayward Lake. This is attributed to the extensive sediment beds in the lake.

Nevertheless, WDNR considers Hayward Lake to be walleye habitat. WDNR supports their position by stating that walleye in Wisconsin inhabit a wide variety of habitat types, ranging from mesotrophic to eutrophic waters. WDNR also states that their 3 fish/acre criteria for Hayward Lake is based on an extensive, very broad-based database for walleye in the state of Wisconsin. Additionally, WDNR suggested that impoundment drawdowns, as described in section V.C.3.d. of this FEA, would improve habitat conditions in the lake by oxidizing sediments along the shoreline, which would benefit walleye reproduction.

Hayward Lake, as it presently exists, does not appear to contain suitable habitat to support a substantial walleye population. Implementing scheduled management drawdowns may,

however, provide substantial benefits to the habitat quality in Hayward Lake. Management drawdowns when coupled with protecting walleye fingerlings may improve walleye recruitment and, ultimately, the lake's fishery.

Competition with other species - Competition was never addressed by the resource agencies as a possible reason for the low numbers of juvenile walleye. Walleye are known to associate with yellow perch, northern pike, muskellunge, and smallmouth bass (Scott and Crossman, 1973). These species, as well as, walleye, are known to feed on young fish, suggesting that competition among these species for prey may exist. This conclusion is supported by Forney (1977), who reported that reduced competition among walleye, American eel, northern pike, and chain pickerel enhanced walleye recruitment.

Scott and Crossman (1973) indicate that northern pike is probably the most important predator of walleye over much is its range, while muskellunge, largemouth bass, and a variety of other species also prey on young walleye. In studying the relationship between walleye and smallmouth bass, Johnson and Hale (1977) indicated that a large population of bass could influence walleye fingerling survival. Strong populations of northern pike, largemouth bass, and muskellunge exist in Hayward Lake, which may indicate that, although opportunistic in their feeding habitats, predation on young walleye by these species may be an important factor limiting walleye growth and abundance.

Walleye, particularly young walleye, feed on aquatic insects and macroinvertebrates (Scott and Crossman, 1973), which are also the primary food source for bluegill, black crappie, and a variety of other panfish. Bever and Lealos (1974) suggested that an inverse relationship exists between walleye numbers and the abundance of panfish. Hayward Lake has a healthy panfish fishery, suggesting that competition between walleye and panfish for food sources, may have an influence on the walleye population in Hayward Lake.

WDNR commented on staff's DEA discussion concerning competition and predation. WDNR acknowledges that predation on walleye probably occurs, especially on those in the 2-inch length class. WDNR contends that Hayward Lake, based on the 1990 fishery survey, contains an ample and diverse forage base, and that there is no evidence that shared resources are limited and in short supply. Additionally, WDNR states that walleye growth and condition do not support the hypothesis that competition is limiting the size of the walleye population.

We do not dispute the results of the 1990 Hayward Lake fishery survey, and concur with the findings relative to the diverse and abundance forage base in the lake. We note, however, that Hayward Lake's outstanding fishery, including the current

species composition, is the result of the existing environmental conditions in lake. Because competition and predation occur in natural systems, increasing the number of adult walleye from 1 fish/acre to 3 fish/acre may result in changes in the fish community, which may be either beneficial or detrimental to the overall fishery.

Our recommendation: In the DEA, we concluded that the FWS and WDNR had not demonstrated that the recommended barrier net would increase the number of walleye in Hayward Lake to a standing stock of 3 fish per acre or provide substantial benefits to the fishery. We also concluded that Northern State's proposal to maintain the existing 1.5-inch trashracks would continue to provide a level of protection that would minimize resident fish entrainment and impingement at Hayward.

WDNR subsequently stated that the performance standard of 3 fish per acre could be attained if recruitment losses dropped to 30 percent or less. According to the WDNR, the 3 fish per acre performance standard can be achieved by reducing entrainment with a barrier net system. WDNR also stated that protecting young walleye would result in substantial benefits to the fishery in the form of improved walleye fishery and better fishing opportunities.

During the Section 10(j) meeting, the Commission's staff, WDNR, the FWS, and Northern States agreed to an approach whereby WDNR and Northern States would share the responsibility of implementing a fish protection plan.

The cooperative arrangement between Northern States and WDNR, as filed with the Commission by Northern States on September 27, 1994, and supplemented on October 11, 1994, would supersede earlier recommendations made by WDNR and the FWS, and includes the following:

(1) Northern States would be responsible for: (a) the one time purchase of the barrier net, floats, anchors and rigging; (b) the purchase of an additional spare barrier net; and (c) funding the installation and maintenance of the barrier net; and

(2) WDNR would be responsible for the annual deployment (or installation) and maintenance of the barrier net.

WDNR, in a letter filed October 14, 1994, concurred with this arrangement. As previously discussed, WDNR would also be responsible for evaluating the net's effectiveness and providing a report and recommendations by December 31, 2000.

Commission's staff agree with the provisions of the arrangement and recommend including these provisions as license

requirements for the Hayward Project. Our recommendation is further discussed in sections VI., Developmental Resources, and VIII., Consistency with Fish and Wildlife Recommendations, of this FEA.

Finally, we recognized that multiple hydroelectric developments could cumulatively affect fisheries in the Saint Croix Basin by reducing aeration, limiting fish movements, and through impingement and entrainment of fish. Hydropower development could also cumulatively affect the reproductive potential of species in the basin by limiting access to spawning sites or by decreasing the suitability of those sites. Further, operating the Hayward Project may affect fisheries in the Namekagon River by altering the quality of the habitat in the project's bypassed reach.

The licensee would minimize potential cumulative effects on fisheries by • operating the project in a run-of-river mode, • maintaining a continuous minimum flow through the bypassed reach, • implementing a stream habitat restoration program for the bypassed reach, and • maintaining the existing 1.5-inch trashrack. In addition, the licensee may add fish passage facilities and/or additional fish protection measures to the project in the future to enhance the fishery resources in the Saint Croix River Basin. Incorporating these protection and enhancement measures would minimize the project's contribution to cumulative effects on the recreational fisheries in the Saint Croix River Basin.

d. Lake sturgeon restoration: The lake sturgeon (Acipenser fulvescens) -- endangered in Wisconsin -- is a state protected species. In commenting on the Hayward Project's Initial Consultation Package, WDNR and the NPS recommended that Northern States consider measures to reintroduce lake sturgeon to the portion of the Namekagon River in the vicinity of the project site. WDNR views stocking as the best possible choice to reestablish the species to this section of the river.

Northern States, as a result of its efforts to relicense the downstream Trego Project, has committed funds ($5,000) to WDNR for the purpose of sturgeon egg gathering, hatchery rearing, and reintroduction of juvenile fish to the segment of the Namekagon River between the Hayward and the Trego Projects. WDNR concluded that Northern States' commitment to restore lake sturgeon above the Trego dam would satisfy its concern for lake sturgeon on the Namekagon River, and recommended no additional measures, relative to relicensing the Hayward Project.

Our recommendation: In the environmental assessment prepared for the Trego Project we recommended that Northern States provide WDNR with funds ($5,000) to restore lake sturgeon to the Namekagon River upstream of the Trego Project. The NPS

recommends that Northern States closely coordinate with the NPS Saint Croix National Scenic Riverway office concerning any plan to stock lake sturgeon in the Namekagon River. Because of the Namekagon River's National Scenic Riverway designation, we expect that any plan to reintroduce lake sturgeon in the Namekagon River would be a coordinated effort among the WDNR, the NPS, the FWS, and Northern States.

Unavoidable adverse impacts: Continued operation of the Hayward Project would cause a minor unavoidable long-term loss of resident fishes due to turbine-induced mortality.

3. Terrestrial Resources

Affected environment: The project area is situated within the Hemlock-White Pine Northern Hardwood Region as described by Braun (1950). Generally, this is a region of low relief whose topographic features are almost entirely controlled by glaciation. The vegetation is characterized by the prevalence of pines and the occasional occurrence of hardwood communities. According to Shelford (1963), deer, wolf, turkey, mountain lion, gray squirrel, bobcat, and others that currently occur in the region were also present under pristine conditions.

Logging throughout the region began in the 1830's. Initially pines were cut, which were moved via the river to the sawmills located from Saint Croix Falls to Stillwater. The pine logging era ended about 1914, but hardwoods continued to be cut for many years after. This activity has produced the appearance of the river and surrounding areas as it is today (National Park Service, 1984).

Today, about 75 percent of the shoreline around Hayward Lake is developed mainly by private homes. The shoreline is gently sloping and generally only 2-3 feet above the water's surface. Included along the shore at scattered locations are small wetlands. Most of the land surrounding the City of Hayward and the project lands and waters remains undeveloped and is forested.

Although the land adjacent to Hayward Lake is moderately developed, much of the shoreline remains under vegetative cover. Many of the shoreline residences have mowed lawns that extend to near the lake's high water mark. The lawns generally contain a mixture of trees that are native to the area, such as white birch, red maple, white, jack and red pine, and occasional black ash, green ash, black willow, cottonwood and oaks. The undeveloped shoreline areas are mostly small wetlands. Northern States' land holdings at the site are limited to about 23 acres near the dam, plus flowage rights to the lake and adjacent lands. The 23 acres under Northern States control is mostly undeveloped river frontage downstream from the dam that is covered with small trees and shrubs as described above.

The wetlands in the Hayward project area are mostly contiguous with the lake and the river 1-mile downstream of the project dam and 1-mile upstream of the lake. Northern States identified a total of 33 wetlands, with five larger than five acres. The majority of these wetlands are in the aquatic bed and emergent/wet meadow class[5], but the scrub/shrub type is also present. The most abundant submersed plant species are wild celery followed by elodea. The floating yellow water lily and sweet water lily were also prevalent in several of the shallow backwaters. Cattail, bulrush, and arrowhead are the most abundant emergent plants. Typical scrub/shrub species are tag alder, willows, and small aspen.

The predominate residential-developed character of the Hayward Lake shoreline minimizes the diversity of wildlife species that inhabit the project area. Those species that are present must tolerate human activities. Common mammals include the white-tailed deer, red fox, striped skunk, woodchuck, grey and red squirrels, cottontail rabbit, chipmunk, and a variety of small rodents. Furbearers common along the shores of the lake and river are the muskrat, mink, weasel, raccoon, beaver, and otter. The most common resident birds are the black-capped chickadee, blue jay, common crow, nuthatch, tufted titmouse, cardinal, goldfinch, and a variety of woodpeckers. Typical waterfowl that utilize the lake, river, and wetland areas include the mallard duck, wood duck, common loon, mergansers, and Canada goose. Also, a variety of hawks and owls feed and nest throughout the project area.

Environmental impacts and recommendations: Since no new construction or changes in operation are proposed, continued operation of the Hayward Project would have little or no effect on vegetation and wildlife resources around the project reservoir and along the Namekagon River, both upstream of the lake and downstream of the dam. Further, continued operation would not contribute toward cumulative adverse effects on vegetation and wildlife resources along the Namekagon River corridor.

a. Wildlife management on project lands: The FWS recommended that Northern States retain the 23 acres of project lands, and that any proposal to withdraw this land be reviewed by the agencies, prior to final approval by the Commission. Also, the FWS recommends the following:

- that Northern States allow public access on project lands, except those lands that are environmentally sensitive, such as areas that provide habitat for federal and state threatened and endangered species, or that are clearly dangerous to the public;

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[5] Wetland nomenclature follows Cowardin, et. al. (1979).

- that Northern States routinely consult the WDNR wildlife managers regarding decisions affecting wildlife management on project lands, and cooperate with the managers in conducting wildlife surveys of project lands; and

- that if any lands having the potential for wildlife management be made an additional part of the project boundary, Northern States consult with the agencies and develop a wildlife management plan for those lands.

The FWS says that the project lands and waters provide valuable habitat for fish and wildlife, and are of tremendous value to the public for recreational use. Additionally, the FWS concurs with Northern States' policy to encourage recreational use of all project lands except where restricted access is necessary for safety reasons or to protect environmentally sensitive habitat.

Our recommendation: The project lands and waters, except for those areas in the immediate vicinity of project works, are currently maintained as fish and wildlife habitat and are open to the public. Any withdrawal of, modification, or addition to project lands and waters would require approval of the Commission by an amendment of the license. In accordance with the Commission's regulations and procedures, an amendment of license would require Northern States to consult with the WDNR, the FWS, and other appropriate agencies prior to filing any license amendment application with the Commission.

In the past, Northern States has voluntarily consulted and cooperated with the WDNR regarding project area fish and wildlife resources, including biological surveys at the Hayward Project. For example, the various fishery surveys that WDNR conducted in Hayward Lake during the 1980's and in 1991 were in cooperation with Northern States (*see fishery resources, section V.C.2.*).

Northern States is likely to continue voluntary consultation and cooperation in the future regarding the management of project lands. Requiring Northern States to maintain project lands as recommended by the FWS would, however, add an extra measure of protection for wildlife and ensure public access to project lands. Therefore, we recommend requiring the licensee to (1) maintain the 23 acres of project lands as wildlife habitat with public access where permitted (i.e., areas that do not present safety hazards or are environmentally sensitive), (2) routinely consult with the WDNR wildlife managers regarding decisions affecting wildlife management on these lands, and (3) consult with the appropriate agencies on additions to project lands.

b. Wetland protection: In order to protect wetlands, the FWS and the NPS recommended that Northern States cooperate with

the agencies in implementing a plan to control the spread of purple loosestrife (Lythrum salicaria) at the project, when deemed appropriate by the agencies. The WDNR recommends that Northern States annually survey the project area for purple loosestrife and eradicate any plants located within the project boundary using the best management practices.

The agencies explain that purple loosestrife is a wetland invading plant that out-competes many other valuable wetland plants and can dominate the wetland in a few years. It has little food value for wildlife, and its infestation of valuable wetlands is extremely undesirable and harmful. The WDNR states that because purple loosestrife thrives in wetlands, especially those recently disturbed, water fluctuations can actually enhance the spread of loosestrife. Therefore, WDNR recommends monitoring, particularly after periods of extended drawdown.

Northern States agreed to monitor the project area for the presence of purple loosestrife during normal operations and to report its findings to the agencies. They don't agree with any requirement to implement a control plan for the species, but they would voluntarily help to control the species. Northern States believes that the control responsibility should reside with the WDNR or another government agency that can develop a consistent, centralized approach for handling the problem. Further, Northern States indicates that because the project is surrounded by private lands where access may not always be granted, eradication of purple loosestrife within the project boundary could be impossible.

Purple loosestrife is currently found throughout the project area and is likely spreading. Its continued spread could eventually displace the valuable wetland species within the emergent and shrub/scrub wetlands of the project area. Such a condition would significantly reduce the ecological value of these wetlands.

According to Malecki, et. al. (1993), no effective method is available to control purple loosestrife, except where it occurs in small localized stands and can be intensively managed. In such isolated areas, uprooting the plant by hand and ensuring the removal of all vegetative parts can eliminate the plant. Other control techniques that have been used include water-level manipulation, mowing or cutting, burning, and herbicide application. Although these controls can eliminate small and young stands, they are costly, require continued long-term maintenance, and, in the case of herbicides, are nonselective and environmentally degrading. Current efforts to control purple loosestrife (Malecki, et. al., 1993), center on importation of host-specific phytophagous (plant eating) insects from the plant's native range in Europe. While the results of these insect-control studies are encouraging, additional studies are

needed before an acceptable biological control technique is available.

Our recommendation: The wetlands in the project area should be protected against the continued spread of purple loosestrife. Measures should, therefore, be taken to control the plant's current levels and future spread. However, because of its widespread distribution throughout the project region and the state, its continual spread, and the aforementioned control problems, the responsibility for directing control techniques should reside with the WDNR, with the cooperation of Northern States. Therefore, we recommend that the licensee develop and implement a plan to monitor purple loosestrife at the project and provide the monitoring results to the WDNR, the NPS, and the FWS. Further, the licensee should cooperate with the WDNR, the NPS, and the FWS to control and, if possible, eliminate purple loosestrife from project lands.

c. Biological survey: The NPS recommends that Northern States survey the Namekagon flowage to identify dragonfly, turtles, and salamanders; and determine the potential impacts of the existing mode of operation on each of these species, including the bald eagle. Further, the NPS requests that this survey include a list of plant and animal species found around the flowage. The NPS explains that to implement effective management of the resource, a full description of plants and animals present and the potential impacts of fluctuation on species of concern is needed.

Our recommendation: Northern States proposes to continue operating the Hayward Project in a run-of-river mode with no additional construction activities. Continuing the present operational mode would maintain the existing biota found in and adjacent to the reservoir and the Namekagon River immediately upstream and downstream of the reservoir. Further, we are recommending additional enhancement and protective measures such as monitoring contaminants, continued run-of-river mode of operation, stable impoundment water level operation, bypassed reach minimum flow releases, and restoration of the bypassed reach river channel (*see water and fishery resources, sections V.C.1&2*).

The project area's existing biological resources are adequately protected and would be protected in the future with the additional measures that we recommend. Also, we recommend bald eagle enhancement and protective measures (*see threatened and endangered species, section V.C.4*).

We conclude that the proposed biological surveys and listings are not necessary in light of the enhancement measures we are requiring and in the absence of a specific identified need or concern. Therefore, we are not recommending that Northern

States conduct the recommended biological surveys and listings. This issue may be revisited in the future if a need is demonstrated.

d. Drawdown management plan: Historically, Northern States has not drawn down the project impoundment more than two feet. They also don't contemplate any future drawdowns associated with project facility maintenance. Prior to Northern States filing the license application, the WDNR suggested that Northern States may need to implement future drawdowns to control nuisance weed growth, promote the oxidation of fish spawning substrates, or repair any of the project facilities. Under any of these circumstances, future impoundment drawdowns could affect fishery, terrestrial, and recreational resources. Based on these concerns, Northern States proposes to cooperate with the WDNR and develop a drawdown management plan within one year of license issuance.

Subsequently, the WDNR developed a drawdown management plan for the Hayward Project and recommended including the plan in any license issuance. The WDNR indicated that they would only permit modifications to the plan upon WDNR and the FWS concurrence. Also, the WDNR recommends that if non-emergency drawdowns are undertaken, Northern States should not lower the pond level more than 6 inches per 24 hours, which should occur at a rate of 1 inch every 4 hours. The WDNR indicates that these ramping rates would minimize the amount of sediments transported downstream, protect fish and wildlife resources, and protect the soil stability of the shoreline.

Further, the WDNR recommended an interim managed drawdown on Lake Hayward to commence on October 15, 1995 with refill beginning on April 1, 1996 (i.e., a 5.5-month drawdown period). Under this drawdown, the reservoir would be drawn down 3 feet in accordance with the conditions of the WDNR's plan. If appreciable resource or recreational benefits result, the drawdown should be incorporated as a requirement of the license. Also, if the anticipated benefits do not accrue or if the drawdown is found to have unacceptable negative impacts, management-based drawdowns would be discontinued.

The FWS recommended that Northern States develop and implement a reservoir drawdown plan, including appropriate ramping rates. The NPS also recommended that Northern States coordinate the drawdown management plan with the WDNR, the FWS, and the NPS Saint Croix National Scenic Riverway office.

In response to the WDNR's drawdown management plan, Northern States indicated that they were agreeable to the plan except for three provisions: (1) sediment monitoring during drawdowns, (2) potential pre- and post-drawdown monitoring of sensitive biological resources, and (3) an experimental management-based

5.5-month-long drawdown. Northern States agreed to WDNR's recommended drawdown rate, but they request modifying the recommendation to allow for some flexibility. Specifically, they request wording any drawdown rate requirement such that a 6 inch per 24 hours drawdown rate occurs at about 1 inch every 4 hours.

We generally agree with WDNR's recommended drawdown management plan and believe it would help avoid potential adverse environmental effects, ensure sufficient coordination between the resource agencies, and provide an opportunity to enhance biological resources. In the DEA, staff stated its agreement with Northern States' objections with the three provisions specified above. However, because of the WDNR's DEA comments, Section 10(j) discussions, and further investigations on these issues, we have modified this position.

Sediment monitoring

Regarding sediment monitoring, we still maintain that because of the drawdown rate requirement, the resuspension of sediments in the flowage and the movement of sediments downstream would be minimized because of the drawdown rate requirement. However, since the WDNR indicated during Section 10(j) discussions that they knew of one contaminated site within the reservoir (i.e., 0.5 mile upstream of the dam), it would be prudent to conduct sediment monitoring during reservoir drawdown. Sediment monitoring should allow detection of any resuspended contaminated sediments from the known site or any unknown sites. If resuspension of contaminated sediments is found during monitoring, modifications to the drawdown plan could be made to further minimize or prevent such resuspension. For example, the reservoir drawdown rate could be reduced.

Monitoring of sensitive biological resources

Regarding monitoring of sensitive biological resources, an additional provision of WDNR's recommended drawdown plan would require Northern States to undertake reasonable alternatives to avoid any drawdown associated with project facility maintenance (e.g., the use of divers for inspection and coffer dams for construction projects). This requirement, as well as the drawdown rate requirement, would minimize any adverse effects to biological resources. However, while these drawdown requirements may minimize some adverse biological effects, the effects that may occur on other sensitive biological resources should be considered. For example, the drawdown rate may prevent stranding of fish in backwater areas and the drawdown period may produce the intended results of submersed aquatic plant control and sediment compaction, but other biological resources like reptiles, amphibians, and invertebrates that hibernate within the reservoir bottom could be adversely affected.

Another consideration of drawdown effects on biological resources relates to the area included within the drawdown zone. In general, the drawdown zone an aquatic bed wetland. Reduction or removal of the submerged aquatic vegetation within this zone would be an adverse wetland impact. The adverse effects on this wetland versus the intended benefits of the drawdown should also be considered prior to implementing any drawdown.

The implementation of a drawdown plan should also consider that the winter drawdown effects on some plant species vary. For example, Cook, et. al. (1986), found that elodea populations, also an abundant species in Hayward Reservoir, decreased, increased, and did not change in winter drawdowns on three different Wisconsin lakes.

Because of the potential multiple effects and variables involved in reservoir drawdowns, the drawdown plan should include a requirement to monitor sensitive biological resources during the drawdown. We believe that the responsibility of monitoring both sensitive biological resources and sediments is the responsibility of the WDNR. The WDNR agreed during Section 10(j) discussions that this monitoring is the WDNR's responsibility. Northern States should cooperate with the WDNR for monitoring sediments and sensitive biological resources during any management-based reservoir drawdown.

Drawdown duration

Concerning WDNR's recommended management-based drawdown, Northern States opposed a 5.5-month-long drawdown and suggested a drawdown of 30 days in late fall or early winter. Northern States indicated that a 5.5-month-long drawdown would significantly effect project economics and disrupt winter recreation events held on the frozen impoundment. They also indicate that requiring an impoundment drawdown over the winter would require modification to the existing powerhouse water inlet. Northern States implies that a 30-day-long drawdown in the late fall or early winter wouldn't require these powerhouse inlet modifications.

Although we agree that management-based drawdowns could benefit biological resources, we believe that a 5.5-month-long drawdown is too lengthy. This is especially true since the WDNR's recommended interim drawdown is an experimental approach to control aquatic plants. Because the environmental benefits of drawing-down the Hayward impoundment are not currently verified, Northern States' suggested that a 30-day-long drawdown is a more reasonable approach. Based on WDNR's response to the DEA and the Section 10(j) discussions, we agree that a 30-day-long drawdown approach is probably insufficient.

The WDNR says that both sediment compaction and aquatic plant reduction rely on exposing the littoral zone to subfreezing temperatures and desiccating conditions for extended periods. The WDNR does not state specifically what the extended period should be, but does indicate that it should be longer than 30 days. WDNR indicated that a 2 to 3 month-long period may be acceptable. Cooke, et. al. (1986), states that long periods of drying and freezing are needed (3 weeks or more) to kill plants such as Eurasian water milfoil.

We conclude that drawing the reservoir down for a period of 2 to 3 months beginning in the late fall (e.g., starting in November) would likely be sufficient to provide the drying and freezing needed to compact sediments and reduce aquatic plants. We recognize, however, that during some years the weather conditions may not be suitable to achieve the intended results. For example, heavy snows may fall during the first part of the drawdown period, which would tend to insulate the exposed reservoir bottom preventing sufficient drying and freezing. Therefore, because of the uncertainty of the drawdown period and appropriate climatic conditions, among other variables, the drawdown plan should incorporate provisions for modifications, or adaptive management.

Finally, we think it's reasonable to assume that Northern States couldn't precisely control the drawdown rate, and that a drawdown rate of about 1 inch every 4 hours is sufficient to minimize any adverse environmental effects.

Our recommendation: We recommend that the licensee develop and implement a final Hayward Lake drawdown management plan. The licensee should develop and implement the plan in consultation with the WDNR, the FWS, and the NPS Saint Croix National Scenic Riverway office. The licensee should develop the final plan based on the plan developed by the WDNR (letter to the Commission dated October 1, 1993), but modified to include: (1) provisions for implementing management-based drawdowns, where the need for and the depth, timing, and duration of such drawdowns are determined cooperatively with the WDNR, the FWS, and the NPS, and is based on documented fish and wildlife needs at the project; (2) a non-emergency drawdown ramping rate provision stipulating that the licensee wouldn't lower the pond level more than 6 inches per 24 hours, which would occur at a rate of about 1 inch every 4 hours; (3) a cooperative agreement between the licensee and WDNR to monitor sediments and sensitive biological resources during drawdowns; (4) a schedule for implementing any planned drawdowns; (5) a strategy to evaluate the effectiveness of the management-based drawdowns; (6) cost estimates for implementing any drawdowns; and (7) comments from the resource agencies on the final plan. Further, in lieu of an interim experimental drawdown as proposed in the WDNR's plan, the final plan should contain provisions for an initial test drawdown for a period of 5.5

months. The results of the initial test drawdown would be used to make modifications on any subsequent managed drawdowns (i.e., the final plan should incorporate provisions for adaptive management). The licensee should submit the final plan to the Commission for approval within one year after license issuance.

Finalizing and implementing the drawdown management plan for the Hayward flowage would ensure sufficient coordination between the resource agencies, provide an opportunity to enhance biological resources, and help avoid any negative environmental effects of unexpected drawdowns. The drawdown management plan would also help minimize any cumulative effects on the water quality in the Namekagon River by preventing the disturbance of any existing contaminated sediments at the project.

e. Long-term fish and wildlife protection and enhancement: For the conservation and development of fish and wildlife resources, the FWS recommends that Northern States construct, maintain, and operate, or arrange for the construction, operation, and maintenance of such reasonable facilities, and comply with such reasonable modifications of project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Interior, the FWS, or WDNR, after notice and opportunity for hearing. The FWS explains that this condition would provide for the unexpected resource problems or opportunities that may occur during the term of the license.

The WDNR requests that the subsequent license contain provisions for the Commission to reopen the license and consider amended terms and conditions should new information suggest the need. The WDNR states that because of the proximity of the Trego Project to the Hayward Project, any changes to the Trego Project should also trigger a review of the Hayward license.

In reply to WDNR's recommendation, Northern States indicates that it is opposed to such a reopener because of the uncertainty that they instill on long-term operations, planning, and investment recovery. Further, Northern States disagrees with linking the license provisions for the Trego and Hayward Projects since the two projects are separated by about 30 miles of free-flowing river and their operations are totally independent.

Our recommendation: We recognize that future fisheries and wildlife needs and management objectives cannot always be predicted at the time of license issuance. Therefore, the Commission provides for the option to require changes to projects upon its own motion and opportunity for hearing regardless of the reason for changes. Such provisions are included in the standard articles of all currently licensed projects.

Since the Hayward and Trego Projects are the only hydroelectric projects on the Namekagon River, we further recommend relicensing the Hayward Project with a license term ending concurrently with Trego[6]. Concurrent licensing terms would facilitate future environment review of these projects and their cumulative effects on the Namekagon River; a National Wild and Scenic River.

Unavoidable adverse impacts: None.

4. Threatened and Endangered Species

Affected environment: According to the FWS, the bald eagle (Haliaeetus leucocephalus), a federally listed threatened species in Wisconsin, forages along the Namekagon River but doesn't nest on project lands. The project is within a large area of land designated as "potentially suitable habitat" for the federally listed endangered gray wolf (Canis lupus), but because of the project's proximity to the City of Hayward, this species is not likely to occur on project lands. The peregrine falcon (Falco peregrinus), a federally listed endangered species, may be present in the project area, primarily during spring and fall migrations. Further, the lake sturgeon (Acipenser fulvescens), a candidate species (Category 2)[7] is found in low to moderate numbers in the Namekagon River both upstream and downstream of the Hayward project.

Environmental impacts and recommendations: According to the FWS, continued operation of the project wouldn't affect the bald eagle, gray wolf or peregrine falcon. We agree. The FWS makes no specific comments on the effect that continued operation of the project would have on the lake sturgeon. However, the NPS recommends that Northern States closely coordinate with the NPS Saint Croix National Scenic Riverway office on any plan to stock lake sturgeon in the Namekagon River. The lake sturgeon is discussed further in the Section V.C.2., Fishery Resources-Lake sturgeon restoration.

a. Bald eagle habitat protection and enhancement: Northern States proposes to follow WDNR's and the FWS's management guidelines for both the bald eagle and osprey, if future nests are constructed on company-owned lands.

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[6] The Commission issued the license order for the Trego Project on June 2, 1994 (67 FERC ¶ 61,282).

[7] A "Category 2" species is one for which information now in possession of the FWS indicates that proposing to list it as threatened or endangered is possibly appropriate, but conclusive data on biological vulnerability and threat are not currently available to support proposed rulemaking.

The FWS recommends that Northern States preserve all super canopy trees (e.g., white and red pine) that occur or that may develop in the future as available nesting sites for bald eagles. The FWS explains that since bald eagles commonly forage on lands and waters adjacent to or associated with the project area, the availability of several large white and red pine trees would provide potential nest sites.

The 23 acres of project lands provides potential nesting and perching habitat for bald eagles. The likelihood of eagles perching or nesting on these lands, however, is diminished by the size of trees (i.e., trees are generally small), presence of nearby development, and the abundance of undeveloped lands and waters surrounding the project area. Preserving such trees on project lands should require little effort or expense. The use of these trees for nesting by bald eagles would be beneficial to the population and should be encouraged.

Our recommendation: We recommend that the licensee preserve trees, such as white or red pines that presently exist on project lands or those that develop in the future, suitable for bald eagle perch and nest trees. Tree preservation should include those from 15 to 18 inches diameter breast height (DBH) within 200 feet of the reservoir or river shoreline, and those specimens less than 15 inches DBH that have the potential to attain this size. The licensee should also consider preserving other tree specimens that extend above the over-all tree canopy of the forest which are less than 15 inches DBH.

Further, we recommend allowing the licensee to remove felled or disease-damaged trees, which may affect public safety or project-related operation, after agency consultation. In order to provide protection for future bald eagle use in the project area, we also recommend that the licensee prepare a bald eagle monitoring and protection plan if eagles begin perching or nesting on project lands. Preserving suitable trees as potential nesting and perching trees on Northern States' project lands, would benefit both bald eagle and osprey management.

Unavoidable adverse impacts None.

5. Cultural Resources

Affected environment: The City of Hayward's origin and growth is linked to the first Hayward dam (1883) built by the Northwest Wisconsin Lumber Company. The lumber company used the impoundment to power the mill saws, move logs to the sawmill, and clean logs before milling. The lumber industry transformed the area into a booming logging center and by 1886 the project supplied the mill with electricity. Following a flood in 1907 the mill shut down and the dam was rebuilt the same year by the Edward Hines Lumber Company. The lumber industry began declining

in Hayward by the early 1900s, and successive hydroelectric owners resurfaced and repaired the project facilities, altering their historic integrity.

Northern States evaluated the project facilities in 1990 to assess their eligibility for inclusion in the National Register of Historic Places (National Register). After reviewing the resulting documentation the Wisconsin State Historic Preservation Officer (SHPO) indicated that the project facilities are not eligible for inclusion in the National Register because of the substantial alterations (letter from Richard W. Dexter, Compliance Section Chief, Division of Historic Preservation, The State Historical Society of Wisconsin, Madison, Wisconsin, August 21, 1990).

Between 1976 and 1978, archaeological surveys were conducted along the Saint Croix and Namekagon Rivers as part of the formation of the Saint Croix Scenic Riverway. The three-phase surveys located 217 archaeological sites, and one of these sites is located in the Hayward Project area. The NPS revisited 33 of these sites between 1981-1983 in an effort to update existing information. The survey reports suggest that the Namekagon River saw its heaviest prehistoric use during the late Middle Woodland (about. 300 A.D.-1600s A.D.) to early Historic periods (about 1630s-1840s).

Northern States conducted an archeological survey at the Hayward Project, locating three known cultural resources sites (Van Dyke, 1991). No previously unidentified sites were discovered during the survey. Two of the cultural resource sites (47 Sy-29, 47 Sy-119) are not currently affected by project operation. However, the SHPO recommended monitoring site 47 Sy-29 every five years to detect any erosional activity (letter from Richard W. Dexter, Compliance Section Chief, Division of Historic Preservation, The State Historical Society of Wisconsin, Madison, Wisconsin, February 3, 1992).

Northern States evaluated the historic significance of the remaining site (47 Sy-121), which consists of submerged pilings in Lake Hayward from a railroad bridge. After reviewing the resulting archeological report, the SHPO determined that the site is not eligible for listing on the National Register due to a loss of site integrity (letter from Richard W. Dexter, Compliance Section Chief, Division of Historic Preservation, The State Historical Society of Wisconsin, Madison, Wisconsin, July 17, 1992).

Other unidentified archaeological sites from uses before the dam construction may presently exist in the sediments of Lake Hayward.

Environmental impacts and recommendations: Continued operation of the project could adversely affect known and undiscovered properties eligible for the National Register. These effects could result from: erosion along the impoundment shoreline, unscheduled ground-disturbing activities, or from any unscheduled impoundment drawdowns. To protect the cultural resources in the project area, Northern States consulted the SHPO and developed a draft programmatic agreement in 1992. However, a subsequent statewide programmatic agreement was developed for licensed hydroelectric projects in Wisconsin.

The Wisconsin Statewide Programmatic Agreement (Programmatic Agreement) was executed among the Commission, the Advisory Council on Historic Preservation, the Michigan SHPO, and the Wisconsin SHPO, on December 30, 1993. The Programmatic Agreement requires the licensee to develop a Historic Resource Management Plan (HRMP) within one year of license issuance. The HRMP would require the licensee to develop procedures to (1) monitor the project shoreline on a periodic basis, (2) identify historic properties which become accessible during periods of project impoundment drawdown or dewatering; and (3) ensure that an archaeological survey is conducted at any unscheduled ground-disturbing activity.

Our recommendation: We recommend that the licensee implement the Programmatic Agreement provisions to protect cultural resources at the Hayward Project. Implementing the Programmatic Agreement would ensure adequate protection of known and undiscovered historic properties in the project area. Based on Northern States' cultural resource research in the project area, it's unlikely that the continued operation of the Hayward Project would cumulatively affect cultural resources along the Namekagon River.

Unavoidable adverse impacts: None.

6. Recreation and Other Land and Water Uses

Affected environment: The Namekagon River is a unit of the National Park System as part of the Saint Croix National Scenic Riverway, and the river is also a component of the National Wild and Scenic Rivers System. The NPS has classified the 63.5-mile-long reach, which includes the entire Hayward Project, as a Scenic River Area (U.S. Department of the Interior, National Park Service, 1976). As a result of the "scenic" designation, the NPS restricts river shoreland developments within one quarter mile of the river.

The wilderness qualities along the Namekagon River have attracted canoeists and trout fishermen over the past century. Disturbances to the pristine character along the Namekagon River included dam construction, the logging industry, and the growth

of the cities of Hayward and Trego. Both the Hayward and Trego dams obstructed uninterrupted canoe touring down the river, contributing to the cumulative effect on canoeing along the Namekagon River. Despite these disturbances, the river upstream and downstream of the Hayward Project retains many of the pre-impoundment qualities and continues to attract canoeists and fishermen. Other recreation pursuits following the Hayward dam's construction were oriented around the logging industry (i.e., logrolling, lumberjack expertise demonstrations).

In addition to canoeing and fishing, the project area currently provides a variety of public outdoor recreational opportunities, including swimming, sightseeing, cross-country skiing, snowshoeing, and snowmobiling. Due to the small size of the lake and its shallow weedy conditions, boating and water skiing is limited. Organized recreation activities which occur in the project area include an international cross-country skiing race (The American Berkebeiner), a world class snowmobile race (WinterFest), a lumberjack competition (World Lumberjack Championship), an off-road bicycle race (Chequamegon Fat Tire Festival), and a muskellunge fishing tournament (Muskie Festival).

Northern States provides a canoe portage around the east side of the dam and unimproved shoreline fishing areas downstream of the spillway. Portions of the canoe portage trail are steep, deteriorating due to erosion, and are overgrown with vegetation. An unimproved road leading to Northern States canoe put-in area also provides access; however, the road is steep and severely eroded. Other recreational facilities adjacent to the project impoundment include the City of Hayward's public park. The park provides a boat launch facility, a swimming area, restrooms, barrier-free fishing pier, and picnic areas. About 1/2 mile downstream of the Hayward dam, the WDNR provides river access including parking, picnic tables, benches, a wood dock, and garbage cans.

Environmental impacts and recommendations: To determine the adequacy of the existing public access facilities on Lake Hayward, Northern States conducted a recreational use survey in 1990. The Northwest Regional Planning Commission (NRPC) analyzed the survey results and conducted a recreation needs assessment. In the resulting report, the NRPC recommended improvements at Northern States canoe portage and at sites administered by the City of Hayward (Northern States Power Company, 1991(a), Appendix D). Northern States agreed to improve the canoe portage access as part of their proposed Remediation Plan (*see fishery resources section V.C.2.b*). Northern States indicated that they are finalizing the Remediation Plan in consultation with the WDNR and the NPS, and propose to do the work in 1994.

a. Barrier-free canoe portage access: Northern States' proposed canoe portage improvements include clearing overgrown vegetation along the portage trail, stabilizing the canoe put-in with rock riprap and timber structures, and soil erosion control measures. The erosion control measures include grading the steep areas along the trail, providing steps constructed of timbers, restricting vehicle access at the unimproved road by erecting a gate, diverting runoff away from the road, and seeding the area along the unimproved road. Stabilizing the shoreline bank would also enhance shoreline fishing opportunities below the dam.

The NPS recommends that Northern States: (1) stabilize the canoe portage trail to reduce existing erosion, (2) design the access to meet the needs of the disabled, (3) erect a gate restricting vehicular traffic at the unimproved road associated with the canoe portage, and (4) reestablishing the area along the portage trail and the unimproved road with native vegetation.

In support of their disabled access recommendation, The NPS indicated that Wilderness Inquiry, a commercial outfitter, currently provides extended canoe trips on the Namekagon River for individuals with disabilities. The NPS subsequently indicated that while the improvements should facilitate portage use by physically-challenged canoeists, it may not be reasonable to apply the Americans with Disabilities Act of 1990 (ADA) standards at this site.[8] The NPS recommends that Northern States consult with the NPS Saint Croix National Scenic Riverway office to remove the barriers to access for physically-challenged canoeists without destroying the primitive nature of the Namekagon River.

The WDNR recommends that Northern States cooperate with the WDNR and the NPS in implementing any plans to provide disabled access to the Namekagon River at the project. WDNR also recommends that Northern States consider the needs of the disabled in any recreational access upgrades or repairs.

In response to WDNR's recommendation, Northern States opposes constructing barrier-free access at the canoe portage. They believe barrier-free access isn't reasonable because of the steep ascending and descending slopes along the portage trail, the dangers associated with high flows through the spillway area, and the unlikelihood of any use of the facility. They also indicate that a serious problem with constructing any type of

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[8] "Reasonable or readily achievable" is defined as easily accomplishable and able to be carried out without much difficulty or expense (Architectural and Transportation Barriers Compliance Board, Federal Register, Volume 56, No. 144).

facility in the spillway channel is potential ice and debris damage and recurring maintenance needs.

Our recommendation: We agree that Northern States proposed canoe portage improvements would significantly improve the canoe access below the dam. Northern States' planned improvements should also consider measures to improve access for individuals with disabilities without destroying the primitive nature of the Namekagon River. The ADA requires Northern States to accommodate individuals with disabilities at their public facilities, where it's reasonable to do so.

Future recreational use among the disabled population would likely increase along the Namekagon River due to (1) the river's attraction as a unit of the National Park system, (2) commercial canoe outfitters providing wilderness experiences for the disabled, and (3) WDNR's statewide goal to provide recreation for disabled populations (Statewide Comprehensive Outdoor Recreation Plan, 1991).

Therefore, we recommend that the licensee implement the Remediation Plan in consultation with the WDNR and the NPS Saint Croix National Scenic Riverway office. The licensee should submit the final plan to the Commission for approval, including design drawings for any enhancement measures and schedules for installing the enhancement measures. Implementing the Remediation Plan includes measures consistent with the resource agencies' recommendation.

The canoe portage improvements would result in beneficial cumulative effects on recreation opportunities in the river basin. Specifically, the improvements would enhance canoe touring down the entire Namekagon River reach by providing a safe route around the project dam.

b. Recreation monitoring studies: The NPS recommends that Northern States invite the WDNR, the NPS, the FWS, and local agencies responsible for recreational facility planning, to meet every five years in order to review and address existing recreation and land management issues.

Our recommendation: The City of Hayward's public park, WDNR's river access, and Northern States proposed canoe portage improvements, would provide adequate access to both the project impoundment and tailwaters. Although these facilities should meet the projected recreational needs at the Hayward Project, recreational demands could require addition facilities over the term of the license. Therefore, the licensee should monitor recreational use at the project during the term of the license to ensure the adequacy of the recreation facilities.

Licensees are routinely required to file a Form 80 with the Commission every 6 years. This requires the licensee to monitor recreational use at the project throughout the term of the license. During the Form 80 data collection year, we also recommend that the licensee monitor the adequacy of the recreational facilities in the project area. The licensee should conduct these recreation monitoring studies in consultation with the WDNR, the NPS, the FWS, and local agencies responsible for recreational facility planning. Our recommended recreation monitoring studies would ensure the adequacy of recreation opportunities at the Hayward Project throughout the term of the license, as recommended by the NPS.

Unavoidable adverse impacts: None.

D. Project Retirement Effects

The project retirement alternative involves denial of the relicense application and surrender of the existing license with appropriate conditions. We consider project retirement to consist of the removal of generation equipment from the powerhouse and the electrical tie to the local power grid. Under this alternative the dam would remain in place and the Commission would seek an application for surrender of the project's original license. Under this scenario, Northern States would continue to maintain the project dam with a non-power license until a new owner assumed the responsibilities of the project facilities.

1. Geology and soils. Under the project retirement alternative, the surface levels of the impoundment would remain within the same range as those under the proposed run-of-river mode of operation. Retiring the project would not, therefore, increase the potential of significant shoreline erosion or stream sedimentation in the project area or below the dam. Also, no land-clearing or ground-disturbing activities would occur in connection with the retirement of the existing project development that would affect geological resources.

2. Water Resources.

a. Water quality: If the Hayward Project were to be retired, the flows in the Namekagon River downstream of the Hayward dam would be the same as flows under the proposed run-of-river operating mode. Flows would no longer, however, pass through the powerhouse but would pass over the dam spillway. Under the current operation, the project's hydraulic capacity is exceeded 46 percent of the time, so spillage already occurs frequently at the site. The additional turbulence that would accompany spillage over the dam may provide some minimal enhancement of DO levels in the river. Therefore, DO concentrations would probably be maintained at or above state of Wisconsin's water quality standards.

Under the project retirement alternative, Northern States would no longer minimize leakage through the use of a "cindering" process to seal holes between the stop-logs. Eliminating this practice would alleviate any potential of introducing contaminants that could affect ecological resources in the Namekagon River. The necessity for us to recommend that Northern States monitor the fly ash/cinders currently used at the project would no longer exist.

b. Project Operation: Under the project retirement alternative, flows in the Namekagon River downstream of the dam would be directly dependent on inflows to the impoundment. If the Hayward Project were retired, the impoundment elevation would be dependent on the crest of the outflow structure (elevation at about 1,187.4 feet). There would be no difference in the effects on the aquatic resources downstream of the dam when compared to the recommended and proposed run-of-river operating mode of the project.

c. Gaging: Under the retirement alternative, no flow gaging would be necessary since outflow over the Hayward dam would correspond in volume and periodicity to natural inflow to the Hayward impoundment. Therefore, if this alternative were selected, we would not recommend that Northern States develop a plan to monitor the operation of the project. In addition, we would not recommend Northern States' proposed improvement and maintenance of the existing headwater staff gage with public visibility features.

3. Fishery Resources.

a. Stream habitat in the bypassed reach: The concentrated tailrace flows that are presently discharged from the project powerhouse would no longer occur. Flows currently used for power generation would spill over the dam instead of passing through the powerhouse. The resulting additional spillage released over the project spillway may result in some enhancement of aquatic habitat for fish and macroinvertebrates. This scenario would no longer necessitate a required minimum flow into the bypassed reach.

Under the retirement alternative, we would continue to recommend that Northern States implement their Remediation Plan *(for further discussion see section V.C.2.b)*. Northern States developed this plan after spillway reconstruction subsequently degraded the aquatic habitat quality of the bypassed reach. We, therefore, conclude that implementing the proposed plan is necessary under the retirement alternative to restore aquatic habitat that was lost or damaged during Northern States' dam reconstruction.

b. Fish protection: If the Hayward Project was retired, the project operation would not result in turbine related mortality to fish in the Namekagon River. Also, any downstream fish movement would pass over the spillway and would not pass through the project turbines, as may occur now. Therefore, Northern States would not need to install a barrier net to minimize entrainment and turbine related mortality to fish. The absence of turbine mortality as a result of the discontinued operation, would benefit fisheries resources in the Namekagon River and therefore lessen any cumulative impacts to aquatic resources.

c. Fish passage: Under the retirement alternative, there may be no mechanism in place for the Commission to require Northern States to install, maintain, or operate fishways in the future. For the foreseeable future, the Hayward dam may continue to block the upstream passage of fish in the Namekagon River, and selection of the retirement alternative may preclude the installation of future fish passage facilities.

4. Terrestrial Resources.

a. Wildlife management on project lands: Under the retirement alternative, the 23 acres of project lands owned by Northern States would no longer be under Commission jurisdiction or protection, as described in section V.C.3. Therefore, Commission protection relating to the use of these lands will be lost. Northern States could be free to sub-divide the project lands that could led to increased human disturbance at the expense of terrestrial habitat for wildlife and botanical resources. Property conveyances could occur without Commission approval and agency comment, thus potentially reducing the amount of land available for recreation, wildlife management, and watershed protection.

In addition, there may be no Commission requirement for Northern States to (1) maintain the 23 acres of project lands as wildlife habitat with public access where permitted, (2) routinely consult with the WDNR wildlife managers regarding decisions affecting wildlife management on these lands, and (3) consult with the appropriate agencies on additions to project lands. Wildlife habitat within the 23 acres of project lands would be subject to any state or federal law governing the usage of private lands.

b. Wetland protection: If the project were retired, the project impoundment would remain in place and impoundment surface levels would remain within the same range as presently experienced. While flows currently used for power generation would spill over the dam, the same volume and periodicity of flows that now occur downstream of the project would continue after project retirement. Therefore, we expect that the existing riparian vegetation and wetland resources along the impoundment

shoreline and downstream of the project dam would remain unchanged.

We would not recommend requiring Northern States to develop and implement a plan to monitor purple loosestrife at the project. Nor would we recommend requiring Northern States to cooperate with the resource agencies to control and eliminate purple loosestrife from project lands. Without a plan to monitor purple loosestrife, the continued spread of this exotic species may go undetected and could displace valuable wetland species in the project area.

c. Drawdown management plan: Northern States' current ability to drawdown the project impoundment is dependent on the powerhouse intake. Since the overflow spillway does not have any gates, it would no longer be possible to drawdown the project under the project retirement alternative. Surface levels of the impoundment would remain as those under the proposed run-of-river operating mode. Therefore, we would no longer recommend that Northern States develop and implement a final drawdown management plan under the retirement alternative. Any potential biological resource benefits associated with management-based drawdowns would not occur without the provision for a drawdown management plan (*for further discussion see section V.C.3.d*).

5. Threatened and Endangered Species. Under the retirement alternative, there may be no Commission requirement to implement the bald eagle protection measures. These measures would include preserving suitable trees as potential nesting and perching trees on project lands. In addition, if the 23 acres of land were subdivided, as might occur if the lands were removed from the Commission's jurisdiction, increased human disturbance could result in a loss of suitable bald eagle habitat.

6. Cultural Resources. The Hayward Project facilities are not eligible for inclusion in the National Register and project retirement on the 23 acres of land within the project boundary wouldn't affect or threaten any known historic facility. Project retirement could, however, have an adverse effect on the known archaeological site located along the impoundment perimeter due to future erosional activity. Also, future ground-disturbing activities (i.e. logging) or bank erosion along the shoreline of the impoundment could affect undiscovered National Register-eligible properties in the project area. The licensing alternative's Programmatic Agreement, which includes contingency provisions to cover such eventualities, would not be in effect under a project retirement situation.

Transferring title of the project could result in an effect on the known archeological site that could diminish the properties' historic values. There are no assurances that the project would be transferred to an entity that would monitor

erosional activity at this archaeological site and continue to preserve its integrity. Including adequate restrictions or conditions in the transfer would ensure preservation of this particular property. If the Commission determined that the project should be retired, we would consult with Northern States, the Advisory Council, and the Wisconsin SHPO to seek ways to avoid or reduce the effects on historic properties.

Although we would seek ways to avoid or reduce adverse effects to known cultural resources within the Hayward Project boundary as a condition to project retirement, there is no guarantee that we would be successful. Further, previously undiscovered National Register-eligible properties could be affected in the future, through ground-disturbing activities or as a result of bank erosion along the shoreline of the impoundment.

7. Recreation and Other Land Uses. Under the retirement alternative, Northern States would not be required to maintain the project lands for recreational access or maintain the existing canoe portage. Also, Northern States could enter into lease agreements or land sales contracts, including sub-division of the 23 acres of project lands. The recreational access currently provided on these lands may not be maintained and may be closed to the public, resulting in a loss recreational opportunities in the region. Northern States would, however, maintain the project dam until another party assumed its responsibility; ensuring that Northern States maintains the project facilities would protect the recreational opportunities afforded by the impoundment (*see section V.C.6, for further discussion on the Lake Hayward's recreational importance).*

In addition, we would no longer require Northern States to monitor recreation use at the project to ensure the adequacy of recreational opportunities at the Hayward Project throughout the term of a new license.

We would recommend, as a condition of retirement, that Northern States repair existing erosion damage at the canoe portage as proposed under their Remediation Plan (*these measures are discussed in section V.C.6.a*). While we would recommend including adequate conditions to ensure that Northern States enhance the existing canoe portage by implementing the Remediation Plan, there may be no provisions for Northern States to maintain the portage.

8. Aesthetics. Project retirement would not involve any immediate, visible changes in project lands or structures. However, the well-maintained appearance of the project powerhouse, dam, and surrounding grounds may become impaired by the neglect that might result after retirement. Also, some aesthetic enhancement would occur as a result of increased

spillage over the dam. The incidence of spillage would increase from about 46 percent to 100 percent of the time, and the amount of spillage would increase by 120 to 178 cubic feet per second -- the hydraulic range of the existing project turbine.

Adverse effects could occur to the Namekagon River's scenic designation, under the Wild and Scenic Rivers Act, if the project lands were no longer protected from land disturbance or construction.

9. Socioeconomics. Lake Hayward is important to the city of Hayward's economy; Lake Hayward is an integral part of the city's tourism industry and about 25 percent of the city's tax base is lake-front property (letter from Lucy Gunther, Clerk-Treasurer, City of Hayward, Wisconsin, February 17, 1995). Under the project retirement alternative, Northern States would continue to maintain the Hayward impoundment until a new owner or party assumed responsibility of the project facilities. Project retirement, therefore, wouldn't result in significant impacts on employment, business, or infrastructure in the project area. Also, project retirement wouldn't result in any major construction activities that would affect the local economy. Some loss of tax revenues would probably result from retirement of the project's energy generation.

E. No-Action Alternative

The Hayward Hydroelectric Project is constructed and operating. Under the no-action alternative, the project would continue to operate under the terms and conditions of the existing license. No changes to the existing physical, biological, or cultural components would occur in the project area. Also, we wouldn't require Northern States to implement any new environmental protection or enhancement measures.

VI. DEVELOPMENTAL RESOURCES

In this section, we analyze the project's use of the water resources of the Namekagon River for hydropower purposes, give our estimate of the economic benefits of the proposed project, and look at the effects of various environmental enhancement measures on the project's benefits and costs. We also estimate the cost of retiring the project.

A. Power and Economic Benefits

A project would be economically beneficial, so long as it would cost less than the currently available alternative power (energy and capacity). In view of the changing economics in the electric industry, and the fact that project economics is one of the many public interest factors the Commission considers in

project licensing, the Commission is changing its approach to evaluating the economics of both new and existing hydroelectric projects. We no longer will employ an analysis that assumes alternative fossil fuel and other costs escalated steadily over the term of the license.[9]

In the case of the Hayward Project, Northern States has proposed no new capacity or unit upgrading. Consequently, the costs of the project operation would include carrying costs on the net investment, relicensing costs, any planned dam repair costs, operation and maintenance (O&M) costs, and the administrative and general (A&G) costs.

We made an estimate of the power value based on the average cost of alternative fossil fuel for utilities (plus variable O&M) in the East North Central Census Region, as published by the Energy Information Administration (EIA) of the Department of Energy.[10] We extrapolated the fossil fuel costs to the year 1995 at the rates of real escalation and inflation developed by EIA. Accordingly, we estimate the value of fossil fuel plus variable O&M would be about 17.6 mills per kWh in 1995.

We derived the alternative capacity value based on installing a state-of-the-art combined cycle plant plus its associated fixed O&M. We obtained a price quote from a large equipment manufacturer for a combined cycle unit and used a fixed charge rate of 14 percent in our evaluation. As a result, we estimate the value of alternative capacity plus fixed O&M would be about $109.33 per kW-year for a project coming on line in 1995, the base year of our analysis. We applied this value to the average (or creditable) capacity of the Hayward Project.

Northern States is a utility which uses all of the project power to serve its power system and its customers in portions of

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[9] See Mead Corporation, Publishing Paper Division, 72 FERC, ¶ 61,027 (July 13, 1995).

[10] Our estimate of the cost of alternative energy is based on the projected cost of energy generation in fossil-fueled steam electric plants in the East North Central Census Region of the country. Our estimate of the amount of fuel that would be displaced by the hydroelectric generation is based on the fuel consumption of a steam electric plant, operating at a heatrate of 10,600 Btu/kWh. We estimate the cost of fuel based on the Energy Information Administration's reference-case estimate of average real fossil fuel costs for electric utilities, shown on Table 13 of its February 1995 publication Supplement to the Annual Energy Outlook 1995, and on its reference-case projections of general escalation as shown by the GDP implicit price deflator indices on Table A19 of the same publication.

Wisconsin, Michigan, Minnesota, North Dakota, and South Dakota. It plans to continue this policy in the future.

In its September 23 and October 17, 1994 letters, Northern States provided us several items of cost information which were not available before issuing the DEA. Among the data that Northern States provided were the undepreciated net value of the project, the project relicensing costs to date, costs of dike stabilization work planned for October 1994, and its average annual O&M costs for a recent 21-year period.

In our 30-year study, we have taken the costs provided by Northern States, adjusted them to 1995 dollars, and amortized them over 20 years. This includes Northern States' O&M costs. In all of our studies we assumed there would be no escalation for any of the costs or power values beyond 1995, the base line year for our analyses. The results of these analyses are shown in Table 2 below, along with value of project power.

Table 2. Summary of the staff's estimate of benefits and costs for the Hayward Project **without** enhancement costs, in 1995 dollars (Source: staff).

Item	Annual Value	Annual Unit Value
Power value		
Alternative cost of power for utilities (1.45 gigawatt-hours gen.)	$43,600	30.1 mills
Project costs		
Undepreciated project debt	$18,600	12.8 Mills
Relicensing costs to date	$7,300	5.0 mills
Dike stabilization costs planned for October 1994	$4,600	3.2 mills
Annual O&M costs	$55,300	38.1 mills
SUBTOTAL PROJECT COSTS	$85,800	59.1 mills
NET ANNUAL BENEFITS OF PROJECT (without enhancement costs)	-$42,200	-29.1 mills

In summary, our economic analyses show that the project power costs are significantly more than the 1995 alternative power value (exceeding it by 97 percent) **without** consideration of any of the environmental enhancements listed in Table 3.

B. Economic and Power Reduction Costs of Various Enhancement Measures

The agencies recommended that the Hayward Project make an 8-cfs minimum flow release from the spillway into the bypassed reach of the Namekagon River. Northern States did not propose such a release but has agreed to make the release starting in 1994. The minimum flow release would reduce the project generation from 1.45 gigawatt-hours (GWh) to about 1.42 GWh, which amounts to a loss of 0.03 GWh or 30,000 kWh. We further estimate than an 8-cfs minimum flow release would reduce the project's annualized benefits by about $1,000 annually.

The FWS and WDNR recommended that Northern States install a seasonal barrier net to protect fish from turbine entrainment. In a letter dated November 16, 1993, Northern States developed a cost estimate for installing such a fish net annually. Northern States' original cost estimate included a net system cost; travel time, labor, and per diem costs; SCUBA diver expenses; and vehicle mileage charges. During the Section 10(j) telephone conference, WDNR agreed to install and maintain the barrier net seasonally if Northern States would reimburse it for the costs.

Northern States submitted a revised cost estimate on September 23, 1994, containing costs for annual deployment of the net by WDNR personnel, the cost for a one-time purchase of a barrier net, and the cost for a spare net. We used Northern States' revised cost estimate, adjusted it to 1995 dollars, and amortized the fish barrier net costs over a 20-year period. The results of our analysis are shown in Table 3 below.

Northern States provided a cost estimate for restoring the bypassed reach and improving the canoe portage at the Hayward Project, as proposed in their Remediation Plan. The estimate included costs for a deflector wall in the spillway channel and stabilization of an unimproved road for the portage facility. We amortized Northern States' cost estimate over a 20-year period in an independent analysis (see Table 3).

In its September 23, 1994, letter, Northern States provided a cost for their proposed headwater chart recorder. We also amortized this cost over a 20-year period and included it in Table 3.

The FWS and WDNR recommended that Northern States install a USGS-type stream gage at the Hayward Project if the present flow calibration system doesn't provide sufficient accurate data in

Table 3. Summary of possible enhancement costs for the Hayward Project, annualized by the staff in 1995 dollars (Source: staff).

	Item	Annual Cost	Unit Cost
1)	8-cfs minimum flow release	$1,000	0.7 mills**
2)	Seasonal barrier net	$2,200	1.5 mills**
3)	Bypassed Restoration & Canoe portage improvements (Remediation Plan)	$1,100	0.8 mills**
4)	Headwater chart recorder	$500	0.3 mills**
5)	USGS-type stream gage - installation and operation	$12,000	8.3 mills
6)	Installation of state-of-the-art headwater & tailwater monitoring equipment	$6,400	4.4 mills
7)	One full-time operator[1]	$30,700	21.2 mills
or			
	Installation of equipment for automatic operation	$47,900	33.0 mills
8)	Drawdown of 3 feet for 5.5 months[2]	$1,000	0.7 mills**
or			
	Drawdown of 3 feet for 3 months[3]	$600	0.4 mills
9)	Recalibrate turbine rating curve once every 2 years (annual cost)	$1,100	0.8 mills
Cumulative Cost Range		$55,600 to $73,200	38.4 mills to 50.5 mills

** Indicates a staff recommendation.

[1]A single operator would be on duty nearly 24 percent of the time, which means Northern States would have to employ at least four operators to have the project manned 24 hours per day, seven days a week. The cost for employing a crew of four operators would cost four times this amount.

[2]Assuming a drawdown once every 5 years at a cost of $4,900 per drawdown, this would amount to a cost of about $1,000 on an annual basis.

[3]Assuming a drawdown once every 5 years at a cost of $2,800 per drawdown, this would amount to a cost of about $600 on an annual basis.

the future. We obtained a cost from the USGS for installing a stream gage, operating that gage, and providing telemetry for the gage. We assumed the operational costs would not escalate beyond 1995. We amortized those costs and have shown our results in Table 3.

The FWS recommended additional continuous recording gages as part of their operational compliance plan recommendation. Our estimate for installing state-of-the-art headwater and tailwater monitoring and recording equipment, amortized over a 20-year period is also included in Table 3.

The FWS and WDNR recommended fairly close tolerances for operating the project reservoir (operating range of ±0.25 feet). Currently the turbine wicket gates are set manually by an operator stationed at the Trego Project which is about 45 minutes travel time away. We developed a cost estimate for Northern States to employ one (and only one) full-time operator for purpose of operating the project within the tolerances requested by the agencies. We assumed the one operator would be on duty 40 hours per week; nearly 24 percent of the time, with no one on duty the remaining 76 percent of the time. Our annualized cost estimate for employing a single station operator is shown in Table 3.

An alternative to employing a full-time operator at the Hayward Project is installing equipment so that the project would operate automatically by remote control. A major equipment manufacturer informed us that automatic control equipment for the Hayward Project would cost about $300,000 in 1994 dollars. We amortized this amount over a 20-year period and included the results in Table 3.

During the Section 10(j) conference telephone call on September 15, 1994, the WDNR indicated they could accept the 0.5-foot band of reservoir fluctuation, so long as Northern States would not use the reservoir for peaking purposes. We consider the issue resolved but have listed the costs for remedying the situation in Table 3; specifically, we have listed the costs for employing a full time operator and for installing equipment for automatic project operation.

The WDNR has requested a 5.5-month reservoir drawdown of 3 feet once every 4 or 5 years. Northern States objects to such a recommendation and estimated that the Hayward Project would lose 217,800 kWh of generation per drawdown. We made an independent analysis and estimate the project would lose about 160,000 kWh of generation per drawdown, which is lower than Northern States' estimate. We estimate the lost power would equate to about $4,900, based on our generation loss estimate, and have included this in Table 3. We point out that this loss is per each 5.5-

month drawdown occurrence and should be divided by the frequency of the drawdown to obtain the annual loss.

The average head at the Hayward Project site is 17 feet. Operating a turbine above or below its design head can cause cavitation damage to the turbine runner, as well as other operational problems. Neither Northern States nor the staff has addressed possible degradation effects on the turbine runner and other equipment by operating the project at a head of 14 feet for 5.5 months.

Alternatively, the staff looked at the impacts on project economics of a 3-month reservoir drawdown of 3 feet on a periodic basis. We estimate that the Hayward Project would lose about 90,000 kWh of generation per drawdown, which equates to about $2,800 per occurrence.

Finally, the agencies recommended that Northern States create a flow rating curve for the project and recalibrate it every 2 years. We obtained a cost from the USGS for calibrating a streamflow rating curve, annualized it over the life of the project, and included it in Table 3.

The costs in Table 3 were developed on the same basis as those in Table 2. Hence, any of these costs can be subtracted individually or collectively from the net project benefits shown in Table 2 to determine the approximate impact on project net annual benefits.

C. Economic Effects of Project Retirement

Since the annualized cost of continued operation of the project would be greater than the cost of other generation resources, we examined the economic effects of project retirement. The net benefits under the project retirement alternative (Shown in Table 4) would include the carrying costs of the undepreciated debt, relicensing costs to date, dike stabilization costs to make the decommissioned project safe, and annual dam maintenance costs.

D. Atmospheric Pollution Resulting from Project Retirement

Currently, more than forty percent of Northern States' energy requirements are satisfied by coal-fired, steam-electric generating facilities. As a result, energy to replace the 1,448,000 kWh of annual generation from the Hayward Project would probably come from coal-fired generation.

We have made estimates of the amount of coal necessary if the 1,448,000 kWh of electric energy were generated in a coal-fired steam-electric plant. We have also made estimates of the amounts of pollutants---oxides of sulfur, oxides of nitrogen,

Table 4. Summary of the staff's estimate of annualized benefits and costs for the Hayward Project retirement alternative **without** dam or powerhouse removal and **without** enhancement costs, in 1995 dollars (Source: staff).

Item	Annual Value
Power value	
Alternative cost of power for utilities (for zero gen.)	$ 0
Project costs	
Undepreciated project debt	$18,600
Relicensing costs to date	$7,300
Dike stabilization costs planned for October 1994	$4,600
Annual O&M costs[1]	$30,000
SUBTOTAL PROJECT COSTS	$60,500
NET ANNUAL BENEFITS OF PROJECT RETIREMENT	-$60,500

[1]We assume the annual O&M expense for the dam and associated works would amount to $30,000 annually, without escalation.

carbon monoxide, carbon dioxide, and particulate matter--- produced by burning that coal. In our analyses we assumed that the coal burned would contain 1.0 percent sulfur and the powerplants would not have state-of-the-art emission control systems. Table 5 shows the results of our analyses.

Carbon dioxide is considered to be a prime contributor to global warming, and the oxides of nitrogen and sulfur are considered to be prime contributors to the production of acid rain.

The recently enacted Clean Air Act mandates control of the fraction of the oxides of sulfur and nitrogen produced by combustion which can be released to the atmosphere. State-of-the-art pollution control technology is capable of removing about 95 percent of the oxides of sulfur and about 60 percent of the oxides of nitrogen from the flue gases produced by the combustion of coal by utility companies.

Removing the oxides of sulfur and nitrogen from the flue gas increases the cost of generating electricity. We have made

Table 5. Amounts of coal, resulting pollutants, and costs for pollutant removal, necessary to produce equivalent amounts of generation from a coal-fired steam-electric plant annually (Source: staff).

Item	Amounts
Pulverized Bituminous Coal (tons)	610.
Oxides of Sulfur (tons)	12.
Oxides of Nitrogen (tons)	5.
Carbon Monoxide (tons)	0.3
Carbon Dioxide (tons)	1,400.
Particulates (tons)	36.
Removal Costs for Oxides of Sulfur	$5,600.
Removal Costs for Oxides of Nitrogen	$1,300.

estimates of costs to utility companies for removing these oxides, assuming that the utility were to generate equivalent amounts of power that would be produced by the Hayward Project. These costs are also shown in Table 5. The removal costs for the oxides of nitrogen can vary widely; consequently, we used a midpoint cost above in our analysis.

The agencies have recommended that Northern States make a minimum flow release of 8 cfs from the spillway. Such a release would reduce the project generation slightly. Northern States would have to replace that small loss of generation at Hayward from a fossil-fueled steam-electric plant, which would in turn cause additional power plant emissions to be released into the atmosphere. However, we consider the slight increase in emissions to be insignificant. We conclude that continued operation of the Hayward Project would benefit air quality and the environment.

VII. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a)(1) of the FPA require the Commission to give equal consideration to all uses of the waterway on which a project is located. When the Commission reviews a hydropower project, the recreational, fish and wildlife, and other nondevelopmental values of the waterway are considered equally with its electric energy and other developmental values. In deciding whether, and under what conditions a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

The licensing of the Hayward Project is complicated by unusually high average annual O&M costs, and our economic studies of relicensing the project indicate negative net annual benefits. Recognizing that the net benefits of the project are negative, any additional enhancements would be an added financial burden on Northern States' ratepayers. Certain environmental enhancements would prove beneficial, however, those enhancements would increase the negative net benefits of the project. Due to the project's negative net annual benefits, we also evaluated project retirement as a reasonable alternative.

A. Recommended Alternative.

Our independent review and evaluation of the project included the project as proposed by Northern States, the project with staff and agency recommendations, the project retirement alternative, and the no-action alternative. Based on our analysis, we have selected issuing a subsequent license for the Hayward Project, with our recommended protection and enhancement measures, as the preferred option. We recommend this option because: (1) continued project operation, with our recommended measures, would have minor environmental effects; (2) our recommended environmental measures would protect and enhance fish and wildlife resources, water quality, cultural resources, and recreational resources; (3) the economic costs of operating the project as conditioned in the staff's recommended licensing alternative are less than the costs of project retirement; and (4) the electricity generated from a renewable resource would reduce the use of fossil-fueled, steam-electric generating plants, thereby, conserving nonrenewable energy resources and reducing atmospheric pollution.

Licensing the Hayward Project with our recommended measures would ensure that Northern States' ratepayers would continue to receive the benefits of hydroelectric power while providing environmental enhancement measures that we believe are in the public interest.

B. Developmental and Nondevelopmental uses of the waterway

The significantly higher cost of energy production for the staff's recommended licensing alternative weighs heavily against its energy and environmental benefits. For this reason, we concluded that the economic and environmental consequences of project retirement need to be weighed against the benefits of the staff's recommended licensing alternative.

In order to determine which course of action, on balance, is in the public interest we analyzed the economic and environmental consequences of the various alternatives. Table 6 shows the results of our economic studies of various alternatives including no action, licensing the project with various environmental

Table 6. Summary of economic comparison of alternatives for the Hayward Project (Source: staff).

	GROSS ANNUAL POWER VALUES	ANNUAL PROJECT COSTS	ANNUAL NET PROJECT BENEFITS[1]
No Action	$ 43,600	$ 85,800	-$ 42,200
Northern States' Proposal[2]	$ 42,600	$ 89,600	-$ 47,000
Agencies' Proposal[3]	$ 41,600	$109,100	-$ 67,500
Project Retirement[4]	$ 0	$ 61,600	-$ 61,600
Staff's licensing Proposal[5]	$ 41,600	$ 89,600	-$ 48,000

[1]Negative annual benefits represents a cost paid by Northern States' ratepayers.
[2]Northern States has agreed to make an 8-cfs minimum flow release, to install a fish net and reimburse the WDNR for installation labor costs, to implement their Remediation Plan, and install a headwater chart recorder
[3]The agencies recommend an 8-cfs minimum flow, a barrier net, implementing Northern States' Remediation Plan, a headwater chart recorder, an USGS-type stream gage, additional headwater and tailwater monitoring equipment, a periodic 3-foot reservoir drawdown for 5.5 months, headwater chart recorder costs, and recalibration of the turbine rating curve every 2 years.
[4]Includes a condition to implement Northern States' Remediation Plan
[5]The staff recommends an 8-cfs minimum flow, installation of a barrier net, Northern States' Remediation Plan, and headwater chart recorder, and a periodic 3-foot reservoir drawdown for 5.5 months.

enhancements, and project retirement. Below we clarify the recommended environmental measures and consequences under both the staff's licensing alternative and the project retirement alternative.

1. Staff's Licensing Alternative

This FEA analyzes the effects of Northern States' existing Hayward Project on the Namekagon River and, under the staff's licensing alternative, the staff recommends 16 measures to protect and enhance the environmental resources. The staff's recommended measures are:

- analyze annually the fly ash/cinders used to minimize leakage at the spillway;
- operate the project in a run-of-river mode;
- maintain the impoundment at a target elevation of 1,187.4 feet, with an allowable fluctuation limit between 1,187.0 feet and 1,187.5 feet under normal flow conditions;

- develop and implement a plan to monitor the run-of-river mode of operation and minimum flow requirement;
- maintain the existing headwater and tailwater staff gages and renovate the existing headwater chart recorder, which would continuously monitor impoundment levels;
- develop a plan to ensure downstream flows during power outages;
- provide a continuous minimum flow of 8 cfs, or inflow, whichever is less, to the bypassed reach;
- implement a fish protection plan to include a barrier net designed to protect fish from turbine entrainment;
- finalize and implement Northern States' Remediation Plan to restore the stream habitat in the bypassed reach and improve the canoe portage;
- maintain the existing trashracks, which have 1.5-inch clear bar spacing, to minimize resident fish entrainment and impingement;
- maintain the project lands as fish and wildlife habitat with public access where permitted;
- develop and implement a plan to monitor purple loosestrife and cooperate with the WDNR to control purple loosestrife;
- develop and implement a drawdown management plan for the project impoundment, including appropriate ramping rates;
- preserve all suitable trees (e.g., all large white and red pines) on project lands as potential bald eagle nesting and perching trees;
- implement the provisions contained in the Wisconsin Statewide Programmatic Agreement to protect cultural resources; and
- monitor the adequacy of the recreation facilities over the license term.

Our economic analyses show negative net economic benefits of the project (-$42,200 annually), **without** considering any of our recommended environmental enhancements. Operating the Hayward Project with our recommended enhancement measures would further reduce the projects net economic benefits to -$48,000 or about -33.1 mills/kWh (*see section VI., for a detailed economic analysis*). Under the staff's licensing alternative, the cost of the enhancement measures would increase the annual project cost

($85,800) by $3,800 to $89,600. In addition, staff's minimum flow enhancement and recommended periodic reservoir drawdown would further reduce the power benefits of the project ($43,600) by $2,000 to $41,600. Therefore, the staff's recommended measures would reduce the project's total net benefits by $5,800 annually (from -$42,200 to -$48,000).

The recommended 8 cfs minimum flow in the spillway channel would result in a loss of $1,000 annually over a 30-year period. We concluded that this expense is reasonable given the environmental benefits provided by the minimum flow (*described in detail in section V.C.2*). The 8 cfs minimum flow would provide adequate aeration to maintain water quality in the bypassed reach; protecting the instream habitat for fish and other aquatic organisms.

Renovating the existing headwater chart recorder would cost about $500 annually over a 30-year period. If the Hayward Project is licensed, we conclude that the headwater chart recorder is necessary to help verify the project's operation and improve the public's visibility features regarding impoundment water levels.

Our recommended fish protection plan includes providing a barrier net at the powerhouse intake from June 1 to July 31 annually (*described in detail in section V.C.2*). Through a cooperative arrangement between Northern States and WDNR, the licensee would purchase a barrier net and fund the installation and maintenance of the barrier net. Under the cooperative arrangement, WDNR would annually install and maintain the barrier net. Our recommended fish protection measures would cost the licensee about $2,200 annually. We conclude that this expense is reasonable given the fishery resources that would be protected from fish entrainment through the project.

Our recommendations for restoring the river channel below the spillway and improving the canoe portage at the Hayward Project would cost about $1,100 annually over the license period (*described in detail in section V.C.2 and section V.C.6*). The expense of these enhancements are reasonable when the benefit to both fishery and recreational resources are compared to the minimal energy loss associated with these enhancements.

The bypassed restoration measures would improve fishery habitat by increasing the depth and velocity of the bypassed reach, provide velocity shelters during periods of high flow, and help to maintain suitable substrates in the bypassed reach. Our recommended canoe portage improvements would upgrade the existing access below the dam.

In addition to the costs specified above, any management-based reservoir drawdowns to control nuisance vegetation growth

would further reduce project economics. We estimated the cost of a 5.5 month long drawdown every 4 to 5 years could reduce the project's power value by $4,900 per drawdown or about 11 percent of the gross annual energy value of the project. If the experimental drawdowns prove successful in controlling nuisance vegetation, the licensee would be required to implement as many as six drawdowns over the license period. Under this scenario, we estimated that the periodic reservoir drawdowns for 5.5 months would reduce the project's power value by $1,000 annually.

Measures considered, but not recommended - Our selected alternative didn't include adopting three measures recommended by the agencies regarding Northern States' operational compliance plan. The recommendations included: (1) installing USGS-type gaging stations, if needed in the future; (2) installing additional continuously recording headpond and tailwater devices; and (3) developing a flow rating curve (including calibration every two years). We found that requiring these measures would significantly effect the Hayward Project's economic benefits, costing Northern States nearly $20,000 annually.

USGS gaging and continuous recording equipment - Requiring a USGS gaging station and additional continuous recording gages, as recommended by the FWS, would cost Northern States about $18,400 annually. We concluded that these costs outweigh the value of their potential benefit since Northern States' proposed operational monitoring measures would adequately monitor the project's mode of operation. Northern States' proposed operational compliance system includes maintaining the existing headwater and tailwater staff gages, modifying the existing headwater staff gage for public visibility, and renovating an existing continuous recording headwater gage.

Flow rating curve - Northern States has indicated that a flow rating curve for the Hayward Project exists and calibration of the flow rating curve is based on flow through the turbine which has a very slow rate of wear. The added expense of $1,100 annually for Northern States to provide an additional flow rating curve and require them to calibrate the flow rating curve every two years, as recommended by WDNR, wouldn't provide any additional benefits.

In summary, we estimated that the combined costs to implement the three recommended measures discussed above would further reduce the project's negative economic benefits by nearly $20,000 annually. We concluded that the added expense associated with these measures don't outweigh the value of their potential benefit.

2. Project Retirement Alternative

Because the project is uneconomical without any enhancements, we considered project retirement as an alternative to licensing the Hayward Project. The negative net annual benefits under the project retirement alternative, including our recommended conditions, are $13,600 more than the staff's licensing alternative. Table 7 (on page 73) compares the environmental and economic effects of the Hayward Project under the staff's licensing alternative with the environmental and economic effects under the project retirement alternative.

We find that retirement of the Hayward Project would provide certain environmental enhancements. Under the project retirement alternative, the Hayward Project would no longer entrain fish, thus eliminating turbine-related mortality. Additional flows over the spillway could enhance aquatic habitat in the bypassed reach, increase DO concentrations downstream of the Hayward dam, and enhance aesthetic views of flows over the spillway. Retiring the project would eliminate Northern States' cindering process to minimize leakage; eliminating this practice would alleviate any potential of introducing contaminants in the Namekagon River (*see section V.D. for further discussion on the consequences of project retirement*).

If the Commission selects the project retirement alternative, we recommend including a condition to require Northern States to finalize and implement their Remediation Plan. Implementing the proposed plan is necessary under either alternative tc restore aquatic habitat that was lost or damaged during Northern States' recent dam reconstruction. Implementing the Remediation Plan would cost about $1,100 annually (*described in detail in section V.C.2 and section V.C.6*).

We also find that retirement of the Hayward Project would result in some negative environmental impacts on fishery, wildlife, cultural, and recreation resources. Regarding fishery resources, the future option to install fish passage at the project would be lost under project retirement. Protection of wetlands at the project against the invasion of exotic wetland species may also be lost. If the Commission no longer had jurisdiction over the 23 acres of lands within the project boundary, the sale or lease of these lands could lead to changes in land use practices. Increased human disturbances through timbering, agricultural or residential development could reduce the amount and quality of lands for recreation, wildlife, and botanical resources. These disturbances *could* also affect the Namekagon River's scenic designation, under the Wild and Scenic Act. If the Hayward Project were retired, the existing recreational facilities may not be maintained and the facilities could be closed to public access.

Under the project retirement alternative, cultural resources associated with the project would not receive the benefits and protection afforded to them through implementing the provisions of the Wisconsin Statewide Programmatic Agreement. Retirement may affect the characteristics of the archeological property at the project that is eligible for inclusion on the National Register. Also, any undiscovered cultural resources on the project lands would not be protected from human disturbances. If the Commission determined that the project should be retired, we would consult with Northern States, the Advisory Council, and the Wisconsin SHPO to seek ways to avoid or reduce the effects on historic properties. We recommend including a condition in the transfer that would ensure adequate protection of the archeological site within the project boundary.

The replacement of 1,448,000 kWh of lost Hayward Project energy with coal-fired generation would likely require the combustion of about 610 tons of pulverized bituminous coal annually, with the attendant production of air pollution and environmental degradation associated with mining and transporting the fuels. Finally, Northern States would incur the cost to amortize sunk project expenses without the benefit of the 1,448,000 kWh electrical energy generated annually by the Hayward Project.

Table 7. Comparative environmental effects of the Hayward Project under the staff's licensing alternative and under the project retirement alternative (Source: staff).

Resource	Staff's Licensing Alternative	Project Retirement alternative
Geology & Soils	No geological effects would result from the continued run-of-river operation or from any new construction.	Same.
Water Quality & Quantity	Potential introduction of contaminants into the river could result from Northern States' "cindering" process to seal small holes between stop-logs; staff recommended monitoring would help minimize this potential effect.	Eliminating the cindering process would alleviate potential contaminant introduction in the Namekagon River.
	Northern States would operate the project in a run-of-river mode and maintain a stable impoundment level; staff recommended operational monitoring plan would verify operational compliance.	Outflow would correspond in volume and periodicity to natural inflow; no flows would pass through the powerhouse and all flows would pass over the spillway. The additional turbulence resulting from increased spillage may provide minimal dissolved oxygen concentration enhancements.
Fisheries		
Bypassed reach habitat	Continuous minimum flow of 8 cfs would protect fisheries resources in the bypassed reach. Implementing the staff recommended bypassed reach restoration plan would improve the existing aquatic habitat.	Additional flows released over the spillway may further enhance aquatic habitat. We would still recommend implementing the bypassed reach restoration plan.
Fish protection	The existing 1.5-inch trashracks would continue to minimize fish entrainment and the staff recommended barrier net would further prevent fish entrainment during the period between June 1 to July 31.	Project retirement would alleviate entrainment, impingement, and any turbine related mortality effects to fish.

Table 7. (continued)

Resource	Staff's Licensing Alternative	Project Retirement alternative
Fish passage	The staff recommended license article would reserve Interior's authority to prescribe fishways in the future.	There would no longer be a mechanism enabling the Commission to require fishways in the future.
Vegetation & Wildlife		
Wildlife Management	Northern States would continue to maintain the 23 acres of project land as fish and wildlife habitat.	The 23 acres of project lands would no longer be protected under Commission jurisdiction and future land use practices could adversely affect terrestrial habitat on these lands.
Wetlands	Northern States would develop and implement a plan to monitor purple loosestrife and cooperate with the resource agencies to control and eliminate this species at the project.	Without a plan to monitor purple loosestrife, its continued spread may go undetected and could displace valuable wetland species at the project.
	Northern States' future management-based drawdowns could help control purple loosestrife and other nuisance weed growth.	It would no longer be possible to manually drawdown the impoundment and any potential biological benefits associated with management-based drawdowns would be lost.
Threatened & Endangered Species	Northern States would preserve trees on the 23 acres of project land that provide potential nesting and perching habitat for bald eagles.	If the project land was removed from Commission jurisdiction, the potential nesting or perching trees on the property would not be protected from disturbance and could result in a loss of suitable bald eagle habitat.
Cultural	Northern States would develop and implement a historic resource management plan to ensure adequate protection of known and undiscovered historic properties at the project, as required by the Wisconsin Statewide Programmatic Agreement.	The programmatic agreement would no longer be applicable to the project area and cultural resources at the project would not be adequately protected from future disturbance.

Table 7. (continued)

Resource	Staff's Licensing Alternative	Project Retirement alternative
Recreational	Northern States would enhance the existing canoe portage facility and ensure public access at the project.	While we would still recommend that Northern State enhance the canoe portage as part of their bypassed reach restoration plan, they would no longer be require to maintain recreational facilities or access at the project.
Aesthetics	No new project-related construction would obstruct the view shed at the project.	While the increased flows over the spillway would enhance the aesthetic views below the dam, the well-maintained appearance of the project facilities may become impaired by neglect. Adverse effects could occur to the Namekagon River's scenic designation, under the Wild and Scenic Rivers Act, if the project lands were no longer protected from land disturbance or construction.
Socioeconomics	Continued operation would not affect the local economy.	Some loss of tax revenues may result from retiring the project's energy generation.
Air Quality	Operating the project would not result in any air pollution effects.	Replacing the potential hydroelectric power produced by the Hayward Project with energy produced by a coal-fired steam-electric plant would annually result in about 600 pounds of additional carbon monoxide and 1,400 tons of additional carbon dioxide.
Hydroelectric Generation	Hayward would produce an annual energy generation of 1.42 gigawatt-hours.	None.
Net Annual Economic Benefits	-$48,000	-$61,600

C. Comprehensive plans

Section 10(a)(2) of the FPA requires the Commission to consider the extent to which a project is consistent with federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2), federal and state agencies filed a total of 63 comprehensive plans that address various resources in Wisconsin. Of these, we identified 12 plans relevant to the project.[11] No conflicts were found.

Conclusion of Section 10(a)(1) and 10(a)(2)

From our independent analysis of the environmental and economic effects of the project and the alternatives, as well as the comprehensive plans relevant to the project, we conclude that relicensing the Hayward Project, with our recommended environmental conditions, would best adapt the project to a comprehensive plan for developing the Saint Croix River Basin.

In summary, we conclude that the net economic and environmental benefits associated with issuing a subsequent license to Northern States outweigh the net economic and

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[11] **Federal Plans:** St. Croix National Scenic Riverway final master plan, 1976, National Park Service; Land protection plan, 1984, St. Croix National Scenic Riverway, National Park Service; Land protection plan, 1984, Lower St. Croix National Scenic Riverway, National Park Service; Statement for management, St. Croix and Lower St. Croix National Scenic Riverways, 1986, National Park Service; Comprehensive master plan for the management of the upper Mississippi River system - Environmental report, 1986, National Park Service; North American waterfowl management plan, 1986, U.S. Fish and Wildlife Service and Canadian Wildlife Service; and Fisheries USA: the recreational fisheries policy of the U.S. Fish and Wildlife Service, Fish and Wildlife Service.

State Plans: St. Croix River Basin areawide water quality management plan, 1980, Wisconsin Department of Natural Resources; Statewide comprehensive outdoor recreation plan, 1991, Wisconsin Department of Natural Resources; Upper St. Croix management policy resolution, 1993, Upper St. Croix Management Commission; Wisconsin water quality assessment report to Congress, 1992, Wisconsin Department of Natural Resources; and An evaluation of the sedimentation process and management alternatives for the Trego flowage, Washburn County, Wisconsin, 1989, Wisconsin Department of Natural Resources.

environmental benefits of project retirement. Thus, our preferred alternative is relicensing the Hayward Project.

VIII. CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS

Section 10(j) of the FPA requires the Commission to include license conditions, based on recommendations provided by the federal and state fish and wildlife agencies for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources affected by the project. We have addressed the concerns of the federal and state fish and wildlife agencies and made recommendations, some of which are inconsistent with those of the agencies.

Section 10(j) of the FPA states that whenever the Commission believes any fish and wildlife agency recommendations are inconsistent with the purposes and requirements of the FPA or other applicable law, the Commission and the agencies shall attempt to resolve any such inconsistency, giving due weight to the recommendations, expertise, and statutory responsibilities of such agencies. Both the FWS and WDNR recommended license conditions pursuant to Section 10(j) of the FPA. The NPS also provided Section 4(e) recommendations which we've considered under Section 10(a) of the FPA (*for further discussion on the NPS's recommendations see section III, Mandatory Requirements, page 5*).

We determine that some of the federal and state fish and wildlife agencies' recommendations conflicted with the comprehensive planning and public interest standards of Sections 4(e) and 10(a) of the FPA. Specifically, we do not recommend requiring Northern States to implement the following three measures regarding Northern States' operational compliance plan: (1) installing additional continuously recording headpond and tailwater devices; (2) installing USGS-type gaging stations, if needed in the future; (3) developing a flow rating curve (including calibration every two years). We found that requiring these measures would cost Northern States nearly $20,000 annually, further reducing the project's negative economic benefits. We concluded that the excessive costs of implementing these recommendations would significantly impact the project's economics and that the costs are more than the value of their potential benefits.

Moreover, we determine that the following agency recommendations are inappropriate fish and wildlife recommendations: (1) the FWS's and WDNR's recommendations concerning a re-opener clause to recommend additional facilities or modifications to project structures and operation; (2) WDNR's recommendation regarding the consistency of project operation with federal and state comprehensive plans; (3) WDNR's

recommendation pertaining to recreation access; (4) WDNR's recommendation to comply with applicable state laws and permits; and (5) the FWS's project retirement fund recommendation. Under Section 10(j) of the FPA, these recommendations do not provide measures for the protection, mitigation of damages to, and enhancement of fish and wildlife resources.

Recommendations that we considered outside of the scope of 10(j) were considered under Section 10(a) of the FPA. With two exceptions, these recommendations are addressed in the specific resource sections of this FEA (*see section V.C*). We have not addressed WDNR's recommendations which require compliance with Wisconsin State statutes and codes. The applicability of state law requirements to licensed projects is beyond the scope of this FEA.

We also have not addressed the FWS's project retirement fund recommendation. The FWS recommended, under Section 10(j) of the FPA, that the licensee establish a retirement fund for the Hayward Project. Specifically, the FWS recommends that within 1 year, and in consultation with the resource agencies, the licensee should estimate the costs of: (a) permanent non-power operation; (b) partial project removal; or (c) complete project removal at the Hayward Project. They further recommend that the licensee submit to the Commission, for approval, the cost estimates and a schedule for making payments to a trust fund. Within 5 years of license issuance the licensee should begin payments to the trust fund according to the approved schedule, and the State of Wisconsin should be the beneficiary.

The FWS's retirement fund recommendation is not a fish and wildlife recommendation pursuant to Section 10(j) of the FPA, in that it does not provide measures for the protection, mitigation of damages to, and enhancement of fish and wildlife resources. Furthermore, the statements made by the FWS in support of its recommendation provide no evidence that a trust fund is needed, and we conclude that it is an inappropriate recommendation.

The federal and state recommendations subject to Section 10(j) and 10(a), and whether they are adopted under the staff alternative, are detailed in Table 8. We attempted to resolve the inconsistencies between our recommended resource enhancement measures and those of the federal and state agencies during a September 15, 1994, telephone conference.

During the Section 10(j) telephone conference, three 10(j) issues were discussed, including specific provisions of the reservoir drawdown management plan, the seasonal barrier net, and the impoundment fluctuation limit. We reached agreement on the seasonal barrier net and the impoundment fluctuation limit. Discussions in Sections V.C.1.b., V.C.2.c., and V.C.3.d., and in

our responses to comments on the DEA reflect the outcome of discussions during the Section 10(j) telephone conference.

Table 8. Summary of agency recommendations and actions (Source: staff).

Recommendation	Agency	Within scope of § 10(j)	Annual cost of environmental measures	Adopted
1. Monitor the fly ash/ cinders used at the project	WDNR	Yes	Indeterminate	Yes
2. Run-of-river operation with a impoundment fluctuation limit of ±0.25 feet	FWS WDNR	Yes	Indeterminate	No (resolved at 10(j) meeting)
3. Consult with agencies during drought events that require alteration of project operation	WDNR	Yes	Indeterminate	Yes
4. Maintain headwater and tailwater staff gages	WDNR	Yes	Indeterminate	Yes
5. Create a flow rating curve for the project and calibrate flows every 2 years	WDNR	Yes	$1,100	No (No agency comments at 10(j) meeting - resolved)
6. Develop a plan to monitor the project operation	FWS	Yes	$18,400	No (partial: Our recommended plan doesn't include additional continuous recording gages and USGS-type flow gages. No agency comments at 10(j) meeting - resolved)
7. Ensure downstream flows during power outages	FWS	Yes	Indeterminate	Yes
8. Maintain a upstream staff gauge which is visible to the public	WDNR	Yes	$500	Yes

Table 8. (continued)

Recommendation	Agency	Within scope of § 10(j)	Annual cost of environmental measures	Adopted
9. Ensure that project operation is consistent with federal and state comprehensive plans	WDNR	No	Indeterminate	Yes
10. Maintain a minimum flow of 8 cfs in the bypassed reach	FWS WDNR	Yes	$1,000	Yes
11. Implement habitat rehabilitation for the bypassed reach and canoe portage plan	WDNR	Yes	$1,100	Yes
12. Install seasonal barrier net	FWS WDNR	Yes	$2,200	Yes (Resolved through 10(j) process)
13. Retain the 23 acres of project lands for the protection of fish and wildlife	FWS	Yes	Indeterminate	Yes
14. Purple loosestrife monitoring and control measures	FWS WDNR	Yes	Indeterminate	Yes
15. Develop a drawdown management plan which includes appropriate ramping rates	FWS WDNR	Yes	$1,000	Yes
16. Reopener clause to recommend additional facilities or modifications to project structures and operation	FWS WDNR	No	Indeterminate	No
17. Preserve all super canopy trees in project area for potential bald eagle nesting sites	FWS	Yes	Indeterminate	Yes

Table 8. (continued)

Recommendation	Agency	Within scope of § 10(j)	Annual cost of environmental measures	Adopted
18. Barrier-free canoe portage improvements	WDNR	No	Indeterminate	Yes
19. Compliance with Wisconsin State statutes and codes	WDNR	No	Indeterminate	No
20. Project retirement fund	FWS	No	Indeterminate	No

IX. FINDING OF NO SIGNIFICANT IMPACT

Continuing to operate the Hayward Project, with our recommended protection and enhancement measures, involves no land-disturbing or land-clearing activities. Our recommended measures would ensure state water quality standards, ensure natural flow patterns below the project, and prevent potential dewatering to the impoundment shoreline and tailwater areas. Restoration of the river channel below the spillway and improvements to the canoe portage would cause minor, short-term increases in soil erosion and sedimentation. Project operation and the associated fish entrained through the project's turbines would result in some minor, long-term effects on resident fish in the Namekagon River. Maintaining the existing trashracks would continue to minimize these effects and implementing our recommended fish protection plan would further prevent losses to the fishery resources.

On the basis of our independent environmental analysis, relicensing the Hayward Project would not constitute a major federal action significantly affecting the quality of the human environment.

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APPENDIX A

LETTERS OF COMMENT ON THE DRAFT ENVIRONMENTAL ASSESSMENT
AND STAFF RESPONSES

Northern States Power Company

July 14, 1994

Ms. Lois Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capital Street, N.E.
Washington, D.C. 20426

Dear Madam Secretary,

RE: HAYWARD HYDROELECTRIC PROJECT, FERC PROJECT NO. 2417-001
COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT

Northern States Power Company (NSP) has reviewed the Draft Environmental Assessment (EA) for the Hayward Project, dated June 16, 1994, and offers the following comment for consideration by the Commission Staff (hereinafter Staff).

Under section V.C.6.a , page 45, of the Draft EA, the Staff recommends that NSP redesign the canoe portage trail at the Hayward Dam to ensure that there are no architectural barriers which would exclude disabled individuals. Specific actions that were recommended included installation of a hardened surface, switch back, trail that meets the ADA barrier-free design standards, and safety railing at the canoe put-in.

1. As indicated in our previously filed comments, dated November 16, 1993, NSP disagrees with the above cited recommendation. The basis for our disagreement is several fold. First, the ADA states that it is discriminatory to fail to remove structural, architectural, and communication barriers in existing facilities (the Hayward Dam canoe portage trail is an existing facility) where such removal is "readily achievable" - easily accomplished and carried out without much difficulty or expense. NSP does not believe that installation of the switch-back trail recommended by the staff meets the "reasonable" criteria spelled out in the ADA for the following reasons:

   1) The recommended slope of a trail to accommodate access by handicapped individuals is 20:1 with rest areas every 100 feet.

   - The slope to be descended at the Hayward dam is at least 20 feet high and covered for the most part with trees and shrubs. The lateral area along the face of the slope that can accommodate the trail is limited to about 100 feet, at the maximum. The slope specifications and site constraints translate to a trail that would have to be at least 400 feet long with four switch backs cut across the face of the slope

1. We agree, see revised section V.C.6.a.

3) Trail formation would severely alter the vegetative cover, drainage pattern and aesthetic character of the hillside in the dam tail-water area. This would not be a "reasonable" compromise for the overwhelming majority of users of the area who are not handicapped.

4) The Staff recommendation does not address measures that would have to be developed at the canoe "take-out" to make the project site totally accessible for the handicapped. At the "take-out", there is another steep bank that is at least 6 feet high which would pose comparable installation concerns as on the downstream side of the dam.

5) The likelihood of use of the portage trail by the disabled is remote. Most canoeists who use the Namekagon River upstream from the project plan their trip so they are ready to take-out at the headwaters of Lake Hayward rather than paddle through the lake's 2.25 miles of slack water to take-out at the dam. Those who canoe the river downstream from the city of Hayward start their journey at the DNR launch site which is located about 0.50 miles downstream from the Hayward dam. The launch site provides excellent highway access, good parking, and ready access with a wooden dock to the river for the handicapped individuals. These two sites would be expected to receive the majority of use by the canoeing public, irrespective of the planned improvements at the dam's portage trail.

NSP wants to clarify that we support the ADA and have incorporated appropriate barrier-free facilities throughout our buildings and other facilities. At the same time, we believe there needs to be a certain degree of reasonableness applied when there is room to apply this criterion for existing facilities. In the case of the staff's recommended barrier-free canoe portage trail, we do not believe that the ADA-specified reasonableness criterion is met. NSP, therefore requests that staff's recommendation on this issue be reconsidered during preparation of the final EA.

Thank you for the opportunity to comment on the draft EA. Any questions on this filing can be directed to me by telephone at 715/839-2692.

Very truly yours,

Lloyd Everhart

Lloyd Everhart, Administrator
Hydro Licensing & Environmental Studies

c: J. Schierer (WDNR)
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July 27, 1994

Ms. Lois D. Cashell, Secretary
Federal Energy Regulatory Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

COMMENTS ON DRAFT ENVIRONMENTAL ASSESSMENT
Hayward Hydroelectric Project
FERC Project #2417
Northern States Power Company

Dear Ms. Cashe.

The Wisconsin Department of Natural Resources submits the following comments on the Draft Environmental Assessment which the Commission prepared for Northern States Power Company's Hayward Hydroelectric Project. Please consider these comments when you finalize the Environmental Assessment for this project. We are particularly concerned about the Commission's preliminary determination on our recommendations for the provisions of the Drawdown Management Plan and our request for a fish barrier net to mitigate entrainment. In accordance with the Commission's regulations, we have enclosed this original plus 8 copies of our remarks on the Draft Environmental Assessment. We have also sent copies of this letter to all parties on the Commission's service list for Project #2417.

We support the Commission's recommendation to relicense the Trego and Hayward hydroelectric projects together. By adjusting the license terms for these projects so that their subsequent licenses expire at the same time, the Commission can facilitate a comprehensive and coordinated review of the environmental effects of the Trego and Hayward hydro projects on the resources of the St. Croix/Namekagon river system.

1. Our second comment concerns the administration of Wisconsin's floodplain zoning and dam safety programs. The last paragraph on page 57 of the Draft Environmental Assessment dismissed our recommendation for license articles requiring compliance with the Chapters 30 and 31 of the Wisconsin State Statutes, as well as with NR 116 (Wisconsin's Floodplain Management Program), NR 330 (Warning Signs and Portages for Dams), and NR 333 (Dam Design and Construction Standards) of the Wisconsin Administrative Code:

> "We have not addressed WDNR's recommendations which require compliance with Wisconsin State statutes and codes. The applicability of state law requirements to licensed projects is beyond the scope of this DEA."

We believe that dam safety and floodplain zoning issues should be considered in the Environmental Assessment for any hydro project under the comprehensive development standard of the Federal Power Act. Matters related to dam safety and floodplain zoning affect not only the human environment, but the natural environment as well. Therefore, floodplain zoning and dam safety concerns should be addressed in the Environmental Assessment to adequately ensure the public's welfare and to protect natural resources. In addition, there have been recent court challenges regarding the state and federal regulatory authority for dam safety and floodplain zoning at licensed hydroelectric

1. **State verses Federal Law.** Comment noted, Mead and Hunt, consulting engineers for Northern States Power Company (Northern States), completed a dam break analysis for the Hayward Project and filed it on May 26, 1992. The analysis was made for purposes of the reevaluation of the hazard potential rating of the project. The Federal Energy Regulatory Commission's (Commission) Chicago Regional Office informed Northern States, by letter dated November 5, 1992, that the hazard potential classification would remain "low."

We have no objection if Northern States wishes to voluntarily file a copy of the dam break analysis with the State of Wisconsin. However, we will not recommend any license article which requires Northern States to comply with state law dealing with flood plain management and dam design standards. The

projects. We request affirmation of your position in light of the First Iowa and Rock Creek decisions by the U.S. Supreme Court. If you conclude that the state's authority is preempted by federal jurisdiction, then we request that you include the provisions of NR 116, NR 330, and NR 333 in the license to adequately protect public health, safety, and welfare. We ask that you require the licensee to use warning signs that comply with the provisions of NR 330. This license provision will promote consistency in warning signage among dam sites and help to avoid any confusion on the part of the public users.

2. We concur with the Commission's recommendation that Northern States Power should develop and implement a Drawdown Management Plan for Lake Hayward in consultation with the resource agencies. We do not object to rewording our recommendation for a drawdown rate to provide some flexibility. We can agree to a drawdown rate of 6 inches/day at about 1 inch every 4 hours, provided that water levels decrease slowly and gradually. We cannot permit the reservoir to be drawn rapidly and suddenly, even within the prescribed rate of 6 inches/day. However, we disagree with your specific recommendations that the provisions for monitoring sediments and biological resources should be excluded from the plan. Your staff pointed out that the recommended drawdown rates and alternatives to drawdowns, such as cofferdams and diver inspections, would minimize resuspension and movement of the sediments and minimize any adverse effects to biological resources. We recognize that appropriate alternatives to drawdowns could preclude the need to monitor sediments and biological resources. Our recommendation was intended to cover those instances where a reservoir drawdown was necessary or desired, and no suitable alternative could be found to accomplish the same objectives. We believe that it is necessary to monitor sediments and biological resources during future drawdowns on a case-by-case basis to verify that the prescribed methods and rates of the drawdown provide adequate resource protection. The drawdown rate of 6 inches/day and 1 inch every 4 hours is a generic recommendation, based on the professional judgment of our resource managers, for reducing the adverse impacts of drawdowns. By monitoring sediments and biological resources during drawdowns, the drawdown rate and procedures can be adjusted, if necessary, for optimal resource protection under the specific circumstances of that particular drawdown. For instance, if observations reveal that a drawdown is jeopardizing a sensitive species or habitat, then preventive or corrective actions could be taken before the full impact is realized. We believe that provisions for monitoring sediments and biological resources during future drawdowns are essential components of a Drawdown Management Plan because they serve as specific measures to protect fish and wildlife resources. We ask the Commission to reconsider its recommendation that these provisions should be excluded from the Drawdown Management Plan for the Hayward Hydro Project.

We also ask the Commission to reexamine its recommendation for shortening the duration of the 5½-month management-based drawdown which the Department proposed for Lake Hayward. We disagree with your staff's opinion that a drawdown lasting 30 days would probably result in the same environmental benefits anticipated from one lasting 5½ months. To correct an apparent misunderstanding, we would also like to clarify several points about the experimental nature of the management-based drawdown that we made in our original recommendation. According to the Draft Environmental Assessment, the Commission staff believed that a 5½-month drawdown is too lengthy because the recommended drawdowns are an experimental approach to control aquatic plants and because the environmental benefits of drawing the Hayward impoundment are not currently verified. We want to point out that the practice of manipulating the water level of impoundments to control aquatic macrophytes and improve fish populations is a proven management technique that is both highly effective and cheap. The scientific literature contains numerous citations where management-based drawdowns were successfully used to control nuisance aquatic vegetation, improve the spawning success of gamefish, increase the growth rates of stunted panfish populations, compact sediments for better navigation and enhanced recreational opportunities, etc.[1] The reference to an

[1]We have provided several examples from the numerous citations on management-based drawdowns.

Beem, J. H. 1981. The effect of water level management on populations trends of white crappie in Elk City reservoir, Kansas. North American Journal of Fisheries Management 3:34-40.

Beard, T. D. 1984. Overwinter drawdown, impact on the aquatic vegetation in Murphy Flowage, Wisconsin. Technical Bulletin No. 61. Department of Natural Resources, Madison, Wisconsin.

Commission should not encumber a project license with requirements that would force Northern States to comply with state dam safety laws. The Hayward dam is subject to the safety standards of the Commission, which has full authority over all dam safety matters.

2. **Drawdown management plan.** While staff maintains that the rate of reservoir drawdown would minimize the resuspension of sediments and minimize any adverse effects on sensitive biological resources, we recognize Wisconsin Department of Natural Resources' (WDNR) concerns. Regarding the resuspension of sediments issue, the WDNR noted during the Section 10(j) telephone conference that they knew of one contaminated site about .5 mile upstream of the dam that contained chromium, oil, and grease deposits. Although no specific sensitive biological resource has been identified thus far, we recognize that there is a potential for an adverse effect on such resources with reservoir drawdown. Also, we recognize that with monitoring, certain adjustments could be made with the drawdown rate and procedure to minimize resuspension of sediments and protect sensitive biological resources. However, as discussed during the Section 10(j) negotiations, we maintain that the WDNR is responsible for such monitoring. The WDNR agreed. Therefore, we have revised our recommendation in section V.C.3.d. to include a requirement for the licensee to develop a cooperative agreement with the WDNR to monitor sediments and sensitive biological resources during non-emergency reservoir drawdown events.

In reconsideration of the reservoir drawdown period issue, staff finds that a 30-day drawdown period would probably not be sufficient for intended purpose of submerged aquatic plant reduction and sediment compaction. The WDNR states that both sediment compaction and aquatic plant reduction rely on exposing the littoral zone to subfreezing temperatures and desiccating conditions for extended periods. The WDNR does not state specifically what the extended period should be, but does indicate that it should be longer than 30 days. During the 10(j)

"experimental drawdown" in our original recommendation was not intended to imply that there is a need to test the effectiveness of drawdowns as a means to achieve resource management objectives. From our own experiences and those of others, we are convinced that seasonal pond level manipulations can serve as an effective means for managing the aquatic community in impoundments with water control structures. Many of our resource managers routinely employ reservoir drawdowns for the very purposes discussed above. We are confident that our recommended winter drawdown would benefit the resources in Lake Hayward.

Our reason for the "experimental drawdown" of the Hayward Flowage was intended to provide an opportunity to demonstrate the benefits of periodic winter drawdowns of 2 to 3 feet every 4 to 5 years. After the first scheduled drawdown in 1995-96, we would evaluate the positive and negative aspects of the drawdown with respect to fish, wildlife, and aquatic plant communities, hydropower generation, winter and summer recreational opportunities, littoral habitat, sediment control, impacts on furbearers, reptiles, and amphibians, muskellunge reproduction, panfish size structure, etc. If the first drawdown results in appreciable benefits to resources, we requested the Commission to incorporate management-based drawdowns at 4 to 5 year intervals into the subsequent license as a long term provision of the Drawdown Management Plan. If the first "experimental" drawdown results in marginal benefits or unacceptable adverse impacts to natural resources or hydroelectric generation, then management-based drawdowns would be discontinued. We regret if our original recommendation caused any confusion, and we hope that this explanation clearly defines our Hydro Review Team's position on management based drawdowns at the Hayward Project.

The Commission staff also believed that the 30-day drawdown suggested by Northern States Power was more reasonable because it would probably yield the same environmental benefits as a 5½-month drawdown, but a 1-month drawdown in late autumn would not require modifications to the project's dam. The Department's resource managers do not believe that a 1-month-long drawdown in late fall would produce the same anticipated benefits as a 5½-month drawdown. If fact, we are skeptical that a 30-day drawdown during the fall would yield any measurable resource benefits for Lake Hayward. Most of the management objectives that were listed above focus on reducing the density of the aquatic macrophytes and consolidating the sediments in the littoral zone. Both sediment compaction and aquatic plant reduction rely on exposing the littoral zone to subfreezing temperatures and desiccating conditions for extended periods. While it may be possible to begin refilling the reservoir before April 1, we believe that the winter drawdown should last longer than 30 days. Furthermore, our experiences have shown that successful management drawdowns require exposure to harsh winter conditions that will not be present in late fall, even at the latitude of the Hayward Project. A month-long drawdown of Lake Hayward for road construction in the fall of 1991 resulted in no perceptible change in the density of aquatic vegetation.

We emphasize that over the 30-year term of the subsequent license the associated cost of the management based drawdowns is reasonable. Northern States Power's objections to our recommended drawdown included concerns about lost generation from a 3 foot decrease in operating head during a 5½-month drawdown. They estimate that

Benson, N. G., and P. L. Hudson. 1975. Effects of a reduced fall drawdown on benthos abundance in Lake Francis Case. Transactions of the American Fisheries Society 104:526-528.

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negotiations the WDNR indicated that a 2 to 3 month period may be acceptable. Cooke, et. al. (1986), states that long periods of drying and freezing are needed (three weeks or more) to kill plants such as Eurasian water milfoil.

Staff contends that drawing the reservoir down for a period of 2 to 3 months beginning in the late fall (e.g., November) is likely to be sufficient to provide the drying and freezing needed to compact sediments and reduce aquatic plants. However, staff recognizes that during some years the climatic conditions may not be suitable to achieve the intended results. For example, heavy snows may fall during the first part of the drawdown period, which would tend to insulate the exposed reservoir bottom preventing sufficient drying and freezing. Therefore, because of the uncertainty of the drawdown period duration and appropriate climatic conditions, among other variables, the drawdown plan should incorporate provisions for modifications, or adaptive management. Revisions have been made in section V.C.3.d regarding these changes in staff's position.

each drawdown would reduce the gross energy value for the project by about 15%. This cost must be levelized over the 30-year term of the next license. Our recommended management-based drawdowns could take place as many as 5 to 7 times, or only once, depending on the evaluation of the first drawdown. For the remaining 23 to 29 years, Northern States can maintain a target pond elevation of 1187.4 feet to produce hydropower under the run-of-river conditions of project operation. The Draft Environmental Assessment explains that the Hayward Project supplies a renewable source of energy, that there is a demonstrated need for this power to meet the anticipated increase in demand in this region, and that replacement of lost generation would probably come from fossil fuel burning steam plants which contribute to atmospheric pollution and global warming. Consequently, we would be receptive to proposals for reasonable modifications to the magnitude, duration, and frequency of management drawdowns for the purpose of reducing generational losses, provided that the objectives of the drawdowns and the probability of meeting those objectives is not compromised. Northern States can pursue any such options for decreasing lost generation when it prepares its Drawdown Management Plan in consultation with the resource agencies. In addition, we have already agreed to coordinate drawdowns for resource management with drawdowns scheduled for the maintenance and inspection of project structures whenever possible. Northern States also explained that a 3-foot drawdown would create an opening between the power canal and the powerhouse, and the resulting loss of heat through this opening would cause severe ice build-up that could damage the turbine. Although Northern States did not provide a cost estimate to alleviate this problem, we believe that a temporary and reusable addition to the curtain wall could be inexpensively installed at the intake to prevent heat loss from the powerhouse during winter drawdowns.

The provisions for management based drawdowns and for monitoring sediments and biological resources during future drawdowns are specific measures to protect and enhance fish and wildlife resources. Over the 30-year license term, the cost of implementing these provisions is reasonable in light of the value of their benefits to the aquatic and recreational resources of Lake Hayward. Therefore, we ask that these provisions be retained in the Drawdown Management Plan as conditions of the license for the Hayward Hydro Project.

3. Finally, we wish to address the Commission's preliminary determination that our recommendation for installing a seasonal barrier net as mitigation for fish entrainment conflicts with the comprehensive planning and public interest standards of the Federal Power Act because the cost of the seasonal barrier net is greater than its potential benefits. We believe the estimated price for installing and maintaining the barrier net was exorbitantly inflated in the cost/benefit analysis. We disagree with your staff's conclusion that Northern States Power's proposal to maintain the existing 14-inch trashracks would continue to provide a level of fish protection that would minimize resident entrainment and impingement at the Hayward Project. In addition, we wish to present supplemental information to support the need for entrainment protection and to persuade the Commission to incorporate our recommendation for a barrier net as an article of the subsequent license for this project.

It may be helpful to briefly recount the proceedings on the entrainment issue. In early consultations for this license application, the Department identified fish entrainment as one of the resource issues associated with the Hayward Hydro Project. In response, Northern States Power proposed to place a barrier net in front of the plant intake as a direct mitigation measure, in lieu of conducting comprehensive fish surveys on Lake Hayward and entrainment studies. We did not accept the proposition to jump straight to mitigation without evaluation. We reiterated our original recommendation and referred to our fisheries management guidelines which offer a range of options to address entrainment at the Hayward Project. At that time we believed that the results from other entrainment studies could be applied to the Hayward Project, provided that there were enough similarities in the projects and the fish communities to do so. In addition, the Department would need quantitative fisheries information from a comprehensive survey on Lake Hayward to enable us to relate the results from other studies to the fishery at the Hayward Project. We agreed to wait for the results of several ongoing and scheduled entrainment studies that were necessary for the environmental review of other license applications. We would then determine whether or not the results of those studies could be used to infer the impact of entrainment on the fishery at Lake Hayward. Northern States Power did address entrainment in their license application, citing entrainment studies done at their Thornapple Hydro Project and elsewhere. We disagreed with their conclusion that turbine passage and mortality should be low at the Hayward Hydro site. Although Lake Hayward supports a good fishery for other species, adult walleyes density is substantially below the regional average. Based on studies at other sites, including the Thornapple Entrainment Study, we inferred that entrainment of young walleyes through the project's turbine and

3. Fish entrainment and installation of a seasonal barrier net. Commission staff held a telephone conference call, September 15, 1994 with representatives from the WDNR, U.S. Fish and Wildlife Service (FWS), and Northern States to resolve the differences relating to fish protection. We revised Section V.C.2.c., to reflect the discussions of the 10(j) meeting.

spillways adversely affected recruitment, and those losses to recruitment in turn suppressed the adult population density below regional norms. We disagree with Northern States Power's contention that the strength of all the other fish populations in Lake Hayward strongly implies that entrainment is not a significant problem because it is illogical to presume that walleyes would be differentially affected by entrainment. To the contrary, recent entrainment studies indicated that walleyes are more prone to entrainment than other species. At the Crowley Hydro Project on the Flambeau River walleyes comprised 41% of the total annual entrainment estimate.[1] Also, in the **Draft Environmental Assessment** for the Hayward Hydro, the Commission staff cited Jemejcic's observations that the movement of young walleyes through Tygart Dam in West Virginia was probably selective to walleyes in that no other species exhibited similar movement patterns.[2]

In the **Draft Environmental Assessment** your staff agreed that fish escapement is likely occurring, and that this loss may have a detrimental effect on the walleye population in Lake Hayward. In their subsequent recommendation, however, they explained that the agencies have not provided persuasive evidence to demonstrate that the recommended barrier net will provide substantial benefits to the fishery of Lake Hayward. In the absence of the site specific entrainment data for the Hayward Project, we wish to present figures from entrainment studies conducted at other hydro projects. We offer this information to demonstrate that entrainment of young walleyes is a serious and widespread problem which dampens the walleye fisheries of small impoundments. We also wish to show that your staff's recommended alternative of maintaining the existing 1¾-inch trashracks will not reduce losses to walleye recruitment caused by entrainment.

Hydroacoustic and tailrace netting assessments of fish entrainment at several hydroelectric projects in Wisconsin and Michigan have revealed similar patterns of high walleye entrainment in the spring. The hydroelectric projects where entrainment studies were conducted included the Little Quinnesec, White Rapids, and Park Mill hydro projects on the Menominee River, the Brule Project on the Brule River, and the Upper, Lower, Pixley, Crowley, and Thornapple projects on the North Fork and mainstem of the Flambeau River. For most of these investigations the Department expressed its serious concerns about the design, methods, procedures, and conduct of the studies which would ultimately compromise the quality of the results. Due to complications from undersampling, equipment failure, and not adjusting estimates for size specific net capture efficiency, we believe that many of these studies yielded inaccurate results that did not represent the real conditions. Nonetheless, the results revealed that episodes of high juvenile walleye entrainment were common to many of these projects. Considering the general similarities and differences among hydro projects, it stands to reason that there would be a similar trend of high numbers of young walleyes passing through the Hayward Project. The Department's analysis of several entrainment studies revealed that fish entrainment is site specific, episodic, and highly variable, both among projects and among the turbine units within the same project. Consequently, we do not recommend the application of the numerical results from one entrainment study to other projects.

Although we hold strong reservations about transferring results of entrainment studies among projects to determine the extent of entrainment and turbine mortality, it may be possible to relate tendencies which are common to many projects. We will present information from the entrainment studies at the Crowley and Thornapple hydros to support our original recommendation for a barrier net at the Hayward Project. Our analysis of the data collected in the entrainment study at the Crowley Hydro Project demonstrates that walleyes make up a large proportion of all fish entrained annually. Of the 69,439 fish estimated to pass through one of the project's two turbines, 28,252 (41%) were walleyes. Most of the walleyes that passed through the turbine at the Crowley project were young-of-the-year fish. The length-frequency distribution showed 93% of the walleyes collected in the tailrace net sample were less than 3 inches in total length, and 69% were less than 2 inches long (Figure 1). The single episode of high walleye

[1] This figure represents a minimum estimate because samples were not adjusted for size specific net capture efficiency. Net capture efficiency could be as low as 10 - 15%, depending on the size and shape of the species. The 41% estimate was based on projections from tailrace net samples collected from one of the two turbines at the project. The estimate does not include fish entrained through the second turbine or through the spillway gates.

[2] Jemejcic, F. 1986. Walleye migration through Tygart Dam and angler utilization of the resulting tailwater and lake fisheries. pp. 294-300 in G.E. Hall and M.J. Van Den Avyle (editors), Reservoir Fisheries Management: Strategies for the 80's. Reservoir Committee, Southern Division American Fisheries Society, Bethesda, Maryland.

entrainment was relatively short in duration. The vast majority of walleye entrainment at the Crowley Hydro Project took place at night in late May, June, and early July (Figures 2 & 3). The Thornapple Hydro Project has an impoundment size (295 acres) and trashrack spacing (1 69-inch) similar to the Hayward Project. At Thornapple, walleyes comprised 9% of the actual number of fish collected in the tailrace net sample, and most of the annual walleye entrainment occurred in May. About 68% of all fish entrained at the Thornapple Project were less than 4 inches long, and 59% were in the size range of juvenile walleye, i.e. between 2.0 and 3.9 inches long. We believe that the proportion of walleyes in the total catch was actually higher than estimated for several reasons. Sampling for 72 continuous hours each month may not have adequately represented the episodic nature of young-of-the-year walleye entrainment. It is highly possible that large numbers of juvenile walleyes passed through the Thornapple Project between successive sampling periods in late spring and early summer. Secondly, the 9% figure was computed before the monthly estimates were expanded to the annual projection.

Despite the misgivings that we have concerning the entrainment studies at Crowley, Thornapple, and elsewhere, the results illustrate that entrainment of juvenile walleyes is commonplace at small impoundments. We would expect a similar occurrence at the Hayward Project. Because most of the fish that were entrained at the Crowley and Thornapple projects were less than 3 inches long and because the trashrack spacing at Thornapple is similar to the spacing at the Hayward Project, it is illogical to conclude that Northern States proposal to maintain the existing 1¾-inch trashracks would provide adequate protection against entrainment. The size and shape of juvenile walleyes would require a small mesh barrier with clear spacing less than 3/8 inches to afford even minimal protection against entrainment.

Our original recommendation for a seasonal barrier net to protect juvenile walleyes from entrainment was intended to be an adaptive management strategy to improve the walleye population in Lake Hayward. The Department would evaluate the effectiveness of the barrier net for improving the walleye fishery within six years of the initial installation. The evaluation criterion would be sufficient survival of juvenile walleyes to increase the walleye stock in Lake Hayward from the present 1 adult/acre to about 3 adults/acre. The 6-year timeframe would permit us to monitor at least one walleye cohort from fingerlings to adults. There is a strong likelihood that a barrier net could be successfully employed to reduce entrainment at the Hayward Project. The configuration of the project and the low water velocity at the plant's single intake structure make the site well suited for deploying a barrier net at the powerhouse. We also believe that the performance standard of 3 walleye adults/acre can be achieved by reducing entrainment with a barrier net system, even if the nets do not provide 100% protection against the loss of juvenile walleyes. We acknowledge the argument in the Draft Environmental Assessment that some walleyes would continue to move downstream through the spillway even if a barrier net was installed at the project intake. The purpose of the barrier net is to reduce, not eliminate, fish entrainment. Based on the numbers of juvenile walleyes counted in entrainment studies at other small hydro projects, we estimate that there is a 90% loss to walleye recruitment from entrainment at Lake Hayward. Considering that 3 adult walleyes/acre is about the average density for water in this region, we believe that our performance standard of 3 adults/acre could be attained if recruitment losses dropped to 30% or less. Although we are confident that installing a barrier net would reduce entrainment and improve the walleye fishery in Lake Hayward, if the follow-up evaluation revealed that the net did not achieve the expected performance standard, then we would recommend discontinuing the future use of the net system.

We also have several remarks on the cost analysis which was used to balance the developmental and nondevelopmental uses of the waterway. According to the Draft Environmental Assessment installation and maintenance of a barrier net would cost Northern States Power about $12,000 annually over the 30-year term of their next license. We believe that the $8,000 annual cost estimate which Northern States Power submitted for the purchase, installation, maintenance/monitoring of the net system was grossly exaggerated. The $12,000/year estimate that the Commission used in the Draft Environmental Assessment overestimated the cost even further. We are certain that our recommendation can be implemented for far less than the $360,000 total cost estimate. We offer the following explanation for this assertion. We will not dispute the $1500 cost for the initial purchase of the barrier net system, although we believe that an adequate system can be designed and constructed for less than $1500. It may be possible to attain adequate entrainment protection without full coverage of the water column. If the webbing of the net does not have to extend from the top to the bottom of the water column, additional savings in material costs could be realized. However, we will argue that it will not be necessary to purchase a new net every year. The barrier net that we envisioned should be reusable for many years, especially since it would be deployed for only

about 2 months each year. Nylon nets that are treated with a preservative tar or plastic coating are extremely durable. Some commercial fisherman have had the same nylon nets in service for longer than 30 years. With proper care the net that we envisioned may need replacement only once or twice during the course of the license. We also challenge the $6,300/year cost for installing and maintaining the barrier net. The net system should be designed to minimize installation and monitoring costs, and we offered our expertise to help Northern States design an efficient system. There are numerous design options which would reduce the cost of annual installation and maintenance. For instance, the barrier net could be deployed from a cable suspended near the surface. Annual installation and routine maintenance of such a net system would be facilitated by drawing and retracting the net on the cable, in a manner similar to the way a stage curtain operates. Natural debris loading should not present a major difficulty during the late spring season when the net would be in use. We anticipate that diver inspections probably would be necessary only occasionally, or not at all.

We also want to clarify the apparent misapprehension over who would be responsible for evaluating the effectiveness of the barrier net. Our recommendation for entrainment protection included a qualification that the barrier net's effectiveness shall be evaluated by the Department with a report provided by December 31, 2000. The statement in the second paragraph on page 26 of the Draft Environmental Assessment accurately explains our original recommendation. In the economic analysis on page 55, however, the cost of the effectiveness studies was charged to Northern States Power to demonstrate that the economic costs to install a barrier net system are not warranted:

> "In addition to our estimated $12,000 for the barrier net, effectiveness studies could cost Northern States as little as $25,000 per year and as much as $50,000 per year over a five year period."

Aside from the fact that the $125,000-$250,000 cost estimate for the evaluation studies was highly escalated, Northern States Power would not incur those costs. The Department has assumed responsibility for conducting and financing the fisheries surveys to assess the utility of the net system as entrainment protection. Those survey projects have already been included in the Department's long range work and budget planning process. Because Northern States Power will not share fiscal responsibility for the effectiveness studies, funding for those evaluations should not be included in the analysis to balance the cost of mitigation with the benefits to the fishery.

We ask the Commission to reassess the economic analysis for entrainment protection using more reasonable costs. Our recommendation for a barrier net should provide substantial benefits to the fishery and recreational opportunities at Lake Hayward. An important sport fishery will realize a 200% increase if the performance standard of 3 adult walleyes per acre is achieved. An improved walleye fishery will create more quality fishing trips in a locale which is famous for world class sport fishing. We believe that when accurate and reasonable cost estimates are applied, the long term values gained from a properly designed barrier net system do indeed outweigh the costs.

Concerning the possibility of predation and interspecific competition as alternative explanations for the poor abundance of walleyes in Lake Hayward, we offer the following response to the discussion in the Draft Environmental Assessment. Predation probably is another source of mortality for walleyes, especially those in the 2-inch length class. However, as evidenced in the 1990 fishery survey, there is also an abundant supply of alternative prey in this system. We know of no literature citations for studies that showed selective predation on walleye by any predator in a diverse, food rich ecosystem like the one in Lake Hayward. For the same reason, we doubt that interspecific competition is a plausible rationalization for the subaverage walleye density in Lake Hayward. Again, Lake Hayward contains an ample and diverse forage base. There is no evidence that shared resources are limited and in short supply. Furthermore, the growth rate and condition of walleyes do not support the hypothesis that interspecific competition is limiting the population size.

We examined several alternatives to our recommendation for a fish barrier net. One option would be to collect site specific entrainment data to quantify losses at the Hayward Project. A well designed, on-site investigation would provide the compelling evidence which we now lack to either confirm or dispel our assumption that significant numbers of young walleyes pass through the project each spring. At this time, however, we believe that it is not prudent to request additional study because the trends observed in other studies can be applied to the Hayward Project, and because entrainment studies can be expensive and time consuming. We also considered reduced trashrack spacing to accomplish the same objective as the seasonal barrier net. To reduce entrainment of juvenile

walleyes, trashrack spacing would have to be on the order of about 1/4 - 3/8 inches apart, and this narrow spacing would curtail power generation by decreasing flow and operating head. We rejected this alternative because the costs associated with lost generation and modification or replacement of the existing trashracks would certainly be greater than the cost of implementing our recommendation for a barrier net. We would be receptive to a recommendation which provided upstream and downstream fish passage to achieve or surpass the same resource management goals that the fish barrier net would attain. In fact, restoration of fish movement dynamics is our preferred strategy for improving a river system's fishery and benthic community. We support the Commission's statements on fish passage in the section of the Draft Environmental Assessment which addresses cumulative impacts:

> "In addition, the licensee may add fish passage facilities and/or additional fish protection measures to the project in the future to enhance the fishery resources in the Saint Croix River Basin. Incorporating these protection and enhancement measures would minimize the project's contribution to cumulative effects on the recreational fisheries in the Saint Croix River Basin."

In summary, we agree with the Commission's conclusion that continued operation of the Hayward Project would cause long term loss of resident fishes from Lake Hayward due to entrainment and turbine-induced mortality. We also agree that project operation without entrainment protection will continue to have cumulative adverse impacts on the aquatic resources of the Saint Croix/Namekagon river system. We do not agree that these losses and impacts are minor, nor are they unavoidable. We contend that the walleye density in Lake Hayward is below regional averages because of losses of juvenile fish from entrainment. We believe that entrainment losses can be reduced with a seasonal barrier net. Successful application of a barrier at the Hayward Project is feasible at a reasonable cost. Reduction of losses to entrainment would provide substantial benefits to the fishery in the form of an improved walleye fishery and better fishing opportunities. Our recommendation is virtually identical to the proposal that the applicant made in early consultations. Finally, the value of the anticipated benefits of our recommendation for a barrier net system as entrainment protection outweigh the cost of its reasonable implementation.

We appreciate the opportunity to convey our comments on the Draft Environmental Assessment. We look forward to resolving our differences on those recommendations which the Commission has determined to be inconsistent with the purposes and requirements of the Federal Power Act. If after considering these comments and additional information, you determine that there are still inconsistencies in our recommendations, then we would like to discuss our differences with you and your staff. Please notify us of your subsequent determination on these issues before the end of the 10j process. We would prefer a meeting to a telephone conference. Our past experiences with 10j resolutions have shown that face-to-face meetings were more productive than conference calls. If you or your staff have any questions about our concerns, please contact me at our Area Headquarters in Park Falls at (715) 762-3204.

Sincerely,

Jeffrey Wm. Scheirer

Jeffrey Wm. Scheirer
River System Manager

cc Fred E. Springer, Director, Division of Project Review, Office of Hydropower Licensing, Federal Energy Regulatory Commission, Room 1027, 825 North Capitol Street, N.E., Washington D.C. 20426.

Michael J. Cain, Wisconsin Department of Natural Resources, 101 South Webster Street, P. O. Box 7921, Madison, WI 53707

Bill Clark, Wisconsin Department of Natural Resources, Spooner

Anthony G. Schuster, Lloyd D. Everhart, John P. Moore, Jr., Northern States Power Company (WI), 100 North Barstow Street, P. O. Box 8, Eau Claire, WI 54702-008.

Gary R. Johnson, Northern States Power Company (MN), 414 Nicollet Mall, Minneapolis, MN 55401.

Thomas A. Baird, Michigan Hydro Relicensing Coalition, White, Beekman Przybylowicz, 2300 Jolly Oak Road, Okemos, MI 48864.

Janet Smith, U.S. Fish and Wildlife Service, 1015 Challenger Court, Green Bay, WI 54311.

Angela Tornes, National Park Service, 310 West Wisconsin Avenue, Room 500, Milwaukee, WI 53203.

Anthony L. Andersen, Superintendent, National Park Service, St. Croix National Scenic Riverway, P. O. Box 708, St. Croix Falls, WI 54024.

Karen Vermillion, Great Lakes Fish and Wildlife Commission, P.O Box 9, Odanah, WI 54861.

Paul Hansen, Director, Izaak Walton League of America, Inc., Midwest Regional Office, 5701 Normandale Road, Suite 210, Minneapolis, MN 55424.

COPY

United States Department of the Interior
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ST. CROIX NATIONAL SCENIC RIVERWAY
P.O. BOX 708
ST. CROIX FALLS, WISCONSIN 54024

IN REPLY REFER TO

August 31, 1994

A7615(SACN)
L76(SACN)

Honorable Lois D. Cashell
Secretary, Federal Energy Regulator, Commission
825 North Capitol Street, N.E.
Washington, D.C. 20426

Dear Secretary Cashell:

Thank you for the opportunity to comment on the DRAFT ENVIRONMENTAL ASSESSMENT FOR HYDROPOWER LICENSE, Hayward Hydroelectric Project FERC Project No. 217 Wisconsin.

1. Page 14. We believe correct interpretation of the flow duration data for the Hayward project site would indicate that at the project's minimum capacity of 120 cubic feet per second (cfs), the project would be shut down approximately 10 percent of the time due to insufficient streamflow. The Draft Environmental Assessment (DEA) states it would be less than one percent of the time.

2. Page 11. We appreciate the FERC staff's recommendation that fly ash used in sealing the stop-log spillway at Hayward be analyzed for chemical composition. We further recommend that this analysis be conducted prior to the time the fly ash/cinders are introduced into the reservoir.

3. Page 19, FERC recommendation: We strongly urge that recommendation three be modified to express the recommendation in Jonathan P. Deason's letter of September 23, 1993 to you, page 6, item 1.A. which states: "The licensee shall not operate the project between the low and high ends of the operating range on a daily basis as this would constitute a peaking operation..." We fully support this recommendation.

4. Page 20, paragraphs 3 and 4. We continue to support the recommendation (see item 4.C., page 8, of Deason's letter of 9/23 quoted in the above para.) that if it proves necessary, the applicant will install U.S. Geological Survey (USGS, flow gauges both upstream and downstream of the project. We firmly believe this item should be included in the FERC license with the potential to be a future condition of the license.

5. Page 21, para. 1, item 4(iii), we request the elevation and flow data reports be sent to the St. Croix National Scenic Riverway office on a quarterly basis, or more frequently if requested.

1. We agree, see revised section V.C.1.

2. We agree, see revised section V.C.1.a.

3. We agree, see revised section V.C.1.b.

4. While staff agrees that streamflow gaging is needed at the Hayward Project to monitor compliance with run-of-river operation, we continue to disagree with the need for a license condition that would require installation of a U.S. Geological Survey (USGS) streamflow gaging station if needed in the future. Should a USGS gaging station be required in the future, the WDNR and the Department of the Interior, on behalf of the FWS and the National Park Service, can request additional streamflow gaging measures at that time under the provisions of the standard articles included in any license issued for the Hayward Project. WDNR and FWS concur with this conclusion, as no comments disagreeing with the approach described in the draft environmental assessment (DEA) were filed.

5. We agree, see revised section V.C.1.d.

6. Page 25, para 2 of item c., Fish protection: We are unsure what the 25 percent and 20 percent refer to in the discussion of fish mortality caused by entrainment. Please clarify if this is in reference to the total number of fish passing through the system or of the local population of a fish species.

7. Page 29, FERC recommendation: We are not convinced that FERC has demonstrated entrainment is not the cause of the limited walleye population in the reservoir. We continue to support the U.S. Fish and Wildlife Service recommendation which calls for installing a barrier net.

8. Page 38, FERC recommendation on drawdown. We believe that sediment monitoring as well as monitoring sensitive biological resources should be required in the event of a non-emergency drawdown. Roughly calculated, a drop of one inch in four hours over the entire 241-acre reservoir would require a flow of approximately 62 cfs over and above the flow coming into the reservoir (we emphasize these are very rough calculations). Regardless, the flow escaping from the outlet pipe would quite probably be highly erosive to the riverbed. Another significant concern is the sediment which would be pulled off the reservoir bottom and carried downstream. These concerns warrant planned monitoring of water quality and biological resources in the event of a drawdown.

9. Page 44. We support your findings and conclusions stated on page 45. The portage needs to be improved with planning and development to facilitate portage use by physically-challenged canoeists. However, I question if the ADA standard should be applied at the portage around the dam. A paved trail is not in keeping with the primitive nature which the managing agencies practice on the Namekagon River. Perhaps there are other alternatives. In our experience, physically-challenged river users are seeking the primitive nature the river presents. They accept the challenge and risk that canoe travel offers. It is important that wherever feasible, rivers managers remove the barriers to access for physically-challenged canoeists without destroying the resource they are trying to protect. The "Universal Access to Outdoor Recreation: A Design Guide" would be a better standard or guide to follow for this application. The National Park Service will assist Wisconsin DNR and Northern States Power Company as a plan incorporating and balancing goals of accessibility and resource protection is developed.

Sincerely,

Anthony L. Andersen
Superintendent

Enclosure

6. The fish mortality rates identified on page 25, paragraph 2, item c of the DEA (25 percent and 20 percent) are not associated with any mortality studies conducted at the Hayward Project. The mortality rates cited in the DEA are based on several studies conducted at other projects in the midwest, which are summarized in Electric Power Research Institute (1992), and reflect the average turbine-specific mortality for a particular fish species. For example, the mortality for centrarchids (i.e., blackbass and sunfish) passing through a Francis-type turbine averages about 12 percent, where as the average mortality for perch and walleye passing through a Francis generating unit is about 24 percent.

7. Commission staff held a telephone conference call, September 15, 1994 with representatives from the WDNR, FWS, and Northern States to resolve the differences relating to fish protection. We revised Section V.C.2.c., to reflect the discussions of the 10(j) meeting.

8. Comment noted, see revised section V.C.3.d.

9. We agree, see revised section V.C.6.a.

SUMMARY OF THE 10(J) MEETING FOR THE HAYWARD PROJECT (FERC No. 2417-001) HELD ON SEPTEMBER 15, 1994 AT THE FEDERAL ENERGY REGULATORY COMMISSION, ROOM 1040, 810 1ST ST., NE, WASHINGTON, D.C. 20426

On September 15, 1994, the staff from the Federal Energy Regulatory Commission (staff) held a teleconference meeting with representatives from Northern States Power Company (NSP), the Wisconsin Department of Natural Resources (WDNR), and the U.S. Fish and Wildlife Service. The teleconference meeting was held in attempt to resolve inconsistencies between fish and wildlife recommendations and requirements of the Federal Power Act (FPA), pursuant to Section 10(j) of the FPA.

A list of participants is appended to this summary. The 10(j) issues discussed were previously described in the staff's Draft Environmental Assessment for the Hayward Hydroelectric Project, issued June 16, 1994.

Section 10(j) issues:

Drawdown Management Plan for Control of Noxious Weeds

The staff attempted to resolve two issues relative to the Drawdown Management Plan: (1) the duration of the drawdown and (2) monitoring of sediments and sensitive biological resources.

Duration of the drawdown - NSP favored a 30-day drawdown period while WDNR recommended a 5.5-month drawdown period. The staff asked WDNR if the 5.5-month period could be shortened. NSP commented that shorter drawdown periods have been used in the past at other projects (Oswego and Trego) and have proved successful in controlling submerged aquatic weeds. WDNR, on the other hand, commented that the reservoir needs to be drawn down early enough in the year (i.e., late fall or early winter) to freeze the sediments and aquatic weeds. Typically this would occur in late fall (i.e., mid October) and would extend to April (5.5-month period). The WDNR indicated that if the reservoir were to get any weedier that certain fish populations would probably become stunted. The WDNR also stated that it has had complaints from the public on the excess aquatic vegetation, mainly from lakeshore owners. However, the WDNR stated that it didn't have any data to substantiate the apparently increasing weed problem.

Although we did not come to an agreement on a drawdown period shorter than the WDNR's requested 5.5-month period, the WDNR seems to be willing to consider a shorter period.

Monitoring of sediments and sensitive biological resources - The WDNR stated that monitoring of sensitive biological species and sediments was needed during a reservoir drawdown, and recommended that such monitoring be included in the

Drawdown Management Plan. The WDNR cited concerns relative to contaminated sediments, and stated that the Drawdown Management Plan should allow for adaptive management (i.e., flexibility to make adjustments depending on initial results). NSP indicated that requiring them to monitor sensitive biological species and sediments is unreasonable.

Although neither NSP nor the WDNR wanted to take full responsibility for monitoring, they are willing to cooperate in the monitoring of sensitive biological species and sediments during any planned drawdown.

Regarding both issues of the Drawdown Management Plan, the staff will include a license article designated to allow a cooperative agreement between the WDNR and NSP.

Barrier Net

The WDNR continued to recommend a barrier net at the powerhouse intake to deter walleye movement downstream and improve the walleye fishery in Hayward Lake. WDNR commented that although there is limited natural production of walleye in Hayward Lake, the lake is well suited for walleye. The WDNR also stated that a barrier net would help increase the walleye fishery from 1 fish per acre to 3 fish per acre, with no significant negative biological impacts on the other fisheries. NSP stated it has found barrier nets (3/8 to 1/2-inch size) to be very effective, but has had very little experience with barrier nets in Wisconsin.

WDNR offered its expertise in helping set up a barrier net. NSP also was concerned about the cost of maintaining a barrier net. WDNR indicated that the state would be open to maintaining the net, but could not guarantee it. WDNR also mentioned that a local walleye conservation group might be willing to help maintain the net. NSP indicated a willingness to purchase and install a barrier net if WDNR agreed to maintain the net.

The staff was agreeable to a cost-share approach to installing and maintaining the seasonal barrier net. NSP agreed to provide the staff within 1 week, various cost information, including the cost-share agreement with the WDNR for the barrier net, for the staff to analyze.

Reservoir Operating Range

The WDNR stated that it could live with a 0.5-foot band of reservoir water level fluctuation for project operation, but the Final Environmental Assessment would have to state that the variation is not for peaking operation. The staff agreed.

Attendees at the 10(j) teleconference meeting for the Hayward Hydroelectric Project (FERC No. 2417-001)
September 15, 1994

NAME	AFFILIATION	PHONE NUMBER
Mary Golato	FERC	(202) 219-2804
John Novak	FERC	(202) 219-2828
Ethel Morgan	FERC	(202) 208-0450
Richard McGuire	FERC	(202) 219-3084
David Zehner	FERC	(202) 219-2820
Patrick Murphy	FERC	(202) 219-2659
Allan Creamer	FERC	(202) 219-0635
Eddie Crouse	FERC	(202) 219-2794
Lloyd Everhart	NSP	(715) 839-2692
Christopher Olson	NSP	(715) 839-2692
Robert Olsen	NSP	(715) 839-2692
Frank Pratt	WDNR	(715) 634-2688
Jeffrey Scheirer	WDNR	(715) 762-3204
Frank Koshere	WDNR	(715) 635-2101
Larry O'Borny	FWS	(414) 433-3803

Form L-3
(October, 1975)

FEDERAL ENERGY REGULATORY COMMISSION

TERMS AND CONDITIONS OF LICENSE FOR CONSTRUCTED MAJOR PROJECT AFFECTING NAVIGABLE WATERS OF THE UNITED STATES

Article 1. The entire project, as described in this order of the Commission, shall be subject to all of the provisions, terms, and conditions of the license.

Article 2. No substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission: Provided, however, That if the Licensee or the Commission deems it necessary or desirable that said approved exhibits, or any of them, be changed, there shall be submitted to the Commission for approval a revised, or additional exhibit or exhibits covering the proposed changes which, upon approval by the Commission, shall become a part of the license and shall supersede, in whole or in part, such exhibit or exhibits theretofore made a part of the license as may be specified by the Commission.

Article 3. The project area and project works shall be in substantial conformity with the approved exhibits referred to in Article 2 herein or as changed in accordance with the provisions of said article. Except when emergency shall require for the protection of navigation, life, health, or property, there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any dam or other project works under the license or any substantial use of project lands and waters not authorized herein; and any emergency alteration, addition, or use so made shall thereafter be subject to such modification and change as the Commission may direct. Minor changes in project works, or in uses of project lands and waters, or divergence from such approved exhibits may be made if such changes will not result in a decrease in efficiency, in a material increase in cost, in an adverse environmental impact, or in impairment of the general scheme of development; but any of such minor changes made without the prior approval of the Commission, which in its judgment have produced or will produce any of such results, shall be subject to such alteration as the Commission may direct.

Article 4. The project, including its operation and maintenance and any work incidental to additions or alterations authorized by the Commission, whether or not conducted upon lands

of the United States, shall be subject to the inspection and supervision of the Regional Engineer, Federal Energy Regulatory Commission, in the region wherein the project is located, or of such other officer or agent as the Commission may designate, who shall be the authorized representative of the Commission for such purposes. The Licensee shall cooperate fully with said representative and shall furnish him such information as he may require concerning the operation and maintenance of the project, and any such alterations thereto, and shall notify him of the date upon which work with respect to any alteration will begin, as far in advance thereof as said representative may reasonably specify, and shall notify him promptly in writing of any suspension of work for a period of more than one week, and of its resumption and completion. The Licensee shall submit to said representative a detailed program of inspection by the Licensee that will provide for an adequate and qualified inspection force for construction of any such alterations to the project. Construction of said alterations or any feature thereof shall not be initiated until the program of inspection for the alterations or any feature thereof has been approved by said representative. The Licensee shall allow said representative and other officers or employees of the United States, showing proper credentials, free and unrestricted access to, through, and across the project lands and project works in the performance of their official duties. The Licensee shall comply with such rules and regulations of general or special applicability as the Commission may prescribe from time to time for the protection of life, health, or property.

Article 5. The Licensee, within five years from the date of issuance of the license, shall acquire title in fee or the right to use in perpetuity all lands, other than lands of the United States, necessary or appropriate for the construction maintenance, and operation of the project. The Licensee or its successors and assigns shall, during the period of the license, retain the possession of all project property covered by the license as issued or as later amended, including the project area, the project works, and all franchises, easements, water rights, and rights or occupancy and use; and none of such properties shall be voluntarily sold, leased, transferred, abandoned, or otherwise disposed of without the prior written approval of the Commission, except that the Licensee may lease or otherwise dispose of interests in project lands or property without specific written approval of the Commission pursuant to the then current regulations of the Commission. The provisions of this article are not intended to prevent the abandonment or the retirement from service of structures, equipment, or other project works in connection with replacements thereof when they become obsolete, inadequate, or inefficient for further service due to wear and tear; and mortgage or trust deeds or judicial sales made thereunder, or tax sales, shall not be deemed voluntary transfers within the meaning of this article.

Article 6. In the event the project is taken over by the United States upon the termination of the license as provided in Section 14 of the Federal Power Act, or is transferred to a new licensee or to a non-power licensee under the provisions of Section 15 of said Act, the Licensee, its successors and assigns shall be responsible for, and shall make good any defect of title to, or of right of occupancy and use in, any of such project property that is necessary or appropriate or valuable and serviceable in the maintenance and operation of the project, and shall pay and discharge, or shall assume responsibility for payment and discharge of, all liens or encumbrances upon the project or project property created by the Licensee or created or incurred after the issuance of the license: Provided, That the provisions of this article are not intended to require the Licensee, for the purpose of transferring the project to the United States or to a new licensee, to acquire any different title to, or right of occupancy and use in, any of such project property than was necessary to acquire for its own purposes as the Licensee.

Article 7. The actual legitimate original cost of the project, and of any addition thereto or betterment thereof, shall be determined by the Commission in accordance with the Federal Power Act and the Commission's Rules and Regulations thereunder.

Article 8. The Licensee shall install and thereafter maintain gages and stream-gaging stations for the purpose of determining the stage and flow of the stream or streams on which the project is located, the amount of water held in and withdrawn from storage, and the effective head on the turbines; shall provide for the required reading of such gages and for the adequate rating of such stations; and shall install and maintain standard meters adequate for the determination of the amount of electric energy generated by the project works. The number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, shall at all times be satisfactory to the Commission or its authorized representative. The Commission reserves the right, after notice and opportunity for hearing, to require such alterations in the number, character, and location of gages, meters, or other measuring devices, and the method of operation thereof, as are necessary to secure adequate determinations. The installation of gages, the rating of said stream or streams, and the determination of the flow thereof, shall be under the supervision of, or in cooperation with, the District Engineer of the United States Geological Survey having charge of stream-gaging operations in the region of the project, and the Licensee shall advance to the United States Geological Survey the amount of funds estimated to be necessary for such supervision, or cooperation for such periods as may mutually agreed upon. The Licensee shall keep accurate and sufficient records of the foregoing determinations to the satisfaction of the Commission, and shall make return of such records annually at such time and in such form as the Commission may prescribe.

Article 9. The Licensee shall, after notice and opportunity for hearing, install additional capacity or make other changes in the project as directed by the Commission, to the extent that it is economically sound and in the public interest to do so.

Article 10. The Licensee shall, after notice and opportunity for hearing, coordinate the operation of the project, electrically and hydraulically, with such other projects or power systems and in such manner as the Commission any direct in the interest of power and other beneficial public uses of water resources, and on such conditions concerning the equitable sharing of benefits by the Licensee as the Commission may order.

Article 11. Whenever the Licensee is directly benefited by the construction work of another licensee, a permittee, or the United States on a storage reservoir or other headwater improvement, the Licensee shall reimburse the owner of the headwater improvement for such part of the annual charges for interest, maintenance, and depreciation thereof as the Commission shall determine to be equitable, and shall pay to the United States the cost of making such determination as fixed by the Commission. For benefits provided by a storage reservoir or other headwater improvement of the United States, the Licensee shall pay to the Commission the amounts for which it is billed from time to time for such headwater benefits and for the cost of making the determinations pursuant to the then current regulations of the Commission under the Federal Power Act.

Article 12. The United States specifically retains and safeguards the right to use water in such amount, to be determined by the Secretary of the Army, as may be necessary for the purposes of navigation on the navigable waterway affected; and the operations of the Licensee, so far as they affect the use, storage and discharge from storage of waters affected by the license, shall at all times be controlled by such reasonable rules and regulations as the Secretary of the Army may prescribe in the interest of navigation, and as the Commission may prescribe for the protection of life, health, and property, and in the interest of the fullest practicable conservation and utilization of such waters for power purposes and for other beneficial public uses, including recreational purposes, and the Licensee shall release water from the project reservoir at such rate in cubic feet per second, or such volume in acre-feet per specified period of time, as the Secretary of the Army may prescribe in the interest of navigation, or as the Commission may prescribe for the other purposes hereinbefore mentioned.

Article 13. On the application of any person, association, corporation, Federal agency, State or municipality, the Licensee shall permit such reasonable use of its reservoir or other project properties, including works, lands and water rights, or parts thereof, as may be ordered by the Commission, after notice and opportunity for hearing, in the interests of comprehensive development of the waterway or waterways involved and the

conservation and utilization of the water resources of the region for water supply or for the purposes of steam-electric, irrigation, industrial, municipal or similar uses. The Licensee shall receive reasonable compensation for use of its reservoir or other project properties or parts thereof for such purposes, to include at least full reimbursement for any damages or expenses which the joint use causes the Licensee to incur. Any such compensation shall be fixed by the Commission either by approval of an agreement between the Licensee and the party or parties benefiting or after notice and opportunity for hearing. Applications shall contain information in sufficient detail to afford a full understanding of the proposed use, including satisfactory evidence that the applicant possesses necessary water rights pursuant to applicable State law, or a showing of cause why such evidence cannot concurrently be submitted, and a statement as to the relationship of the proposed use to any State or municipal plans or orders which may have been adopted with respect to the use of such waters.

Article 14. In the construction or maintenance of the project works, the Licensee shall place and maintain suitable structures and devices to reduce to a reasonable degree the liability of contact between its transmission lines and telegraph, telephone and other signal wires or power transmission lines constructed prior to its transmission lines and not owned by the Licensee, and shall also place and maintain suitable structures and devices to reduce to a reasonable degree the liability of any structures or wires falling or obstructing traffic or endangering life. None of the provisions of this article are intended to relieve the Licensee from any responsibility or requirement which may be imposed by any other lawful authority for avoiding or eliminating inductive interference.

Article 15. The Licensee shall, for the conservation and development of fish and wildlife resources, construct, maintain, and operate, or arrange for the construction, maintenance, and operation of such reasonable facilities, and comply with such reasonable modifications of the project structures and operation, as may be ordered by the Commission upon its own motion or upon the recommendation of the Secretary of the Interior or the fish and wildlife agency or agencies of any State in which the project or a part thereof is located, after notice and opportunity for hearing.

Article 16. Whenever the United States shall desire, in connection with the project, to construct fish and wildlife facilities or to improve the existing fish and wildlife facilities at its own expense, the Licensee shall permit the United States or its designated agency to use, free of cost, such of the Licensee's lands and interests in lands, reservoirs, waterways and project works as may be reasonably required to complete such facilities or such improvements thereof. In addition, after notice and opportunity for hearing, the Licensee shall modify the project operation as may be reasonably prescribed by the Commis-

sion in order to permit the maintenance and operation of the fish and wildlife facilities constructed or improved by the United States under the provisions of this article. This article shall not be interpreted to place any obligation on the United States to construct or improve fish and wildlife facilities or to relieve the Licensee of any obligation under this license.

Article 17. The Licensee shall construct, maintain, and operate, or shall arrange for the construction, maintenance, and operation of such reasonable recreational facilities, including modifications thereto, such as access roads, wharves, launching ramps, beaches, picnic and camping areas, sanitary facilities, and utilities, giving consideration to the needs of the physically handicapped, and shall comply with such reasonable modifications of the project, as may be prescribed hereafter by the Commission during the term of this license upon its own motion or upon the recommendation of the Secretary of the Interior or other interested Federal or State agencies, after notice and opportunity for hearing.

Article 18. So far as is consistent with proper operation of the project, the Licensee shall allow the public free access, to a reasonable extent, to project waters and adjacent project lands owned by the Licensee for the purpose of full public utilization of such lands and waters for navigation and for outdoor recreational purposes, including fishing and hunting: Provided, That the Licensee may reserve from public access such portions of the project waters, adjacent lands, and project facilities as may be necessary for the protection of life, health, and property.

Article 19. In the construction, maintenance, or operation of the project, the Licensee shall be responsible for, and shall take reasonable measures to prevent, soil erosion on lands adjacent to streams or other waters, stream sedimentation, and any form of water or air pollution. The Commission, upon request or upon its own motion, may order the Licensee to take such measures as the Commission finds to be necessary for these purposes, after notice and opportunity for hearing.

Article 20. The Licensee shall clear and keep clear to an adequate width lands along open conduits and shall dispose of all temporary structures, unused timber, brush, refuse, or other material unnecessary for the purposes of the project which results from the clearing of lands or from the maintenance or alteration of the project works. In addition, all trees along the periphery of project reservoirs which may die during operations of the project shall be removed. All clearing of the lands and disposal of the unnecessary material shall be done with due diligence and to the satisfaction of the authorized representative of the Commission and in accordance with appropriate Federal, State, and local statutes and regulations.

Article 21. Material may be dredged or excavated from, or placed as fill in, project lands and/or waters only in the prosecution of work specifically authorized under the license; in the maintenance of the project; or after obtaining Commission approval, as appropriate. Any such material shall be removed and/or deposited in such manner as to reasonably preserve the environmental values of the project and so as not to interfere with traffic on land or water. Dredging and filling in a navigable water of the United States shall also be done to the satisfaction of the District Engineer, Department of the Army, in charge of the locality.

Article 22. Whenever the United States shall desire to construct, complete, or improve navigation facilities in connection with the project, the Licensee shall convey to the United States, free of cost, such of its lands and rights-of-way and such rights of passage through its dams or other structures, and shall permit such control of its pools, as may be required to complete and maintain such navigation facilities.

Article 23. The operation of any navigation facilities which may be constructed as a part of, or in connection with, any dam or diversion structure constituting a part of the project works shall at all times be controlled by such reasonable rules and regulations in the interest of navigation, including control of the level of the pool caused by such dam or diversion structure, as may be made from time to time by the Secretary of the Army.

Article 24. The Licensee shall furnish power free of cost to the United States for the operation and maintenance of navigation facilities in the vicinity of the project at the voltage and frequency required by such facilities and at a point adjacent thereto, whether said facilities are constructed by the Licensee or by the United States.

Article 25. The Licensee shall construct, maintain, and operate at its own expense such lights and other signals for the protection of navigation as may be directed by the Secretary of the Department in which the Coast Guard is operating.

Article 26. If the Licensee shall cause or suffer essential project property to be removed or destroyed or to become unfit for use, without adequate replacement, or shall abandon or discontinue good faith operation of the project or refuse or neglect to comply with the terms of the license and the lawful orders of the Commission mailed to the record address of the Licensee or its agent, the Commission will deem it to be the intent of the Licensee to surrender the license. The Commission, after notice and opportunity for hearing, may require the Licensee to remove any or all structures, equipment and power lines within the project boundary and to take any such other action necessary to restore the project waters, lands, and facilities remaining within the project boundary to a condition satisfactory to the

United States agency having jurisdiction over its lands or the Commission's authorized representative, as appropriate, or to provide for the continued operation and maintenance of nonpower facilities and fulfill such other obligations under the license as the Commission may prescribe. In addition, the Commission in its discretion, after notice and opportunity for hearing, may also agree to the surrender of the license when the Commission, for the reasons recited herein, deems it to be the intent of the Licensee to surrender the license.

Article 27. The right of the Licensee and of its successors and assigns to use or occupy waters over which the United States has jurisdiction, or lands of the United States under the license, for the purpose of maintaining the project works or otherwise, shall absolutely cease at the end of the license period, unless the Licensee has obtained a new license pursuant to the then existing laws and regulations, or an annual license under the terms and conditions of this license.

Article 28. The terms and conditions expressly set forth in the license shall not be construed as impairing any terms and conditions of the Federal Power Act which are not expressly set forth herein.

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