UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Northern States Power Company-Wisconsin — Project No. 2440-002 Wisconsin

ORDER ISSUING NEW LICENSE
(Major Project)

(Issued January 14, 1994)

INTRODUCTION

Northern States Power Company-Wisconsin (Northern States) filed a license application under Part I of the Federal Power Act (FPA) to continue to operate and maintain the 21.6 megawatt (MW) Chippewa Falls Project, located on the Chippewa River, in Chippewa County, Wisconsin. Northern States proposes no new capacity and no new construction. The project would affect the interests of interstate commerce. 1/

BACKGROUND

Notice of the application has been published. On August 14, 1992, the Wisconsin Department of Natural Resources (WDNR) filed a motion to intervene to become a party to the proceeding. Motions to intervene were also filed by the U.S. Department of the Interior (Interior) and The Izaak Walton League of America which were made parties to the proceeding. None of the intervenors objects to issuance of the license. Comments received from interested agencies and individuals have been fully considered in the EA in determining whether to issue this license.

The Commission's staff issued an Environmental Assessment (EA) for this project on April 28, 1993. The staff also prepared a safety and Design Assessment (SDA) which is available in the Commission's public file for this project.

1/ The Chippewa River is a navigable waterway which empties into the Mississippi River. Northern States is a utility which is connected to an interstate grid. Since the project is located on a river over which Congress has jurisdiction uncer the Commerce Clause, affects interstate commerce through its connection to an interstate power grid, and was constructed after 1935, it is required to be licensed pursuant to section 23(b)(1) of the Act.

PROJECT DESCRIPTION

The existing project consists of a 29-foot-high earthen embankment dam with a concrete gated spillway section, a reservoir with a surface area of 270 acres, a powerhouse containing six generating units with a total rated capacity of 21.6 MW, a substation and appurtenant facilites. A more detailed project description can be found in ordering paragraph B(2) and in the EA.

APPLICANT'S PLANS AND CAPABILITIES

Northern States' Record as a Licensee

In accordance with Sections 10 and 15 of the FPA, the staff evaluated Northern States' record as a licensee for these areas: (1) conservation efforts; (2) compliance history and ability to comply with the new license; (3) safe management, operation, and maintenance of the project; (4) ability to provide efficient and reliable electric service; (5) need for power; (6) transmission line improvements; and (7) project modifications. I accept the staff's finding in each of these areas.

Here are the findings:

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

The Public Service Commission of Wisconsin (PSCW) has statutory and regulatory authority regarding least cost planning and energy conservation in the state of Wisconsin. Northern States promotes electric conservation among its member systems in compliance with the requirements and policies of the PSCW.

Northern States' plans and activities to promote and achieve conservation of electric energy and to reduce the peak demand for generating capacity include: (1) installation of automated control systems, (2) direct air-conditioning load control, (3) implementation of demand-side management programs, (4) energy-efficient technologies, (5) weatherization, and (6) bill-stuffing of conservation information to its customers.

Therefore, Northern States is making a good faith effort to conserve electricity in compliance with the requirements of the PSCW.

2. Section 15(a)(2)(A): Compliance History and Ability to Comply with the New License

We have reviewed Northern States' license application in an effort to judge its ability to comply with the articles, terms, and conditions of any license issued, and with other applicable provisions of this part of the FPA.

Based on that review, we believe Northern States has or can acquire the resources and expertise necessary to carry out its plans and comply with all articles, terms and conditions of a new license.

3. Section 15(a)(2)(B): Safe Management, Operation, and Maintenance of the Project

Northern States has continuously operated the plant in a safe way. In the event of a flood or severe ice conditions, Northern States attempts to pass the entire flow while maintaining the normal pond level and extracting the maximum energy at the expense of water wheel efficiency. To this end, the blade angles are adjusted manually to pass as much of the flow as possible through the water wheels, after which spillway gates are opened as necessary to pass the excess flow.

In case of unexpected emergency or flooding, Northern States notifies its central dispatch center in Eau Claire, Wisconsin, which in turn notifies the Eau Claire County Warning Center.

Northern States maintains an air-bubbler system upstream of the spillway gates to prevent ice buildup and pressure against the gates during the winter.

Northern States has posted warning signs on the downstream face of the powerhouse to warn of project operations. It also has buoys and fences warning of dangerous areas. It has installed a river warning system consisting of flashing lights, sirens and loudspeakers.

Northern States retains an independent consultant to make a complete inspection of the project facilities every five years in accordance with Part 12 of the Commission's regulations.

Therefore, the project is safe for continued use and operation.

4. Section 15(a)(2)(C): Ability to Provide Efficient and Reliable Electric Service

The project is operated to derive maximum energy benefit from the river flow in conjunction with flows from the upstream Wissota plant. Therefore, Northern States is operating in an efficient and reliable manner.

5. Section 15(a)(2)(D): Need for Power

Northern States' need for the electricity produced by the project is addressed in the attached EA. Based on the discussion in the EA, I conclude that Northern States' short- and long-term

need for power exists to justify licensing the Chippewa Falls Project.

6. Section 15(a)(2)(E): Transmission Line Improvements

Northern States proposes no new development at the project but wants to continue to use the low-cost energy in its system. The transmission and distribution systems are designed to function with the project out-of-service, such that no operational or circuit loading impacts would occur.

Therefore, the existing transmission system is sufficient, and no changes to the service affected by the project operation would be necessary whether the Commission issues a license for the project or not.

7. Section 15(a)(2)(F): Project Modifications

Northern States plans to implement a $13.4-million project rehabilitation program at the project. Northern States doesn't propose any additional generating capacity for the project. The project, as presently constructed and as Northern States proposes to operate it, fully develops and uses the economical hydropower potential of the site.

8. Section 15(a)(3)(A) and (B)): Compliance Record

Northern States has complied with the terms and conditions of the existing license and has made timely filings with the Commission.

WATER QUALITY CERTIFICATION

On November 21, 1990, Northern States applied to the WDNR for 401 water quality certification for the Chippewa Falls Project. The WDNR waived Northern States' Section 401 water quality certification on December 6, 1990.

SECTION 18 - RESERVATION OF AUTHORITY TO PRESCRIBE FISHWAYS

Interior, by letter dated December 21, 1992, requests that its authority to prescribe the construction, operation, and maintenance of fishways pursuant to Section 18 of the FPA be reserved for any project licensed at Chippewa Falls.

Although fish passage facilities may not be prescribed by Interior at the time of project licensing, the Commission's practice has been to include a license article which reserve Interior's authority to prescribe facilities for fish passage. Therefore, Article 409 of this license reserves authority to the Commission to require the Licensee to construct, operate, and

maintain such fishways as may be prescribed by Interior pursuant to Section 18 of the FPA.

RECOMMENDATIONS OF FEDERAL AND STATE FISH AND WILDLIFE AGENCIES

Section 10(j) of the Act requires the Commission to include license conditions, based on recommendations of Federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife. Staff made a preliminary determination in letters dated May 6, 1993, that one recommendation of WDNR and Interior was inconsistent with Part I of the FPA and applicable law.

Specifically, staff concluded that the recommendation of Interior and the WDNR concerning the development and implementation of a plan for the construction, operation and maintenance of a fish trap and transfer facility below the Dells Dam is premature at this time.

Staff attempted to resolve its difference with the WDNR and the FWS at a Section 10(j) meeting held via a telephone conference on August 5 and 6, 1993.

All parties agreed that development of a fish trap and transfer facility below the Dells Dam was premature at this time, and that consideration of such a facility would be more appropriate under a relicensing proceeding for the Dells Project.

In a letter dated June 23, 1993, the FWS indicated that several other Section 10(j) recommendations were not fully adopted by staff. In response to the FWS's letter, staff agreed to discuss these possible inconsistencies during the Section 10(j) meeting held on August 5 and 6, 1993. A brief description of these issues and their resolutions follows.

The FWS was concerned that a ramping rate plan would address ramping situations caused by seasonal minimum flow releases, peaking flows and spillage. The FWS also wanted any plan to monitor the structural and functional integrity of any channel modifications made in response to fish stranding and entrapment also include a provision for monitoring the presence of stranded fish. Lastly, there was concern about fish entrainment and turbine mortality and the installation of trashracks.

Article 405 addresses ramping situations caused by seasonal minimum flow releases, peaking flows and spillage as indicated by the FWS. The issue of monitoring the presence of stranded fish when monitoring structural and functional integrity of any channel modifications made in response to fish stranding and entrapment is incorporated by the requirement in article 407 that biological effectiveness also be monitored.

Several issues related to fish entrainment and turbine mortality were discussed including the engineering feasibility of 1-inch trashracks, schedules for installing trashracks or providing plans for alternative protection measures, plans for determining residual losses of fish due to turbine mortality and plans for determining the effectiveness of any protection measure implemented at the site. The following provisions were agreeable to both the WDNR and the FWS, and include an engineering feasibility study of 1-inch full-depth trashracks at one unit; if feasible, a schedule to install 1-inch full-depth trashracks at all units; if 1-inch trashracks are not feasible, an alternative enhancement plan; if agreement cannot be reached as to the feasibility of 1-inch trashracks, study results must be filed with the Commission for resolution; a plan to monitor the effectiveness and determine residual fish losses as a result of turbine mortality; a schedule (not to exceed 5 years) for providing either minimization or compensation for residual losses which occurred since the date of license issuance; and, if agreement cannot be reached as to the means for determining residual losses, the matter would be referred to the Commission for resolution. Article 408 implements the above provisions.

Staff also concluded that the recommendation of the WDNR that Northern States file a comprehensive plan to evaluate the presence of and potential project operational or physical impacts to state and federal listed endangered and threatened resources is outside the scope of Section 10(j). Many of the study elements requested by WDNR are scientific queries that are not needed to reach an informed decision about project impacts. With the implementation of aquatic enhancement measures discussed herein, the aquatic environment of the Chippewa River downstream of the powerhouse would be adequately protected and enhanced. No additional protection or enhancement specific to state-listed species is warranted at this time.

COMPREHENSIVE PLANS

Section 10(a)(2) of the FPA requires the Commission to also consider the extent to which a project is consistent with Federal or state comprehensive plans for improving, developing, or conserving a waterway or waterways affected by the project. Under Section 10(a)(2) of the Act, Federal and state agencies filed 61 comprehensive plans that address various resources in Wisconsin. Of these, staff identified and reviewed 9 plans relevant to this project. 2/ No conflicts were found.

2/ Lower Chippewa River Basin areawide water quality management plan and river basin report, 1978, Wisconsin Department of Natural Resources (WDNR); Upper Chippewa River Basin areawide water quality management plan. 1980, WDNR; Wisconsin water quality-report to Congress, 1986, WDNR;

COMPREHENSIVE DEVELOPMENT

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 proposed project, the recreational, fish and wildlife resources, and other nondevelopmental values of the involved waterway are considered equally with power and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

A. Recommended Alternative

Based on an independent review and evaluation of (1) Northern States' proposal for the existing Chippewa Falls Project, (2) the project with staff's recommended environmental measures, and (3) the no-action alternative as documented in the EA prepared in this proceeding, I have selected issuing a new license for the Chippewa Falls Project with additional enhancement measures as the preferred option. I have selected this option because: (1) the required measures would protect and enhance the water quality, fishery resources and aesthetics; and (2) the electricity generated from a renewable resource would be beneficial because it would continue to replace the use of fossil-fueled, steam-electric generating plants, thereby, conserving nonrenewable energy resources and reducing atmospheric pollution.

B. Developmental and Nondevelopmental Uses of the Waterway

The Chippewa Falls Project generates about 5,422,668 MWh annually. The estimated 40-year levelized alternative value of energy in the region would be about 36.8 mills per kWh in 1994. The Chippewa Falls Project has 21,460 kW of dependable capacity. Based on 71,632, MWh of generation, staff computed the levelized dependable capacity value to be 18.6 mills per kWh. Adding the energy and capacity values, the total levelized value of power from the Chippewa Falls Project would be 55.4 mills per kWh.

Wisconsin statewide comprehensive outdoor recreation plan for 1991-1996, 1991, WDNR; Wisconsin peregrine falcon recovery plan, 1987, WDNR; Wisconsin red-necked grebe recovery plan, 1988, WDNR; Wisconsin common tern recovery plan, 1988, WDNR; Wisconsin forester's tern recovery plan, 1988, WDNR; Fisheries USA, the recreational fisheries policy of the U.S. Fish and Wildlife Service, U.S. Fish and Wildlife Service; The nationwide rivers inventory, 1982, National Park Service.

Northern States' costs to produce this power would consist of project operating costs and its proposed rehabilitation costs. The levelized project operating costs would be the operation and maintenance (O&M) costs, administrative and general (A&G) costs, taxes, and miscellaneous depreciation. Northern States estimates these operating costs for the Chippewa Falls Project to be about 9.7 mills per kWh.

Northern States' plans for rehabilitation consist of replacing turbine runners with new more efficient runners, overhauling the components of the associated water passages, and improving some of the electrical facilities.

Northern States has estimated the cost of this rehabilitation work would be about $13,365,000. Staff estimated this cost to amount to about $2,470,000 annually when levelized over a 40-year period, or about 34.4 mills per kWh. The project levelized net annual benefits, without staff's required enhancement measures, is about 36.8 mills per kWh.

Chippewa Falls is a peaking project. Although the minimum flow releases would have a negligible effect on the total amount of energy generated, Northern States would have to shift some of its peak energy generation to off-peak periods to comply with the minimum flow releases. Because peak energy has a higher value than off-peak energy, this shift would result in a loss of economic benefits to Northern States' ratepayers.

Because the Chippewa Falls Project has very small storage capability, Northern States would have to make releases from storage at its upstream Wissota Project to satisfy any minimum flow requirements at Chippewa Falls. The shift from peak energy to off-peak energy at the Wissota Project, also a peaking facility, would represent an additional cost to Northern States ratepayers. Furthermore, Northern States would have to install new adjustable Kaplan turbine runners on its units to make the releases. Northern States has estimated the loss of project benefits to be 0.6 mill per kWh when it shifts peak energy to off-peak energy.

The estimated levelized annual cost for shifting on-peak generation to off-peak generation to provide minimum streamflow releases of 1,000 cubic feet per second (cfs) from April 15 through May 31 and 785 cfs for the remainder of the year is $150,300 or 2.1 mills per kWh.

The resource agencies have requested, and I am requiring, Northern States to install trash racks with a 1-inch clear opening. The Chippewa Falls Project presently has trash racks with 4.5-inch clear openings. Installing trash racks with more narrow openings would create more frictional resistance to flow and thus reduce the available head, and would consequently reduce

both the dependable capacity rating and energy generation. Trash racks with more narrow openings would collect more debris, requiring Northern States to expend additional labor to the clean the trash racks. This would produce additional debris which would have to be collected and hauled to a landfill.

The levelized annual cost of installing trash racks with 1-inch clear openings is $300,000 or 4.2 mills per kWh for steel bars. For PVC bars, the levelized annual cost is $152,000 or 2.1 mills per kWh.

Northern States is currently in the process of installing a set of PVC trash racks on one of its generating units to test the operational characteristics of PVC. It is unknown at this time how a PVC rack with 1-inch clear spacings will function with the ice and debris present on the Chippewa River. Additionally, the present raker system is designed for a trash rack with a 4.5-inch clear bar spacing and will not work on the PVC rack with 1.0-inch spacings. Northern States may be able to modify its present raker or it could try hand raking. If neither of these possibilities are practical, then Northern States would have to purchase a new raker system at a cost of $250,000.

The resource agencies have also requested Northern States to construct a fish trap and transfer facility as an enhancement feature. Northern States has developed construction and other associated costs for the fish trap and transfer facility. Because there are three projects involved, staff allocated only one third of the costs to the Chippewa Falls Project with the exception of the energy cost. The levelized annual cost of a fish trap and transfer facility attributable to the Chippewa Falls Project is $246,000 or 3.4 mills per kWh.

The above enhancement being required excluding the trap and transfer activity would cost $302,300 or 4.2 mills/kWh. The trap and transfer would add $246,000 or 3.4 mills/kWh for a total cost of $548,300 or 7.6 mills/kWh. The levelized net annual benefit for the project with the additional enhancement measures is about 6 mills per kWh of energy generated.

I believe that issuing a license for the Chippewa Falls Project, with the required enhancement measures and other special license conditions, would permit the best comprehensive development of the Chippewa River. The clean energy that would be produced by the project would continue to displace fossil-fueled power generation, thereby conserving nonrenewable energy resources and reducing the emissions of noxious gases that contribute to atmospheric pollution and global warming.

PROJECT RETIREMENT

The Commission has issued a Notice of Inquiry (NOI) dated September 15, 1993, requesting comments that address the decommissioning of licensed hydropower projects 3/. The NOI states that the Commission is not proposing new regulations at this time, but is inviting comments on whether new regulations may be appropriate. Alternatively, the Commission may consider issuing a statement of policy addressing the decommissioning of licensed hydropower projects, or take other measures. The Chippewa Falls Project may be affected by future actions that the Commission takes with respect to issues raised in the NOI. Therefore, I have included Article 204, which reserves authority to make the Commission to require the licensee to conduct studies, make financial provisions or otherwise make reasonable provisions for decommissioning of the project.

TERM OF LICENSE

Section 15 of the FPA specifies that any license issued shall be for a term which the Commission determines to be in the public interest, but not less than 30 years, nor more then 50 years. This provision is consistent with Commission policy which establishes 30-year terms for those projects which propose no new construction, 40-year terms for those projects that propose a moderate amount of new development, and 50-year terms for those projects that propose a substantial amount of new development.

Northern States proposes extensive rehabilitation for the project consisting of replacing turbine runners with more efficient runners, overhauling the components of the associated water passages and rehabilitating some of the electrical facilities. Accordingly, the new license for the Chippewa Falls project will be for a term of 40 years.

SUMMARY OF FINDINGS

An EA was issued for this project. 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 EA attached to this order. Issuance of this license is not a major federal action significantly affecting the quality of the human environment.

The design of this project is consistent with the engineering standards governing dam safety. The project will be safe if operated and maintained in accordance with the

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3/ Notice of Inquiry, Project Decommissioning at RElicensing Docket No. RM93-23-000, September 15, 1993.

requirements of this license. Analysis of related issues is provided in the Safety and Design Assessment. 4/

I conclude that the project would not conflict with any planned or authorized development, and would be best adapted to comprehensive development of the waterway for beneficial public uses.

The Director orders:

(A) This license is issued to Northern States Power Company-Wisconsin (Licensee), for a period of 40 years, effective January 1, 1994, to operate and maintain the Chippewa Falls Project. This license is subject to the terms and conditions of the FPA, which is incorporated by reference as part of this license, and subject 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 shown by exhibit G:

Exhibit G-	FERC No. 2440-	Showing
1	4	Project Map

(2) Project works consisting of: (a) an existing earth embankment dam 1,267 feet long and 29 feet high with a concrete gated spillway section containing 13 40-foot by 13-foot radial gates; (b) a reservoir with a surface area of 270 acres and a gross storage capacity of 2,250 acre-feet at the normal water surface elevation of 507.4 msl; (c) an existing concrete and masonry powerhouse containing six vertical-shaft, four-bladed, propeller-type turbines driving six 3,600-kilowatt (kW) generators; (d) a substation; and (e) appurtenant facilities.

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

Exhibit A - The following sections of Exhibit A filed December 16, 1991:

Section 3, pages A-6 and A-7, entitled "Turbines and Generators;" Section 4, pages A-7 and A-8, entitled

4/ A Safety and Design Assessment was prepared for the Chippewa Falls Project No. 2440 and is available in the Commission's public file for this project.

"Transmission and Substation," with the exception that two 300-foot-long transmission lines would be included in the project; and Section 5, pages A-8 and A-9, entitled "Additional Mechanical and Electrical Equipment."

Exhibit F - The following Exhibit F drawings, filed on December 16, 1991:

Exhibit	FERC No.	Showing
F-1	2440-1	Principal Project Works, Plan, Sections, and Elevation
F-2	2440-2	Principal Project Works, Sections
F-3	2440-3	Powerhouse Plan

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

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

(D) This license is subject to the articles set forth in Form L-11, (October 1975), entitled "Terms and Conditions of License for Constructed Major Project Affecting the Interests of Interstate or Foreign Commerce," and the following additional articles.

Article 201. The Licensee shall pay the United States an annual charge, effective January 1, 1994, 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 28,800 horsepower.

Article 202. Pursuant to Section 10(d) of the FPA, a specified reasonable rate of return upon the net investment in the project shall be used for determining surplus earnings of the project for the establishment and maintenance of amortization reserves. The Licensee shall set aside in a project amortization reserve account at the end of each fiscal year one half of the project surplus earnings, if any, in excess of the specified rate of return per annum on the net investment. To the extent that there is a deficiency of project earnings below the specified rate of return per annum for any fiscal year, the Licensee shall

deduct the amount of that deficiency from the amount of any surplus earnings subsequently accumulated, until absorbed. The Licensee shall set aside one-half of the remaining surplus earnings, if any, cumulatively computed, in the project amortization reserve account. The Licensee shall maintain the amounts established in the project amortization reserve account until further order of the Commission.

The specified reasonable rate of return used in computing amortization reserves shall be calculated annually based on current capital ratios developed from an average of 13 monthly balances of amounts properly includable in the Licensee's long-term debt and proprietary capital accounts as listed in the Commission's Uniform System of Accounts. The cost rate for such ratios shall be the weighted average cost of long-term debt and preferred stock for the year, and the cost of common equity shall be the interest rate on 10-year government bonds (reported as the Treasury Department's 10 year constant maturity series) computed on the monthly average for the year in question plus four percentage points (400 basis points).

Article 203. 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. The benefits will be assessed in accordance with Subpart B of the regulations.

Article 204. The Commission reserves authority to require the Licensee, in the contect of a rulemaking proceeding, a statement of policy, or a proceeding specific to this license, to conduct studies, make financial provisions, or otherwise make reasonable provisions for decommissioning of the project.

Article 401. The Licensee shall release from the Chippewa Falls Project in the Chippewa River a minimum flow of 1,000 cubic feet per second (cfs) during the period from April 15 through May 31 and a minimum flow of 785 cfs during the period from June 1 through April 14, as measured at the U.S. Geological Survey gaging station located 1 mile downstream of the Chippewa Falls Project, or inflow to the project reservoir, whichever is less, for the protection and enhancement of fish and wildlife resources and water quality in the Chippewa River. The above minimum flow requirement shall become effective when the Licensee installs a new adjustable propeller-type turbine capable of operating efficiently at 785 cfs, but not later than December 31, 1994. In the interim, the Licensee shall release from the Chippewa Falls

Project in the Chippewa River a minimum flow of 300 cfs, as measured at the U.S. Geological Survey gaging station located 1 mile downstream of the Chippewa Falls Project, or inflow to the project reservoir, whichever is less, for the protection and enhancement of fish and wildlife resources and water quality in the Chippewa 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 and the Wisconsin Department of Natural Resources (WDNR). If the flow is so modified, the Licensee shall notify the Commission as soon as possible, but not later than 10 days after each such incident. The Licensee shall provide a copy of the report to the WDNR when it is filed with the Commission.

Article 402. The Licensee shall operate the project so that the project impoundment is maintained between elevation 838.5 feet mean sea level (msl) and 839.5 msl at all times except up to 840.25 msl during a brief period (2 to 4 days) in the spring when the spillway gates are intentionally overtopped to erode ice from the downstream side of the gates. Limits on impoundment elevations may be temporarily modified if required by operating emergencies beyond the control of the Licensee, or for short periods for project maintenance purposes, upon mutual agreement between the Licensee and the WDNR. If limits on impoundment elevations are so modified, the Licensee shall notify the Commission as soon as possible, but no later than 10 days after each such incident. The Licensee shall provide a copy of the report to the WDNR when it is filed with the Commission.

Article 403. Within 180 days of license issuance, the Licensee shall file with the Commission for approval a plan to: (1) install a continuous telephone link-up at the U.S. Geological Survey gaging station located 1 mile downstream of the Chippewa Falls Project; (2) install and maintain automatic water level sensors to continuously monitor and record headwater and tailwater elevations and maintain a daily record of project operations data; (3) maintain a staff gage on the upstream wall of the project dam; and (4) install and maintain a staff gage in the tailwater area to monitor compliance with minimum flow requirements and impoundment fluctuation limits, as stipulated by articles 401 and 402, respectively.

The plan shall include, but not be limited to: (1) the proposed location, design, and calibration of the monitoring equipment; (2) a schedule for installing the monitoring equipment; (3) the method of flow data collection; and (4) a provision for providing flow data to the consulted agencies within 30 days from the date of the agencies' request for the data.

The Licensee shall prepare the plan after consultation with the U.S. Geological Survey, the U.S. Fish and Wildlife Service (FWS) and the Wisconsin Department of Natural Resources. 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 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 approval, the Licensee shall implement the plan, including any changes required by the Commission.

Article 404. At least 90 days before implementation of the permanent minimum flow releases stipulated in article 401, the Licensee shall file with the Commission, for approval, a plan to monitor dissolved oxygen (DO) levels of the Chippewa River downstream of the project.

The purpose of this monitoring plan is to ensure that streamflows below the project, as measured 1 mile downstream of the project, maintain a DO content of no less than 5 milligrams per liter.

The monitoring plan shall include a schedule for: (1) implementation of the program; (2) consultation with the appropriate federal and state agencies concerning the results of the monitoring; and (3) filing the results, agency comments, and Licensee's response to the agency comments with the Commission.

The Licensee shall prepare the plan after consultation with the U. S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources.

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. At least 90 days before implementation of the permanent minimum flow releases stipulated in article 401, the Licensee shall file with the Commission, for approval, a plan to establish limits on the maximum rate of change in river flow (ramping rate) caused by seasonal minimum flow releases, peaking flows, and spillage for the protection of fish resources in the Chippewa River.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service, and the Wisconsin Department of Natural Resources. 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.

A copy of the plan shall be filed with the Commission's Regional Office. 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 406. Within 180 days of license issuance, the Licensee shall file with the Commission, for approval, a plan to make channel modifications in the Chippewa River downstream of the project.

The plan shall include but not be limited to: (1) the type and size of material that will be excavated; (2) the location where the material will be redistributed; (3) the costs associated with the channel modifications; and (4) a schedule for implementing the plan, consulting with the appropriate federal and state agencies concerning the results of the channel modification work, and filing a report on the modification results, including agency comments and the Licensee's response to agency comments, with the Commission. The plan shall evaluate the potential effects that the movement of materials will have on streambank erosion, sediment aggradation and degradation, and the likelihood of fish stranding.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the Wisconsin Department of Natural Resources.

The Licensee shall include with the plan documentation of agency 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 and 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 407. Within 180 days of license issuance, the Licensee shall file with the Commission, for approval, a plan for studies to monitor the structural and functional integrity (i.e. boulder placement, channel depth, shoreline erosion, etc.) and biological effectiveness (i.e. presence of stranded fish) of the channel modifications required in article 406.

The plan shall include: (1) a discussion of monitoring objectives and activities; (2) a description of study methods and materials to be used; and (3) a schedule for implementing the monitoring studies, consulting with appropriate federal and state agencies concerning the results of the monitoring studies, and filing a report on the monitoring results, including comments and the Licensee's response to agency comments, with the Commission.

The Licensee shall prepare the plan after consultation with the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, and the Wisconsin Department of Natural Resources. 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 and 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. If the results of the monitoring indicate that changes in project structures or operations, including alternative flow releases, are necessary to protect fish resources, the Commission may direct the Licensee to modify project structures or operations.

Article 408. Within 1 year of license issuance, the Licensee shall file, for Commission approval, a plan to reduce the entrainment of resident fish at the Chippewa Falls Project. In the interim, the Licensee must conduct an engineering feasibility study of 1-inch full-depth trashracks installed at one intake structure. The feasibility study shall be conducted for a period that would include winter and spring seasons (i.e. November 1 through June 1). If after the feasibility study, it is determined that 1-inch full-depth trashracks are feasible at the Chippewa Falls Project, the Licensee must include in the enhancement plan, functional design drawings of the 1-inch trashracks and a schedule to install the trashracks in front of all turbine units. Full-depth trashracks must be installed within 18 months of license issuance. If after the feasibility study, it is determined that 1-inch full-depth trashracks are not feasible at the Chippewa Falls Project due to engineering constraints, then within 1 year of license issuance, the Licensee shall file, for Commission approval, an alternative enhancement plan (for example, installation of larger spaced racks, installation of 1-inch racks on a seasonal basis). If agreement is not reached among the Licensee, the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources regarding the feasibility of the 1-inch full-depth trashracks or any other proposed enhancement measure, the Licensee shall file with the Commission, the results of the engineering feasibility study along with comments from the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources.

Within 1 year of license issuance, the Licensee shall file, for Commission approval, a plan to monitor effectiveness of the full-depth trashracks or alternative enhancement measure and to determine residual fish losses as a result of turbine-induced mortality and a schedule (not to exceed 5 years) for providing either minimization or compensation for mortality losses. Residual losses must be assessed from the date of license issuance for the life of the license. Residual losses may be determined, for example, by extrapolating entrainment and mortality information obtained from comparable sites or from limited site-specific studies. If agreement is not reached among the Licensee, the FWS and the WDNR as to the means for determining residual losses, the matter shall be referred to the Commission for resolution.

The Licensee shall prepare the aforementioned plans and schedules after consultation with the FWS and the WDNR. The Licensee shall include with the plans documentation of consultation, copies of agency comments and recommendations on the plans and specific descriptions of how the agencies' comments are accommodated by the Licensee's facilities. The Licensee shall allow a minimum of 30 days for the agencies to comment and to make recommendations before filing the final plans and schedules 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 proposed facilities and schedule. Upon Commission approval, the Licensee shall implement the proposal, including any changes required by the Commission.

Article 409. 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 under Section 18 of the FPA.

Article 410. Within one year of the issuance date of this license, the Licensee shall file with the Commission for approval a plan to manage the 38.36 acres of Licensee-owned project lands for protection of environmentally sensitive areas. The plan shall provide for, but not be limited to, the following: (1) a description of the measures for protecting and enhancing environmentally sensitive areas such as littoral zones, canopy trees, and wetlands with emphasis on management for wildlife including the bald eagle; (2) a discussion of the allowable uses for project land; (3) conditions to be specified for such allowable uses and any proposed permit system (with a sample); (4) a schedule for implementing protective and enhancement measures; (5) a monitoring program to determine the effectiveness of implemented measures; and (6) a schedule for filing the monitoring results with the Commission.

The Licensee shall prepare the plan after consulting with the U.S. Fish and Wildlife Service and the Wisconsin Department of Natural Resources. 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 and recommendations are accommodated by the plan. The Licensee shall allow 30 days for the agencies to comment and 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.

If during the term of the license, the Licensee proposes to withdraw any of the 38.36 acres of project lands from the project the Licensee shall obtain comments from the FWS and the WDNR prior to filing such a request with the Commission.

Article 411. Within 6 months of the issuance date of this license, the Licensee shall file with the Commission for approval a plan to monitor project wetlands, at least annually, for the presence of purple loosestrife (Lythrum salicaria). 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 and the U.S. Fish and Wildlife Service.

The Licensee shall prepare the plan after consultation with the WDNR and the FWS. The Licensee shall include with the plan 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 from 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 term of the license, the WDNR or the FWS deem it necessary, the Licensee shall cooperate with the agencies to control or eliminate purple loosestrife in project waters and wetlands.

Article 412. The Licensee shall protect potential perch and nest trees on the 38.36 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 15 inches diameter breast height (DBH) or greater. These trees include, but are not limited to, white pines and red pines that presently occur or may grow to the 15 inch DBH size 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 and the Wisconsin Department of Natural Resources 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 the 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 U. S. Fish and Wildlife Service and/or Wisconsin Department of Natural Resources, 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. Within 180 days of the date of this license, the Licensee shall file with the Commission for approval, a final recreation plan that includes: (1) provisions to widen and expand vehicle parking, turn-around areas, and a boat ramp at the reservoir boat ramp owned by the City of Chippewa Falls; redevelop the existing unimproved boat landing located downstream of the dam as a public day use area and boat landing; install a handicapped-accessible fishing pier at the city well field site adjacent to the project reservoir; relocate the existing canoe portage so that portage users can avoid crossing State Highway 124; and provide a constant minimum downstream flow to provide sufficient continuous water levels for acceptable public use for navigation; (2) a discussion of how the needs of the disabled were considered in designing each recreational facility; (3) a description of signs to be used in order to identify the recreational facilities; (4) drawings and specifications for each recreational facility and for the erosion and sediment controls that would be implemented during construction; and (5) a construction schedule.

The Licensee shall prepare the plan in consultation with the FWS, The WDNR, and the City of Chippewa Falls. 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 and recommendations are accommodated by the plan. The Licensee shall allow 30 days for the agencies to comment and 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 414. The Licensee shall implement the provisions of the Programmatic Agreement among the Federal Energy Regulatory Commission, the Advisory Council on Historic Preservation, the State of Wisconsin, State Historic Preservation Officer, and the State of 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 executed on December 30, 1993. The Commission reserves the authority to require changes to any Cultural Resources Management Plan or plans at any time during the term of the license.

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 waters 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; and (3) embankments, bulkheads, retaining walls, or similar structures for erosion control to protect the existing shoreline. 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 and roads for which 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-kV 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 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 the edge of the project reservoir at normal maximum 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 45 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 covenants running with the land adequate to ensure that: (i) the use of the lands conveyed shall not endanger health, create a nuisance,

or otherwise be incompatible with overall project recreational use; and (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.

(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.

(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 issued under authority delegated to the Director and constitutes final agency action. Requests for rehearing may be 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

ENVIRONMENTAL ASSESSMENT

FEDERAL ENERGY REGULATORY COMMISSION
OFFICE OF HYDROPOWER LICENSING
DIVISION OF PROJECT REVIEW

Chippewa Falls Hydroelectric Project

FERC Project No. 2440-002, Wisconsin

April 28, 1993

I. APPLICATION

On December 18, 1991, Northern States Power Company-Wisconsin (Northern States) filed an application for a new license for the existing 21.6-megawatt (MW) Chippewa Falls Hydroelectric Project. On September 17, 1992, Northern States supplemented its application with additional information.

The project is located on the Chippewa River at river mile 77 near the City of Chippewa Falls in Chippewa County, Wisconsin (Figure 1). The Chippewa Falls project has been owned and operated by Northern States since 1928. The Chippewa Falls Project license was originally issued in 1965 and expires in December 1993. Northern States proposes no new capacity and no new construction.

II. PURPOSE AND NEED FOR POWER AND ACTION

A. Purpose

The Chippewa Falls Project would generate about 5,422,668 megawatthours (MWh) of electric energy per year which would be used by Northern States for sale to its customers in the City of Chippewa Falls and the surrounding region.

B. Need for Power and Action

Construction of the Chippewa Falls Project was started on August 1, 1927. On August 19, 1928, the construction forces turned the completed facility over to the operating department for commissioning.

More than 60 years of operation to supply the end-use electricity needs of Northern States and its predecessor's customers provides adequate proof of the short-term and long-term needs for the electricity generated by the project. Additionally, the assurance of continued growth in the demand for generating capacity and electric energy provides further assurance for continued long-term need.

A discussion of projections of service-area future demands and generating resources is not warranted.

III. PROPOSED PROJECT AND ALTERNATIVES

A. Proposed Project

The project facilities consist of:

(1) an existing earth embankment dam 1,267 feet long and 29 feet high with a concrete gated spillway section with a crest elevation of 826.5 feet msl containing 13 40-foot by 13-foot radial gates;

(2) a reservoir with a surface area of 270 acres and a gross storage capacity of 2,250 acre-feet at the normal water surface elevation of 507.4 msl;

(3) an existing concrete and masonry powerhouse containing six vertical-shaft, four-bladed, propeller-type turbines driving six, 3,600-kilowatt (kW) generators;

(4) a substation; and

(5) appurtenant facilities.

The local distribution substation supplying the City of Chippewa Falls and environs from Northern States' 69-kV system is situated on project lands about 300 feet from the powerhouse, but is not included in the project. Because this substation and the 69-kV lines supplying it are required regardless of the existence of the hydro plant, only the generator leads are included in the project.

B. Proposed Environmental Measures

1. Construction. No new construction is proposed.

2. Operation. The Chippewa Falls plant has a small pond capacity and its operation is closely coordinated with the operation of Northern States' Wissota Hydro plant about 3.0 miles upstream where a large pond has been created. The two plants are almost always operated in tandem. The Chippewa Falls plant is operated primarily for peaking.

To avoid or reduce adverse project-related environmental impacts to water quality and aquatic resources and to enhance existing environmental conditions, Northern States proposes to:

- Release a minimum flow of 785 cfs when a new turbine runner is installed, but not later than December 31, 1994, and in the interim, to release a minimum flow of 300 cfs through either the spillway gates or powerhouse to protect existing water quality;

- Release a minimum flow of 1,000 cfs from April 15 through May 31;
- Develop a plan for dissolved oxygen (DO) monitoring downstream of the project to be implemented within 1 year of initiating the continuous minimum flow releases;
- File a final streamflow monitoring plan to monitor compliance with minimum flow and impoundment water level requirements;
- Maintain a continuous minimum flow during power outages;
- Conduct physical alterations to the stream channel downstream of the Chippewa Falls Project;
- Develop and implement a ramping rate plan;
- Move boulders that are uncovered during remediation of fish stranding areas and place them in the vicinity of their original location;
- Maintain the elevation of the impoundment between 838.5 feet msl and 839.5 msl under normal operating conditions and up to elevation 840.25 feet msl during a brief period of 2 to 4 days in the early spring for purposes of ice removal;
- Coordinate with the WDNR on all emergency and planned maintenance impoundment drawdowns;
- Test the effects of 1-inch polyethylene trashracks at one of the project's six turbine units and if they are found acceptable, to retrofit the remaining five intakes.

To enhance terrestrial resources, Northern States proposes to:

- Preservation of all suitable trees (e.g., all large white and red pines) on project lands as potential bald eagle nesting and perching trees;
- A wildlife management plan;
- Purple loosestrife monitoring and control.

To enhance public access and recreational use at the project, Northern States proposes to:

- Widen and expand vehicle parking, turn-around areas, and the boat ramp at a boat access area owned by the City of Chippewa;

- Redevelop the existing unimproved boat landing located downstream of the dam as a public day use area and boat landing;
- Install a handicapped-accessible fishing pier at the City well field site adjacent to the project reservoir;
- Relocate the existing canoe portage so that portage users can avoid crossing State Highway 124;
- Provide a downstream minimum flow to provide sufficient continuous water levels for acceptable public use for navigation.

C. No Action Alternative

The no-action alternative is the continued present operation of the project. The project would continue to operate as required by the original project license without change to the current environmental setting. No alterations or enhancements from the existing baseline resources would be made.

IV. CONSULTATION AND COMPLIANCE

A. Agency Consultation

The following entities commented and/or intervened on the application subsequent to the public notices which were issued on August 5, 1992, and November 2, 1992. All comments become part of the record and are considered during our analysis of the proposed project. Northern States filed reply comments on December 3, 1992, and February 12, 1993. No intervenor opposed the issuance of a new license for project.

Commenting agencies and other entities	Date of letter
Department of the Interior	12-21-92
Wisconsin Department of Natural Resources	12-28-92

Intervenor	Date of motion
Wisconsin Department of Natural Resources	8-14-92
Department of the Interior	10-5-92

B. Water Quality Certification

On November 21, 1990, pursuant to Section 401 of the Clean Water Act, Northern States applied to the WDNR for 401 water quality certification (WQC) for the Chippewa Falls Project. The WDNR waived Northern States' Section 401 WQC on December 6, 1990 (Edward J. Bourget, Water Management Supervisor, WDNR, Eau Claire, Wisconsin, December 6, 1990).

V. ENVIRONMENTAL ANALYSIS

A. General Description of the Locale

1. Chippewa River Drainage Basin.

The Chippewa Falls Project is located on the Chippewa River in Chippewa County, Wisconsin. The Chippewa River discharges into the Mississippi River.

The Chippewa River Basin rises in the northwestern part of Wisconsin and flows in a generally southwesterly direction to its confluence with the Mississippi River about 75 miles below St. Paul, Minnesota. The basin has a drainage area of 9,480 square miles which constitutes 17 percent of the area of the state. Its length is about 180 miles and its average width is nearly 60 miles. In the upper reaches the gradient averages 5.7 feet per mile while in the reach between Eau Claire and the mouth the gradient averages 1.6 feet per mile.

The principal tributaries of the Chippewa are the Flambeau and Red Cedar Rivers.

The topography of the Chippewa River Basin varies from relatively flat and swampy areas in the headwaters to rolling terrain in the middle and lower regions. The headwater areas contain many lakes. The lower regions are in an area generally characterized as unglaciated or "driftless." Hills vary from 300 to 600 feet in height above the surrounding country. There are bluffs along the Chippewa River below Durand that are 400 to 500 feet in height.

The mean annual precipitation in the Chippewa Basin is about 31 inches, and is quite uniformly distributed geographically. The average annual runoff is about 11 inches for a runoff factor of 35 percent. Runoff has a distinctly seasonal characteristic, ranging from 0.46 inches during January to 2.14 inches during April.

The central portion of the Chippewa Basin includes some of the richest agricultural land in Wisconsin. Agricultural development varies within the basin, however, because of differences in soil types and lengths of growing season. Grains and corn are grown primarily in the southern counties while silage corn and hay are grown on scattered farms in the northern portion of the basin. The northern part is characterized by large areas of poorly drained swamplands and forest reserve areas. About 20 percent of the basin is in county, state, national, and industrial forests.

Manufacturing is a principal enterprise in the southern part of the Chippewa Basin, particularly in Chippewa and Eau Claire

Counties. Except for paper mills, most of the industry is located in the Chippewa Falls-Eau Claire area where rubber and wood products, processed foods, beverages, metalwork, textiles, and machinery are produced.

Mining plays a small role in the economy of the basin. Most of the minerals mined are nonmetallic. Sand and gravel are the chief products in the central basin area. Iron ore deposits are found in two northern counties and there are some dolomite deposits in the southern area.

The water resources represented by the natural lakes, artificial reservoirs, and undeveloped reaches of the various streams contribute greatly to the economy of the basin by providing opportunities for boating, fishing, swimming, and other water-based activities which attract tourists.

2. Existing and Proposed Hydropower Development

The Chippewa River Basin has a number of hydropower projects (Figure 1). We have compiled a list of authorized major license, minor license, and exempted projects in the basin, as well as the operating unlicensed projects as of March 16, 1993. Those projects are as follow (Federal Energy Regulatory Commission, 1993):

Type	Number	Capacity
Major licenses	11	215,680 kW
Minor licenses	6	7,410 kW
Exemptions	4	9,845 kW
Unlicensed	2	425 kW
Total	23	233,360 kW

There are no license or exemption applications for new projects pending before the Commission in the Chippewa River Basin. However, the Commission has issued two preliminary permits, which are currently outstanding, to study the hydropower potential at sites that could result in license applications for a total of 1,675 kW.

The Chippewa River Basin has been developed extensively, primarily for hydroelectric production. Six hydroelectric projects which are owned by Northern States are in operation on the lower 121 miles of the Chippewa River. In upstream order, they are Dells (FERC Project No. 2670) at river mile (rm) 61.1, Chippewa Falls (FERC Project No. 2440) at rm 76.6, Wissota (FERC Project No. 2567) at rm 79.8, Jim Falls (FERC Project No. 2491) at rm 92.8, Cornell (FERC Project No. 2639) at rm 102.6, and Holcombe (FERC Project No. 1982) at rm 110.6. The Holcombe project impoundment extends upstream to within about a mile of

the Flambeau River confluence at rm 121. Downstream of the Dells Project, the Chippewa River flows unimpeded to the Mississippi River.

3. Cumulative Impacts. As part of our analysis, we considered the cumulative impacts that the existing Chippewa Falls Project and the other five operating hydroelectric projects on the lower Chippewa River (121 miles) would have on target resources. A target resource is an important resource that may be cumulatively affected by multiple hydropower development within the river basin. We based our selection of target resources on the regional significance and geographical distribution of the resource within the river basin. We identified resident fisheries and water quality as target resources that could be affected in a cumulative manner by multiple developments in the Chippewa River and its vicinity.

The geographic border of this cumulative impact analysis is the lower 121 miles of the Chippewa River. This section of the Chippewa River extends from the mouth of the Flambeau River, a major tributary, to the confluence with the Mississippi River. The Chippewa River in this section is a series of back-to-back reservoirs with similar physio-chemical characteristics and similar fish resources. Upstream of the confluence with the Flambeau River, the Chippewa River is free flowing with a fish resource and water quality characteristic of more riverine systems. The six existing hydroelectric projects within the lower 121-mile section of the Chippewa River have the potential to contribute to cumulative impacts on resident fisheries and water quality.

We identified resident fisheries as a target resource because of its importance for recreational fishing in the lower Chippewa River Basin including the project vicinity. Potential impacts to resident fisheries that may occur due to project operations include turbine-induced mortality of entrained fishes, fish stranding and entrapment in the tailwater area as a result of peaking operations, and the effects of impoundment level fluctuations on fish and forage production.

The installation and maintenance of trashracks with 1-inch clear bar spacing and an intake velocity at the face of the trashracks of about 2.3 feet per second (fps) would enhance resident fisheries resources by reducing fish entrainment and impingement at the project. Implementation of minimum flows along with habitat modifications downstream of the project would reduce fish stranding and entrapment potential. In addition, limiting impoundment level fluctuations to 1 foot or less would improve fish and forage production in the impoundment. The Chippewa Falls Project with these enhancements would have a beneficial effect on the resident fisheries of the lower Chippewa River.

Pollution of Chippewa River Basin streams, particularly downstream from pulp and paper mills, has been a problem historically (Federal Power Commission, 1965). Principal points of pollution have been at Park Falls and Ladysmith on the Flambeau River, and at Cornell and Eau Claire on the Chippewa River (Federal Power Commission, 1965). According to the WDNR, water quality in the Chippewa River was poorer after the construction of the Chippewa Falls Dam in 1928, particularly from 1950 to the early 1970's, than it is presently (letter from Tom Lovejoy, Environmental Impact Coordinator, Wisconsin Department of Natural Resources, Eau Claire, Wisconsin, February 19, 1992).

Water quality is identified as a target resource because of potential cumulative adverse effects that may be caused by a combination of wastewater treatment facilities on the river, and the potential loss of aeration, and altered temperature regimes, by hydropower operation (due to the reduced, or lack of, spillage and the potential for hypolimnetic releases in the river). Since the Chippewa Falls Project has a small storage capacity compared to the upstream Wissota Project and, therefore, a short residence time (about 3 to 4 hours under full hydraulic capacity), effects on DO and temperature due to impoundment stratification would not be expected. In addition, implementation of minimum flow releases would likely improve DO in those areas downstream of the Chippewa Falls Project that are currently experiencing depressed levels (see section V.B.1.). The Chippewa Falls Project with the enhancements described herein may have a minor beneficial effect on the overall water quality in the lower Chippewa River Basin.

B. Proposed Project

We have reviewed the proposed project in relation to the environmental resources in the project impact area and have concluded that there would be no direct or indirect adverse environmental effects on geological, terrestrial, land use, and socioeconomic resources. No changes are proposed or recommended for the project other than providing a continuous minimum flow, developing a dissolved oxygen (DO) monitoring plan, maintaining stream flow gaging, establishing ramping rates, developing a stream flow enhancement plan, designing trashracks, and developing a wildlife management plan. No new construction or project facility modifications are proposed.

1. Water Resources

Affected Environment: The Chippewa Falls Hydroelectric Project is located on the Chippewa River at rm 76.6. The drainage area of the Chippewa River at the Chippewa Falls Project is about 5,530 square miles. The Chippewa Falls impoundment has a normal maximum surface area of 270 acres at a normal maximum surface elevation of 839.5 feet mean sea level (msl), and the normal operating range is between 838.5 and 839.5 feet msl. The

gross storage capacity of the impoundment is 2,250 acre-feet. Since the capacity of the impoundment is relatively small and the impoundment extends upstream to the tailwater of the Wissota Project No. 2567, there is virtually no usable storage capacity. As such, the hydraulic residence time of the impoundment is only about 3 to 4 hours under maximum hydraulic capacity.

Streamflow

Flow duration data for the Chippewa Falls Project are based on a 96-year period of record collected at the U.S. Geological Survey (USGS) gage #05365500 located 1.1 miles downstream of the Chippewa Falls Project. Flow data for the Chippewa Falls Project was adjusted based on a drainage area of 5,650 square miles. Flows of about 1,070 cfs and 11,430 cfs are exceeded 90 percent and 10 percent of the time, respectively. The 7Q10 flow at the project is about 795 cfs. There are no existing or proposed consumptive uses of surface waters in the project area, however, the City of Chippewa Falls' wastewater treatment plant and the Amoco Foam Products Company both discharge wastewater into the Chippewa River downstream of the project. In the past, Northern States released about 115 cfs from one of the spillway gates whenever the project was shut down. However, on September 20, 1991, Northern States voluntarily increased the minimum flow release from 115 cfs to 300 cfs, per agency request.

Water quality

The WDNR has established water quality standards for fish and aquatic life which are applicable to the segment of the Chippewa River that includes the Chippewa Falls Project. The state standards for fish and aquatic life include the following numerical criteria: a minimum DO concentration of 5 milligrams per liter (mg/l) at all times, with temperature not to exceed 31.7 degrees Centigrade (°C) for warmwater fish, and a pH within the range of 6 to 9.

Water quality sampling was conducted jointly by the WDNR and Northern States in the Chippewa Falls impoundment during 1989 and 1990 which included DO and temperature profiles. No thermal stratification was apparent with temperatures varying less than 2°F between surface waters and bottom waters (5 to 9 meters (m) depth). DO remained above 5 mg/l on most sampling occasions, except during June 1989 when DO ranged from 4.2 to 5.0 mg/l at depths ranging from 5 to 9 m. Impoundment waters were slightly basic with pH from surface and bottom waters ranging from 6.85 to 7.75.

Water quality data for the Chippewa Falls tailwater was collected by the WDNR for several years including 1987 and 1988. DO was 4.7 mg/l during the August 1987 sampling event which was below the state standard. However, no violations of state

standards for temperature (range 0 to 26°C) or pH (range 6.70 to 8.40) were reported. In addition, Northern States and the WDNR conducted a joint investigation during the summer of 1990 to assess effects of project operations on DO levels. Results of weekly DO monitoring showed that DO remained above state water quality standards, with the exception of two occurrences in the Chippewa Falls impoundment where DO dropped to 4.8 mg/l and 4.6 mg/l during July and August 1990, respectively. No values below the state water quality standard were observed in the immediate vicinity of the Chippewa Falls tailwaters. However, at a continuous monitoring site about 1 mile downstream of the Chippewa Falls Project, DO declined to between 2 and 3 mg/l during early morning hours over an area about 400 feet by 100 feet. Northern States hypothesized that low DO in this area may be caused by groundwater inflows during low flow periods.

Environmental impacts and recommendations:

a. Project operation and minimum flows . Interior and the WDNR recommend that the Chippewa Falls Project release a minimum flow into the Chippewa River, as measured 1 mile downstream at the USGS gaging station, that equals or exceeds 1,000 cfs during the period from April 15 through May 31, and release a flow that equals or exceeds 785 cfs during the remainder of the year. Interior and the WDNR recommend that the minimum flow become effective when Northern States installs a new adjustable propeller-type turbine runner capable of operating efficiently at 785 cfs, but in any case, not later than December 31, 1994. Interior and the WDNR recommend that in the interim, Northern States release a minimum flow of 300 cfs through the dam's spillway gates year-round until the new runner is installed. The current minimum flow release is 300 cfs. Further, Interior and the WDNR recommend that a change in the minimum flow regime for any purpose outside of an emergency situation should be coordinated with the FWS and the WDNR both verbally and in writing.

Northern States agrees with the recommendations made by Interior and the WDNR regarding project operation with one minor exception. Northern States requests that they be allowed the flexibility to release the 300-cfs minimum flow through one of the project's turbines into the Chippewa River.

Northern States together with the FWS and the WDNR conducted an instream flow study downstream of the Chippewa Falls Project using the Instream Flow Incremental Methodology (IFIM). Seven different flows (295, 520, 785, 985, 1350, 1422, and 3090 cfs) were rated (optimum, acceptable, marginal, unacceptable) for recreational navigation, fish habitat, fish stranding and entrapment, benthic macroinvertebrate habitat, wildlife habitat, water quality, and project economics.

The water quality component of the minimum flow analysis was based primarily on the 7Q10 flow for the Chippewa River in the project vicinity and projected future water requirements for the City of Chippewa Falls wastewater treatment plant. The recommended minimum flow of 785 cfs is about equal to the 7Q10 flow of 795 cfs. The 7Q10 flow has been found to be a conservative flow for protecting water quality (Loar and Sale, 1981). Therefore, we agree that the above analysis is appropriate and recommend that the Licensee release a continuous minimum flow of at least 785 cfs for protecting water quality downstream of the Chippewa Falls Project when Northern States installs the new turbine runner, but not later than December 31, 1994. In the interim, we recommend that the Licensee continue releasing a minimum flow of 300 cfs through either the spillway gates or powerhouse to protect existing water quality. Our analysis of the interim flow recommendation is presented in section 2.a.

b. Dissolved oxygen. The WDNR recommends that Northern States should develop and implement a DO monitoring plan which would evaluate five areas located downstream of the Chippewa Falls Dam that were previously determined to experience low DO levels. The WDNR recommends that the monitoring take place within 1 year of implementing the minimum flow releases (section 1.a.). If areas of low DO persist despite the continuous minimum flow releases, the WDNR recommends that Northern States consult with them in developing and implementing additional remediation. Northern States agrees to develop and implement a DO monitoring plan as recommended by the WDNR.

While problems of low DO are not widespread in the project tailwaters, isolated areas downstream of the project have experienced DO levels that violate state standards and can adversely affect aquatic life. In order to verify whether the Chippewa Falls Project and the recommended minimum flow releases are adequate to protect water quality and aquatic resources in the Chippewa River downstream of the project, we agree with WDNR's water quality monitoring approach.

We, therefore, recommend that the Licensee, in consultation with the FWS and WDNR develop a plan for DO monitoring downstream of the project. We recommend that DO monitoring be implemented within 1 year of initiating the continuous minimum flow releases. The plan should include provisions for providing data to the FWS and the WDNR upon request. Collecting post-operational water quality data would provide the Commission, the Licensee, and the resource agencies with valuable information regarding the adequacy of our recommended enhancement measures. If the results of the monitoring indicate that changes in project structures or operations are necessary to protect water quality, we may require the Licensee to modify structures and operations.

c. Gaging. To monitor compliance with minimum flow and impoundment water level requirements, Interior and the WDNR recommend that Northern States: (1) install a continuous phone link-up at the USGS gaging station located 1 mile downstream of the Chippewa Falls Project; (2) install and maintain automatic water level sensors to continuously monitor and record headwater and tailwater elevations and maintain a daily record of project operations data that would be available to the FWS and WDNR upon request; (3) maintain a staff gage on the upstream wall of the project dam with markings clearly visible to the public showing minimum and maximum water levels allowed in the impoundment; and (4) install and maintain a staff gage in the tailwater area to document the continuous minimum flow releases. Northern States agrees to the streamflow gaging requirements recommended by Interior and the WDNR.

We conclude that the measures recommended above would be adequate to verify compliance with minimum flow and impoundment water level requirements. Therefore, we recommend that Northern States file with the Commission a final streamflow monitoring plan. This plan should include the measures recommended above by Interior and the WDNR and should indicate methods of data collection, describe the location, design, and calibration of monitoring equipment (if needed), and include provisions for providing available operation, flow, and water surface elevation data to the FWS and WDNR within 30 days of the agencies' request.

d. Flow continuation during power outages. Interior and the WDNR recommend that Northern States be required to pass river inflow through the project in the event of a project shut down to avoid dewatering aquatic habitat in the project tailwater. Northern States agrees to provide measures to pass river inflow through the project in the event of a project shut down if a license article includes provisions for incidents that are beyond their control and that address public safety practices at the site. Safety practices include sequencing the fisherman's warning system for 15 minutes before starting the first generator and visual inspection of the spillway tailrace by an operator prior to the first opening of a spillway gate.

Northern States believes that adequate measures exist at the project to assure that the minimum flow requirements can be met under most emergency situations. The Chippewa Falls Project is not continually manned, but is equipped for remote operation and is monitored from the Wissota Project 2.75 miles upstream. An alarm would sound in the Wissota control room if a plant failure occurs at the Chippewa Falls Project. If there was complete power failure for the City of Chippewa Falls, an on-call operator could cold-start the plant.

We conclude that, in the event of a project shutdown, Northern States' operational procedures described above, minimum

flow requirements (section 1.a.) and streamflow gaging plan (section 1.b.) would be adequate to maintain river flow to prevent dewatering of aquatic habitat downstream of the Chippewa Falls Project. Any license article requiring a continuous minimum flow release would contain provisions for modifying flow releases due to operating emergencies beyond the control of the Licensee, or for short periods of time upon agreement between the Licensee and the FWS and WDNR. Therefore, we recommend that the Licensee maintain a continuous minimum flow during power outages and maintain the streamflow gaging plan as specified in section 1.c.

Unavoidable Adverse Impacts: No significant adverse impacts to water resources are expected as a result of project operation. Implementation of minimum flow releases and DO monitoring in the project tailwaters would ensure maintenance of state water quality standards for DO in the project area and minimize any contribution to cumulative adverse impacts in the river basin.

2. Fishery Resources

Affected Environment: The fisheries of the Chippewa Falls impoundment and tailwater area are characterized by a variety of warmwater species. Gamefish occurring in the impoundment include rock bass, smallmouth bass, black crappie, northern pike, muskellunge, channel catfish, walleye, and yellow perch. Additional fishes found in the impoundment include quillback, lake sturgeon, flathead catfish, emerald shiner, golden shiner, troutperch, common carp, black bullhead, and yellow bullhead.

Based on electrofishing surveys conducted during 1989 and 1990, silver redhorse and shorthead redhorse were the dominant species present in the riverine areas downstream of the Chippewa Falls Project. Together they represented between 47 and 81 percent of the total fish collected in all sampling areas except the project's stilling basin. Gamefish species present in the tailwaters included walleye, smallmouth bass, muskellunge, northern pike, yellow perch, black crappie, and bluegill.

The WDNR conducted fisheries investigations of the Chippewa Falls impoundment which included a rather extensive survey of walleye. Of the 1,366 walleye which were collected and measured, about 76 percent were less than 11 inches. Harvestable walleye based on a 15-inch minimum size limit and quality-size walleye of 20 inches or more (Staggs, 1989) represented only 3.3 percent and 0.4 percent of the total catch, respectively.

Environmental Impacts and Recommendations:

a. Minimum flows and fish habitat. Interior's and the WDNR's recommendations for minimum flow releases and Northern States' proposal is discussed in section 1.a.

The fish habitat rating component of the IFIM analysis (section 1.a.) was based on the weighted usable area of suitable habitat for six fish species life stages including log perch (adult), smallmouth bass (adult, juvenile, and spawning), and walleye (adult and juvenile). Northern States, the FWS and the WDNR were in agreement with the results of the flow study. Flows of 295 cfs and 520 cfs received optimum ratings, flows of 785 cfs and 985 cfs received acceptable ratings, flows of 1,350 cfs and 3,090 cfs received marginal ratings, and a flow of 1,422 was rated as unacceptable.

Although the 785-cfs minimum flow recommended by Interior and the WDNR and proposed by Northern States did not receive an optimal rating for fish habitat, ratings for other factors such as recreational navigation, fish stranding and entrapment (section 2.b.), wildlife habitat, water quality (section 1.a.), and project economics also influenced the overall minimum flow recommendation. Recognizing that a variety of factors were evaluated, we conclude that a minimum flow of 785 cfs from June 1 through April 14 is adequate to protect fish habitat downstream of the Chippewa Falls Project. Therefore, we recommend that Northern States release a minimum flow of 785 cfs into the Chippewa River downstream of the Chippewa Falls Project from June 1 through April 14 which would become effective when a new adjustable propeller-type turbine runner capable of operating efficiently at 785 cfs is installed, but not later than December 31, 1994.

Interior and the WDNR recommend that Northern States release a minimum flow of 1,000 cfs from April 15 through May 31 to enhance spawning of resident fishes such as lake sturgeon and walleye. Northern States agrees to provide this flow. Although the instream flow study did not specifically address walleye and lake sturgeon spawning, fish stranding and entrapment flows were evaluated. The potential for fish stranding and entrapment would be expected to be greatest during the spring when lake sturgeon, walleye, and other fishes congregate downstream of the project's dam to spawn. Based on the results of the stranding and entrapment study (discussed below), we recommend a minimum flow of 1,000 cfs for the purposes of protecting lake sturgeon, walleye, and other fishes from stranding and entrapment which may occur during the spring spawning periods.

In the interim, Interior and the WDNR recommend that Northern States continue to release a minimum flow of 300 cfs through the dam's spillway gates year-round until the new runner is installed. Northern States agrees to provide an interim minimum flow of 300 cfs provided that they be allowed the option to release the 300-cfs minimum flow through one of the project's turbines. Based on the IFIM study results discussed above, a flow of 300 cfs would provide optimum fish habitat in the Chippewa River downstream of the Chippewa Falls Project.

Furthermore, since none of the stranding areas identified in the fish stranding and entrapment study were located immediately below the project's dam, we believe, that from the perspective of fish habitat, there is no advantage to releasing the minimum flows from either the spillway gates or the project turbines. Therefore, we conclude that Northern States should have the option to release the interim 300-cfs minimum flow through either the spillway gates or the project turbines.

b. Ramping rates and fish stranding. Interior and the WDNR recommend that Northern States file a plan for Commission approval, at least 90 days before implementation of the minimum flow releases, to establish limits on the maximum rates of change of minimum flows from 1,000 cfs to 785 cfs, and for the increase and decrease in flows released from the powerhouse and spillway gates caused by peaking operation of the project. Northern States agrees to develop and implement the plan as recommended by Interior and the WDNR.

Interior and the WDNR also recommend that Northern States implement several measures to minimize fish stranding and entrapment below the Chippewa Falls spillway gates and in the Chippewa River downstream of the dam. These measures include: (1) maintenance of existing, and creation of additional (if deemed necessary by the resource agencies) escape channels excavated to alleviate stranding in the pools located immediately below the spillway gates; (2) excavation of escape channels or other physical alterations of the river bed to alleviate fish stranding and entrapment areas identified in the WDNR's report entitled Criteria for Evaluating Fish Stranding and Entrapment Areas for the Chippewa River Downstream of the Chippewa Falls Hydroelectric Facility-Final Report dated March 8, 1990; and (3) development and implementation of a plan to monitor and detect fish stranding and entrapment occurrences.

The agencies recommended plan to monitor and detect fish stranding and entrapment occurrences (item 3 above) would include: (1) routine inspection of the project tailwater area for fish stranding incidents and fish kills for not less than 2 years after license issuance; (2) a fish rescue protocol; and (3) establishment of a record keeping system for reporting fish stranding and entrapment incidents. The plan would also require Northern States to immediately report any fish stranding and entrapment incidents to the WDNR and to work with the WDNR to eliminate the cause(s) of fish stranding and entrapment.

In order to address the impact of fish stranding and entrapment, Northern States, the WDNR and the FWS conducted studies in 1988 and 1989 to document the location and extent of fish stranding and entrapment downstream of the Chippewa Falls Project. Four stranding or entrapment areas composed of at least 10 different pools were identified during the studies although no

entrapped fish were found. Seven flows (387, 520, 793, 985, 1350, 1411, and 3000 cfs) were evaluated as to their acceptability for alleviating or minimizing stranding and entrapment of fish. Based upon mutually agreed upon criteria, flows of 520 and 985 cfs were rated as unacceptable and a flow of 1350 cfs was rated marginal by the study participants. However, the study participants mutually agreed that flows between 520 cfs and 985 cfs would be acceptable if physical alterations were made to remedy the stranding and entrapment areas.

In 1991 and 1992, Northern States conducted physical channel modifications below the Chippewa Falls spillway to alleviate fish stranding problems. However, it remains uncertain whether these efforts were effective and whether physical alterations would be sufficient under the recommended minimum flow releases. As a result of the above studies, Northern States agrees to implement the physical alteration measures recommended by Interior and the WDNR to minimize fish stranding and entrapment downstream of the Chippewa Falls Project and to develop and implement a plan to monitor and detect fish stranding and entrapment occurrences.

Therefore, in conjunction with the 1000-cfs minimum flow recommended in section 2.a., we also recommend that Northern States: (1) conduct physical alterations to the stream channel downstream of the Chippewa Falls Project to minimize the potential for fish stranding and entrapment; and (2) prepare a plan to establish limits on the maximum rate of change in river flow (ramping rate) for the protection of fish resources in the Chippewa River downstream of the Chippewa Falls Project.

c. Stream Habitat Enhancement. In the final report Chippewa Falls Instream Flow Study 1990, the FWS stated that the lack of cover appears to be at least one factor limiting fish habitat suitability in the 7-mile stretch of the Chippewa River downstream of the project. Based on the above analysis and field observations, Interior and the WDNR recommend that Northern States place large boulders, which may include those excavated during remediation of fish stranding areas (section 1.b.) in the reach of the Chippewa River downstream of the Chippewa Falls Dam to enhance aquatic habitat for resident fish species.

Northern States does not agree with Interior's and WDNR's rationale that the IFIM study indicated that the absence of quiet-water areas in the river reach downstream of the dam is contributing to reduced habitat value for fish. Northern States states that the IFIM study was not conducted immediately downstream of the dam and that the nearest area sampled was about 2 miles downstream. Northern States also does not believe that a lack of boulders is contributing to poor habitat quality since the predominant substrates in the 5-mile reach below the dam are gravel, rubble, and boulders. However, Northern States does agree to move boulders that are uncovered during remediation of

fish stranding areas provided that the boulders are placed in the vicinity of their original location. Northern States contends that redistributing boulders further downstream would be very difficult since much of the river reach downstream from the dam is inaccessible by road.

Redistributing excavated material (e.g. boulders) may enhance fish habitat in the Chippewa River downstream of the project by providing velocity shelters. However, channel adjustments such as these may cause aggradation, degradation, lateral channel migration, accelerated bank erosion, and other effects which can lead to decreased habitat quality even though these alterations were designed to improve fish habitat. While we agree that removal and selected placement of excavated boulder material in the river downstream of the project may create beneficial effects to fish habitat, we believe that these alterations should only be done after evaluation of potential negative effects to the stream channel downstream of the Chippewa Falls Project.

Therefore, we recommend that Northern States in consultation with the FWS and the WDNR develop a stream habitat enhancement plan for the Chippewa River downstream of the project. The plan should include the type and size of material that will be excavated, the location where the material will be redistributed, and the costs associated with the enhancement measure. The plan should evaluate the potential effects the movement of materials will have on streambank erosion, sediment aggradation and degradation, and likelihood of fish stranding. In addition, we recommend that Northern States prepare and, upon Commission approval, implement a plan for monitoring the structural and functional integrity of the channel modifications.

d. Impoundment fluctuations and drawdowns. In order to accommodate the downstream minimum flow releases, Interior and the WDNR state that the elevation of the impoundment may fluctuate between 838.5 feet msl and 839.5 feet msl under normal operating conditions and up to elevation 840.25 feet msl during a brief period of 2 to 4 days in the early spring when the spillway gates are intentionally overtopped to erode ice from the downstream side of the gates. Northern States agrees with the operational constraints on impoundment elevation fluctuations recommended by Interior and the WDNR.

Water level fluctuations of up to 0.9 feet occur in the Chippewa Falls impoundment. Northern States and the WDNR agree that the 1-foot operating range would not result in significant adverse impacts to environmental resources (letter from Thomas Lovejoy, Wisconsin Department of Natural Resources, Eau Claire, Wisconsin, February 19, 1991). Since the project has a large hydraulic capacity (12,600 cfs) relative to the storage capacity (less than 3000 acre-feet) of the impoundment, the Chippewa Falls

Project allows a rapid exchange of flow in the project impoundment to occur and limits the impoundment fluctuation potential. In addition, the shoreline of the Chippewa Falls impoundment is relatively steep-sided. For these reasons, we do not expect significant adverse impacts to occur to aquatic resources as a result of impoundment fluctuations. Therefore, we recommend that the elevation of the Chippewa Falls impoundment be maintained between elevation 838.5 feet msl and 839.5 feet msl under normal plant operating conditions and up to elevation 840.25 feet msl during a brief period (2 to 4 days) in the spring when the spillway gates are intentionally overtopped to erode ice from the downstream side of the gates.

The WDNR recommends that for all emergency and planned maintenance reservoir drawdowns Northern States should: (1) notify the WDNR at the earliest possible opportunity, but no later than 24 hours of any proposed or already enacted emergency flowage drawdown done to prevent dam failure or imminent risk to public health and safety; (2) consult with the WDNR on proposed remedial actions; (3) submit a written report to the WDNR describing the drawdown, proposed remedial measures, and proposed preventative measures; and (4) provide at least 2 months advance notice of its proposed drawdown for dam maintenance or fish and wildlife enhancement purposes to allow WDNR sufficient time to consider alternatives to prevent or minimize adverse impacts.

Northern States agrees to coordinate with the WDNR on all emergency and planned maintenance impoundment drawdowns. However, Northern States does not believe that they should be required to submit a separate report to the WDNR concerning the nature of an emergency drawdown and remedial measures and that a report to the Commission which would be required in any license (and would be copied to the WDNR) would satisfy any reporting requirements.

We recognize that in some instances, it may not be possible for a Licensee to notify the FWS and the WDNR prior to an impoundment drawdown. However, we recommend that when possible, the Licensee notify the WDNR within 24 hours of any proposed or already enacted emergency drawdown and at least 2 months of any proposed drawdown for dam maintenance or fish and wildlife enhancement purposes. We disagree with the WDNR that Northern States should prepare a separate written report describing the drawdown, proposed remedial measures, and proposed preventive measures for each emergency drawdown to the WDNR. Written notification to the Commission is required for any modification of project operation including emergency and planned impoundment drawdowns. We recommend that this report also be provided to the WDNR at the time it is filed with the Commission.

e. Downstream fish passage and protection. Interior recommends that the Licensee: (1) install trashracks with 1-inch

clear spacing between bars at the Chippewa Falls Project, and (2) implement recommendations made by the FWS as a result of fish entrainment and turbine mortality studies which the FWS will recommend for the Wissota Project upstream of Chippewa Falls. In reference to item (2), Interior would recommend that an entrainment study and turbine mortality study be conducted at the Wissota Project when studies are initiated for the relicensing of that facility (license expires in 2000), a turbine mortality study be conducted concurrently at the Chippewa Falls Project, and that entrainment results from the Wissota study be applied to Chippewa Falls. As an alternative to items (1) and (2), Interior recommends that a fish entrainment and turbine mortality study be conducted at the Chippewa Falls Project. If an entrainment and turbine mortality study is conducted at Chippewa Falls, Interior recommends that the study begin after the installation of a sufficient number of new turbine runners to allow for an adequate study design, but not later than 1995.

The WDNR recommends that the Licensee: (1) develop and submit within 2 years of license issuance for Commission approval, a plan to study fish entrainment and turbine mortality at the Chippewa Falls Project which would include evaluations of spillway operating regimes that could be used to reduce entrainment, (2) develop and submit for Commission approval a mitigation plan which describes measures to avoid and minimize adverse impacts to reservoir and tailwater fishery resources, (3) implement mitigative measures identified in the above plan within 6 years of license issuance, and (4) compensate for unavoidable mortality losses which remain despite mitigative measures. As an alternative to the above recommendations, WDNR recommends that the Licensee install trashracks with 1-inch clear bar spacing at the Chippewa Falls Project.

Northern States preferred approach to alleviating fish entrainment and turbine mortality impacts at the project is to proceed directly to protection. Northern States plans on installing polyethylene trashracks with 1-inch clear spacing between bars at the intake opening of one of the project's six turbine units. Northern States plans on testing the effects of the new trashracks on flow dynamics, fouling problems related to sheet ice and general debris, and increased maintenance time. If the trashracks are found acceptable, Northern States proposes to retrofit the remaining five intakes with the 1-inch trashracks. If the trashracks are found unacceptable, Northern States would evaluate other trashrack dimensions or other fish deterrent technologies that might be available. As a final option if no protection technologies appear acceptable, Northern States states that a fish entrainment and turbine mortality study could be done with the purpose of determining the level of mitigation necessary to compensate for fish losses.

As a result of the above proposals, Northern States requests that the Commission include in any license issued for the project an article requiring them to develop a plan to resolve fish turbine entrainment concerns for the project within 2 years of license issuance, and to complete all studies and remedial measures identified in the plan within 4 years of license issuance.

The operation of the project powerhouse could cause impingement and entrainment-related mortalities and injuries to resident fish. Mortality or injury would 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). The design of the project intake structure would affect the amount of project-induced fish injury or mortality during periods when fish are present at the site.

We evaluated four alternative trashrack spacings for their effects on entrainment and impingement of walleye at the Chippewa Falls Project (Table 1). We assumed that if conditions are favorable for walleye then conditions would be favorable for other warmwater fishes occurring at the project. We evaluated the existing trashrack structure with clear spacing between bars of 4.5 inches, the agencies' recommended alternative of 1-inch spaced trashracks, and two staff alternatives of 1.5-inch and 2-inch spaced trashracks.

Table 1. Comparison of trashrack design alternatives for the Chippewa Falls Project (FERC Project No. 2440).

	Existing	Alternative 1 (WDNR,FWS)	Alternative 2 (staff)	Alternative 3 (staff)
Bar Spacing (inches)	4.5	1.0	1.5	2.0
Approach Velocity (feet per second)	2.3	2.3	2.3	2.3
Size of walleye (fish length in inches) excluded	None (100% of impound. pop.)	10.7 inches or more (24% of impound. pop.)	15.6 inches or more (3.3% of impound. pop.)	20.5 inches or more (~0.4% of impound. pop.)

Trashracks have been used at hydropower plants to deter fish from entering project intakes. Intake velocity and size of bar spacings on trashracks can influence entrainment rates (Bell, 1986). The influence of bar spacings on fish entrainment is related to the size of the fish. For a given size fish the greater the spacings between trashrack bars the greater the chances of the fish passing through the trashrack and being

entrained through the turbine. Based on data collected by Lawler et al. (1991), we determined that walleye greater than 10.7 inches would be excluded from entrainment at the project if trashracks with 1-inch bar spacings were installed. If trashracks with 2-inch bar spacings were installed, walleye greater than 20.5 inches would be excluded. However, data from Stone and Webster (1990) indicate that walleye of 6.7 inches and 13.3 inches would likely be excluded by trashracks with 1-inch and 2-inch bar spacings, respectively. All sizes of walleyes would be susceptible to entrainment if trashracks with 4.5-inch spacing were retained.

The velocity of water, as measured immediately in front of the trashrack intake, influences potential impingement on the trashrack in much the same manner as the trashrack bar spacings influence fish entrainment through the turbines. For a given species, there is a positive relationship between fish size (i.e. length) and swimming ability. Therefore, the greater the intake velocity the larger a fish must be to escape impingement against the trashrack bars. Flow velocities which are too high can impinge a fish against a trashrack structure.

Using the relationship $V=KL^e$ (V = critical velocity, L = fork length, and where K is a constant and e is an exponent for the length-velocity regression), Jones et al. (1974) calculated K and e for walleye as 13.07 and 0.51, respectively, at a critical swimming speed. Critical swimming speed was defined as the maximum velocity a fish could maintain for 10 minutes. Applying this equation and solving for fork length, we determined that a walleye must be about 11 inches long to overcome an approach velocity of 2.3 feet per second (fps). Therefore, a trashrack structure with a clear bar spacing of 1 inch and an approach velocity of 2.3 fps or greater could potentially impinge walleye less than 11 inches in length if they were not able to pass through the racks. Since we previously determined that walleye less than or equal to 10.7 inches would not be excluded by 1-inch bar spacing (using the Lawler et al. data), we would not expect impingement of walleye to be a significant impact if 1-inch racks with an approach velocity of 2.3 fps or less were installed at the Chippewa Falls Project.

Although the Stone and Webster (1990) data suggest that fish between 6.7 inches and 10.7 inches would be excluded by a 1-inch spaced trashrack, burst speeds for these smaller individuals would still likely be high enough to permit escape from the trashrack area. Using an equation from Bainbridge (1961), we calculated a burst speed for 6.7-inch walleye to be 5.88 fps. Since the intake at the Chippewa Falls Project is integral with the dam, walleye between 6.7 and 10.7 inches, which would otherwise be susceptible to impingement, would likely be able to overcome the anticipated approach velocity of 2.3 fps at the face

of the 1-inch trashracks and escape to lower velocity areas of the impoundment.

We conclude, based on our analysis of approach velocities, intake structure, critical swimming speeds, and burst speeds for walleye, that impingement mortality would be unlikely under each of the trashrack alternatives.

Increasing the spacings of the trashrack bars would increase the numbers of fish potentially entrained through the project turbines (Table 1). Based on 1989 fish survey data collected by the WDNR, about 76 percent of the walleye population (walleye less than 11 inches) would be susceptible to entrainment under all alternatives evaluated (assuming 10.7-inch or larger walleye would be excluded). In addition to protecting walleye greater than 10.7 inches, the agency recommended 1-inch trashrack option would protect all harvestable-size (15 inches) and quality-size (20 inches) walleye from entrainment mortality. The two staff alternatives (1.5-inch and 2-inch trashrack spacing) would potentially allow fish greater than 10.7 inches to be entrained through the project's turbines. However, alternative 2 would still offer protection for most harvestable-size walleye and all quality-size walleye while alternative 3 would offer protection for only quality-size walleye. The above analysis should be considered a conservative approach since we are assuming that exclusion size is based solely on trashrack spacing and fish width (as determined by Lawler et al). A greater percentage of walleye would be protected under the 1-inch, 1.5-inch, and 2-inch alternatives if exclusion lengths based on Stone and Webster (1990) were used. In addition, trashracks may also serve as behavioral barriers and prevent the passage of fish small enough to, otherwise, pass through the racks (Stone and Webster Engineering Corporation, 1986).

We conclude, that the agencies recommended alternative of trashracks with 1-inch clear spacing between bars to be the most effective alternative at minimizing possible entrainment of walleye and other fishes at the Chippewa Falls Project. Therefore, we recommend that the Licensee file, for Commission approval, detailed design drawings of the 1-inch trashrack structure together with a schedule to construct and install the structure. In addition, we also recommend that the Licensee should monitor the effectiveness of our recommended trashrack design in preventing entrainment at the project. The monitoring study could be conducted to coincide with the studies planned for the relicensing of the Wissota Project. This information would provide valuable information to the Licensee, the resource agencies, and the Commission regarding the adequacy of our recommended fish protection measures. The cost of this 1-inch transrack is described in relation to overall project economics in Section VI-Comprehensive Development.

f. Upstream fish passage. Interior recommends that Northern States develop and implement a plan for the construction, operation, and maintenance of a fish trap and transfer facility below Dells Dam. The WDNR recommends that Northern States, within 4 years of license issuance, design, construct, and operate a fish trap and transfer facility below Dells Dam. WDNR recommends that design and operational plans acceptable to the WDNR and FWS should be submitted for Commission approval within 3 years of license issuance.

The WDNR contends that fish populations upstream of the Wissota and Chippewa Falls projects are significantly affected by downstream movement through these facilities' dams and that similar downstream movement is likely occurring at the Dells Dam. Together, these facilities preclude upstream movement of fishes on about 18 miles of the Chippewa River. The WDNR states that objectives of the trap and transfer facility would include: (1) improving the size structure of the population, (2) increasing the spawning stock of a species, (3) increasing the population density of a given species, and (4) transferring various species to areas with better spawning habitat and better overall habitat. In addition, WDNR views the trap and transfer facility as a means to increase the range of four state threatened fish species which occur in the Chippewa River downstream of the Dells Dam. The FWS adds that transferring fish from downstream of Dells Dam to upstream areas would provide improved recreational fishing opportunities.

Northern States believes that neither the FWS or WDNR has provided adequate justification to warrant installation of a trap and transfer facility. Northern States says that a need for the facility should first be established along with some reasonable assurance that the large capital investment in the facility would benefit the resource. In response to the agencies' recommendations, Northern States proposes to restudy the fish populations in the tailwaters of the Dells Dam as part of the relicensing of that facility. In addition, Northern States says that a trap and transfer facility at the Dells site would likely entail structural modifications of the dam and powerhouse as well as operational changes. These potential changes, Northern States says, would need to be discussed with the City of Eau Claire, co-owner of the facility, and a license amendment would be required if the fish passage facility was adopted.

We agree with Interior and the WDNR that a trap and transfer facility operating downstream of the Dells Project would likely have some positive benefits on fisheries resources in the Chippewa River. However, it is not possible to evaluate the appropriateness (need and potential benefits) and feasibility of the facility without a more adequate quantification of the downstream fisheries resources particularly those fish species targeted for trap and transfer. No fishery management plan has

been developed for the Chippewa River justifying the cost and need for upstream fish passage at the Chippewa Falls Project. There has been no evaluation of the presence and abundance of fish species targeted for transfer from downstream of the Dells Project. Further, there has been no evaluation of the availability of suitable habitats for the targeted fish species upstream of the Chippewa Falls and Wissota projects. Therefore, we conclude that it is premature to require the Licensee to develop and implement a plan for the construction, operation, and maintenance of a fish trap and transfer facility without adequate study of the fish populations targeted for upstream passage and an evaluation of habitat suitability for those species. Further, the license for the Dells Project which expires in 2000 would need to be amended to accommodate construction of the trap and transfer facility.

Northern States has proposed to restudy the fish populations in the tailwaters of the Dells Project which would document the presence and relative abundance of fish species that would be available to a trap and transfer operation. These studies would be initiated as part of the relicensing effort for the Dells Project and could begin as early as 1995. We conclude that these studies are necessary in order to adequately document a need for installation of a trap and transfer facility downstream of the Dells Project. Therefore, we recommend that the Licensee in consultation with the FWS and WDNR develop a plan to monitor fish species composition and abundance downstream of the Dells Project.

We believe that the trap and transfer facility should be evaluated during the relicensing of the Dells Project. To require such a facility now (included in the Chippewa Falls license) is not supported by a specific management plan and adequate quantification of the fishery downstream of the Dells Project. However, the WDNR may request fish passage in the future under the provisions of the standard articles included in the license or through Interior, which may prescribe fish passage in the future under Section 18 of the Act 1/.

g. Section 18 reservation of authority. Interior requests reservation of authority to prescribe the construction, operation, and maintenance of fishways for the Chippewa Falls Project, pursuant to Section 18 of the Federal Power Act (Act) (letter from Jonathan P. Deason, Director, Office of

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1/ 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."

Environmental Affairs, Department of the Interior, Washington, D.C., December 21, 1992).

Section 18 of the Act provides the Secretary of the Interior the authority to prescribe fishways. Although fish passage facilities may not be prescribed by Interior at the time of project licensing, such as for the Chippewa Falls Project, the Commission should include a license article which reserves Interior's prescription authority.2/ We recognize that future fish passage needs and management objectives cannot always be predicted when a license is issued. Under these circumstances, and upon receiving a specific request from Interior, the Commission should reserve Interior's authority to prescribe fishways.

Unavoidable Adverse Impacts: Project operation with the recommended 1-inch spaced trashracks should reduce turbine mortality.

3. Terrestrial Resources

Existing Environment: Since the project is located within the City of Chippewa Falls, much of the project vicinity is occupied by urban, commercial, industrial, and residential development. Development adjacent to the 270-acre impoundment consists of a golf course and condominium development on the north shore and a complex of eight research buildings in an industrial park on the south shore. Greater than 50 percent of the impoundment shoreline, however, is undeveloped and tree-lined.

Northern States holds fee title to 38.36 acres of land within the project boundary, 31.10 acres of which are located on both shorelines of the impoundment between the dam and the railroad bridge, a distance of about 0.5 mile. A 7.26-acre parcel is located just downstream near the project spillway. Northern States also retains flowage rights to all lands bordering the remainder of the project reservoir. The reservoir shoreline is protected for aesthetics and from abuses by county floodplain and shoreline zoning ordinances.

Upland forest occupies scattered parcels on the northern and southern shorelines of the reservoir. The uplands are either mixed oak (black, red, and white) or planted pine (jack and red), with scattered white pine. The undeveloped fringe of the reservoir is vegetated by a mixture of upland and lowland trees and scrub/shrub brush (old field). In most cases, the old field habitat predominates. Old field is typified by a mixture of dogwood, sumac, willow, alder, and sapling trees.

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

There are six wetlands within the near-vicinity of the project. Five of the six occur along the reservoir. The sixth is a small island just downstream of the dam. Four of these wetlands are palustrine forested 3/ consisting, predominantly, of cottonwood, green ash, red maple, elm, and speckled alder. They range in size from 2 to 9 acres. The other two wetlands include an unclassified open water area, and a palustrine emergent persistent wetland; each occupying about 2 acres.

The area within the project boundary provides a fairly diverse but modest quantity of habitat for wildlife. Because of existing development, however, most of the wildlife species that occur are those that can tolerate human intrusion. Common resident species found throughout the area include the white-tailed deer, woodchuck, gray squirrel, cottontail rabbit, common crow, blue jay, cardinal, tufted titmouse, and black-capped chickadee. Typical species of the wetlands, reservoir edges, and downstream river shorelines are the raccoon, muskrat, mink, mallard, wood duck, great blue heron, green heron, and several species of reptiles and amphibians. Numerous migratory birds utilize the vegetated habitats for short periods during the spring and fall migrations. The reservoir provides some habitat to a number of migratory waterfowl species.

Environmental Impacts and Recommendations: Continued operation of the Chippewa Falls Project would have little or no effect on vegetation and wildlife resources around the project reservoir. Under the present operation, the reservoir fluctuates usually at ± .5 feet and at a maximum of 1 foot. Reservoir operation is not proposed to change.

Future operation of the project under the proposed increased minimum flow releases (i.e., from the current 300 cfs year-round release to 1000 cfs from April 15 to May 31, and 785 cfs for the remainder of the year) in the Chippewa River downstream of the project powerhouse would have some effects on vegetation and wildlife. Overall, the impact to vegetation is minor because of the preponderance of a rocky/gravelly shoreline substrate, steep river banks, and the infrequent occurrence of lowland and wetland areas. Generally, the river banks are well-stabilized with little evidence of erosion and are vegetated above the high water mark.

The increased downstream releases would adversely impact some wildlife populations. The dens and food supply of aquatic furbearers (e.g., muskrat) may be temporarily disrupted by higher water levels. Also, some waterfowl and wading birds may experience a minor loss of feeding habitat. However, the results of a cooperative wildlife and fish habitat study conducted by the

3/ Wetland nomenclature follows Cowardin, et. al. (1979).

FWS and the WDNR in August 1989 showed that the higher minimum downstream flows would provide additional waterfowl resting habitat.

a. Wildlife management on project lands

Interior and the WDNR recommended that Northern States retain all lands that currently exist within the project boundary (38.36 acres), and that any proposal to withdraw this land be reviewed by the FWS and the WDNR, prior to final approval by the Commission. Further, Interior recommended that Northern States develop a management plan for these lands that includes provisions to protect environmentally sensitive areas such as littoral zones, canopy trees, and wetlands, with emphasis on management for wildlife. Both agencies state that project lands and waters provide valuable habitat for fish and wildlife species and are of great benefit for public multi-recreational use.

Northern States concurs with Interior's recommendations.

The retention of the 38.36 acres of project lands, protection of littoral zones, canopy trees, and wetlands on these lands, and management of the habitats for the benefit of wildlife would maintain and enhance the existing terrestrial ecological value of these areas. Northern States should, therefore, retain the 38.36 acres of project lands, and protect the sensitive habitats within these areas, with an emphasis on management of wildlife. To ensure protection of sensitive habitats and to provide for the effective management of these habitats for the benefit of wildlife, we recommend that Northern States develop a management plan.

b. Wetland protection.

Interior and the WDNR recommended that Northern States cooperate with the WDNR in implementing a plan to control the spread of purple loosestrife (Lythrum salicaria) at the project, when deemed appropriate by the WDNR. Both agencies indicated that although purple loosestrife is not know to occur on project lands, it may invade the area during the term of a new license. The agencies stated that invasion of existing wetlands by purple loosestrife would decrease their value for wildlife use by displacing more valuable wetland plants. Further, control of purple loosestrife will help preserve the integrity of the existing wetlands in the project area and may assist in slowing its spread.

Northern States states that it has agreed with the FWS and the WDNR to monitor the project area for the presence of purple loosestrife during normal operations and to report its findings to the agencies. Northern States does not believe that it should be required to implement a control plan for the species, but

agrees to voluntarily help to control the species if it appears at the project. 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.

Purple loosestrife is a plant introduced from Europe (it is an ornamental plant that escaped from cultivation). Often, it grows profusely, at the expense of the native wetland vegetation, reducing the wildlife habitat value of wetlands. The plant has little food value for wildlife. Although purple loosestrife does not presently occur in the project area, there is the potential for it to become established since it occurs throughout Wisconsin. Further, measures available to control this species are limited. Should it become necessary to control purple loosestrife in the project's reservoir and associated wetlands, and safe, effective control measures become available, Northern States should cooperate with the WDNR to implement purple loosestrife control measures.

Accordingly, we are recommending that Northern States monitor project lands and waters at least annually, and report the results to the WDNR. If found on project lands, Northern States should cooperate with the WDNR if they deem it necessary to control or eliminate purple loosestrife from the project.

Unavoidable Adverse Impacts: Operation of the project with at the proposed increased downstream minimum flow releases would cause a minor temporary disruption of aquatic furbearer dens and food supply. A minor long-term loss of a small amount of waterfowl and wading bird nesting and feeding habitat would also occur.

4. Threatened and Endangered Species

According to Interior, the bald eagle (Haliaeetus leucocephalus), a federally listed threatened species in Wisconsin, forages along the Chippewa River, including the tailwater area of the Chippewa Falls Project. While no bald eagle nesting is known to occur on project lands, bald eagles have nested along the river's edge at two locations about 2 to 2.5 miles downstream of the project between 1989 and 1992. The large canopy trees and secluded nature of the reach of the Chippewa River between Chippewa Falls Dam and the next downstream dam (Dells Dam) provide good habitat for nesting eagles.

Interior also lists the lake sturgeon (Acipenser fulvescens), loggerhead shrike (Lanius ludovicianus), salamander mussel (Simpsonaias ambigua), and spectacle case mussel (Cumberlandia monodonta), candidate species being considered for listing as endangered or threatened. The lake sturgeon inhabits project waters. The spectacle case mussel has been found in the

river reach between the Chippewa Falls and Dells Dams (downstream of the project). Habitat is potentially available for the salamander mussel and loggerhead shrike, category 2 4/ species. 5/

According to the WDNR, 6/ the paddlefish (Polyodon spathula) - state threatened/federal subcategory 3C 7/; blue sucker (Cycleptus elongatus) - state threatened/federal category 2; river redhorse (Moxostoma carinatum) - state threatened; greater redhorse (Moxostoma valenciennesi); and the crystal darter (Ammocrypta asprella) - state threatened/federal category 2 are known to be or have been present in the Chippewa River below the Dells dam. The greater redhorse has also been documented in the upstream Lake Wissota. None of these species have been documented in the project reservoir or the Chippewa River between the Chippewa Falls dam and Dells dam. The WDNR also notes that Northern States has agreed to survey the project area and downstream river shore for the Blandings turtle (Emydoidea blandingi) and the wood turtle (Clemmys insculpta) by 1995. Both turtles are state threatened species.

In a 1989 survey of the Chippewa River downstream of the project, Dr. Terry Balding (University of Wisconsin, Eau Claire) documented not only the spectacle case mussel, but also the purple wartyback (Simpsonaias ambigua). Both mussels are also state endangered species. The study resulted in only one live specimen found along with several dead shells of the two species. Dr. Balding characterized the downstream area as not containing extensive areas of good freshwater mussel habitat, and concluded that mussel diversity is not great and abundance is poor.

4/ 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.

5/ Letter from Jonathan P. Deason, U.S. Department of the Interior, Washington, D.C., to Lois Cashell, Federal Energy Regulatory Commission, December 21, 1992.

6/ Letter from Tom Lovejoy, Wisconsin Department of Natural Resources, Eau Claire, Wisconsin, to Lois Cashell, Federal Energy Regulatory Commission, Washington, D.C., December 23, 1992.

7/ The federal subcategory 3C comprises taxa that are now considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, than previously thought.

A number of other state threatened, endangered, or watch nonaquatic species of plants, insects, and birds were listed by the WDNR as potentially occurring in the project area. The WDNR had initially requested that these species be surveyed in the project area. Northern States states that because only aquatic species could reasonably be impacted by project operations, it was agreed with the WDNR that only the aquatic-oriented species would need to be addressed.

Environmental Impacts and Recommendations: According to Interior, continued operation of the project would not affect the bald eagle, provided Northern States is required to meet the FWS' recommended conservation measures (i.e., the maintenance and protection of present and future potential perching and nesting trees). Interior also states that measures to enhance the habitat for mussels and the lake sturgeon, through increased instream flow and narrow trash rack spacing (for sturgeon protection), are included in its recommendations.

a. Bald eagle habitat protection and enhancement

Interior and WDNR recommend that Northern States preserve all suitable bald eagle nest and perch trees (such as large white and red pines) that presently exist or may develop on project lands throughout the term of a new license. Both agencies also recommend that if eagle nesting occurs on project lands, Northern States should implement the guidelines in the FWS's report entitled "Bald Eagle Management Guidelines".

Northern States concurs with the recommendation of Interior and WDNR.

The 38.36 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 presence of nearby development. Since Northern States has agreed and is being required herein to protect environmentally sensitive areas and manage project lands for the benefit of wildlife, some future eagle perching or nesting may occur. Accordingly, we are recommending that the Licensee preserve trees, such as white or red pines, on project lands that presently exist and may develop into suitable bald eagle perch and nest trees. Tree preservation would include those from 15 to 18 inches diameter breast height (DBH) within 200 feet of the reservoir shoreline, and those specimens less than 15 inches DBH that have the potential to attain this size. Other tree specimens that extend above the over-all tree canopy of the forest, less than 15 inches DBH, should also be considered for preservation. Allowances are being made for removal of felled or diseased-damaged trees, which may affect public safety or project-related operation, after agency consultation. Additionally, in order to provide protection for future bald eagle use in the project area, we are recommending

that the Licensee prepare a bald eagle monitoring and protection plan if eagles begin perching or nesting on project lands.

b. State Listed Threatened and Endangered Species

The WDNR recommends that Northern States file, for Commission approval, a comprehensive plan to evaluate the presence of and potential project operational or physical impacts to state and federal listed endangered and threatened resources. These species, as listed in the WDNR letter, include the paddlefish, blue sucker, river redhorse, greater redhorse, and crystal darter. The WDNR list also includes Blandings and wood turtle. Further, the WDNR recommends that if any of these species is found, based on the study results, Northern States propose mitigative measures and schedules to avoid and minimize adverse impacts to these resources. The WDNR explains that its recommended studies would determine a presence of these species, habitat suitability for introduction, potential for project impacts to listed species, and possible mitigative measures to reduce adverse impacts and possibly enhance species recovery.

Northern States disagrees with the WDNR recommendation. Northern States contends that many of the study elements requested by the WDNR are scientific queries that are not needed to reach an informed decision about project impacts, or are issues that should and will be addressed as part of relicensing the downstream Dells Project. Further, Northern States maintains that its approach, as outlined in Exhibit E of the license application, should be adopted by the Commission. Generally, Northern States' approach calls for delaying surveys for these species until licensing proceedings for the Dells Project, or until 1995. Northern States also indicates that it agrees with the approach in the Commission's June 1, 1992, letter whereby the Commission concludes that the WDNR's request to survey for undocumented state and federal endangered and threatened species is not appropriate. In its letter, the Commission explains that this study is not needed to assess the effect of continued operation of the existing project or to determine appropriate enhancement measures.

Any new license issued for the project would contain a requirement for higher minimum flows (i.e. 1,000 cfs from April 15 through May 31, 785 cfs from June 1 through April 14) downstream of the project dam as addressed in Section 3(a). Higher flows were based in part on the results of IFIM studies that were conducted cooperatively with Interior and the WDNR using the habitat requirements for the various life stages of three fish species. These fish species (i.e., smallmouth bass, walleye, log perch) were selected to categorize the major fish habitats of the river. Recommended flows were selected, in part, to stabilize water levels for the benefit of the fishery resource. The new minimum flows were also based on other factors

such as fish stranding and entrapment, wildlife habitat, water quality, and recreational navigation. Further, these minimum flows were established through the recommendations of Interior and the WDNR.

In conjunction with the minimum flow releases, any new license issued would contain a requirement for the licensee to conduct physical alterations to the stream channel downstream of the project, and to prepare a plan to establish limits on the maximum rate of change in river flow (ramping rate) for the protection of fish resources in the Chippewa River downstream of the project (see Section 3(b)).

A stream habitat enhancement plan for the Chippewa River downstream of the project, as discussed in Section 3(c), would also be required of any new license issued. Basically, this plan would provide for modification of stream substrate and channel morphology to enhance fish habitat, particularly fish cover.

All of the above-referenced requirements, new minimum flows, stream-channel alterations, ramping rates and stream habitat enhancement, would benefit the overall quality of the aquatic environment of the Chippewa River downstream of the project, particularly fish habitat. Such mitigative and enhancement measures would likely benefit the above-referenced state listed aquatic species of concern to the WDNR.

We believe that Northern States should not be required to file a comprehensive plan to evaluate the presence of and potential project operational or physical impacts to the state threatened and endangered species as recommended by the WDNR. With the implementation of the aforementioned aquatic mitigative measures, the aquatic environment of the Chippewa River downstream of the powerhouse would be mitigated and enhanced to the best means practicable, given the multiple factors considered. No additional mitigation or enhancement, specific to the state-listed species discussed herein, is warranted at this time. If the WDNR determines at a future date that specific additional mitigation or enhancement is needed for any of these species, or for any other fish and wildlife resources, the WDNR may make such recommendations to the Commission, under the provisions of standard article 15 of any new license issued.

5. Recreation and Other Land Uses

Affected Environment: Recreational opportunities at the project include most types of water-based activities, limited hunting for small game and waterfowl, picnicking, canoeing, birdwatching, golfing, and hiking. There are five public recreational facilities within the project boundaries that accommodate various uses: (a) a privately-owned, nine-hole golf course; (b) a lakeside day-use area with picnic tables and a boat

launch area owned by the City of Chippewa Falls; (c) a canoe take-out area near the dam; (d) an unimproved boat launch area located at the tailwater area (this area is also used for bank fishing) and; (e) an informal fishing area at the upper reach of the Chippewa reservoir below Northern States Wissota Hydropower project.

Based on a 1989 survey conducted by Northern States in cooperation with the WDNR, the most frequent type of recreational use occurring at the project is fishing (by local residents). Northern States estimates that about 10 fisherman per weekend day and 6.6 per weekday use the project. Most fishing takes place in the tailwaters from the river bank. The most popular time of year for fishing is during the spring walleye spawning season.

Canoeing and swimming are not as prominent as fishing at the project. Although boating use below the dam is low, there is an annual tubing event held in June that draws as many as 2,000 participants.

The Chippewa River, downstream of the project from Eau Claire-Dunn County line to the confluence with the Mississippi River, is included in the Nationwide Rivers Inventory for its outstanding recreational value. The primary recreational values of this river segment are fishing and canoeing.

Northern States reports in its 1990 FERC Form 80 filing (a recreation database for licensed projects) that boat launch facilities at the project are used to 75 percent of their capacity. Northern States also reports that picnic areas and access areas are used to 50 percent of their capacity. The total annual day visits at the project area is estimated to be 4,000.

Environmental Impacts and Recommendations:

a. Recreation. By letter dated August 8, 1992, the WDNR recommends that Northern States: (1) widen and expand vehicle parking, turn-around areas, and boat ramp at the City-owned reservoir boat ramp; (2) redevelop the existing unimproved boat landing located downstream of the dam as a public day use area and boat landing; (3) install a handicapped-accessible fishing pier at the City well field site adjacent to the project reservoir; (4) relocate the existing canoe portage so that portage users can avoid crossing State Highway 124 and; (5) provide a minimum downstream flow to provide sufficient continuous water levels for acceptable public use for navigation. Further, the WDNR recommends that Northern States consult with the City of Chippewa Falls during the design and construction of items 1, 2, and 3 listed above.

By letter dated October 5, 1992, Interior recommended that Northern States consult with the WDNR and file a plan for

recreational improvements in the project tailwater area and on the reservoir. Specifically, Interior asks Northern States to improve the existing unimproved boat landing located downstream of the dam and to develop a safe canoe portage route.

Northern States, with the FWS and the WDNR, conducted a navigation flow study downstream of the Chippewa Falls Project. Several different flows (300, 387, 520, 800, 985, 1411, and 3060 cfs) were rated for acceptability for recreational navigation. According to the study results, "the lowest flow navigated freely by a canoe was 800 cfs, though 520 cfs was a flow very near being acceptable for navigation by a canoe" (Lovejoy, 1990, page 1). The National Park Service (NPS) and the WDNR state in letters dated March 8, 1991 and August 8, 1992, respectively, that the proposed minimum flow of 785 is acceptable for canoeing.

By letter dated October 5, 1992, the Izaac Walton League of America (IZWA) states that the Chippewa Falls Project is having adverse effects on recreational resources and that these effects must be mitigated. The IWLA does not specify what these effects are.

Northern States, by letter dated February 13, 1993, concurs with the Interior and the WDNR previously mentioned recreation-related recommendations. Northern States estimates that these improvements would cost $50,000. Northern States did, however, request that they not be required to consult again with the WDNR in developing the recreation plan because this consultation has already taken place.

b. land use. As mentioned above, the WDNR and Interior agree that Northern States should retain ownership of project lands. Any proposal to withdraw any of this land should be reviewed by the WDNR and FWS before final approval by the Commission. A management plan should be developed for these lands and should include provisions to protect environmentally sensitive areas such as littoral zones, canopy trees, and wetlands; with emphasis on management for wildlife including the federally listed bald eagle.

In its February 13 letter, Northern States also concurs with the WDNR's and Interior's recommendations to retain project lands and develop a land use plan.

Our Recommendations. We agree that the proposed recreational enhancements would result in a positive public benefit. Improving the boat ramps and landings would help facilitate safe boating activity at the project and improve the overall appearance of the recreational areas. Installing a handicapped-accessible fishing pier would provide barrier-free public access for fishing, the most popular recreational activity at the project. Relocating the existing canoe portage so that

portage users can avoid crossing State Highway 124 would provide for safer, more inviting, canoe passage. Providing a minimum downstream flow of 785 cfs would allow canoeists and float fisherman to have an enjoyable boating experience during a longer period of the year. We, therefore, recommend that the Licensee, within one year of the date of license issuance, file with the Commission for approval a plan to implement the above-mentioned recreational enhancements.

We agree that the 38 acres of project land owned by Northern States is a valuable recreational resource and that a land management plan should be developed. Such a plan would provide guidance and foresight as to how the land should be managed. We, therefore, recommend the Licensee develop a land management plan for the Chippewa Project.

We also agree that the FWS and the WDNR should be consulted if any of this land is proposed to be sold. The Commission's standard land use article, included in any license, stipulates how a licensee must handle the sale or lease of project property. We, therefore, believe this article covers the consultation concern.

Unavoidable Adverse Impacts: None

6. Historic Properties

Affected environment: The project's facilities are eligible for listing on the National Register of Historic Places as the Chippewa Falls Dam Historic District (hereinafter, district) consisting of the reinforced concrete multisection dam, the powerhouse, and the high-voltage substation. The dam and powerhouse span the Chippewa River; the substation is located on the north bank just across Bridge Street, east of the powerhouse. The district's generating facilities were constructed between 1927 and 1928 for the Northern States Power Company of Wisconsin from designs supplied by the Byllesby Engineering and Management Corporation of Chicago. The complex that resulted became Wisconsin's third-largest hydroelectric plan and is still one of the state's largest hydroelectric installations.

From studies conducted at this project in the fall of 1990 and spring of 1991, archaeologist Christina Harrison, Burnett County Historical Society, reports negative results within and immediately adjacent to the project reservoir's area of potential effect (Harrison 1990). Similar results were obtained by archaeologist Edgar S. Oerichbauer, when proposed recreational improvements necessitated June 1992 studies on the south shore of the river near the project dam (Oerichbauer 1992).

Both Harrison and Oerichbauer conclude, "While a number of archaeological sites are known to exist on the upper terraces

overlooking the Chippewa Falls Reservoir and there is some indication that the lower terraces also were used (though possibly to a lesser extent), there does not appear to be any cultural evidence along the existing shoreline except in two locations well above/inland from the reservoir impact zone."

Both go on to state that informants report artifacts having been found on normally submerged areas during drawdowns, suggesting that cultural evidence may exist or may have existed on currently-inundated portions of the lower river terraces.

Environmental impacts and recommendations: Normally, when a hydroelectric project's physical facilities are an eligible historic district, continuing to operate the facilities is considered a beneficial effect. Although this is the case with this project, we cannot overlook the opportunities for adverse effects to occur during routine operation and maintenance activities. Operating and maintaining historic generating facilities according to a management plan would eliminate such opportunities to the extent that this reasonably can be done.

Furthermore, even with the extensive discovery efforts that have already been made, there is still the possibility that there could be undiscovered properties in the project area that could be adversely affected by future ground disturbing activities or by project operation. Undiscovered properties could be particularly at risk where the future ground disturbing activities exceed those activities that we have considered in this environmental assessment.

The Commission's Programmatic Agreement with the State of Wisconsin would require a licensee to develop a management plan for protecting historic properties. It also requires a licensee to consult further with the SHPO in the event that effects not already considered have to be taken into account, as described above. Therefore, we recommend that, as a condition of any license issued for the Chippewa Falls Project, the licensee be required to implement the referenced Programmatic Agreement.

Unavoidable adverse impacts: None.

C. Impacts of A Non-Power License

There are two alternatives to the proposed action. These are: (1) issuance of a non-power license; and (2) issuance of a new license with the various enhancement measures evaluated in this EA.

Option (1) is not in the best interest of the public, nor in the best interest of Northern States. Northern States will utilize the power for sale to its customers.

We estimated amounts of coal necessary if the equivalent amount of electric energy were generated in a coal-fired steam-electric plant. We also estimated the amounts of pollutants---oxides of sulfur, oxides of nitrogen, carbon monoxide, and carbon dioxide---produced by burning that coal. In our analyses, we assumed that coal burned would contain 1.0 percent sulfur and the powerplants would not have state-of-the-art emission control systems.

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. This increase may not be impressive if a project is considered alone; but, if the picture is magnified by considering the number of licensed hydropower projects of comparable capacity in the United States, tonnages and costs become quite impressive.

D. Impacts of the No-Action Alternative

Under the no-action alternative, the project would continue to operate as it has in the past as discussed in Section III.

VI. COMPREHENSIVE DEVELOPMENT AND RECOMMENDED ALTERNATIVE

Sections 4(e) and 10(a) of the Act 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 resources, and other nondevelopmental values of the waterway are considered equally with power and other developmental values. In determining whether, and under what conditions, a hydropower license should be issued, the Commission must weigh the various economic and environmental tradeoffs involved in the decision.

A. Recommended Alternative

Based on our independent review and evaluation of the existing Chippewa Falls Project, agency recommendations, and the no-action alternative as documented in this EA, we have selected issuing a new license for the Chippewa Falls Project, with additional staff-recommended enhancement measures, as the preferred option. We select this option because: (1) our

required measures would protect and enhance the water quality, fishery resources and aesthetics; and (2) the electricity generated from a renewable resource would be beneficial because it would continue to replace the use of fossil-fueled, steam-electric generating plants, thereby, conserving nonrenewable energy resources and reducing atmospheric pollution.

This EA analyzes the effects of Northern States' existing project on the Chippewa River and recommends 15 measures to protect and enhance the environmental resources. These measures are:

1. Release a minimum flow of 785 cfs from June 1 through April 14 when Northern States installs the new turbine runner, but not later than December 31, 1994. In the interim, Northern States should continue releasing a minimum flow of 300 cfs through either the spillway gates or powerhouse to protect existing water quality.

2. Release a minimum flow of 1,000 cfs from April 15 through May 31 to enhance spawning of resident fishes such as lake sturgeon and walleye.

3. Develop a plan for DO monitoring downstream of the project to be implemented within 1 year of initiating the minimum flow releases.

4. File a final streamflow monitoring plan to monitor compliance with minimum flow and impoundment water level requirements.

5. Maintain a continuous minimum flow during power outages.

6. Make physical alterations to the stream channel downstream of the project to minimize potential for fish stranding and entrapment in conjunction with the 1,000-cfs minimum flow.

7. Prepare a ramping rate plan for the protection of fish resources in conjunction with the 1,000-cfs minimum flow.

8. Develop a stream habitat enhancement plan for the Chippewa River downstream of the project. Include a plan for monitoring the structural and functional integrity of the channel modifications.

9. Notify the WDNR within 24 hours of any proposed or already enacted emergency drawdown and at least 2 months before any proposed drawdown for dam maintenance or fish and wildlife enhancement purposes.

10. Design and install trashracks with 1-inch spacing and develop a plan to monitor the effectiveness of the trashracks at preventing entrainment.

11. Develop a management plan to protect wildlife habitats.

12. Monitor project lands and waters annually to control or eliminate purple loosestrife.

13. Preserve trees, such as white or red pines, that presently exist and may develop into suitable bald eagle perch and nest trees.

14. Develop and file a final recreation plan.

15. Develop and file a land management plan for 38 acres of project land.

B. Developmental and nondevelopmental uses of the waterway

A project is economically beneficial so long as its projected levelized cost is less than the levelized cost of alternative energy and capacity.

Value of Power

The Chippewa Falls Project generates about 5,422,668 MWh annually. The estimated 40-year levelized alternative value of energy in the region would be about 36.8 mills per kWh in 1994, the assumed first year of operation after a new license could be issued. 8/

The Chippewa Falls Project has 21,460 kW of dependable capacity. Northern States estimates that it would cost $363 per kW to install new capacity on its system in 1994. Assuming a fixed charge rate of 16.6 percent, and fixed O&M costs of $1.91, we estimate the levelized value of capacity on Northern States' system would be $62.17 per kW-year. Based on 21,460 kW of dependable capacity and 71,632, MWh of generation, the levelized dependable capacity value would be 18.6 mills per kWh. Adding

8/ 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 Midwest 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 119 of its February 1993 publication Supplement to the Annual Energy Outlook 1993, and on its reference-case projections of general escalation as shown by the GNP implicit price deflator indices on Table 1 of the same publication.

the energy and capacity values, the total levelized value of power from the Chippewa Falls Project would be 55.4 mills per kWh.

Cost of Power

Because Northern States has not proposed to increase or add any new capacity, the levelized project costs would be the operation and maintenance (O&M) costs, administrative and general (A&G) costs, taxes, and miscellaneous depreciation. Northern States estimates these operating costs for the Chippewa Falls Project to be about 9.7 mills per kWh.

Northern States plans extensive rehabilitation for the project. This rehabilitation consists of replacing turbine runners with new more efficient runners, overhauling the components of the associated water passages, and rehabilitating some of the electrical facilities such as replacing an open switchboard and bus, relocating a station transformer, installing new control panels, and improving lighting.

Northern States has estimated the cost of this rehabilitation work would be about $13,365,000. Assuming a fixed charge rate of about 16.6 percent for Northern States, we estimate this cost would amount to about $2,470,000 annually when levelized over a 40-year period, or about 34.4 mills per kWh. We added interest during construction (IDC) to Northern States estimate and adjusted the costs to 1994 dollars. Our fixed charge rate considers the cost of money, depreciation, insurance, and taxes.

Costs of Enhancement

After Northern States completes installation of its new adjustable Kaplan turbine(s), it proposes to make minimum flow releases of 1,000 cfs during the period April 15 through May 31 and 785 cfs for the remainder of the year through the powerhouse. The resource agencies requested these minimum flow releases and are recommending their implementation. The releases would not reduce the project's power generation since Northern States would be permitted to generate power with them.

Chippewa Falls is a peaking project. Although the minimum flow releases would have negligible effect on the total amount of energy generated, Northern States would have to shift some of its peak energy generation to off-peak periods to comply with the minimum flow releases. Because peak energy has a higher value than off-peak energy, this shift would result in a loss of economic benefits to Northern States' ratepayers.

Northern States has estimated the loss of project benefits to be 0.6 mill per kWh when it shifts peak energy to off-peak

energy. Because the Chippewa Falls Project has very small storage capability, Northern States would have to make releases from storage at its upstream Wissota Project to satisfy any minimum flow requirements at Chippewa Falls. The shift from peak energy to off-peak energy at the Wissota Project, also a peaking facility, would represent an additional cost to Northern States ratepayers. Furthermore, Northern States would have to install new adjustable Kaplan turbine runners on its units to make the releases. A cost has been estimated for that item also.

We have reviewed Northern States's costs and believe the estimates are reasonable. Northern States's estimates are shown below in Table 2.

Table 2. Estimated costs for shifting on-peak generation to off-peak generation to provide minimum streamflow releases of 1,000 cfs from April 15 through May 31 and 785 cfs for the remainder of the year. 9/

Item	Levelized Annual Cost (1994 dollars)	Levelized Annual Cost (mills/kWh) 10/
Energy		
Chippewa Falls	$42,900	0.6 mills
Wissota	$86,800	1.2 mills
Capacity	0	0.0 mills
Turbine cost	$20,600	0.3 mills
TOTAL ANNUAL COSTS	$150,300	2.1 mills

The resource agencies have requested, and we are recommending, Northern States install trash racks with a 1-inch clear opening. The Chippewa Falls Project presently has trash racks with 4.5-inch clear openings. Installing trash racks with more narrow openings would create more frictional resistance to flow and thus reduce the available head, and would consequently

9/ Northern States developed these costs in 1990 dollars. The staff weighted Northern States' costs with respect to periods of flow, adjusted the costs to 1994 dollars, and levelized them over a 30-year period.

10/ Based on an average annual generation of 71,632,000 kWh.

reduce both the dependable capacity rating and energy generation. Trash racks with more narrow openings would collect more debris, requiring Northern States to expend additional labor to the clean the trash racks. This would produce additional debris which would have to be collected and hauled to a landfill.

Northern States has made estimates of the additional operating costs for installing trash racks with a variety of sized openings. We have reviewed these costs and believe that they are reasonable. These costs are shown below in Table 3. Although Northern States provided a breakdown of the individual costs, we have lumped the components together into one cost. The individual cost components include lost capacity, lost energy, increased operating and maintenance costs, and capital construction costs.

Table 3. Northern States's sensitivity analysis for installing trash racks with different width openings. 11/ 12/

Scenario	Levelized Annual Cost (1994 dollars)	Levelized Annual Cost (mills/kWh) 13/
Option 1 Clear opening: 2 inches Steel bar size: 1/2" by 4"	$160,000	2.2 mills
Option 2 Clear opening: 2 inches Steel bar size: 3/8" by 4"	$227,000	3.2 mills
Option 3 Clear opening: 1/1/2 inches Steel bar size: 5/16" by 4"	$257,000	3.6 mills
Option 4 Clear opening: 1 inch Steel bar size: 1/4" by 4"	$300,000	4.2 mills
Option 5 Clear opening: 1 inch PVC bars	$152,000	2.1 mills

Northern States is currently in the process of installing a set of PVC trash racks (Option 5) on one of its generating units to test the operational characteristics of PVC. It is unknown at this time how a PVC rack with 1-inch clear spacings will function with the ice and debris present on the Chippewa River. Additionally, the present raker system is designed for a trash rack with a 4.5-inch clear bar spacing and will not work on the PVC rack with 1.0-inch spacings. Northern States may be able to modify its present raker or it could try hand raking. If neither of these possibilities are practical, then Northern States would have to purchase a new raker system at a cost of $250,000. The

11/ The staff adjusted these costs to 1994 dollars and levelized them using a fixed charge rate of 16.6 percent.

12/ The levelized cost includes lost capacity, lost energy, increased O&M, and capital construction costs.

13/ Based on an average annual generation of 71,632,000 kWh.

cost shown above for Option 5 does not include the cost for a new raker system.

The resource agencies have also requested Northern States to construct a fish trap and transfer facility as an enhancement feature (see Section V.2.f.). Northern States has developed construction and other associated costs for the fish trap and transfer facility. Because there are three projects involved, we allocated only one third of the costs to the Chippewa Falls Project with the exception of the energy cost. These costs are shown below in Table 4.

Table 4. Costs of fish trap and transfer facility attributable to Chippewa Falls Project. 14/

Item	Levelized Annual Cost (1994 dollars)	Levelized Annual Cost (mills/kWh) 15/
Capital construction costs	$127,000 16/	1.8 mills
Annual maintenance costs	$21,000	0.3 mills
Annual operational costs	$52,000	0.7 mills
Lost generation	$46,000	0.6 mills
TOTAL ANNUAL COSTS	$246,000	3.4 mills

We conclude that the existing project would continue to be economically beneficial when compared to the alternative cost of fossil fuel and capacity in the region. Enhancement being required excluding the trap and transfer activity would cost $302,300 or 4.2 mills/kWh. The trap and transfer would add $246,000 or 3.4 mills/kWh for a total cost of $548,300 or 7.6 mills/kWh.

14/ The costs shown in this table, with the exception of lost generation, represent one third of the total costs.

15/ Based on an average annual generation of 71,632,000 kWh.

16/ We assumed a fixed charge rate of 16.6 percent for levelizing the facility costs to maintain consistency with our other economic assumptions.

Section 10(a)(2) of the Act also 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 61 comprehensive plans that address various resources in Wisconsin. Of these, we identified and reviewed 9 plans relevant to this project. 17/ No conflicts were found.

Based upon a review of the agency and public comments filed on the project, and on our independent analysis pursuant to Sections 4(e), 10(a)(1), 10(a)(2) of the Act, we conclude that issuing a license for the Chippewa Hydroelectric Project, with our required enhancement measures and other special license conditions, would permit the best comprehensive development of the Chippewa River.

VII. CONSISTENCY WITH FISH AND WILDLIFE RECOMMENDATIONS

Pursuant to Section 10(j) of the Act, we make a determination that one of the recommendations of the Federal and state fish and wildlife agencies are not consistent with the purposes and requirements of Part I of the Act and applicable law. Section 10(j) of the Act requires the Commission to include license conditions, based on recommendations of Federal and state fish and wildlife agencies, for the protection of, mitigation of adverse impacts to, and enhancement of fish and wildlife resources. We have addressed the concerns of the Federal and state fish and wildlife agencies and made recommendations, one of which is inconsistent with that of the agencies.

Specifically, we have concluded that the recommendation of Interior and the WDNR concerning the development and implementation of a plan for the construction, operation and

17/ Lower Chippewa River Basin areawide water quality management plan and river basin report, 1978, Wisconsin Department of Natural Resources (WDNR); Upper Chippewa River Basin areawide water quality management plan. 1980, WDNR; Wisconsin water quality-report to Congress, 1986, WDNR; Wisconsin statewide comprehensive outdoor recreation plan for 1991-1996, 1991, WDNR; Wisconsin peregrine falcon recovery plan, 1987, WDNR; Wisconsin red-necked grebe recovery plan, 1988, WDNR; Wisconsin common tern recovery plan, 1988, WDNR; Wisconsin forster's tern recovery plan, 1988, WDNR; Fisheries USA, the recreational fisheries policy of the U.S. Fish and Wildlife Service, US Fish and Wildlife Service; The nationwide rivers inventory, 1982, National Park Service.

maintenance of a fish trap and transfer facility below the Dells Dam is premature at this time. It is not possible to evaluate the appropriateness and feasibility of such a facility without a more adequate quantification of the downstream fisheries resources particularly those fish species targeted for trap and transfer. No fishery management plan has been developed for the Chippewa River justifying the cost and need for upstream fish passage at the Chippewa Falls Project. There has been no evaluation of the presence and abundance of fish species targeted for transfer from downstream of the Dells Project. Further, there has been no evaluation of the availability of suitable habitats for the targeted fish species upstream of the Chippewa Falls and Wissota projects. Therefore, we conclude that plans for a fish trap and transfer facility are not warranted.

We also conclude that the recommendation of the WDNR that Northern States file a comprehensive plan to evaluate the presence of and potential project operational or physical impacts to state and federal listed endangered and threatened resources is outside the scope of Section 10(j). Many of the study elements requested by WDNR are scientific queries that are not needed to reach an informed decision about project impacts. With the implementation of aquatic enhancement measures discussed herein, the aquatic environment of the Chippewa River downstream of the powerhouse would be adequately protected and enhanced. No additional protection or enhancement specific to state-listed species is warranted at this time.

VIII. CONCLUSION

The project is constructed and operating. Consequently, there would be no project-related construction impacts. Operating the Chippewa Falls Project as proposed herein would protect and enhance the aquatic resources and water quality in the Chippewa River downstream of the project.

IX. FINDING OF NO SIGNIFICANT IMPACT

On the basis of our independent environmental analysis, issuance of a license for the Chippewa Falls Project would not constitute a major Federal action significantly affecting the quality of the human environment.

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IX. LIST OF PREPARERS

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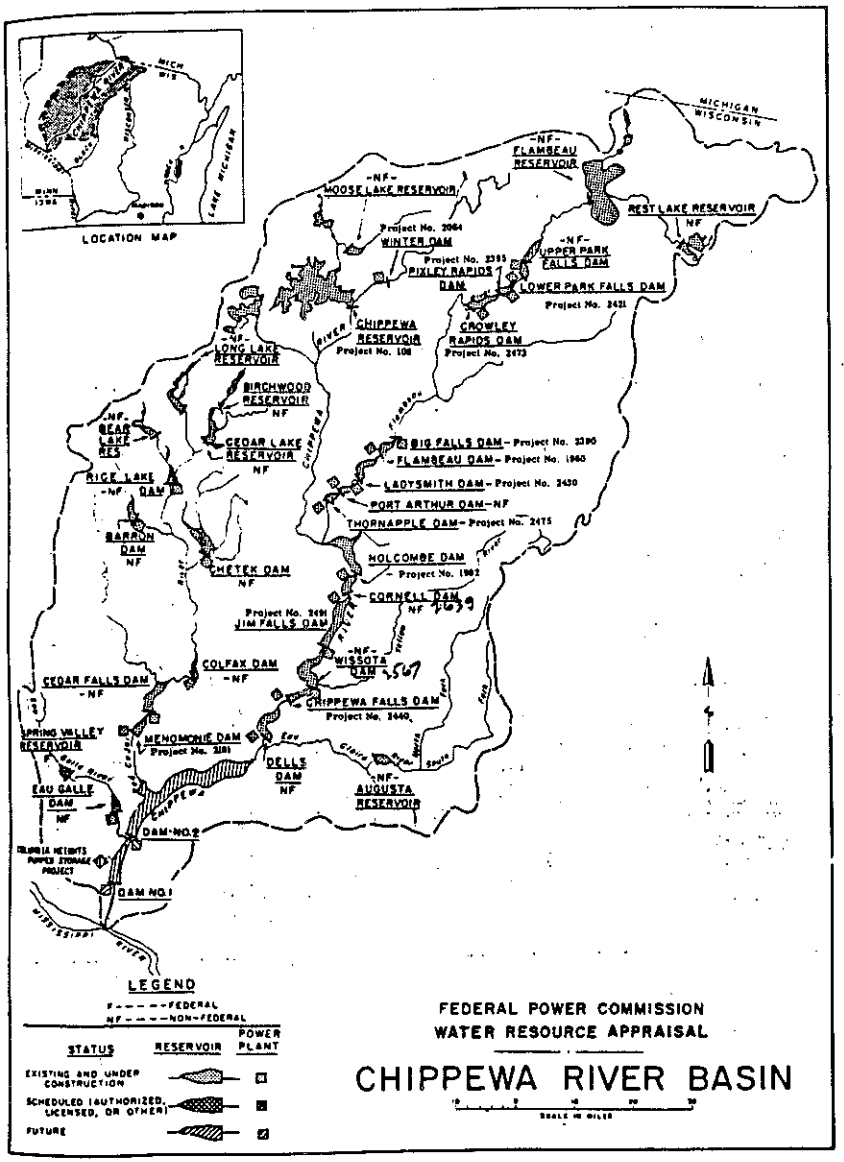

Figure 1. Chippewa River Basin map. (Source: Federal Power Commission, 1965).

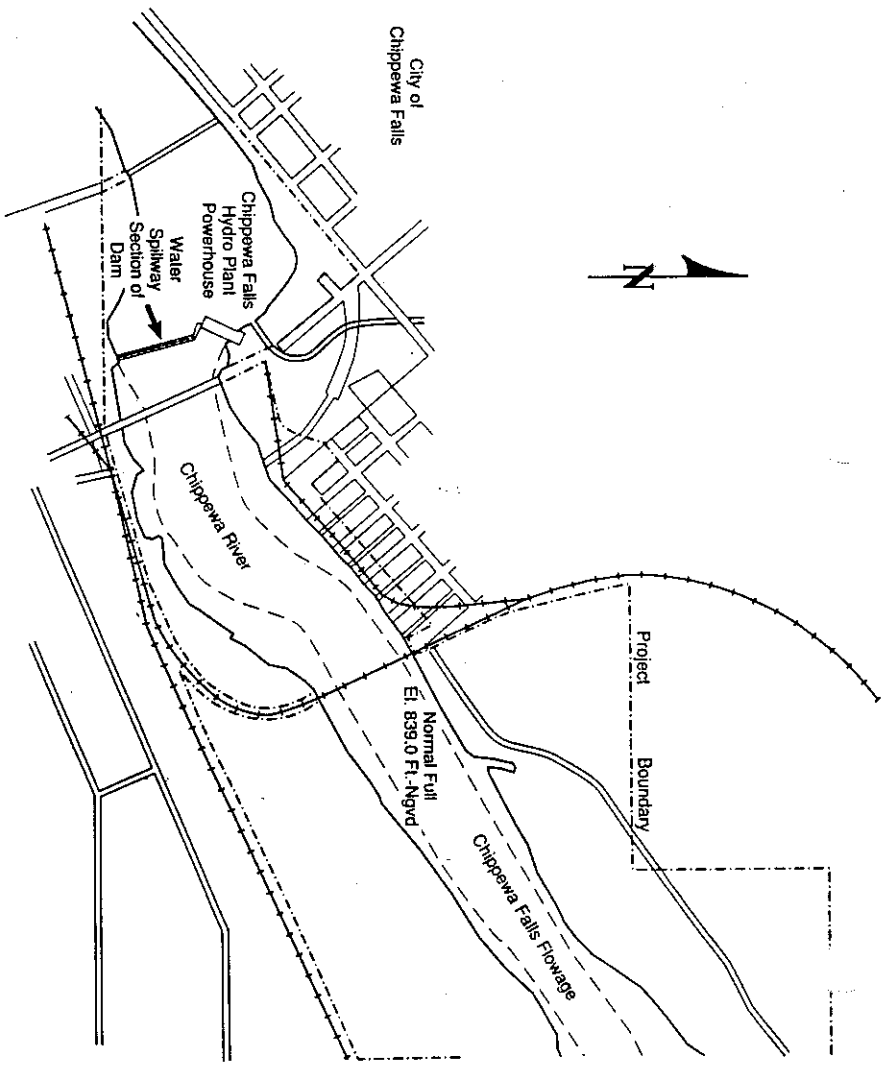

Figure 2. Project Features of the Chippewa Falls Hydro Project No. 2440. (Source: the staff, as modified from Northern States Power Company 1991, application).