

**U.S. Army Corps of Engineers  
Rock Island District**



**2004**  
**Report to Congress**  
  
**Upper Mississippi  
River System  
Environmental  
Management Program**



**02 August 2004**



**Cover:** Top left: LTRMP fish sampling; Top right: Award-winning HREP Project, Pool 8 Phase II HREP-Stoddard, Wisconsin; Bottom right: LTRMP aquatic vegetation sampling; Bottom left: LTRMP water quality sampling.

**2004**  
**Report to Congress**  
**Upper Mississippi River System**  
**Environmental Management Program**

U.S. Army Corps of Engineers  
Rock Island District  
P.O. Box 2004  
Clock Tower Building  
Rock Island, Illinois 61204-2004



**US Army Corps  
of Engineers®**



## Acknowledgments

The U.S. Army Corps of Engineers would like to take this opportunity to express its appreciation to staff from the following Federal and State agencies and non-governmental organizations who participated in the many workshops and meetings requisite to the development of this report. Their coordination efforts and document reviews were invaluable. Although many other individuals contributed to this 2004 Report to Congress on the Upper Mississippi River System Environmental Management Program, only the names of the principal point(s)-of-contact are identified here.

### **UPPER MISSISSIPPI RIVER BASIN ASSOCIATION**

Ms. Holly Stoerker and Ms. Barb Naramore

### **ILLINOIS DEPARTMENT OF NATURAL RESOURCES**

Mr. Scott Stuewe

### **IOWA DEPARTMENT OF NATURAL RESOURCES**

Mr. Kevin Szcodronski and Ms. Diane Ford-Shivers

### **MINNESOTA DEPARTMENT OF NATURAL RESOURCES**

Mr. Steve Johnson and Mr. Tim Schlagenhaft

### **MISSOURI DEPARTMENT OF CONSERVATION**

Mr. Gary Christoff and Ms. Janet Sternburg

### **WISCONSIN DEPARTMENT OF NATURAL RESOURCES**

Mr. Terry Moe and Ms. Gretchen Benjamin

### **UNITED STATES FISH AND WILDLIFE SERVICE**

Mr. Charles Wooley

### **UNITED STATES GEOLOGICAL SURVEY**

Dr. Leslie Holland-Bartels

### **UNITED STATES ENVIRONMENTAL PROTECTION AGENCY**

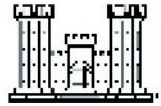
Mr. Bill Franz and Mr. Larry Shepard

### **NATURAL RESOURCES CONSERVATION SERVICE**

Mr. Gary Wooten

In addition to those agencies and individuals specifically named, we would also like to express our appreciation to many members of the public and nongovernmental organizations for their review and thoughtful contributions to the report.





DEPARTMENT OF THE ARMY  
ROCK ISLAND DISTRICT, CORPS OF ENGINEERS  
CLOCK TOWER BUILDING • P.O. BOX 2004  
ROCK ISLAND, ILLINOIS 61204-2004

Office of the  
District Engineer

The Environmental Management Program (EMP) was authorized in the 1986 Water Resources Development Act to help address ecological needs on the Upper Mississippi River System (UMRS). Subsequent amendments have helped shape the Habitat Rehabilitation and Enhancement Projects (HREPs) and the Long Term Resource Monitoring Program (LTRMP), the program's two major components. Together, HREPs and the LTRMP are designed to help improve the environmental health of the system and increase our understanding of the river's natural resources. Implementation of all program elements is coordinated through a partnership comprised of the U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, U.S. Geological Survey, U.S. Environmental Protection Agency, U.S. Natural Resources Conservation Service and the UMRS States of Illinois, Iowa, Minnesota, Missouri and Wisconsin.

This Report to Congress is the second formal evaluation of the Environmental Management Program, the first having come in the 1997 Report to Congress. This report was developed in coordination with our EMP partners, and in conjunction with an engaged public. This evaluation provides an opportunity to step back and take a critical look at the collective impact of the legal authorities, management actions, and policy decisions that have shaped the program.

The overarching message of this report is that Congress has provided a solid foundation for the program and that the management actions and policies instituted have resulted in a sound program. However, the report does contain several recommendations that I believe will improve the program.

The ultimate purpose of the EMP is to make a tangible difference in the environmental health of the river and to increase our scientific understanding of the environmental workings of the system. An added benefit has been the creation of strong partnerships to address river resource issues.

The program has made great strides in achieving its purpose of both improving the environmental health and increasing our understanding of the river. However, there are still tremendous needs in both areas, and I look forward to the EMP continuing to address those needs in the future.

Duane Gapinski  
Colonel, U.S. Army  
District Engineer





# Executive Summary

The Upper Mississippi River System Environmental Management Program (EMP) is successfully implementing innovative and effective habitat projects and conducting cutting-edge monitoring and research. First authorized in Section 1103 of the Water Resources Development Act of 1986, the EMP has made significant contributions to ensure that Congress' vision of the Upper Mississippi River System as "a nationally significant ecosystem and a nationally significant commercial navigation system is maintained." Yet there are still many outstanding restoration and information needs.

This report is submitted in fulfillment of Section 509(b) of the Water Resources Development Act of 1999, which requires the Secretary of the Army, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, to submit a report to Congress by the end of 2004 and every six years thereafter. Consistent with this requirement, this report evaluates the EMP; describes its accomplishments, including development of a systemic habitat needs assessment; and identifies certain program adjustments. It focuses primarily upon changes and accomplishments since the EMP's first report to Congress in 1997 and the program's subsequent reauthorization in 1999. The Corps of Engineers prepared this report in consultation with the five Upper Mississippi River States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin; U.S. Geological Survey; U.S. Fish and Wildlife Service; U.S. Department of Agriculture; and the U.S. Environmental Protection Agency. Endorsements of the report from these partners are included in Attachment A.

## Habitat Rehabilitation and Enhancement Projects

When the EMP began, Habitat Rehabilitation and Enhancement Project (HREP) designers, implemented and refined construction techniques to improve habitats in ways not previously imagined. The intent was to improve habitat through site-specific modifications. Over the past 18 years, the EMP's HREP component has evolved into a successful program that combines a broad range of construction techniques with approaches that strive to use or mimic natural riverine processes, providing benefits to the river at system, reach, pool, and local scales. Since its 1999 reauthorization, the HREP program has continued to build upon the successful foundation established in the program's first years. That foundation includes:

- interagency groups in each of the three Corps Districts that help identify, prioritize, and select projects;
- documentation of the design methods and performance of HREPs;

- protocols for monitoring the physical, chemical, and biological impacts of projects;
- system-level interagency coordination to exchange information and enhance approaches to project design, construction, contracting, and monitoring; and
- established mechanisms for soliciting public input and involvement.

Building on this foundation, the EMP has now completed 40 HREPs, improving fish and wildlife habitat on almost 67,000 acres. Of this total, 16 projects, affecting more than 39,000 acres of aquatic and terrestrial habitat, have been completed since the 1997 EMP Report to Congress. Another 8 HREPs are currently under construction, and 16 projects are in various stages of design. In combination, these 24 projects will improve approximately 74,000 acres of additional habitat.

Innovations and lessons learned in the HREP program have benefits not only on the Upper Mississippi River System but also elsewhere in the United States and beyond, where similar efforts are underway to preserve and restore habitat on large floodplain river systems. The EMP and the U.S. Army Corps of Engineers are internationally recognized leaders in such endeavors.

Important accomplishments and modifications of the HREP program since the 1997 Report to Congress include:

- Projects designed to manage water levels to more closely mimic a natural hydrograph have produced strong positive response by vegetation, fish, and water birds.
- Hydraulic engineering innovations, such as rock groins, more gradual side slopes, and use of native vegetation, have produced more robust island projects that are very stable, yet still yield strong biological response.
- Micro-models have offered a new approach to physical modeling, permitting more thorough evaluation of potential habitat benefit and navigation system impacts from secondary channel modifications.
- Monitoring of two early HREPs designed to enhance overwintering habitat for fisheries has enhanced understanding of the target species' habitat requirements, allowing substantial cost reductions in subsequent projects through the use of smaller water control structures.
- Development of a Habitat Needs Assessment (HNA) was recommended in the 1997 Report to Congress and authorized in the Water Resources Development Act of 1999. The first Upper Mississippi River System Habitat Needs Assessment (HNA) was completed in 2000, with stakeholder participation and support. Habitat needs were identified at the pool, reach, and system scales. The HNA



will be used to aid in the identification of future habitat projects and their subsequent design.

- Building upon the successful District-level interagency HREP design process, the EMP partners recently finalized a new HREP Planning and Sequencing Framework intended to enhance the transparency of the project planning process and ensure that planners make use of newly available tools and consider habitat needs at various spatial scales. This new framework will be employed at the District and system levels beginning in FY 05.
- As recommended in the 1997 Report to Congress, Corps Headquarters delegated limited HREP approval authority to the Division and District levels (\$5 million and \$1 million, respectively). This delegated authority has significantly increased the efficiency with which many HREP proposals can be evaluated and processed.
- In keeping with the 1997 Report Congress and the Water Resources Development Act of 1999, the Army Corps of Engineers, in consultation with the program partners, has developed plans to implement an Independent Technical Review Committee and enhanced public involvement for the EMP.

## Long Term Resource Monitoring Program

The other primary component of the EMP is the Long Term Resource Monitoring Program (LTRMP), which combines environmental monitoring, research, and modeling with data management and dissemination to provide information and insight needed by river managers. This information is used to implement EMP HREPs more efficiently, and to support other Federal and State river programs. Similar to the habitat program, the LTRMP had established a solid foundation prior to reauthorization in the Water Resources Development Act of 1999, including:

- a network of six State-run field stations for environmental monitoring and a U.S. Geological Survey-operated center for coordinating data collection and leading research and modeling efforts;
- an established set of monitoring protocols; and
- a data management and dissemination infrastructure.

This foundation has sustained the LTRMP's mission since the 1997 Report to Congress was submitted. The LTRMP continues to be widely recognized, both nationally and internationally, as a preeminent large-river science program, contributing significant insights not only to the Upper Mississippi River System, but beyond as well. Notable achievements and modifications since the previous Report to Congress include:

- The LTRMP's database of fish, water quality, macroinvertebrate, and aquatic vegetation data expanded by almost 60 percent, or 80,000 data points, enabled in part by such innovations as data entry in the field, with immediate error checking.
- Significant progress has also been made establishing systemic land use/land cover and bathymetric databases.

- New data access and analysis tools, including a new web browser for fisheries data, give resource managers, scientists, and the public more immediate and meaningful access to the LTRMP's data.
- Monitoring, research, and modeling have combined to provide critical insights and understanding regarding a range of key environmental management concerns, including:
  - the relationship between habitat availability and the abundance and distribution of plant communities, aquatic invertebrates, and fish;
  - estimated contributions of nutrients from the Upper Mississippi River and its tributaries to hypoxia in the Gulf of Mexico; and
  - the spread of exotic species including zebra mussels and Asian carp.
- In 2005, the LTRMP is scheduled to publish an update to its 1999 *Status and Trends* report, which will present important conclusions regarding the quantity of data and period of record required to distinguish trends from natural variability. Precursor reports for the individual monitoring components are already providing significant insights.
- Statistical analyses have been used to enhance the monitoring program's efficiency and effectiveness through carefully designed modifications to monitoring protocols. In some instances, these modifications have allowed the LTRMP to maintain information production levels while reducing costs, thereby helping to partially offset the impacts of program funding levels that have not grown commensurate with inflation.

## Issues

In preparing this Report to Congress, the program partners identified eight specific issues meriting special consideration and discussion. In some instances, the partners' discussions of these issues have resulted in a specific recommendation to modify current practice or authority. In other instances, the results were a reaffirmation of current policy or approaches, which were determined to be key factors in the success of habitat restoration and learning through the EMP. In all instances, however, the discussions themselves proved tremendously useful in elucidating and addressing critical elements of EMP's future success. The discussions also demonstrated the benefits of the EMP's partnership approach. In brief, the eight major issues are as follows:

- *NGOs as Cost Share Partners* — Some nongovernmental organizations (NGOs) have expressed interest in serving as the cost share partner for HREPs. This is not currently permitted because it is not explicitly provided for in the EMP's authorizing legislation. However, there is precedent for such a provision in the authorizing language for several other Corps environmental programs. Allowing NGOs to sponsor HREPs would increase opportunities for cost shared projects on the Upper Mississippi River System, particularly on lower river reaches, wheremost more land is in private ownership.
- *Cost Sharing* — Since its inception, the EMP has



required cost sharing for HREPs, unless the project is on lands managed as a national wildlife refuge. When the program was reauthorized in 1999, the non-Federal cost share percentage was increased from 25 to 35 percent. More recently, questions have arisen regarding the application of cost sharing requirements to lands owned and managed by other Federal agencies and to Corps General Plan lands that are not managed by the Fish and Wildlife Service. The partners are satisfied with the Corps' confirmation that projects on Corps-owned General Plan lands managed by a State may be constructed at 100 percent Federal expense, with the State assuming full responsibility for operation and maintenance (O&M) costs. They further concur that the cost share and O&M requirements for any proposed HREPs located on lands owned or controlled by Federal agencies other than the Corps or U.S. Fish and Wildlife Service should be determined on a case-by-case basis.

- *HREP Operation and Maintenance* — Responsibility for the O&M of habitat projects rests with the agency that manages the lands on which the project is located. To date, this has meant the Fish and Wildlife Service and the five States have assumed O&M responsibility for all habitat projects. Inevitably, as the number of completed HREPs has grown, so too have the Service's and States' annual O&M outlays. The Service in particular has had difficulty securing adequate O&M funding. This is of concern to all EMP partners because construction of HREPs on the Service's refuge lands is absolutely essential to the continued success of environmental restoration efforts on the UMRS.
- *Delegated Authority* — Multi-level project review can be time-consuming and costly. Consistent with trends in other programs, the Corps has had considerable success with delegating limited authority to approve HREPs to the Division and District levels. Currently, only habitat projects exceeding \$5 million and those raising policy issues must be approved by Corps Headquarters. As the partnership's experience and record of success grows, there would appear to be opportunities to further expand the delegated approval authority and thereby increase program efficiency.
- *HREP Rehabilitation* — To date, existing EMP habitat projects have weathered flood events quite well, including the major flood of 1993. Any necessary rehabilitation has been handled on a case-by-case basis. However, it is inevitable that some HREPs will suffer damage due to major floods. Thus, the partners concurred that it would be helpful to clarify policy governing project rehabilitation, as distinguished from routine operation, maintenance, and repair of HREPs. The partners' jointly held understanding is that rehabilitation is undertaken in response to flood events, with decisions made on a case-by-case basis. In general, rehabilitation takes precedence over new construction, and rehabilitation costs are apportioned consistent with the project's original cost share agreement.

- *Land Acquisition* — Land acquisition has long been a potential, but little used, tool in EMP habitat projects. In 1994, the Corps of Engineers issued policy guidance that addressed land acquisition as part of HREPs. That policy permits cost-efficient acquisition by the non-Federal sponsor, with reimbursement to the extent those acquisition costs exceed the sponsor's 35 percent share of total project costs. Lands acquired must involve active construction or O&M. Program partners concur that this policy does not appear to unreasonably limit acquisition as an HREP tool. The partners intend to make more active use of acquisition from willing sellers as part of future habitat projects.
- *HREP Planning and Prioritization* — While generally satisfied with the District-level collaborative interagency teams that guided HREP design and selection in the EMP's early years, the program partners also realized that the process could be enhanced. In particular, they agreed that the process should make explicit use of a variety of new tools, including the Habitat Needs Assessment and the Environmental Pool Plans. In addition, there was a desire to consider project design and priorities at the system-level and to employ a more transparent and accessible process for stakeholders. A multi-year effort to redesign this process culminated in the EMP Coordinating Committee's November 2003 endorsement of the HREP Planning and Sequencing Framework, which will be implemented beginning in FY 05.
- *Coordination between the LTRMP and Other Programs* — The EMP partners have long recognized the potential value of enhanced coordination between the LTRMP and other river projects and programs. However, they are also cognizant of the constraints associated with the LTRMP's authorized purpose and limited resources. It is simply not within the LTRMP's authority or capacity to fulfill all the needs for river-related information on the Upper Mississippi River System. At the same time, it is clear that the LTRMP and other river programs would benefit from a more comprehensive approach to identifying and addressing river-related science needs.

## Recommendations

In preparing this Report to Congress and considering its potential recommendations, the Corps of Engineers and its EMP partners deliberately confined themselves to evaluating and making recommendations concerning the EMP in its present form. Consequently, this report does not address possible ways in which the ongoing Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study may ultimately influence the EMP. While the Navigation Study's final recommended package of measures to promote economic and environmental sustainability may well have implications for the EMP, the EMP partners concluded that such potential changes would be best identified and considered in the broader context of the Navigation Study. It is with this understanding that the Corps

of Engineers and its EMP partners make the following focused recommendations, which they are confident will maintain the EMP's strong record of success and accomplishment:

- *Continue the EMP* — The EMP should continue to serve ecosystem restoration and environmental monitoring needs on the Upper Mississippi River System.

In particular:

- The LTRMP should continue to focus on effective and efficient environmental monitoring, management-relevant science issues and developing innovative tools for data access and interpretation.
  - The HREP program should continue to use a combination of established and innovative restoration techniques to address vital habitat needs on the UMRS.
- *NGOs as Cost Share Partners* — The EMP authority should be amended to specifically allow nongovernmental organizations (NGOs) to serve as non-Federal sponsors of HREPs.
  - *HREP Operation and Maintenance* — Funding for the O&M of HREPs should be coordinated in annual Federal budgets to ensure that the U.S. Fish and Wildlife Service has the resources needed to operate and maintain the growing inventory of HREPs on the refuge lands it manages.
  - *Coordination between the LTRMP and Other Programs* — The U.S. Geological Survey and U.S. Environmental Protection Agency should jointly convene an interagency science planning process to identify the full range of data and information that are needed to support environmental management decisions for the Upper Mississippi River System and its watershed.
  - *Delegated Authority* — Authority for project approval of HREPs with estimated construction costs less than \$5 million and using standard restoration practices should be delegated to the Corps of Engineers' Districts. Approval authority for projects with estimated construction costs greater than \$5 million or incorporating untested practices or policies should be delegated to the Mississippi Valley Division.

# Table of Contents

Foreword.....	v
Executive Summary.....	vii
Table of Contents.....	xi
Introduction.....	1

## Chapter 1

History and Background.....	3
Origins of the EMP.....	3
Evolution of the EMP.....	3
Habitat Rehabilitation and Enhancement Projects (HREPs).....	6
Long Term Resource Monitoring.....	7
EMP Implementation.....	8
The Partnership.....	8
Roles and Responsibilities.....	8
Funding.....	9

## Chapter 2

EMP Accomplishments and Update.....	11
Habitat Rehabilitation and Enhancement Projects.....	11
HREP Accomplishments.....	11
Project Highlights and Lessons Learned.....	15
Engineering Review Workshops and Design Innovations.....	17
Habitat Needs Assessment.....	18
Habitat Project Planning Process.....	20
Delegated Authority.....	20
Independent Technical Review.....	21
Public Participation.....	21
Long Term Resource Monitoring.....	22
Long Term Resource Monitoring Program Accomplishments.....	22
Status and Trends Analysis.....	26
Evaluations and Revisions to Monitoring Design to Improve LTRMP Efficiencies.....	28

## Chapter 3

Implementation Issues.....	31
NGOs as Cost Share Partners.....	31
Cost Sharing.....	31
Habitat Rehabilitation and Enhancement Project Operation and Maintenance.....	32
Delegated Authority.....	32
Habitat Rehabilitation and Enhancement Project Rehabilitation.....	33
Land Acquisition.....	33
Habitat Rehabilitation and Enhancement Project Planning and Prioritization.....	34
Coordination between the Long Resource Monitoring Program and Other Programs.....	34

## Chapter 4

Conclusions and Recommendations.....	35
Conclusions.....	35
Overall Program.....	35
Habitat Rehabilitation and Enhancement Projects (HREPs).....	36
Long Term Resource Monitoring Program (LTRMP).....	36
Recommendations.....	37

Continued on the Next Page

Attachment A

Letters of Support ..... A-1

    U.S. Fish and Wildlife Service ..... A-3

    U.S. Natural Resource Conservation Service ..... A-5

    U.S. Geological Survey ..... A-7

    U.S. Environmental Protection Agency..... A-9

    Illinois Department of Natural Resources .....A-11

    Iowa Department of Natural Resources ..... A-13

    Minnesota Department of Natural Resources..... A-15

    Missouri Department of Natural Resources ..... A-17

    Wisconsin Department of Natural Resources ..... A-19

    Mississippi River Citizen Commission ..... A-21

    The Nature Conservancy ..... A-23

    Upper Mississippi River Basin Association ..... A-25

Attachment B

.....B-1

Upper Mississippi River System Environmental Management Program Authorization ..... B-1





Congress authorized the Upper Mississippi River System Environmental Management Program (EMP) in Section 1103 of the 1986 Water Resources Development Act. Over the course of its first 13 years, the EMP proved to be one of this country's premier ecosystem restoration programs, combining close collaboration among Federal and State partners, an effective planning process, and a built-in monitoring process. This success led Congress to reauthorize the EMP in the 1999 Water Resources Development Act. Section 509 of the 1999 Act made several adjustments to the program and established the following two elements as continuing authorities:<sup>1</sup>

- planning, construction, and evaluation of fish and wildlife habitat rehabilitation and enhancement projects (known as HREPs)
- long term resource monitoring, computerized data inventory and analysis, and applied research (known collectively as the LTRMP)

This report is presented to Congress in fulfillment of Section 509 of the Water Resources Development Act of 1999. This section directs the Secretary of the Army, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, to submit a report to Congress by the end of 2004 and every six years thereafter that:

- A) contains an evaluation of the [HREP and LTRMP] ...;*
- B) describes the accomplishments of each of the programs;*
- C) provides updates of a systemic habitat needs assessment; and*
- D) identifies any needed adjustments in the authorization of the programs.*

Chapter 1 of this report describes the EMP's origin and presents its funding and implementation history. There is a brief overview of the HREP and LTRMP components and the program's current management framework.

Chapter 2 highlights the EMP's overall accomplishments, with a particular focus on achievements and changes since completion of the first Report to Congress in 1997. This chapter also describes the first iteration of the system-wide habitat needs assessment.

Chapter 3 presents the results of the program partners' evaluation of the EMP, describing specific issues and challenges facing HREPs and the LTRMP.

Chapter 4 articulates a series of conclusions about the EMP

and offers recommended administrative, policy, and legislative changes based on this evaluation.

The recommended modifications identified in this report were developed in consultation with the five Upper Mississippi River Basin States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, the U.S. Fish and Wildlife Service, and the U.S. Geological Survey. In addition to these primary EMP partners, several other governmental agencies and non-governmental organizations actively participated in the formulation of the recommendations presented in this document. Input from the general public was also solicited and considered.

It should be noted that this report confines itself to evaluating and recommending modifications to enhance the EMP in its present form. However, the EMP partners are also participating in the ongoing Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study. The Navigation Study is ultimately expected to result in a package of recommendations to foster both the economic and environmental sustainability of the UMRS. That package *may* include recommendations that would modify the EMP in more fundamental ways. The EMP partners will be fully involved in the development of any such recommendations, but believe they are best formulated and evaluated in the broader context of the overall Navigation Study recommendations. In the interim, this EMP Report to Congress focuses on those changes that will improve the EMP regardless of what future program adjustments may be considered.

Key supporting material is provided in attachments to this document. More extensive documentation of the HREP and LTRMP components is maintained at <http://www.mvr.usace.army.mil/EMP/default.htm> and <http://www.umesc.usgs.gov/ltrmp.html>, respectively. The report itself is available at [www.mvr.usace.army.mil/EMP/Documents/RTC04\\_Final.htm](http://www.mvr.usace.army.mil/EMP/Documents/RTC04_Final.htm). Additional hard copies of this document are available from the U.S. Army Corps of Engineers, Rock Island District, ATTN: Environmental Management Program Project Manager CEMVR PM-M, Clock Tower Building, P.O. Box 2004, Rock Island, Illinois 61204-2004.

---

<sup>1</sup>See Attachment B for the EMP authorizing legislation as amended.



The Upper Mississippi River Basin



# Chapter 1

## History & Background

### Origins of the EMP

Authorization of the Upper Mississippi River System Environmental Management Program (EMP), in 1986, marked the culmination of a controversial debate surrounding replacement of Lock and Dam 26 near Alton, Illinois. In the 1970s, a proposal to replace Lock and Dam 26 and increase its capacity, sparked considerable debate and protracted litigation. Environmental groups and Midwestern railroads were particularly opposed to proposed construction of twin 1200-foot locks. Seeking to balance this concern with the navigation system needs, Congress, in 1978, authorized construction of a new dam with a single, 1200-foot lock and directed the Upper Mississippi River Basin Commission to conduct studies and make recommendations related to further navigation capacity expansion and its ecological impacts. In 1982, the Commission presented its findings and recommendations in a landmark document, the *Comprehensive Master Plan for the Management of the Upper Mississippi River System*.

Among other things, the Master Plan recommended that Congress authorize: a second lock, 600 feet in length, at Lock and Dam 26; a habitat rehabilitation and enhancement program; a long term resource monitoring program; a computerized inventory and analysis system; recreation projects; and a study of the economic impacts of recreation. While not all of the Commission's recommendations were ultimately acted upon by Congress, the key elements were authorized as part of the Water Resources Development Act of 1986 (Public Law 99-662). Section 1103 of that law authorized both a second lock at Lock and Dam 26 and a variety of environmental initiatives on the Upper Mississippi River. Those environmental authorities have come to be known as the Upper Mississippi River System Environmental Management Program, though the law does not confer that name.

The provisions of Section 1103 that constitute the original programmatic elements of the EMP are those that authorized the Corps of Engineers, in partnership with the Department of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin to undertake:

- a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement;
- a long term resource monitoring program;
- a computerized inventory and analysis system;
- a program of recreational projects;
- an assessment of the economic benefits generated by recreational activities; and
- monitoring of traffic movements.

Other provisions of Section 1103 provide both context and statutory direction regarding implementation of the EMP. Of particular note are the provisions that:

- express Congress' desire "to ensure the coordinated development and enhancement of the Upper Mississippi River System;"
- declare that the river is a "nationally significant ecosystem and a nationally significant commercial navigation system;"
- declare that the system should be administered and regulated in recognition of its several purposes;
- define the Upper Mississippi River System as the commercially navigable portions of the Mississippi River north of Cairo, Illinois, and the Minnesota, Black, Saint Croix, Illinois, and Kaskaskia Rivers;
- provide Congressional consent for the basin States to establish interstate agreements or agencies;
- provide for transfer of funds to agencies of the Department of the Interior;
- designate the Upper Mississippi River Basin Association as "caretaker" of the Master Plan; and
- establish the applicability of cost share formulas and clarify that none of the appropriations for the habitat, monitoring, or computerized information and analysis programs shall be considered chargeable to navigation.

### Evolution of the EMP

In contrast to other Corps of Engineers projects, for which reconnaissance and feasibility studies precede construction authorization, the EMP had no prior Corps planning documents. The Master Plan prepared by the Upper Mississippi River Basin Commission was the foundation of the 1986 EMP authorization, but was relatively conceptual in nature. Thus, project planning became as much a part of the EMP as project construction.

To guide EMP implementation, in January 1986 the Corps of Engineers published a foundational document entitled the *General Plan*. That document was followed by six Annual Addenda, each of which provided programmatic and policy updates, individual project status reports, and recommendations for out-year funding and schedules. In August 1992, the Corps prepared a *Midterm Evaluation Report* that set forth EMP accomplishments and recommended continued funding.

The original EMP authorizing legislation in Section 1103 of the Water Resources Development Act of 1986 has been amended three times since its enactment. The Water Resources Development Act of 1990 extended the original EMP authorization period an additional 5 years, through FY



2002. The Water Resources Development Act of 1992 included amendments that 1) allow some limited flexibility in how funds are allocated between the Habitat Rehabilitation and Enhancement Project (HREP) program and the Long Term Resource Monitoring Program (LTRMP) and 2) change the EMP cost sharing provisions to assign sole responsibility for operation and maintenance of habitat projects to the agency that manages the lands on which the project is located. But the most important change, setting the foundation for an ongoing and expanded EMP, was made in the Water Resources Development Act of 1999.

The groundwork for the EMP reauthorization in the Water Resources Development Act of 1999 was laid in 1997, when the Corps of Engineers' Mississippi Valley Division, with the support of the other EMP partner agencies, transmitted the *Report to Congress: An Evaluation of the Upper Mississippi River System Environmental Management Program*. That 1997 report described the accomplishments of the EMP's first 12 years, set forth the partner agencies' vision of the EMP's future, and described the broad public support of the EMP.<sup>2</sup>

Congress responded to that report and public input by reaffirming its support for the EMP, using the Water Resources Development Act of 1999 to reauthorize EMP as a continuing program and increase annual authorized appropriations by 75 percent. In addition, the Water Resources Development Act of 1999 changed EMP cost sharing requirements, called for an EMP independent technical advisory committee, and directed that a "habitat needs assessment" be completed. The EMP authorizing legislation, as amended, is included as Attachment B.

The 1997 Report to Congress included a variety of additional recommendations that did not require Congressional action, but rather, could be accomplished by changes to Corps policy or the resolve of all EMP partner agencies. Table 1-1 summarizes the recommendations of the 1997 Report to Congress and the resulting changes.

When the EMP began in 1986, it included six elements. However, its current focus is on the two components that have been its essence from the beginning: habitat projects and long term resource monitoring. In the Water Resources Development Act of 1999, the authority for a computerized inventory and analysis system was merged with the monitoring program and applied research was explicitly added, thereby making official what has been the administrative reality since EMP's inception. Other components of the original EMP program have either been completed or are not being pursued. In particular, the funding authority to construct recreation projects expired at the end of the 15-year authorization, having never been fully utilized because successive Administrations deemed recreation projects to be a low Federal priority. While the authority to monitor navigation traffic movements had no expiration and thus remains intact within the EMP legislation, it has not been employed since 1990. Instead, the Corps has incorporated this work into its ongoing Upper Mississippi River-Illinois Waterway System Navigation Feasibility study. Finally, the authority to undertake a study of the economic impacts of recreation was deleted by the Water Resources Development Act of 1999, having been completed in 1993. A summary of the evolution of EMP's programmatic elements is contained in Table 1-2.

---

<sup>2</sup>The 1997 Report to Congress is available at <http://www.mvr.usace.army.mil/pdw/rtcfinal.htm>



**Table 1-1. Outcome of 1997 Report to Congress.**

<b>Changes recommended in 1997 Report to Congress</b>	<b>CURRENT STATUS</b> <b>● - complete</b> <b>◆ - on-going/ underway</b> <b>○ - no change</b>	<b>Explanation*</b>
Continue EMP authorization beyond 15 years.	●	Section 509 of 1999 WRDA authorized EMP as a continuing authority.
Merge the authorization for long term resource monitoring (LTRM) and computerized inventory and analysis(CIA) into a single authorization.	●	Accomplished in Section 509 of 1999 WRDA.
Increase annual authorized funding for habitat projects from \$13.0 million to \$22.75 million.	●	Accomplished in Section 509 of 1999 WRDA (Actual appropriations have not yet reached authorized level).
Increase annual authorized funding for long term monitoring from \$5.955 million to \$10.42 million.	●	Accomplished in Section 509 of 1999 WRDA (Actual appropriations have not yet reached authorized level).
Retain/modify cost sharing requirement for non-refuge habitat projects.	●	Section 509 of 1999 WRDA increased cost-sharing from 25 to 35 percent, thereby matching other ecosystem restoration programs.
Allow up to 80 percent of non-Federal share of habitat project costs to be in-kind services.	●	Accomplished in Section 221 of 1999 WRDA.
Allow non-Federal interests to be reimbursed for the Federal share of habitat project costs.	○	Implementation Guidance for 1999 WRDA states that no authority exists for such an approach and that it is contrary to Administration policy.
Complete a habitat needs assessment (HNA) and update it every 6 years.	◆	Congressional direction provided in Section 509 of 1999 WRDA. First HNA completed in 2000. Updates underway.
Delegate approval authority for projects under \$1 million to the District level of the Corps.	●	Accomplished in Implementation Guidance for 1999 WRDA.
Delegate approval authority for projects under \$5 million to the Division level of the Corps.	●	Accomplished in Implementation Guidance for 1999 WRDA.
Review and modify Corps policy, if necessary, to ensure that habitat projects can include land acquisition.	●	Implementation Guidance for 1999 WRDA reaffirmed Corps' 1994 guidance that allows for land acquisition subject to various criteria.
Review and modify Corps policy, if necessary, to allow upland treatment as part of habitat projects.	●	Implementation Guidance for 1999 WRDA indicates that upland sediment controls can be included under certain circumstances.
Identify factors that may limit habitat projects innovations and revise policies, if necessary.	○	Implementation Guidance for 1999 WRDA requested that constraints be identified and proposals for policy changes be forwarded to Corps Headquarters. No further action under EMP has been taken. However, a comprehensive review of Corps UMR environmental authorities is being undertaken as part of the Corps' navigation feasibility study.
Development charters for EMP-CC and A-Team.	○	Joint charter developed in November 1998 and tabled in May 1999.
Increase public involvement.	◆	Public involvement plan developed in August 2001. Implementation underway.

\* 1999 WRDA = Water Resources Development Act of 1999 (P.L. 106-53)

Implementation Guidance = Implementation Guidance for Section 509 of the Water Resource Development Act of 1999, to MVD Commander from CECW-PC, May 12, 2000.

**Table 1-2. Changes to EMP Authorizing Legislation.**

	<b>1986 WRDA Authorization</b>	<b>1999 WRDA Authorization</b>
Habitat Projects	\$13 million/year	\$22.75 million/year
Long Term Resource Monitoring	\$5.08 million/year	Authority for long term monitoring, computerized data analysis, and applied research combined at \$10.42 million/year.
Computerized Inventory and Analysis	\$875,000/year	
Recreation Projects	\$500,000/year (Not pursued after initial \$9,000 for planning in 1986)	No changes made in 1999 WRDA. Thus, the funding authority expired in FY 2002.
Study of Economic Impacts of Recreation	\$750,000 over 3 years (Study completed in 1993)	Authority deleted by 1999 WRDA
Traffic Monitoring	“Such sums as may be necessary”	No changes made in 1999 WRDA. While the authority remains intact, it has not been used since 1990. Analysis of traffic is currently being done, as part of Corps of Engineers navigation feasibility study.
Independent Technical Advisory Committee	N/A	\$350,000/year through 2009

## Habitat Rehabilitation and Enhancement Projects (HREPs)

Fish and wildlife habitat on the Upper Mississippi River System has been declining in quantity, quality, and diversity for decades. Much of this decline is associated with human activity throughout the basin, including upland land use and development, floodplain farming and development, and changes wrought by the system’s 9-foot channel navigation project. While the decline is caused by a variety of factors, some of which EMP cannot address, HREPs are seeking to change the river’s floodplain structure and hydrology to counteract the effects of an aging impounded river system. For example, HREPs may alter sediment transport and deposition, water levels, or the connections between the river and its floodplain. These types of physical changes subsequently affect water quality parameters such as temperature, dissolved oxygen, and distribution of suspended sediments, thereby ultimately improving fish and wildlife habitat. The EMP restoration planning approach and techniques have served as models, both nationally and internationally, for other river restoration planners.

To accomplish their habitat management and restoration objectives, HREPs employ a variety of techniques: backwater dredging, water level management, island creation, shoreline stabilization, secondary channel modification, flow control, and aeration. Many projects combine these measures to address more than one problem. In addition, some projects also include

innovative features or features that provide secondary benefits or complement the primary techniques. Examples include hillside sediment control, land acquisition, and notched wing dams. HREPs may also be done in conjunction with other programs, including the Corps’ channel maintenance work, to take advantage of synergies. The range of project techniques that have been used, or are being considered for possible future use, as part of HREPs is extensive (Table 1-3).

The EMP authorizing legislation requires that a non-Federal sponsor share the construction cost of habitat projects, unless they are located on lands managed as a national wildlife refuge.<sup>3</sup> In particular, the Corps of Engineers provides 65 percent of the funding for non-refuge projects and the non-Federal sponsor, typically a State agency, funds 35 percent. Projects that are located on lands managed as a national wildlife refuge are 100 percent Federally funded through the Corps of Engineers’ EMP appropriations.

In accordance with Section 107(b) of the 1992 Water Resources Development Act, operation and maintenance (O&M) of HREPs are the responsibility of the agency that manages the land, typically the U.S. Fish and Wildlife Service or a State natural resource agency. In addition, each completed project is monitored to determine whether the anticipated physical responses, such as changes in flow or water quality, are occurring. A limited number of projects are also selected for intensive monitoring of biological response, such as plant growth or changes in fish populations. Though not programmatically monitored, public use and acceptance of HREPs is high, as evidenced by visitation to areas where projects have been completed.

<sup>3</sup> Section 906(e) of the 1986 Water Resources Development Act governs cost sharing for EMP habitat projects. In addition to projects on lands managed as national wildlife refuges, Section 906(e) also authorizes 100 percent Federal construction funding for projects that benefit Federally-listed threatened or endangered species, species of national economic importance, species subject to international treaties, and anadromous fish. However, as a matter of Administration policy, 100 percent Federal funding for HREPs has been limited to refuge lands.

**Table 1-3. Upper Mississippi River System Environmental Management Program Habitat Rehabilitation and Enhancement Project Features.**

Technique	Objectives
Dredge backwaters	Alter flow patterns and velocity Improve floodplain structural diversity Increase deep water fish habitat for overwintering Provide access for fish movement Provide dredged material to support revegetation and island building
Manage water levels using dikes and water control systems	Restore natural hydrologic cycles Promote growth of aquatic plants as food for waterfowl Reduce backwater sediment loads Consolidate bottom sediments Control rough fish
Build islands	Decrease wind and wave action Alter flow patterns and sediment transport Improve aquatic plant growth Improve floodplain structural diversity Provide nesting and loafing habitat for waterfowl and turtles Restore woody vegetation
Stabilize Shorelines	Prevent shoreline erosion Maintain floodplain structural diversity Create fish habitat Reduce sediment loads to backwaters Create barriers to waves and currents
Modify secondary channels	Improve fish habitat and water quality by altering inflows Stabilize eroding channel Reduce sediment load to backwaters by reducing flow velocities Maintain water temperature and provided rock substrate
Water aeration	Improve fish habitat and water quality by introducing oxygenated water
<b>Miscellaneous Experimental and Complementary Techniques:</b>	
Seed island	Isolated wetlands
Upland sediment control	Weirs
Land acquisition	Rock sills
Riffle pools	Sediment traps
Potholes	Mussel substrates
Notched wing dams	Bottomland forest restoration
Anchor tree clumps	Vegetative plantings

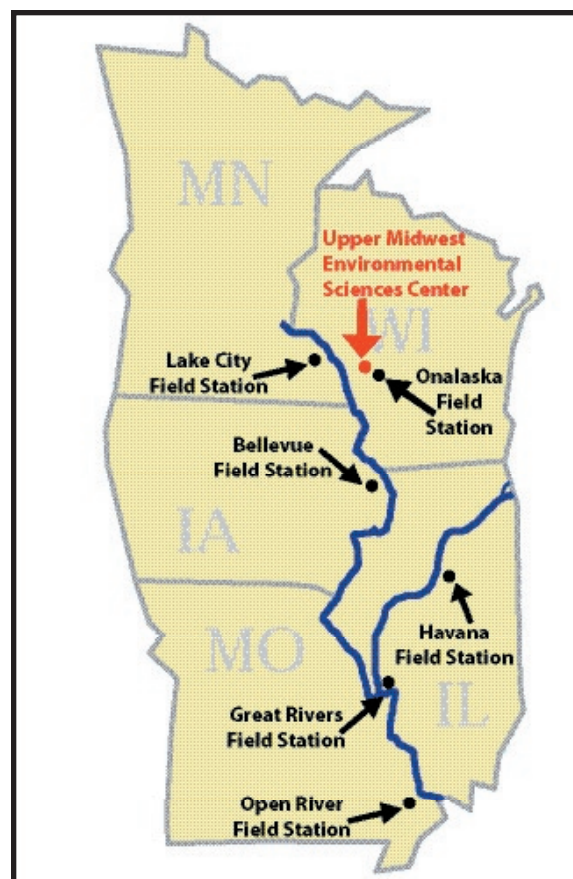
The process of identifying, planning, and prioritizing HREPs is an interagency and public endeavor involving the Corps of Engineers, U.S. Fish and Wildlife Service, the five State natural resources agencies, non-governmental organizations, and individuals. Specific projects to address identified habitat needs are conceived and jointly planned by interdisciplinary teams of partner agencies within each of three Corps of Engineers' districts, with input from the interested public. That project formulation process uses both qualitative and quantitative tools to identify the most cost-effective combination of features to meet the project goals. The planning process used to determine priorities for engineering, design, and construction of projects includes ecological, as well as administrative and policy, considerations. Such considerations include, among other things, timing of planning and construction activities, geographic distribution, and funding availability.

## Long Term Resource Monitoring

The EMP Long Term Resource Monitoring Program (LTRMP) was authorized in response to the need for standardized collection, integration, analysis, and reporting of scientific information about the Upper Mississippi River System. In particular, as articulated by the EMP's partnership of State and Federal agencies, the goals of the LTRMP are to:

- develop a better understanding of the Upper Mississippi River ecosystem and its problems;
- monitor and evaluate long term resource changes and trends;
- develop alternatives to better manage the river system; and
- manage, organize, and distribute scientific information about the river.

The U.S. Geological Survey, through its Upper Midwest Environmental Sciences Center, has lead responsibility for the LTRMP. Monitoring is conducted from six field stations, located on the Upper Mississippi River in Pool 4 (Lake City, Minnesota), Pool 8 (Onalaska, Wisconsin), Pool 13 (Bellevue, Iowa), Pool 26 (Great Rivers; Godfrey, Illinois) and the Open River reach (Open River; Cape Girardeau, Missouri), as well as the La Grange Pool of the Illinois River (Havana, Illinois). (See Figure 1-1). From these State-managed stations, personnel collect data on fish, macroinvertebrates (e.g., zebra mussels,



**Figure 1-1. Long Term Resource Monitoring Program field stations.**



finger nail clams, and mayflies), aquatic vegetation, and water quality. In addition, LTRMP scientists assemble and evaluate data related to bathymetry, hydrology, sediment, land use and land cover, birds, and exotic species. These data sets and the state-of-the-art Geographic Information System (GIS) used to display spatial data enable LTRMP scientists to document system-wide ecological trends and investigate specific resource problems, such as the impacts of navigation, sedimentation, water level fluctuation, lack of aquatic vegetation, and reduced fisheries populations.

## EMP Implementation

### The Partnership

As the Federal agency authorized to implement the EMP, the Corps of Engineers is accountable for management and execution of the program. As a result, the EMP has been shaped in many ways by Corps policies and procedures. Yet the EMP is truly a partnership program. This fact can be traced not only to the EMP's origins in the Upper Mississippi River Basin Commission, but also to the EMP authorizing legislation, which directs the Corps to undertake the EMP "in consultation with" the Department of the Interior and the five basin States. The region has a rich tradition of interagency partnership that the EMP has been fortunate to be able to build upon and nourish.

For the specific purpose of providing interagency coordination for EMP, the Corps of Engineers established the EMP Coordinating Committee (EMP-CC) in 1987 to address Congress' directive to the Corps to implement the EMP in consultation with State and Federal partners. The EMP-CC is the primary consultative body used to discuss and seek consensus on EMP budgetary and policy issues. The Corps of Engineers and the U.S. Fish and Wildlife Service co-chair the EMP-CC. Membership consists of representatives from the U.S. Geological Survey, each of the five State resource agencies, and a variety of Federal agencies<sup>4</sup> that have an interest in the EMP, even though they have no specific implementation responsibilities.

To provide more detailed scientific guidance on implementation of the Long Term Resource Monitoring Program, another interagency committee called the Analysis Team, or "A-Team," was formed. This team provides science and technical advice and recommendations on LTRMP work priorities, annual work plans, and research activities. The team is comprised of biologists and other technical staff from Federal and State agencies.

The planning and prioritization of habitat projects is guided by interagency teams in each of the Corps Districts. These teams include the River Resources Forum (St. Paul District), the River Resources Coordination Team (Rock Island District), and the River Resources Action Team (St. Louis District). The teams

provide specific HREP guidance and endorsement and establish critical links to other river management activities.

The EMP authorizing legislation designates the Upper Mississippi River Basin Association as the "caretaker" of the Master Plan. As such, major EMP policy and budgetary issues are often addressed in this forum; and the Association has a longstanding commitment to the program's successful implementation.

The public participates in the EMP through the involvement of local governments; sport, conservation, and industry non-governmental organizations; and individual participation. The public was influential in the original EMP authorization and has continued to influence the program by providing input and monitoring the implementation of both the HREP and LTRMP components.

### Roles and Responsibilities

In addition to the various interagency consultative and coordination bodies associated with the EMP, individual Federal and State agencies have their own specific responsibilities under the EMP.

**U.S. Army Corps of Engineers.** The Mississippi Valley Division has overall responsibility for the EMP and has assigned many of the program management responsibilities to the Rock Island District. The St. Paul, Rock Island, and St. Louis Districts are also responsible for leading the planning, design, construction, and monitoring of habitat projects.

**U.S. Fish and Wildlife Service.** Region 3 of the Service, which encompasses almost the entire Upper Mississippi River System, coordinates the EMP involvement of Service personnel from the refuges, ecological services field offices, and fisheries resources offices. All of these Service offices participate in the planning, design, and construction of HREPs, both on and off refuge lands. The Service is also responsible for operation and maintenance of projects on lands it manages, and participates in pre- and post-project monitoring. The Corps of Engineers, in compliance with the Fish and Wildlife Coordination Act and Endangered Species Act, consults with the Service during planning of all habitat projects. Through this consultation process, the Service helps to identify proposed projects' biological effects.

**U.S. Geological Survey.** The USGS provides science leadership for the EMP and administers the Long Term Resource Monitoring Program, headquartered at the Upper Midwest Environmental Sciences Center in La Crosse, Wisconsin. This includes program administration, management, and planning, as well as research, analysis, and data management planning with the Analysis Team.

<sup>4</sup>The U.S. Environmental Protection Agency, U.S. Department of Agriculture (Natural Resources Conservation Service), and U.S. Department of Transportation (Maritime Administration) are Federal members of the EMP-CC.

<sup>5</sup>These agencies are the Illinois Department of Natural Resources, Iowa Department of Natural Resources, Minnesota Department of Natural Resources, Missouri Department of Conservation, and Wisconsin Department of Natural Resources.



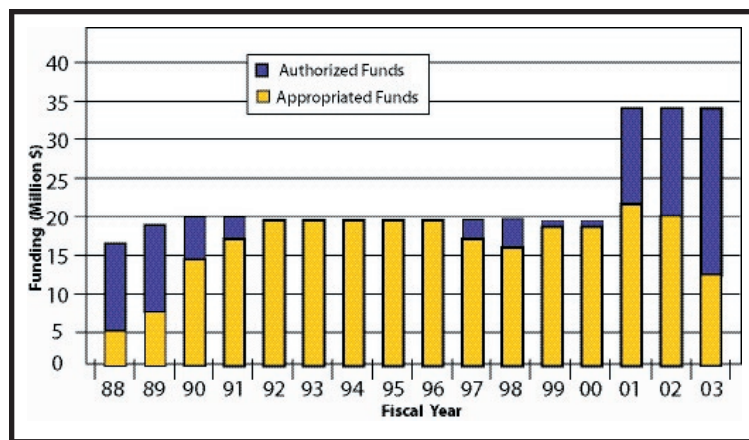
**States.** Resource agencies in each of the five States<sup>5</sup> are actively involved in planning HREPs in their jurisdictions. These agencies participate on the St. Paul, Rock Island, and St. Louis District planning and design teams, the A-Team, and the EMP-CC. Each State funds 35 percent of the total costs of any project within its borders that is not on lands managed as a national wildlife refuge. Upon completion of construction, the respective State is also responsible for 100 percent of the operation and maintenance of projects on lands that it manages. The States are also actively engaged in pre- and post-project monitoring of habitat projects. In addition, the LTRMP field stations are staffed and operated by State employees with funding transferred from the Corps to the States through the USGS. State agencies also contribute in a variety of other ways to the LTRMP's design and execution.

## Funding

The 1999 Water Resources Development Act authorized annual appropriations of \$22.75 million for HREPs; \$10.42 million for LTRMP; and \$350,000, through 2009, for an independent technical advisory committee. Prior to the 1999 reauthorization, the annual legislative authorization for HREPs was \$13.0 million and the LTRMP annual legislative authorization was \$5.955 million. Prior to 1999, there was no authority for an independent technical advisory committee.

From the EMP's inception through FY 2003, Congress has appropriated a total of \$246.72 million. Over that same period, the legislative authorization totaled \$353.475 million. During those 19 years, the full amount of the annual legislative authorization was provided in five years (FY 1992 – FY 1996; Figure 1-2). The annual appropriation averaged \$17.8 million between 1997 and 2003. The range was from a low of \$12.2 million to a high of \$21 million. Combined impacts of inflation and unmet authorizations have hindered the capability of the EMP, especially in recent years.

While appropriations for each component of the EMP are individually authorized, Congress appropriates funds for the EMP as a single line item. From that annual program appropriation, funds are allocated for overall program management costs, as well as the individual program components. Table 1-4 summarizes how funds have been allocated over time. The dollar amounts listed in Figure 1-2 and Table 1-4 differ slightly because of savings and



**Figure 1-2. Environmental Management Program funding history (appropriated vs. authorized).**

slippage applied to Corps of Engineers appropriations.

In administering the EMP, the Corps of Engineers transfers funding to the USGS to carry out the LTRMP. Typically, about one-third of the EMP budget is allocated to the LTRMP. A portion of those funds is then provided to the States to support the work of the six field stations. The Corps also transfers funding to the U.S. Fish and Wildlife Service to support its involvement in the planning, design, and construction monitoring of HREPs.

While appropriations to the Corps of Engineers fund the largest portion of EMP costs, that amount does not fully reflect the investment that has been made. The U.S. Fish and Wildlife Service is responsible for the costs of operating and maintaining HREPs on lands that it manages. For FY 2003, the U.S. Fish and Wildlife Service's estimated annual cost for maintaining and operating HREPs was approximately \$362,000.

The five basin States have also made substantial investments in the EMP. Since its inception, the States have spent approximately \$16.5 million in support of the EMP. Of this amount, \$2.1 million has been expended to meet the non-Federal cost share for HREPs on non-refuge lands. Approximately \$1.1 million was spent to operate and maintain habitat projects on lands the States manage, and the remaining \$13.3 million has supported State involvement in planning, coordinating, and implementing all components of the EMP.

**Table 1-4. EMP Funding Allocation (\$1000).**

	Early Action Pre-Authorization (FY 85-87)	Initial 10-Years (FY88-97)	FY 98	FY 99	FY 00	FY 01	FY 02	FY 03	TOTAL
Habitat Projects	930	80,113	13,568	10,786	10,136	14,034	10,194	6,226	145,987
Long Term Resource Monitoring	844	51,462	4,940	6,124	6,914	6,477	5,373	3,319	85,453
Other Elements*	99	866	—	—	—	—	—	—	965
Program Management	654	10,621	678	715	662	697	668	721	15,416
TOTAL	2,527	143,062	19,186	17,625	17,712	21,208	16,235	10,266	247,821

\*Includes Recreation Projects, Study of the Economic Impacts of Recreation, and Traffic Monitoring





# Chapter 2

## EMP Accomplishments and Update

### Overview

Since its authorization in 1986, the Upper Mississippi River System Environmental Management Program (EMP) has established a record of significant accomplishment. Through its Habitat Rehabilitation and Enhancement Projects (HREPs), the EMP has made vital contributions to the health of the river's ecosystem. The Long Term Resource Monitoring Program (LTRMP) has substantially enhanced our understanding of the UMRS, as well as large floodplain river systems in general. In response to Congress' 1999 directive, this chapter highlights many of the EMP's most significant accomplishments, with a particular focus on achievements since completion of the previous Report to Congress in 1997.

### Habitat Rehabilitation and Enhancement Projects

As described in Chapter 1, the HREP component of the EMP addresses a longstanding trend toward declining fish and wildlife habitat on the UMRS. Combining various techniques, HREPs are designed to modify the river's floodplain structure and hydrology to counteract the effects of an aging, impounded river system. HREPs are frequently large efforts in which a single project may benefit many types of habitat. For example, projects may require fill material for islands that can be dredged from backwaters, thereby creating deepwater aquatic habitat. Conversely, the disposal of backwater sediment dredged to restore deepwater fish habitat can create islands. The projects result in improvements to a variety of habitat types, including submersed aquatic plant, marsh, grassland, and forest habitats. The responses occur in secondary channel, backwater, or impounded aquatic areas or in terrestrial areas. Submersed and emergent marsh plants are common restoration targets in aquatic areas. Forests and grasslands are terrestrial targets. Many marsh communities respond naturally to improved water quality or hydraulic conditions. Plantings on terrestrial areas improve tree species and habitat diversity.

Project designs address specific ecological goals and objectives through a comprehensive planning process. During planning, the projects consider hydraulic and ecological processes to create cost-effective, sustainable project outcomes. While not necessarily sustainable or integrated in an ecosystem context, some areas are isolated and managed independently from the river because ecological functions, primarily hydrologic variation and sedimentation, are impaired in some river reaches.

Projects completed since the EMP's inception are responsible for significant habitat improvement, and are also contributing to the refinement of current efforts. The EMP environmental restoration planning approach has been a key factor in the success of the program. It is a planning process that encourages stakeholder involvement to ensure the appropriate selection and acceptability of the projects. The EMP planning process and restoration techniques have been a model for other Corps Districts and agencies. Restoration planners from Central and South America, Europe, Africa, and China have visited the region to learn from HREP experiences.

Several elements of the HREP's administration are largely unchanged since they were described in the 1997 Report to Congress and continue to function quite well. These include established protocols for monitoring the physical, chemical, and biological impacts of projects and a longstanding practice of holding interagency reviews to exchange important information on project design, construction techniques, contracting issues, and related matters. These practices were detailed in the 1997 Report to Congress, and thus will not be addressed here. Instead, this section will focus on new information, including describing the cumulative impact of the projects completed and what has been learned about particular project techniques. In addition, three important areas of change in the HREP's administration since the 1997 report will be discussed:

- Development of a habitat needs assessment
- Refinement of the HREP planning and sequencing process
- Implementation of delegated project approval authority

### HREP Accomplishments

The EMP's 1997 Report to Congress reported 24 projects affecting 28,000 acres of habitat. Since then, 16 additional HREPs have been constructed, affecting 39,000 acres of aquatic and floodplain habitat (Table 2-1, Figure 2-1). The total area of improved river habitat is about 67,000 acres, distributed among 40 completed projects. As of October 2003, there were 8 projects under construction that will improve 38,000 acres and 16 projects still in various stages of design that will affect another 36,000 acres of river floodplain habitat. When these are all completed, the total area of improved habitat will exceed 140,000 acres among the 64 projects. While these projects will improve habitat conditions on about five percent of the total Upper Mississippi River System floodplain area, they represent only a small fraction of the restoration needs documented in the Habitat Needs Assessment and other planning efforts.



**Table 2-1. Upper Mississippi River System Environmental Management Program Habitat Rehabilitation and Enhancement Project features and their status (Finished (F), under construction (C), or in design (D)) as of Fall 2003.**

Project	Status	Acres	Backwater Dredging	Water Level Management	Island	Bank Stabilization	Side Channel Restoration	Aeration	Other
Ambrough Slough, WI	C	2,500	X			X	X	X	
Andalusia Refuge, IL	F	393	X	X	X			X	
Bank Stabilization, IA/MN/WI	F	1,500				X			
Banner Marsh, IL	C	5,524		X					X
Batchtown Mgmt. Area, IL	C	3,300		X					X
Bay Island, MO	F	650		X					X
Bertom-McCartney Lakes, WI	F	2,000	X		X	X	X		X
Big Timber, IA	F	1,039	X						X
Blackhawk Park, WI	F	282					X	X	
Brown's Lake, IA	F	453	X					X	X
Bussey Lake, IA	F	213	X	X	X			X	
Calhoun Point, IL	C	2,300	X	X					
Capoli Slough, WI	D	600	X		X	X	X		X
Chautauqua Refuge, IL	F	4,200		X					
Clarksville Refuge, MO	F	325		X					
Cold Springs, WI	F	35	X					X	
Conway Lake, IA	D	560	X	X	X	X	X	X	X
Cottonwood Island, MO	F	463	X						X
Cuivre Island, MO	F	290		X			X		X
Dresser Island, MO	F	940	X	X					
East Channel, WI/MN	F	19				X			
Finger Lakes, MN	F	113						X	X
Fort Chartres Side Channel	D	100					X		
Fox Island, MO	D	2,100		X					X
Gardner Division, IL	C	6,000	X			X			X
Guttenberg Ponds, IA	F	35	X	X					
Harpers Slough, IA/WI	D	2,200	X		X	X	X		
Indian Slough, WI	F	631	X			X	X		X
Island 42, MN	F	95	X				X	X	
Lake Odessa, IA	D	6,788	X	X		X	X		X
Lake Onalaska, WI	F	7,000	X		X	X		X	
Lake Winneshick, WI	D	6,000	X		X	X	X		X
Lansing Big Lake, IA	F	9,755					X	X	
Long Lake ,WI	F	15				X		X	



Project	Status	Acres	Backwater Dredging	Water level Management	Island	Bank Stabilization	Side Channel Restoration	Aeration	Other
Long Meadow Lake, MN	D	1,000		X					X
Monkey Chute, MO	F	88	X						
Peoria Lake, IL	F	14,000		X	X		X		X
Peterson Lake, MN	F	500			X	X	X		
Pharrs Island, MO	F	600							X
Pleasant Creek, IA	F	2,350		X					
Polander Lake, MN	F	1,000	X		X	X			
Pool 8 Islands, Phase I, WI	F	1,000	X		X	X			
Pool 8 Islands, Phase II, WI	F	26	X		X	X			X
Pool 8 Islands, Phase III, WI	C	3,000	X		X	X	X		X
Pool 9 Island, WI	F	320			X				
Pool 11 Islands, IA/WI	C	10,342	X		X	X	X	X	X
Pool 12 Overwintering, IA/IL	D	6,900	X						X
Pools 25 & 26 Islands, MO	D	3,185	X		X	X			
Pool Slough, IA/MN	D	52		X					
Potters Marsh, IL	F	2,305	X	X				X	X
Princeton Refuge, IA	F	1,129		X					X
Rice Lake, IL	D	5,600		X					X
Rice Lake, MN	F	210	X	X					X
Schenimann Chute, MO	D	212					X		
Small Scale Drawdown, WI	F	52		X					X
Smith Creek, IA	D	650		X					X
Spring Lake, IL	F	3,300		X					X
Spring Lake Islands, WI	D	300	X		X	X	X	X	X
Spring Lake Peninsula, WI	F	300	X		X	X	X		
Stag & Keeton Islands, MO	F	469					X		
Stone Dike Alternations, MO/IL	D	N/A							X
Stump Lake, IL	F	2,958		X					
Swan Lake, IL	C	4,922	X	X					
Trempealeau Refuge, WI	F	5,620		X		X			
Completed (40 projects)		66,673							
Under Construction (8 projects)		37,888							
Project Design (16 projects)		36,247							
Total Acres (64 projects)		140,808							



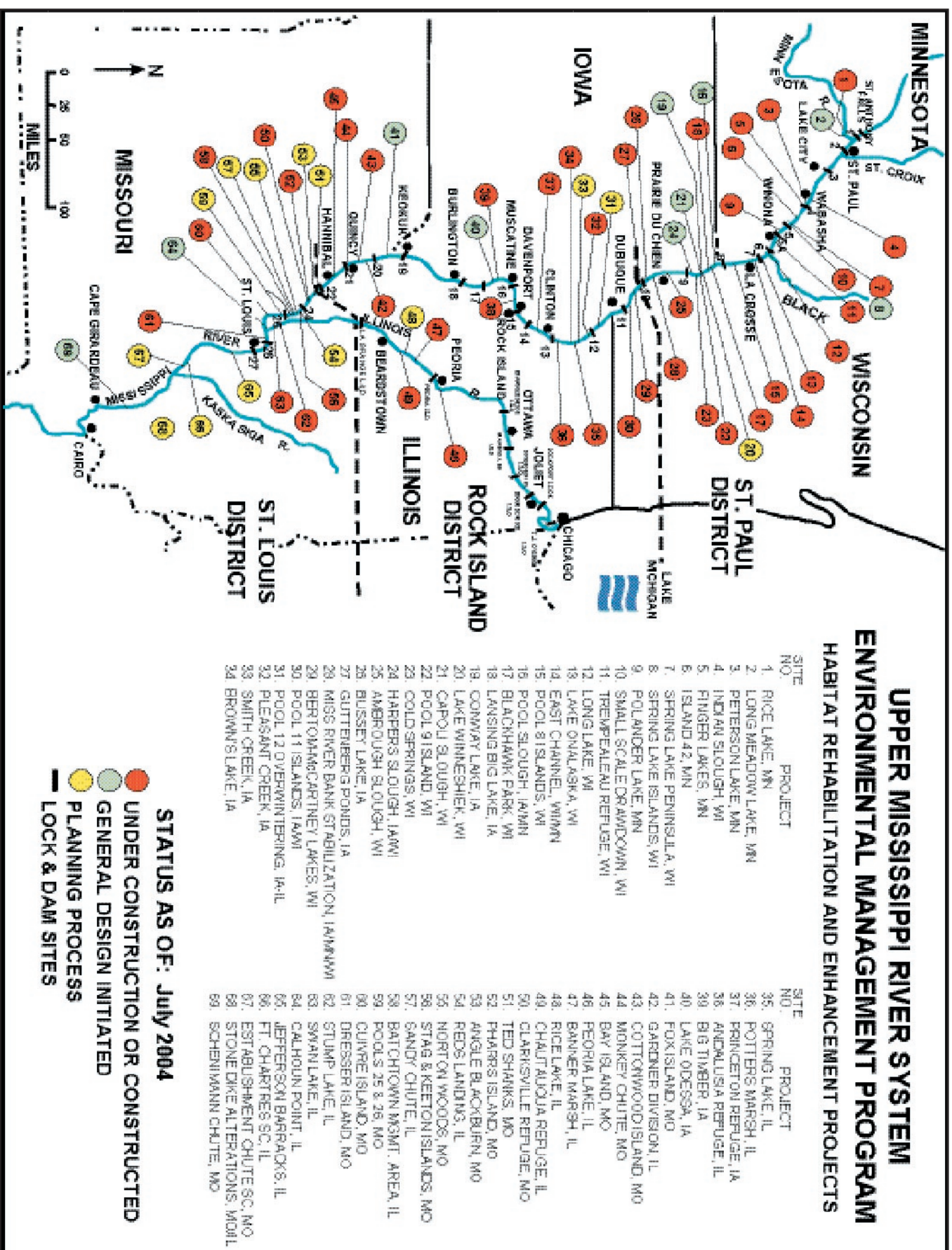


Figure 2-1. Upper Mississippi River System Habitat Rehabilitation and Enhancement Projects (Pool 8 Islands listed as three separate projects in Table 2-1).



## Project Highlights and Lessons Learned

### BACKWATER DREDGING

Backwater dredging (Figure 2-2) is an important component of 33 HREPs because of the widespread loss of backwater and secondary channel depth and depth diversity. The loss of depth and depth diversity are due to the high rates of sediment deposition in the UMRS. Loss of water depth decreases fish habitat quality, especially in the winter, when backwaters provide refuge from harsh conditions in main channel areas. Backwater dredging often complements other project components, such as island or levee construction. Fish habitat and water quality objectives have been met in most dredged channels, although some dredged habitats have filled more quickly than expected. Sustainability of channels dredged in soft substrates is difficult to achieve. New methods involving drying soft sediments prior to dredging are being evaluated as part of the Swan Lake, Illinois project.



**Figure 2-2. Dredged channels in the Potters Marsh, Illinois HREP.**

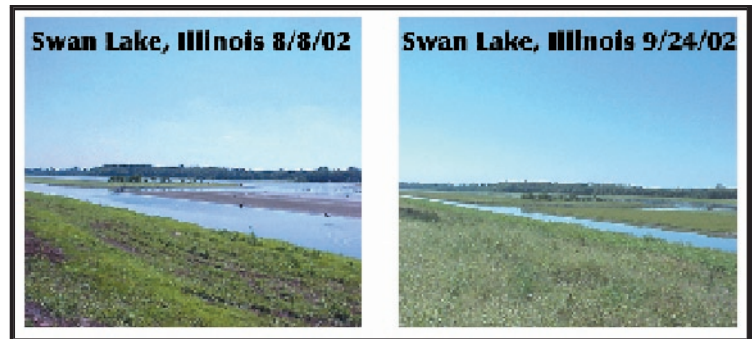
### WATER LEVEL MANAGEMENT

Much of the flora and fauna native to the Upper Mississippi River region is adapted to the wide variations in water levels that characterized the river prior to establishment of the lock and dam system. Since the implementation of the 9-Foot Channel Project, however, these variations have been truncated, with the low river stage portion of the hydrograph increased to support commercial navigation. This water level control, coupled with other cumulative effects, has degraded ecosystem conditions. Most notably, this degradation includes the loss of backwater depth and aquatic plants in many areas. Twenty-seven EMP habitat projects include features designed to increase water level variability in specific areas. Two very impressive responses to water level management projects have been documented since the 1997 Report to Congress: Swan Lake and Lake Chautauqua.

The Swan Lake habitat project on the lower Illinois River near Grafton, Illinois and Pere Marquette State Park was completed in 2002. That same year, both the middle and lower units (2,400 total acres) were completely drawn down and dried out for the first time since 1938, when Lock and Dam 26 was put into operation (Figure 2-3). The wetland vegetation response was excellent and the flocculent bottom sediments had consolidated

dramatically by the time the units were re-flooded in the fall. Waterfowl numbers on Swan Lake during the 2002 migration were the highest in decades.

Pre-project monitoring at Swan Lake was conducted in 1992 and 1993. Post-project bioresponse monitoring began in the fall of 2003 and will evaluate the effects of the project on fisheries, waterfowl, vegetation, invertebrates, water quality, and sediment. Fish passage into and out of the lake will also be monitored. The compartmentalized design of the Swan Lake project will allow individualized management to maximize wetland and aquatic habitat diversity for the benefit of many fish and wildlife species.



**Figure 2-3. The plant community responded vigorously to a drawdown at the Swan Lake, Illinois River HREP.**

Lake Chautauqua on the Illinois River near Havana, Illinois has been managed as a National Wildlife Refuge since 1936, but wetland management capabilities and habitat quality had degraded over the years for a number of reasons. As part of an HREP, features to improve water level management capabilities in the southern pool were completed in 1999. These new water level management capabilities produced a phenomenal wetland plant response (Figure 2-4), which, in turn, resulted in the highest waterfowl use since the 1970s. Submersed aquatic vegetation and marsh plants colonized almost 1,400 acres after project completion. Fish response monitoring indicates the site can produce and export hundreds of millions of larval fish to the Illinois River.

Water level management projects that include levees, pumps, and control structures are more costly to build, maintain, and operate relative to other types of HREPs. Recent evaluations of habitat objectives and opportunities through pool planning and the Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study are revealing, however, that water level management may sometimes be the only reliable mechanism to counteract the impacts of impoundment and floodplain development. Evidence from the EMP and other water level management projects indicates these projects can be effectively operated for multiple management objectives, including waterfowl, shorebirds, wading birds, reptiles, amphibians, and fisheries. Connectivity with mainstem habitats will be a focus of future project investigations. Water control structures that can also permit fish movement are being designed and tested.

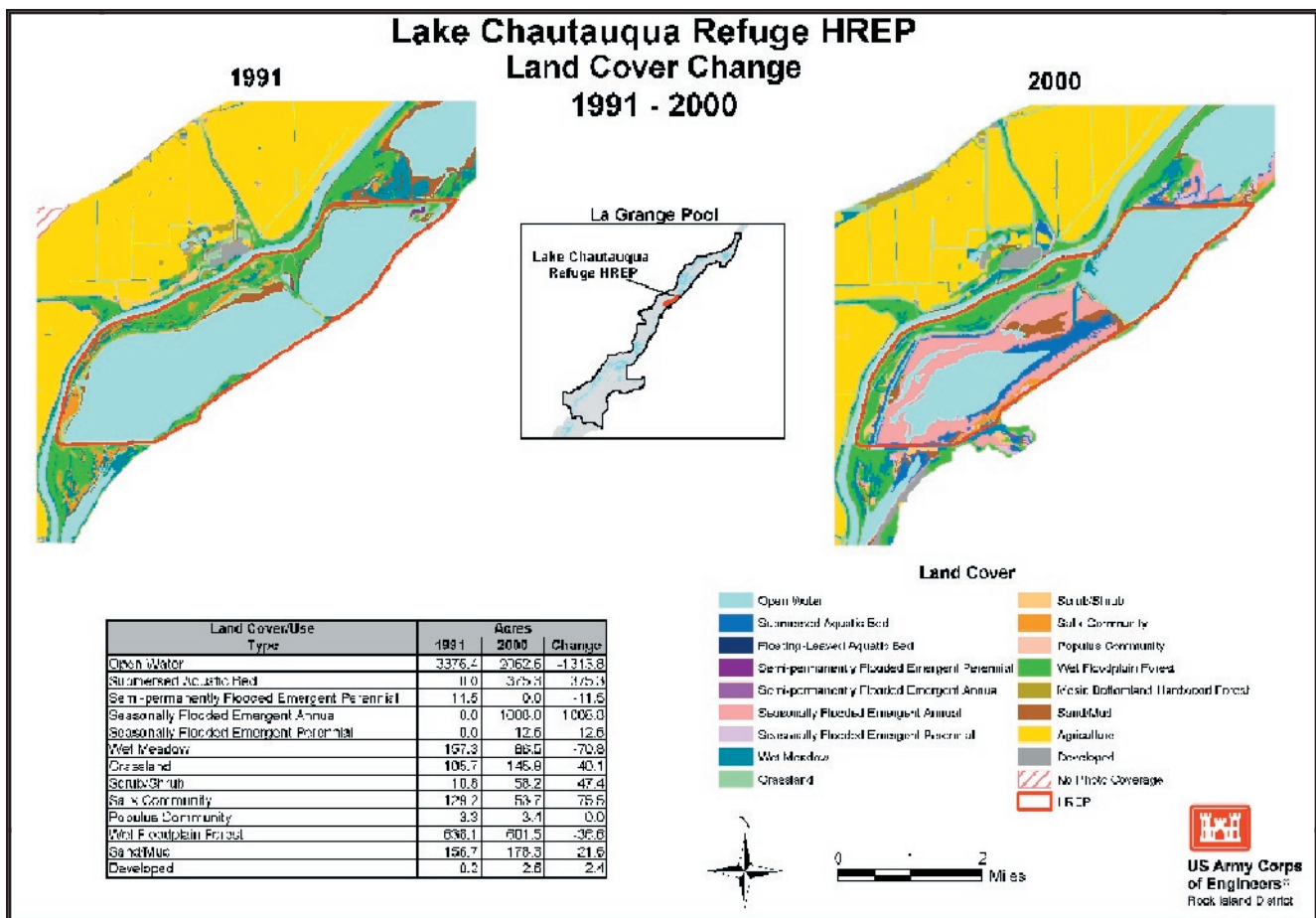


Figure 2-4. Pre- and post-project land cover at the Lake Chautauqua HREP on the Illinois River.

## ISLANDS

Prior to impoundment, the Upper Mississippi River had a braided island form along much of its length. Many of those islands were inundated when the lock and dam system was established, and others were lost subsequently to increased wind-wave erosion. The EMP has been very successful in restoring islands that provide high quality habitat for a wide range of fish and wildlife. The St. Paul District has been particularly successful with island creation. Hydraulic engineering analyses incorporated into island design has resulted in features such as sacrificial berms and rock groins that protect structures, while improving habitat at the same time. Anecdotal observations of completed projects indicate that variable topography on the tops of islands can lead to greater plant diversity and animal use. Environmental objectives for islands have expanded as monitoring results demonstrate the broad range of species responding to this type of habitat improvement.

The Wisconsin Department of Natural Resources' monitoring of the Pool 8 Islands Phase II HREP (Figure 2-5) documented immediate vegetative response to the islands and among the highest abundance of bluegills in all of Pool 8 after project completion. According to the U.S. Fish and Wildlife Service, diving duck and swan use in the Pool 8 Islands area also increased significantly in the late 1990s, when compared to pre-project conditions in the early or mid 1990s.

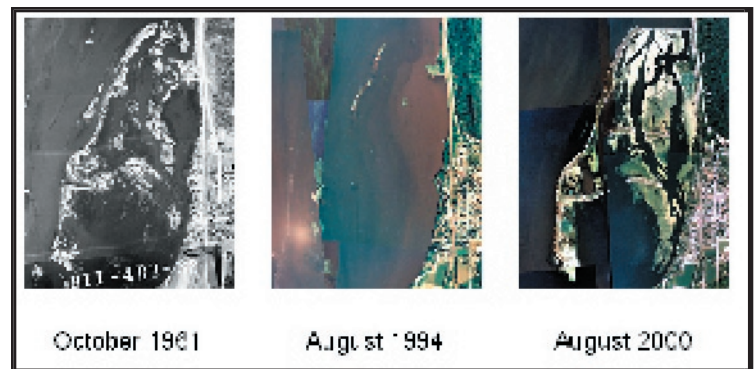


Figure 2-5. Islands eroded by wave action were reconstructed in the Pool 8 Islands Phase II HREP. Plant response was rapid, as shown in the pre-project (August 1994) and post-project (August 2000) images.



## SHORELINE STABILIZATION

Natural and constructed shorelines are subject to erosive currents in many locations on the river. This erosion can threaten the longevity of habitat projects, as well as degrade existing habitat. Traditional bank stabilization measures, such as stone riprap, and innovative approaches, such as vegetation, rock groins (Figure 2-6), and offshore structures, are being incorporated into HREPs. The design and construction of island projects have incorporated these tools so that now the materials and slopes offer greater habitat benefits and improved durability. Sacrificial berms, rock groins, and strategic placement of riprap all improve the stability and performance of constructed islands. More gradual side slopes and sand or mud soils can be beneficial to turtles and waterbirds that nest, feed, and loaf on the shorelines. Native plantings can offer a more aesthetically pleasing alternative to traditional bank stabilization (i.e., riprap). However, traditional stabilization techniques are also being reviewed to improve habitat benefits. Larger rock and mixed grade rock can create greater fish and invertebrate habitat diversity by providing bigger crevices for shelter and flow diversity.



**Figure 2-6. Shoreline stabilization features in the Pool 8 Islands Phase II HREP include sacrificial berm material, willow plantings along the beach, and rock groins in the river to deflect currents.**

## SECONDARY CHANNEL MODIFICATIONS

The relationship between the main channel and secondary channels in the Upper Mississippi River System has been substantially altered by impoundment and other human activities in the floodplain. In the St. Paul District, secondary channel restoration projects typically introduce flow into isolated channels or restrict flow into channels to reduce sedimentation and current velocity. The St. Louis District is pursuing projects to open the upstream end of secondary channels, with the goal of introducing flow and improving water quality. The most innovative secondary channel projects in development are being designed for Middle Mississippi River reaches that have not benefited from HREPs to date. One very innovative concept is to sever landward connections of channel training dikes to allow flow to scour a channel between the bankline and a new island. Drawing from approaches that have been used successfully on small streams and rivers, EMP projects have also used rock structures within degraded channels to improve flow and depth diversity. Schenimann Chute in Missouri is an example of a large secondary channel restoration project that is designed to improve flow and habitat diversity by using river flow over rock

structures to scour deep holes in the secondary channel. It will provide much needed habitat for the endangered pallid sturgeon. Planning for these measures has included the use of small-scale physical models, called micro-models, that are effective tools to predict the outcomes of restoration measures and their potential impacts on the condition of the waterway.

## AERATION

Backwaters can become oxygen deficient under certain environmental conditions where water movement is restricted. This is particularly a problem under ice in low flow areas. As dissolved oxygen levels fall in a backwater, the area loses its habitat value for an increasingly wide range of species. Many HREPs that include water control structures can be used to aerate stagnant habitats. Bioresponse monitoring of the Brown's Lake, Iowa and Finger Lakes, Minnesota (Figure 2-7) projects indicated that their water control structures were very effective at improving water quality. This early monitoring also indicated that the control structures used in these initial projects could be significantly reduced in size, thus reducing both construction and operation and maintenance costs. Monitoring of these two projects substantially improved understanding of panfish and bass overwintering requirements and habits. These "lessons learned" from project bioresponse monitoring were incorporated into newer project designs, substantially reducing costs by using smaller, but still effective, water control structures.



**Figure 2-7. The Finger Lakes, Minnesota HREP introduces oxygenated water from the Pool 4 impounded area through control structures in the dam to backwater lakes below the dam.**

## Engineering Review Workshops and Design Innovations

Engineering review workshops began in 1996, when a session on HREP engineering and design gave engineers, biologists, and project managers an opportunity to review their experiences in the emerging field of large river restoration. Additional reviews were held in 1999 and 2002. These latter two workshops were also attended by staff outside the Corps of Engineers who are involved in HREP planning and design. The evolution of HREPs has combined action and learning by monitoring completed projects to inform future plans. A recent Environmental Science Panel review of Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study restoration alternatives recommended adaptive management and reviewed EMP projects (e.g., islands and water level

management) as case studies in this approach. HREP designers have gained significant experience with construction techniques, operating in an unpredictable environment, design criteria, and contracting. As early hurdles were overcome, the program was able to focus on partner expectations, more nuanced design criteria, aesthetics, natural processes and materials, project selection criteria, and biological objectives and outcomes. Engineers continue to review structural and hydraulic performance and biologists are examining biological responses. A design manual for HREPs is being developed in order to document design concepts for future reference and planning efficiency.

## Habitat Needs Assessment

The EMP's 1997 Report to Congress concluded that "a habitat needs assessment (HNA) should be completed to establish a technically sound, consensus-based management framework for the restoration, protection, and enhancement of the UMR ecosystem." When Congress reauthorized EMP in the Water Resources Development Act of 1999, it directed that a habitat needs assessment be incorporated as an ongoing feature of the EMP. The first HNA for the Upper Mississippi River System was completed in 2000.

At the outset of the first HNA, a coordinating committee of State and Federal agency representatives outlined the following objectives for the assessment:

- achieve a collaborative planning process that produces technically sound and consensus based results;
- address a variety of habitat requirements including physical, chemical, and biological parameters;
- address the unique habitat needs of distinct river reaches and pools;
- describe historical, existing, and projected future habitat conditions; identify objectives for future habitat conditions;
- define habitat needs at system, reach, and pool scales; and
- provide additional tools for planning future habitat protection and restoration projects.

The initial HNA documented broad habitat protection and restoration needs to assist in the planning of future HREPs. The results were presented in a report as a "first approximation" of habitat restoration needs. The HNA is a tool that will need to be maintained and updated periodically. Future efforts will refine estimates of habitat need and habitat change as new information is acquired and additional public input is obtained. Several recent planning efforts ancillary to the EMP have produced information and insights that will be valuable in refining the HNA. These include Environmental Pool Plans for the Upper Mississippi River, Dike Alteration and Side Channel Restoration Plans for the Middle Mississippi Reach, the Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study, Comprehensive Conservation Plans for the National Wildlife Refuges, and an ecosystem restoration comprehensive plan for the Illinois River Basin.

## EXISTING AND HISTORICAL CONDITIONS

A system-wide HNA land cover and aquatic area database was developed from LTRMP data to evaluate existing and historical habitat conditions throughout the river. These areas and habitat classes were summarized at pool, reach, and system-wide scales to better understand what resources were present and their general distribution throughout the river system. The HNA identified clear differences in existing habitat types and conditions among river reaches. Those differences are largely related to the amount and distribution of public land, degree of floodplain development, geomorphic form of the river, and effects of river impoundment. The differences in existing conditions clearly suggest that habitat needs and restoration objectives will vary by river reach and pool.

## DESIRED FUTURE HABITAT CONDITIONS

Natural resource managers and scientists involved in the first HNA indicated that the future should be characterized by improved habitat quality, habitat diversity, and a closer approximation of pre-development hydrologic variability. They believe these changes are critical to sustaining the ecological integrity of the river ecosystem. Deep backwaters, grasslands, hardwood forests, and marsh habitats were rated the most threatened habitats requiring restoration. River regulation, sedimentation, and floodplain development were rated as the primary stressors affecting river habitats. Resource managers identified specific locations where they were aware of adverse changes occurring. Fifteen processes responsible for habitat change were identified at more than 530 specific locations on the UMRS.

Public involvement meetings, convened in April and May 1999, also provided input to the HNA. Participants identified five themes or general areas of need for the Upper Mississippi River System:

- more fish and wildlife in general (habitat diversity, species diversity, and abundance);
- clean and abundant water;
- reduced sediment and siltation;
- balance between the competing uses and users of the river; and
- restoration of backwaters, side channels, and associated wetlands.

As part of the HNA process, focus groups representing industry, environmental organizations, and other members of the public were asked about their desired future conditions for the river system. Their responses closely reflected the five themes from the public meetings (see list above). A "multi-use" river was the most frequently expressed desired condition. Two conflicting, overarching desired conditions were expressed: a return to more naturally variable conditions and a stabilization of existing conditions. Other desired future conditions identified included a sustainable, natural river ecosystem and increased biodiversity. Most participants felt strongly that a diverse public should be continually involved in river management programs.



With consideration of existing conditions, current trends, and desired future conditions, resource managers and scientists were asked to develop quantitative estimates of habitat needs for the system. The aggregate needs shown in Table 2-2 are based on their input concerning specific river reaches and pools. The intent was to identify, very approximately, the quantities of various habitat types needed across the system to achieve the broad restoration objectives that the managers, scientists, and public have articulated. It is important to note that the need for a particular type of habitat is not necessarily uniformly distributed throughout the system. For example, the need for island habitat was identified primarily on the upper portion of the UMR and on the Open River, while improved depth diversity was identified as a need system-wide.

## ***System - Wide Habitat Needs on the Upper Mississippi River System***

Developed as part of the first HNA, a geographic information system-based Query Tool (Figure 2-8) estimates the potential distribution of species and habitats throughout the UMRS. The Query Tool was designed to provide easy access to the rich spatial data and component databases of the LTRMP for use in habitat project planning. Users can select a pool, several river miles, or even define potential project areas for their queries. Querying on a species will show what habitats are available for that species, while querying on specific areas will identify what species are likely to occur there. Planners can compare existing conditions with project objectives to evaluate what habitat characteristics are missing to achieve a desired condition. These queries are accomplished using relational databases developed to associate a species' potential to occur within various types of habitat. The Query Tool presently incorporates land cover and geomorphic area data to generate information about user-specified species, groups of similar species, or habitats for selected portions of the UMRS. It is being updated to be compatible with newer GIS software and to incorporate new data available through the LTRMP.



## HNA INTEGRATION IN RIVER PLANNING

The HNA data and Query Tool are proving to be very useful planning aids in the EMP. HREP planners can quickly delineate proposed project boundaries and assess land cover characteristics and the species likely to occur in project area boundaries. Views of a project area can be expanded to identify other habitats in the vicinity of a project. HNA information can be used to obtain a system- or reach-level perspective on species and habitats, or to compare specific areas from different parts of the system.

The HNA has also proven to have significant applications beyond EMP habitat project planning. For example, a draft version of the HNA Query Tool was used to analyze the physical characteristics of river reaches based on aquatic area types (i.e., channels, islands, and backwaters). This analysis was then used to help design fish sampling methods for river areas that the LTRMP had not previously monitored. Scientists at the U.S. Geological Survey are also using HNA tools to help develop bird conservation plans throughout the upper Midwest and to assist the U.S. Fish and Wildlife Service with its National Wildlife Refuge System Comprehensive Conservation Plans. Desired future conditions documented in the HNA were important input for identifying environmental sustainability objectives under the ongoing Upper Mississippi River-Illinois Waterway System Navigation Feasibility Study. Pool planning activities conducted by interagency committees in the St. Paul and Rock Island Corps Districts used the HNA's land cover data and predicted future conditions as the basis of their in-depth, and more spatially explicit, description of habitat needs known as Environmental Pool Plans.

## Habitat Project Planning Process

The EMP partners are implementing a revised process for planning and sequencing HREPs. This is an effort to build upon the strengths of the processes previously used in each of the Corps' three UMR Districts, while ensuring that the project planners make the best possible use of newly available tools and consider habitat needs at a variety of spatial scales. These tools include the Habitat Needs Assessment (HNA), the interagency Environmental Pool Plans, and the sustainability objectives identified as part of the ongoing Navigation Study. The goals of this HREP planning and sequencing process are:

- to ensure that EMP habitat projects address UMRS ecological needs at pool, reach, and system scales by building on existing HREP prioritization mechanisms and integrating the HNA and other planning efforts into project evaluation;
- to enhance public understanding and trust in the decision-making process by making HREP evaluation criteria explicit and consistent; and
- to retain the flexibility necessary to ensure efficient, effective program execution and to apply adaptive management principles to project planning, design and implementation.

The process seeks to build upon past experiences, new data, and an increased understanding of ecosystem form and function to create a more systemic and comprehensive planning approach

that is transparent and accessible. The ecological merits of the proposed projects remain the most important factor in determining HREP priorities. Other factors to be considered include project-specific administrative issues and consistency with overall EMP goals.

The new process includes a District level evaluation similar to that which has existed since the inception of the EMP, a system-wide ecological review, and a HREP planning review to ensure a mix of ecologically sound projects that also reflects administrative considerations such as funding availability and regional needs. At the first stage, State and Federal natural resource managers participate on interagency District Ecological Teams (DETs). Habitat needs will be considered at the pool and reach scales within their respective jurisdictions. The DETs will recommend potential projects and a proposed implementation sequence for HREPs within their Districts, based on ecological needs. At the second stage, a System Ecological Team will consider the DETs' recommendations and compile a system-wide sequencing, also based on ecological needs. Ecological criteria considered at these first two stages will include factors related to geomorphology, water quality, habitat, biota, and hydrology and hydraulics. A third stage will refine the recommended systemic sequencing based on administrative considerations such as regional needs, available funding, and construction capability. Project implementation will not proceed rigidly in a strict order of numerical rankings. The Corps of Engineers will work in consultation with EMP partners to resolve unexpected issues, respond to unanticipated opportunities, and remain flexible.

## Delegated Authority

The Corps of Engineers' process for reviewing and approving HREPs varies with the project cost estimate. The current delegated authority allows projects with estimated construction costs of less than \$1 million to be approved at the District offices, and projects estimated at less than \$5 million to be approved at Division offices. Higher cost or innovative projects have final review and approval at U.S. Army Corps of Engineers Headquarters.

The current delegated authority was granted in 2000 in response to a recommendation in the 1997 EMP Report to Congress. Since then, only two projects have required approval at Headquarters. In contrast, six HREPs have been approved at the Division-level, saving an estimated time of six months per project. In addition, two projects have been approved at the District-level, saving an estimated 2-3 months per project, relative to Division-level approval. Cost savings associated with reducing these review times are between \$5,000 and \$10,000 per project, depending on the complexity of the project.



## Independent Technical Review

In the Water Resources Development Act of 1999, Congress made several important changes to the EMP, including directing the establishment of an independent technical advisory committee. The committee's purpose is "to review projects, monitoring plans, and habitat and natural resource needs assessments." More specifically, the Independent Technical Review Committee (ITRC) will report directly to the Commander of the Mississippi Valley Division and will be asked to:

- Review the application of information gained from the Long Term Resource Monitoring Program and make recommendations for information to better understand the ecological needs of the system, and support the development and formulation of projects.
- Evaluate the methods of selecting and formulating projects and recommend improvements based on sound science.
- Make recommendations regarding up-to-date environmental restoration techniques that could be used in project formulation and design.
- Recommend generic types of HREP projects that could meet system-wide and reach-specific ecosystem needs.
- Review and recommend post-construction monitoring procedures for HREP projects to insure that the long-range program benefits are realized.

The Corps' Mississippi Valley Division has taken the lead on establishing the committee, but recently transferred that responsibility to the Rock Island District. Due to funding shortfalls and the demands of other program priorities, the ITRC has not yet been formed. But the precursor steps necessary to establish the committee have been undertaken. Specifically, in consultation with the EMP partner agencies and stakeholders, MVD developed an implementation plan for the ITRC in late 2001. More recently, at the Corps' request, members of the EMP-CC and stakeholder groups have submitted names of potential committee members in an effort to identify experts with the broad range of scientific disciplines relevant to the EMP and the Upper Mississippi River. An effort is also being made to ensure geographic diversity among the ITRC members, and to combine people with direct UMR experience with those whose primary expertise is with other river systems. The committee will consist of six members, one of whom will be selected to serve as chairman. Members of the ITRC will be appointed in FY 04, with the first meeting scheduled for early FY 05.

## Public Participation

The public was instrumental in establishing the EMP in the 1980s and supportive of its reauthorization in the late 1990s. Since the program's inception, members of the public have been actively involved in site-specific habitat project planning. Moreover, public perspectives concerning general program issues, as well as more narrowly focused questions, are often brought before the EMP-CC and the interagency District planning groups. The States and non-governmental organizations are instrumental in raising public perspectives and concerns with the EMP partnership. The 1997 Report

to Congress recommended greater public involvement in the EMP, and the partners have been working to implement this recommendation since the program's 1999 reauthorization.

Opportunities for the public to learn about and participate in the program come from a wide variety of sources, including media coverage, public meetings associated with HREP projects, formal coordination efforts associated with the EMP-CC, conferences, speakers attending local and regional meetings of various groups, scientific publications, annual reports, and public participation in scientific meetings. Cumulatively these efforts have resulted in more than 250 outreach events since the 1997 Report to Congress.

Public involvement has resulted in incremental but significant changes to most program areas, from habitat project identification and development to evaluating program policies and then making recommendations for administrative refinements and change. These changes manifest themselves in modifications to HREPs and LTRMP products and in policy reaffirmation or changes such as are contained in this Report to Congress. In general there has been very strong public support for the EMP among those who have been actively associated with the program.

Of particular note, public participation was actively sought during the Habitat Needs Assessment process through a series of public meetings held jointly with the Audubon Society at 12 locations in 1999. Nearly 300 people interested in the UMRS attended the 12 meetings. After receiving information about the condition of the UMRS, the participants were asked to write down all their answers and ideas related to three questions: (1) What are the important natural resources in the Mississippi (or Illinois) River ecosystem? (2) What do you think are the problems and opportunities in the river ecosystem? and (3) How will you recognize successful restoration of the river system?

The HNA team also sought more specific information regarding the public's reaction to the products and approaches developed by the HNA Technical Team. During July and August 2000, the U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, and Upper Mississippi River Basin Association convened ten focus groups at seven locations in the Upper Mississippi River Basin. Over 700 people who showed previous interest in river issues were invited to the focus groups. Various river interests were reflected in the 92 focus group participants, including perspectives from environmental groups, industrial and transportation groups, fishers and hunters, landowners, and river residents. The focus groups were specifically designed to (1) gauge public reaction to details of the HNA process, (2) capture public perspectives of desired future habitat conditions, and (3) capture perspectives and preferences for future public involvement in the HNA and the EMP more generally.

Following completion of the first HNA, a public involvement plan was developed in 2001. That plan identifies a variety of specific actions designed to (1) inform and educate the public about the EMP and (2) gather public input concerning various aspects of the program. Specific activities are identified in a variety of major task areas. Those task areas include solicitation

of public review and input, media outreach, development and maintenance of web-based tools, and creation of various other public information tools. Specific activities in the plan include development of a new EMP brochure, an increased emphasis on public information at HREP sites, a renewed commitment to public involvement in project planning as part of the revised HREP planning process, and continuation of many of the activities described above. While implementation of the 2001 public involvement plan has been slowed somewhat by the EMP's fiscal constraints, activities in each of the major task areas are ongoing.

## Long Term Resource Monitoring

The Long Term Resource Monitoring Program (LTRMP) combines environmental monitoring, research, and modeling in an effort to provide a solid scientific foundation upon which to base management actions and environmental policy on the Upper Mississippi River System. Data gathering, analysis, and dissemination are all key elements of the LTRMP. The 1997 Report to Congress presented a comprehensive overview of the program's functions and products, and highlighted the results of an LTRMP report on the ecological status and trends of the UMRS. The LTRMP's basic structure remains largely unchanged, and therefore the earlier information will not be repeated here. Instead, this section will describe the LTRMP's accomplishments since the 1997 report, with a focus on particular scientific insights that have been gained, tools that have been developed, and the management applications of those accomplishments. It will also highlight recent trend analysis findings. In addition, evaluations and revisions of the monitoring design to improve LTRMP efficiencies will be discussed.

### Long Term Resource Monitoring Program Accomplishments

#### ADDITIONS TO THE LTRMP DATABASE

Between 1998 and 2002, over 80,000 additions were made to the LTRMP database for the four main field monitoring components—i.e., fish, water quality, macroinvertebrates, and aquatic vegetation (Table 2-3). This is a nearly 60 percent increase in the LTRMP database in only five years of the program's 15 years of data collection. These data have been used in a variety of applications including ecological trend analysis, nutrient loading and hypoxia investigations, exotic

**Table 2-3. Number of LTRMP data collection records generated over time by each monitoring component.**

Monitoring Component	Number of Site Collection Records	
	1998-2002	1987-2002
Water Quality	26,000	76,000
Fish	14,500	36,000
Macroinvertebrates	3,400	7,500
Aquatic Vegetation	37,500	86,900

species tracking, and many natural resource management and restoration applications. For each of the four LTRMP monitoring components, a 10-year synthesis will be completed in 2004.

To improve the speed and cost effectiveness of data management and reporting, automated data management was recently incorporated into field and laboratory operations. LTRMP staff developed software that allows data to be entered directly into a computer in the field and performs immediate error checking, which greatly reduces data input errors. Field data entry has reduced program costs by eliminating the need for a data entry contractor. Moreover, computerized error checking greatly reduces the staff time needed for quality control on data. In all, it is estimated that these field and laboratory innovations have resulted in a 50 percent reduction in the amount of time required to make new data available to scientists, managers, and the public via the World Wide Web.

Systemic land cover and land use geographic information system (GIS) coverages of the UMRS have been completed for 1975 and 1989, and are about 80 percent complete for aerial photography taken in 2000. Land cover maps from the pre-dam era (1890s) are available for the entire Upper Mississippi River (Figure 2-9), and many locations have presettlement maps (c. 1810s) that help evaluate the natural potential for Upper Mississippi River landscapes. These various geospatial data are being used for long-term trend analyses; detecting change in specific locations; and modeling to assess the effects of droughts, floods, and habitat rehabilitation projects. These maps also form the basis of a variety of GIS-based decision support systems developed for Federal and State resource managers.

Progress has continued in completing a systemic bathymetric (i.e., water depth) database for the UMRS. Recent work has focused on data gaps in the middle and lower river reaches. Presently, the database is complete for about 57 percent of the system. These data on river depths are critical for hydrologic and environmental modeling, designing and planning restoration projects, and predicting and communicating the effects of water level management projects.

Access to LTRMP data is essential and has been a major focus of the program over the last five years. Several new LTRMP web pages have been developed, and systemic bathymetric and land cover data are now available online. In addition to the LTRMP partner agencies, a wide range of other commercial, educational, governmental, and non-governmental organizations also rely on LTRMP data, methods, and reports. People in over 65 countries also access LTRMP data and expertise on large river monitoring and science via the World Wide Web, thereby enabling the program to distribute lessons learned on the UMRS to the world.

#### MONITORING, RESEARCH, AND MODELING RESULTS

LTRMP monitoring, research, and modeling activities are intended to help answer specific management questions about causal relationships among various factors and threats to UMRS ecological conditions. Monitoring activities are used to detect trends, changes in the system, and unusual occurrences. Applied research is designed to test specific hypotheses about different



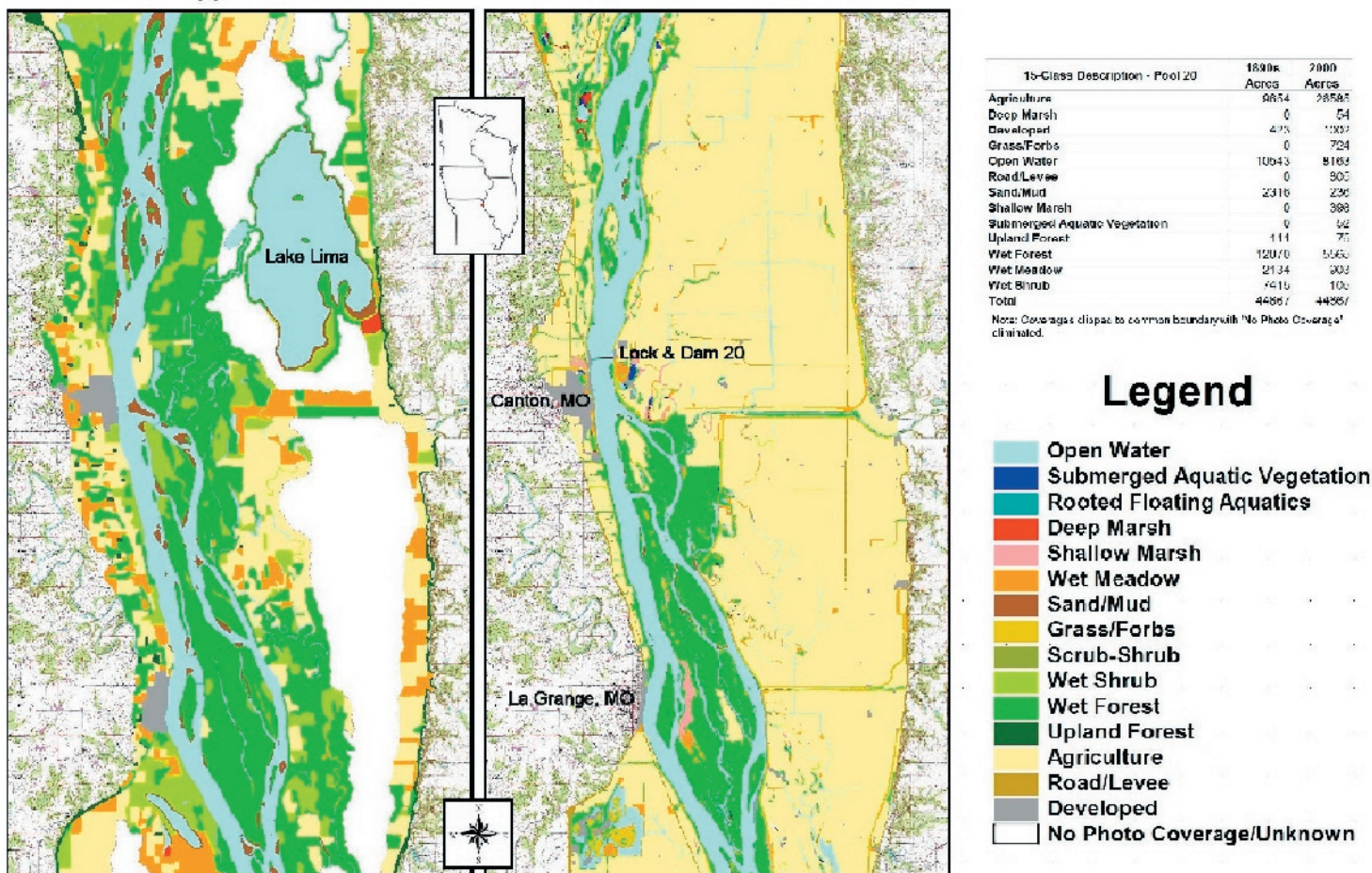


Figure 2-9. Comparison of land cover near Lock and Dam 20 from the 1890s and 2000. The river channel has retained many of its major features, but the floodplain has changed dramatically.

aspects of the system's functioning. Modeling allows scientists and managers to explore how the system might react to various sorts of changes. All three activities are used in combination to understand the UMRS ecosystem. Examples of program findings in each of these areas are presented below.

## MONITORING

### Gulf of Mexico hypoxia

A recent report of the Federal/State Gulf of Mexico Hypoxia Task Force estimated that 35 percent of the nutrient load into the Gulf originates from Midwestern States through the Upper Mississippi River System. The LTRMP continues as an important source of consistent, quality-assured data on nutrients (specifically, nitrogen and phosphorus) for the Upper Mississippi River and many of its tributaries. Both the LTRMP monitoring data and supporting research have been vital to the U.S. Environmental Protection Agency and the States in ongoing efforts to develop nutrient criteria for Midwestern streams and rivers. LTRMP data on tributary inputs also helped the Hypoxia Task Force evaluate spatial patterns of nitrogen yields across the basin, with an aim towards targeting management actions to specific watersheds for greatest effect (Figure 2-10).

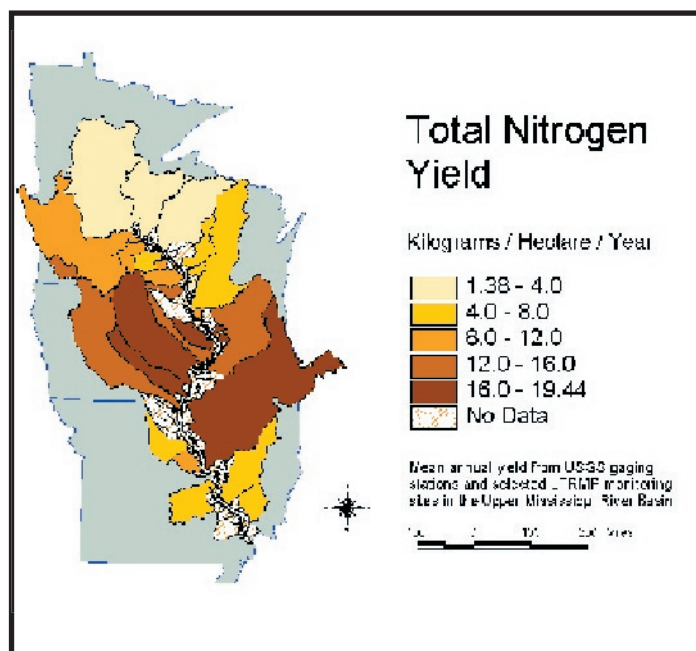
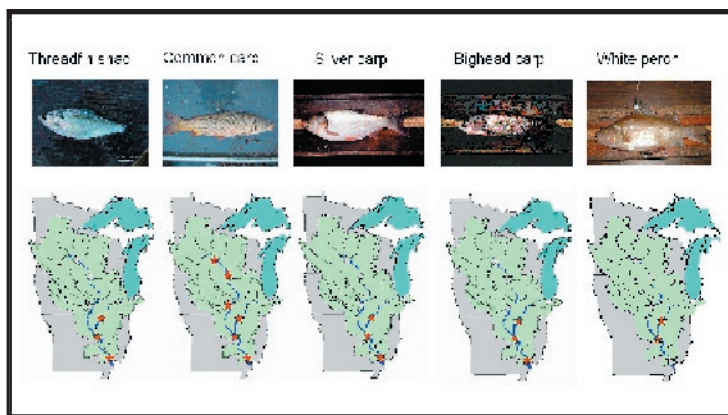


Figure 2-10. Patterns in annual inputs of nitrogen to the Upper Mississippi River from different tributary streams. Yields were estimated from a combination of USGS and LTRMP data from 1977 to 1996.

## Invasive and exotic species

Some of the monitoring program's most valuable contributions in recent years were in documenting the occurrence and dynamics of non-native species that have invaded the UMRS. LTRMP data on zebra mussels helped document the spread of this invasive species in the study reaches. Monitoring has also confirmed the occurrence of exotic fishes in study reaches (Figure 2-11) and recorded rapid increases in the abundance of invading exotic fishes from both the lower river basin and the Great Lakes.



**Figure 2-11. Occurrence of selected exotic fishes in the LTRMP monitoring reaches.**

Of urgent concern are Asian carp species (i.e., bighead, silver, and black carp), which are moving up the UMRS from the south. These invaders compete directly with native fishes for food and habitat and could drastically alter fish communities. LTRMP data have provided baseline information for numerous research and applied management initiatives to control the spread of Asian carp through the UMRS and toward the Great Lakes. The Lower Impounded, Unimpounded, and Illinois River reaches of the UMRS appear most susceptible to invasion by exotic fishes. The spatial design of the LTRMP data collection has allowed managers to determine the habitat preferences of the invaders and therefore to postulate which native species may be at greatest competitive risk. These invaders can compete with, and prey upon, native fishes. Silver carp, which reach 30-50 pounds, can also be a hazard to humans because they jump out of the water when disturbed and have injured passing boaters.

## RESEARCH

### Fish habitat

An effort to examine how much habitat is required to sustain desired fish populations in the UMRS was completed in 2002. An analysis of backwater habitats and fish abundance throughout the UMRS indicated that, in reaches where backwater habitats account for less than about five percent of total habitat area, the abundance of sunfish, an important recreational species, is limited. In these locations, increasing or decreasing backwater habitats through restoration efforts is likely to affect the abundance of these and many other valued fish species.

## Fish ecology

A comparison of current (late 20th century) hydrologic conditions and fish catches on the Illinois River to historical (19th century) hydrologic conditions showed moderate to high levels of hydrologic alteration. For many native river fishes, the abundance of young fish in recent years has been highest in those years when the water regime approximated more natural, historical conditions.

### Fish response to the Flood of 1993

LTRMP's long-term data also provide critical insight into the ecological effects of natural events, such as floods and droughts. The Great Flood of 1993 had immediate and substantial negative social and economic effects. In terms of ecological impacts, the results were more mixed. LTRMP analysis has provided river managers with information about the flood's impacts on river resources, such as rejuvenation of habitats and increased reproduction of fishes. For instance, the 1993 flood produced notable shifts in the 1994 UMRS fish communities as compared to more recent years. These shifts were principally related to abundance of juvenile fishes. Reproductive success was high for many species because the flood provided access to floodplain areas that are not typically available for spawning (e.g., areas behind levees). However, in most locations, only species that are habitat generalists persisted as adults. Backwater dependent species, such as bluegills and crappies, experienced very high mortality in subsequent years. This response indicates that, given access to the floodplain, reproductive potential is high for many UMR fishes, but that the life history requirements for adults are not being met in some locations and for some species. This suggests that habitat rehabilitation projects that improve access to the floodplain and provide more off-channel habitats for all life stages may help to increase abundance of a variety of fish species.

## MODELING

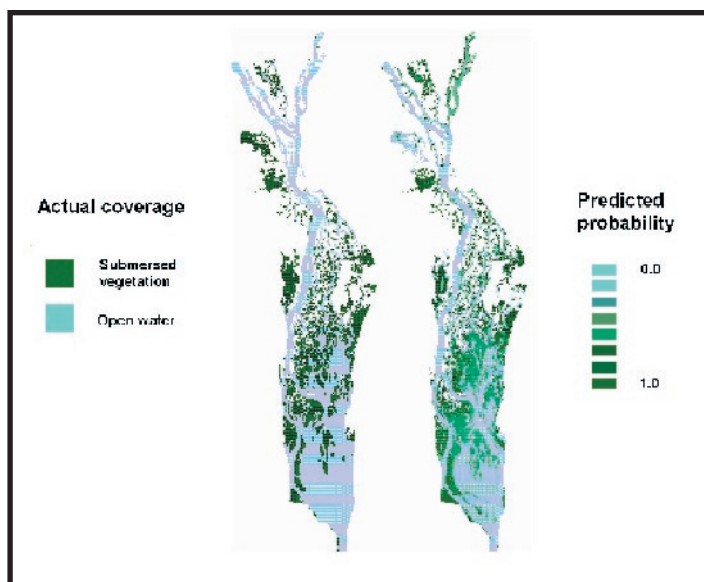
### Flooding

A model was developed to predict the number of days per year that flooding would occur at any elevation for each river mile in the UMR. Model outputs and tables were developed for each river mile and made available on the World Wide Web. Foresters have used the results to help determine which tree species to use for replanting, based on the flood tolerance of different tree species and the probability of flooding and flood duration at any specific location.

### Sedimentation

Statistical models were developed to explain variation in sedimentation rates in backwaters. The models are an important tool for forecasting depth and future conditions within these critical habitats. This modeling effort suggests that annual variability in sedimentation rates is associated with changes in flows, with higher flows tending to bring more sediment. In contrast, spatial variability in rates is generally associated with water depth, with deposition tending to increase as depth increases. These results can be used to prioritize backwater types with the highest likelihood for long lasting restoration benefits.

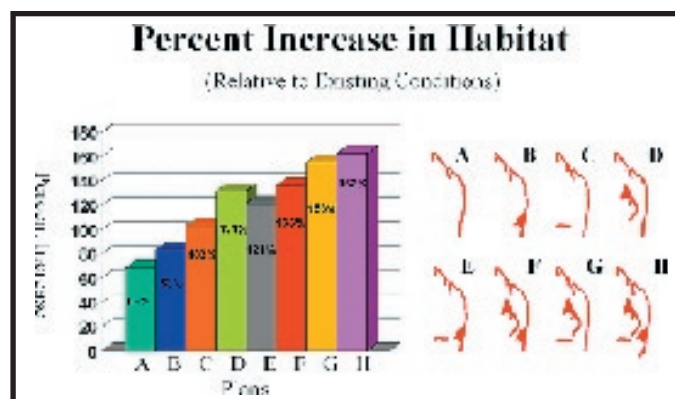




**Figure 2-12. Comparison of actual vegetation coverage in Pool 8 for 1989 and predicted coverage for the same year, derived from a LTRMP model of the probability of vegetation occurrence based on physical parameters.**

### Biological response to restoration

A model was developed to predict the abundance of submersed aquatic vegetation based on physical parameters such as water depth, current velocity, and wind fetch. Submersed aquatic vegetation is a critical habitat element for fishes and migratory waterfowl. The model, developed for Pool 8 using historical data (Figure 2-12), successfully predicted submersed vegetation response near islands constructed in Pool 8. This model will likely be useful as an aid for the evaluation of proposed island alignments for future HREPs.



**Figure 2-13. Analysis of increases in duck habitat associated with different configurations of constructed islands (A-H) in Pool 8. When combined with cost estimates for the alternative island configurations, this data can be used to calculate cost:habitat benefit ratios for the different options.**

A geospatial model developed by LTRMP scientists has demonstrated how biological response predictions can be combined with engineering models to evaluate construction costs and biological benefits simultaneously. The resulting biological models become the basis for assessment of project performance. The first such effort, an LTRMP-USGS-USFWS partnership, defined dabbling duck habitat value for a variety of proposed island project designs. The habitat benefits of the different project designs were compared with the alternative designs' respective costs, using a method called incremental analysis. This analysis showed which alternative provided the best cost:habitat benefit ratio (Figure 2-13).

### Fish wintering habitat

Another model successfully predicts the range of water temperature, current velocity, dissolved oxygen, depth, and connection to the main channel required to create quality overwintering habitat for key fish species. These predictions, once validated, can be combined with geo-referenced water quality and bathymetric data to identify specific areas where habitat restoration efforts might be most beneficial.

### MANAGEMENT APPLICATIONS OF LTRMP INFORMATION

LTRMP projects and data have been used by a variety of clients, both internal and external to the program, to evaluate management options and their effects. For example, data on bathymetry, land cover, and aquatic vegetation were used extensively to plan an experimental drawdown of water levels in Pool 8, under the Corps' channel maintenance program. LTRMP data were used to anticipate the response of vegetation and to develop a monitoring approach to evaluate the drawdown's effects. Staff from UMESC and the Pool 8 Field Station documented vegetation response in 2001 and 2002. The monitoring will continue through 2004. These data will be compared to LTRMP vegetation data collected before 2001 to assess both short- and long-term effects of the drawdown. A similar drawdown has been proposed for Pool 5. Pool 4 Field Station staff have already collected pre-project vegetation data, which will be used to assess drawdown responses there if the project is undertaken.

LTRMP staff often participate in evaluations of Habitat Rehabilitation and Enhancement Projects. One common habitat project technique is to construct islands designed to serve as wave breaks to improve aquatic plant beds. LTRMP data are frequently used during the planning of such projects to establish project objectives. In addition, between 1997 and 2002, LTRMP staff monitored biological response to several such islands in Pools 5, 7, 8, and 9. Post-construction monitoring documented that most projects had produced the desired conditions. Of note, post-project monitoring at Pool 8 Islands Phase II indicated that aquatic vegetation, which provides critical habitat for fish and waterfowl, was established more rapidly at this project (within 1-2 years) than in many of the older island projects (5-6 years). The Pool 13 Field Station and UMESC conducted water quality and biological sampling to evaluate three HREPs in Pools 12 and 13 and one in Pool 5 that were designed to improve

habitat by controlling flow into backwaters. The results helped determine the flow rates and timing needed to produce desired temperatures and dissolved oxygen levels during summer and winter. Fish tracking with radio-telemetry validated predictions concerning fish use of restored backwater habitat. It was determined that smaller scale, less expensive water control structures could be used to achieve the target temperature and dissolved oxygen levels. These results were incorporated into subsequent similar projects, saving design, construction, and operating costs.

Biological monitoring by the La Grange Pool Field Station indicated that HREPs on the Illinois River were successful at increasing habitat quality and fish abundance. New deepwater habitats were occupied almost immediately by freshwater drum, and shallow backwater areas produced as many as 750 million larval fish to supply river stocks. In addition, waterfowl surveys conducted by the Illinois Natural History Survey documented significant increases in submersed aquatic vegetation and bird-use days in many HREP areas. These findings are used to determine when and how to operate water control structures to maximize larval fish export to the river while still ensuring high quality bird habitat in the summer and fall.

In addition to planned applications of LTRMP information, UMESC and field station staff routinely respond to informal and unanticipated requests for data, information, and expertise. For example, in 2002, field station staff responded to 187 requests for LTRMP information. At UMESC, data requests include direct requests to staff and web-based requests for LTRMP data and products. Many data requests from the news media in 2002 were related to information on Asian carp, which are invading the UMRS from the south.

## Status and Trends Analysis

The first major synthesis of LTRMP data was published in a 1999 report titled *Ecological Status and Trends of the Upper Mississippi River System 1998: A Report of the Long Term Resource Monitoring Program*. The report included tables and graphs for a variety of ecosystem components, and an assessment of the ecosystem health of four river reaches within the UMRS. Six ecological criteria were used to assess the condition of each reach and to forecast future conditions. Results generally indicated that environmental conditions are best upstream, where habitat diversity is greatest and the river maintains its connection to the floodplain, which is mainly in public land without levees. Conditions gradually decline downstream as habitat diversity is lost, the river becomes more isolated from its floodplain, and public land is rare. The report has been used extensively by Federal and State partner agencies and non-governmental organizations to develop management plans and papers that focus on a variety of natural resource issues.

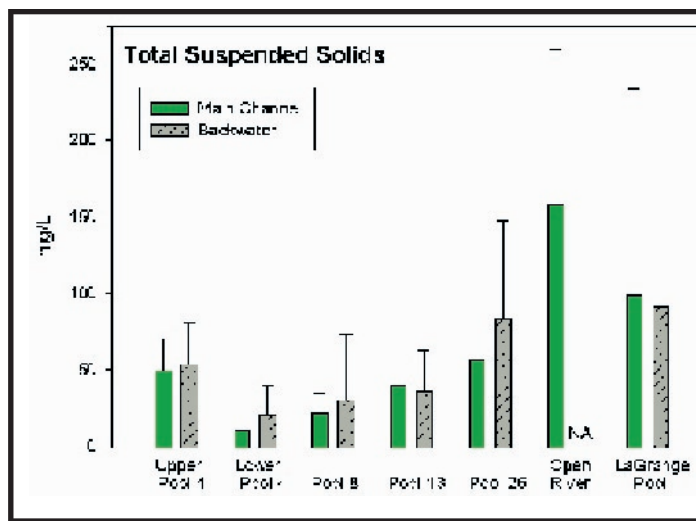
More recently, each of the LTRMP monitoring components has been summarizing and analyzing the data collected during the previous 10 years. These reports include analyses

intended to reveal the mean and variation of selected indicators and distinguish between natural variability and trends in the monitored components. These reports will provide the basis for an updated *Status and Trends* report scheduled for 2005. In the interim, several significant findings are highlighted briefly below.

A variety of different analyses of LTRMP fish data have concluded that, at large spatial scales, there is a general north-south dichotomy in UMR fish communities. A northern fish community is common to the upper three study reaches monitored by the LTRMP (Pools 4, 8, and 13), which is different from a southern community that is prevalent in the three lower reaches (Pool 26, Open River Reach, and La Grange Pool). The two communities differ primarily in the abundance of fishes associated with backwater and off-channel habitats, with the northern community having a greater abundance of such fish, and in the occurrence of some species whose distribution is limited by temperature. Besides community composition, species richness (the number of different species expected from a specific level of sampling effort) exhibits the same north-south gradient and showed a positive relationship with the diversity of habitat types adjoining the main channel. Thus, the greater the types and amounts of habitats adjoining the main channel, the greater the species richness. The three LTRMP study reaches with the lowest species richness (i.e., Pool 26, Open River, and La Grange) are also the reaches with the greatest floodplain isolation due to levees and dikes and the least amount of backwater or side channel habitat. Thus, to increase fish species diversity, management actions should generally focus on improving the quality and quantity of side channel and backwater habitats in areas with low habitat diversity.

Scientists and managers sometimes assume that water quality in large rivers is relatively homogenous. However, LTRMP data show that water quality in the UMRS is not homogenous, but exhibits distinct gradients at many scales. At the system scale, this is illustrated by data on total suspended solids (TSS, Figure 2-14). The concentration of TSS drops from upper Pool 4 to lower Pool 4 because Lake Pepin, a natural lake on the river, serves as an efficient trap for suspended solids. TSS concentrations then increase steadily downstream, primarily due to sediment inputs from agricultural areas. Suspended solids concentrations are inversely related to water transparency, which is an important determinant of aquatic plant growth. The lack of submersed aquatic vegetation in lower river reaches is probably due largely to high suspended sediment loads and low water transparency.

At the pool scale, there can be distinct lateral gradients within pools when water quality in tributaries is substantially different from that in the main channel. This is illustrated by data on dissolved solids in Pools 4, 8, and 13 (Figure 2-15). The Chippewa River in Pool 4 and the Black River in Pool 8 are low in dissolved solids compared to main channel water, whereas dissolved solids in the Maquoketa River in Pool 13 are higher than the main channel. In each pool, water from these tributaries does not mix readily with main channel water and can be traced

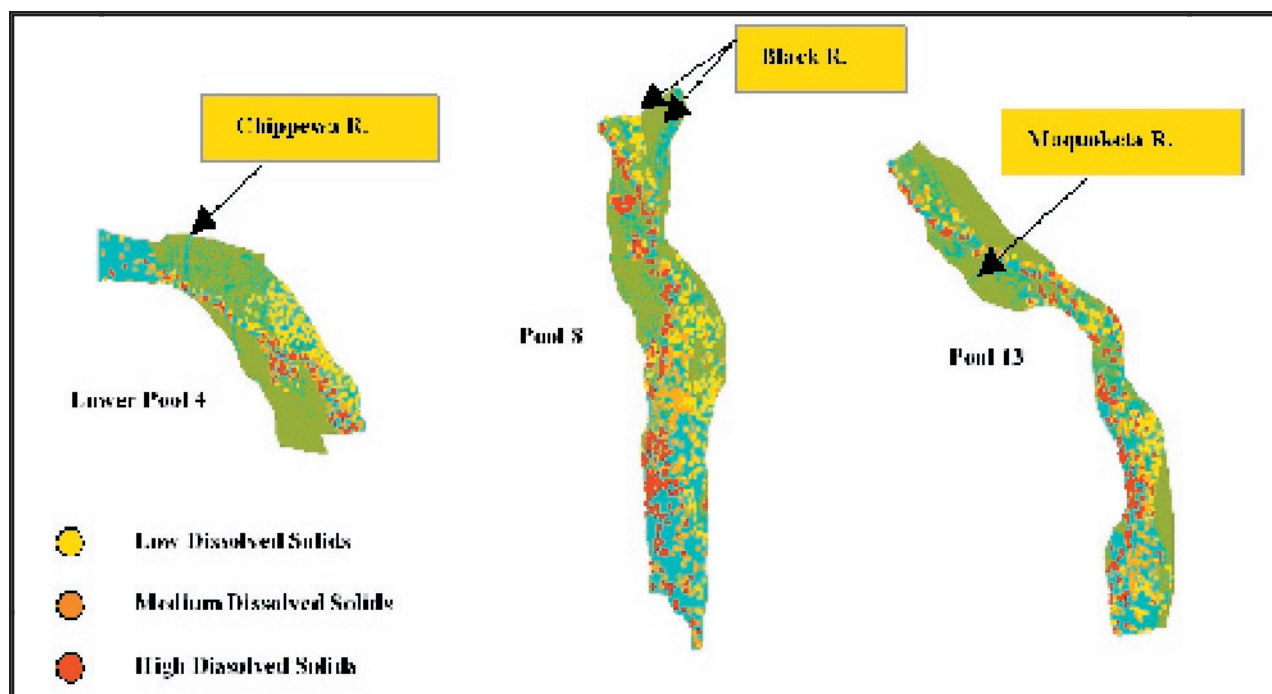


**Figure 2-14. Mean concentration of total suspended solids in main channel and backwater strata of the LTRMP study reaches. Vertical lines are +1 standard deviation. There are no backwater habitats in the Open River Reach.**

down the length of the pool by its distinct chemical signature. This results in substantial differences in water quality from one side of the pool to the other. These differences can affect the distribution of nutrients, sediments, and other chemical constituents within pools, as well as habitat quality and biological production. The gradients, revealed by LTRMP data, can help inform the site selection and design of HREPs.

Since the late 1980s, LTRMP data have documented a rebound in aquatic vegetation, with high abundances occurring in many of the northern river reaches. Trends among northern pools have been variable and differences between pools appear to be related primarily to water turbidity and water level fluctuations. In these reaches, habitat rehabilitation projects successfully altered transparency and currents to increase vegetation (see Figure 2-5). However, below Pool 14, aquatic vegetation is generally sparse or lacking. This appears to be partly due to low transparency in the southern reaches, but another important factor may be short-term variation in water levels, which tends to denude shorelines of vegetation. Daily variation in water levels is much greater now than it was historically. Some of this variation could be eliminated by changes in dam operations. However, some of the increase in variability is due to changes in the watersheds of tributary streams that have increased the speed with which water is delivered from the landscape to the river. These effects will be much more difficult to eliminate. LTRMP staff are now developing models to test these concepts and to develop management techniques for increasing vegetation abundance in the lower reaches of the UMR.

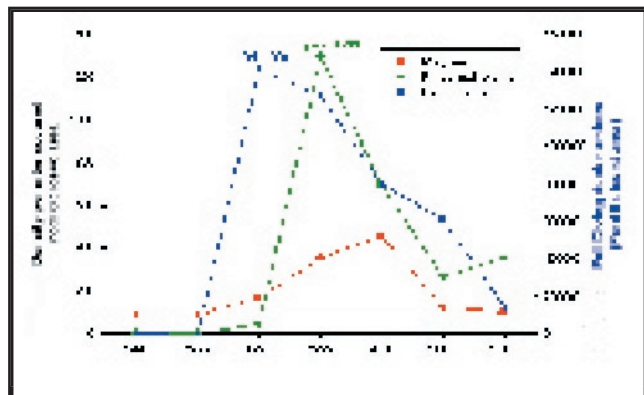
Densities of fingernail clams and burrowing mayflies have been highly variable over the LTRMP's period of record, but have generally been higher in the upper study reaches. Analyses of LTRMP data have shown that substrate is one of the main factors explaining invertebrate distribution. Both mayflies and



**Figure 2-15. Levels of dissolved solids (measured as conductivity) in Lower Pool 4, Pool 8, and Pool 13 .**



finger nail clams prefer silt clay substrates, which are more common in the upper reaches. These organisms are important food for fish and waterfowl. In fact, Fish and Wildlife Service data on the abundance of diving ducks on Pool 8 indicate that duck abundance is closely related to densities of finger nail clams over the years (Figure 2-16). Invertebrate sampling is conducted in the spring of each year, but is indicative of abundances the previous fall. Soft-substrate invertebrates such as finger nail clams and mayflies (*Hexagenia* spp.) are less common in the lower reaches of the UMR. Alternative



**Figure 2-16. LTRMP data on density of finger nail clams and mayflies compared to numbers of diving ducks (data from U.S. Fish and Wildlife Service) in the area of Pool 8 that is closed to hunting.**

sampling methods, such as rock baskets and drift nets, are currently being explored for sampling invertebrates that are more likely to be present in these lower reaches.

Backwater depths within the UMRS are generally decreasing as sediment fills these areas. However, a five-year monitoring study showed that annual sedimentation rates in backwaters varied more than 50-fold among Pools 4, 8, and 13. The observed range was 0.008 cm/year to 0.45 cm/year, with no distinct spatial or temporal trends. Differences were associated mainly with annual discharge and riverbed elevation. These findings should help define conditions that produce either sedimentation or erosion in backwaters, and should help in determining what management options are most effective in modifying flows or sediment loads to reduce infilling of backwaters. This will extend the useful life of many backwaters and could help to increase the design life of HREPs in backwaters.

## Evaluations and Revisions to Monitoring Design to Improve LTRMP Efficiencies

To remain effective, any monitoring program must periodically reevaluate its procedures and design to be sure that the data it provides meet program objectives and are collected efficiently, particularly in light of advances in sampling techniques and technologies. In addition, as more data are available over time, this allows for a more powerful statistical review of the

effectiveness of the sample design. The first comprehensive statistical analysis of the LTRMP component data was completed in 2001. Analyses of water quality, fish, aquatic vegetation and macroinvertebrate data focused on the ability to determine changes between years. The LTRMP's capability to detect change was generally high for water quality, fish, and aquatic vegetation, but was low for macroinvertebrates. These analyses were vital during the program partners' subsequent effort to define base monitoring levels for the LTRMP and revise monitoring methods for individual components. This effort, which was intended to enhance the monitoring program's efficiency and effectiveness, is described further below.

In the Open River Reach, water quality monitoring from 1993 to 2002 revealed important short-term patterns and persistent differences between main channel and side channel areas. Analyses suggested that a new sampling approach that incorporated these patterns could provide more useful information for this river reach with less effort. A new, more efficient water quality sampling design for this reach is currently being evaluated.

In 2002, the analytical performance of UMESC's LTRMP water quality laboratory was evaluated under the Standard Reference Sample Program of the USGS. The laboratory was one of only three laboratories, among 93 participants, to receive an excellent overall laboratory rating. In a typical year, the UMESC laboratory performs about 60,000 analyses on samples collected from the UMRS.

Analyses of macroinvertebrate data revealed that sampling by the standard method yielded inadequate statistical results in the Open River Reach. This problem is largely related to the relative scarcity of the target macroinvertebrates in this sampling area. As a result, macroinvertebrate sampling was discontinued in this reach. Other sampling techniques are being explored to develop a macroinvertebrate monitoring design appropriate for conditions in the Open River.

A new protocol to sample aquatic vegetation was initiated in 1998. Under the original protocol, aquatic vegetation data were collected in selected backwaters along fixed transects. Under the new protocol, sampling sites were randomly selected from all areas where aquatic vegetation could potentially grow (areas less than four feet deep). Unlike the original protocol, the new design provides statistically valid pool-wide estimates of plant abundance and allows grouping of the data in many different ways, which is especially useful for statistically sound hypothesis testing and for integrated, multi-component analyses. Increased efficiencies associated with the new protocol allowed LTRMP staff to conduct exploratory sampling in six additional river reaches during 2001-2002, at no additional cost.

In the fish component, a rigorous statistical evaluation of existing data, along with a review by program partners, was conducted in 2000-2001. Results indicated that four sampling gears produced redundant data, and these gears were subsequently eliminated from the sampling design. This reduced



the annual monitoring effort by 33 percent, while maintaining the statistical integrity of the design and nearly all of the original information provided by the program.

A programmatic reevaluation in 1998 led to changes in land cover and land use monitoring, with an emphasis on providing information more quickly. A flexible vegetation classification scheme was developed that includes different levels of detail and effort, depending on the data requirements and time constraints of the intended application. A highly detailed 150-level classification was developed for focused studies, but this can be collapsed to a 31-level classification for applications where large areas need to be mapped quickly. The revised classification maintains comparability with both the Habitat Needs Assessment classification and the National Vegetation Classification Standard.

These revisions to the monitoring design and methods have increased the efficiency with which the LTRMP obtains, serves, and analyzes data. This has allowed the program to produce the same level of critical information with less effort and at lower cost, and to make that information available more quickly to managers and the public. Increased efficiency helps partially offset the impacts of inflation and allows the LTRMP to direct more efforts toward analyzing program data, evaluating new types of data collection, creating modeling tools for managers, and improving web-based access to program data. Without increased efficiency, these efforts would have been eliminated.





# Chapter 3

## Implementation Issues

Preparing periodic Reports to Congress provides an opportunity for the Environmental Management Program (EMP) partners to review the program's accomplishments and identify any needed adjustments. To accomplish this programmatic review for the 2004 Report to Congress, the partners identified a variety of specific implementation issues meriting discussion. Some are issues that have arisen since the last Report to Congress in 1997. Others involve reexamination of long standing policies and procedures to ensure current and future relevance.

The following sections describe each of eight issues addressed in the review process, including options for change that may have been considered. Ultimately, some issues were resolved by reaffirming or clarifying current policies or practices. For others, the deliberations led to recommended changes. Chapter 4 sets forth the conclusions and recommendations resulting from this process.

### Non-Government Organizations to Serve as Non-Federal Sponsors

To date, nongovernmental organizations (NGOs) have not directly served as non-Federal sponsors for Habitat Rehabilitation and Enhancement Projects (HREPs) because the EMP authorization does not specifically provide that authority. Absent such a specific authority, the Corps does not believe that there is latitude to allow NGOs to serve as non-Federal project sponsors. However, several other programs administered by the Corps of Engineers (Sections 1135, 206, 204, 503, 312 and 602) specifically permit NGOs to serve in this capacity.

To date, 80 percent (or 96 percent by costs) of all HREP projects have been constructed on lands managed as a national wildlife refuge with 100 percent Federal funding. State governments have served as the non-Federal sponsor on the remaining projects. Considering the immediate restoration opportunities that have been expressed by some NGOs and the considerable proportion of private land in southern river reaches, allowing NGO cost share participation could increase the project opportunities for the EMP.

Based upon inquiries with NGOs regarding project sponsorship, it is generally believed that the overall program would benefit if NGOs could serve directly as cost share sponsors for HREPs. However, in allowing NGOs to serve as project sponsors, it will be important to ensure that equitable public access to the site is maintained, so that public funds are not used to benefit private interests or exclusive use. In addition, it is presumed that,

similar to other Corps authorities, the approval of the local and/or State government would be required and other requirements, such as operation and maintenance (O&M) responsibilities and confirmation of financing ability, would apply. Finally, the membership of coordinating bodies, such as the Environmental Management Program Coordinating Committee (EMP-CC), would remain unchanged.

### Cost Sharing

EMP habitat projects are either 100 percent Federally funded or require a non-Federal sponsor to pay 35 percent of the construction cost. Which of these options applies is governed by Section 906(e) of the 1986 Water Resources Development Act. Section 906(e) authorizes 100 percent Federal construction funding for projects that (1) are "located on lands managed as a national wildlife refuge," (2) benefit Federally threatened or endangered species, or (3) "provide benefits that are determined to be national" (e.g., benefit anadromous fish or species subject to treaty). All other EMP habitat projects require a 35 percent non-Federal cost share.

The percentage of the non-Federal share has changed since the EMP was first authorized in 1986. Originally, a 25 percent non-Federal cost share was required. The 1997 EMP Report to Congress recommended that cost sharing remain at 25 percent. However, when the EMP was reauthorized in the 1999 Water Resources Development Act (WRDA), Congress chose to increase EMP cost sharing to 35 percent, consistent with Section 210 of 1996 WRDA, which established non-Federal cost sharing for ecosystem restoration and protection projects at 35 percent nationwide. It is not anticipated that national policy and related statutory requirements will change in this regard.

However, the question of which projects qualify for 100 percent Federal funding on the Upper Mississippi River required closer examination. While Section 906(e) identifies three criteria for determining which projects shall be undertaken at full Federal cost, only one of those criteria has been applied to the EMP. Namely, EMP projects on lands managed as a national wildlife refuge are fully Federally funded. As a matter of Administration policy, the other two criteria (i.e., projects that benefit threatened and endangered species or provide national benefits) have not been utilized in the EMP.

Many projects on the Upper Mississippi River System could potentially qualify under either of these two criteria. However, operationalizing these criteria would likely necessitate development of relatively elaborate guidelines and increase the length of time required for project review. Based on this combination of policy and practical considerations, it is not



anticipated that these two provisions of Section 906(e) will be routinely employed in the EMP. Thus, 100 percent Federal funding is most often applicable only to HREPs on lands managed as a national refuge under Section 906(e).

Defining which lands qualify as “lands managed as a national wildlife refuge” is more complicated than it may seem. Clearly, lands owned by the U.S. Fish and Wildlife Service that constitute the national wildlife system fall within the definition. However, in addition, much of the Corps of Engineers’ General Plan (GP) lands are managed for wildlife purposes under cooperative agreements with the Fish and Wildlife Service. In some instances, the Fish and Wildlife Service may further delegate management to one of the States. In particular, the 2001 amended Cooperative Agreement between the Corps of Engineers and Fish and Wildlife Service, governing management of GP lands, states “certain segments of the land subject to this agreement may be allocated to the States of Illinois, Iowa, Minnesota, Missouri and Wisconsin for conservation management through subsequent agreements between the Service and those states.” Therefore, the Corps considers all GP lands that are not specifically reserved by the Corps for some other management use to be managed as a national wildlife refuge for the purpose of Section 906(e). Thus, HREPs may be 100 percent Federally funded if they are on GP lands managed by either the Fish and Wildlife Service or by a State. However, the agency managing the land on which the HREP is located is required to assume responsibility for the costs of operation and maintenance.

A second clarification resulting from the re-examination of EMP cost sharing provisions relates to the applicability of 100 percent Federal funding to HREPs on all Federally owned lands. In particular, there are 33,739 acres in the Upper Mississippi River System floodplain that are owned by Federal agencies other than the Corps of Engineers or the Fish and Wildlife Service. They include 301 acres owned by the National Park Service and 33,438 acres owned by the U.S. Forest Service.

It is Corps policy that HREPs on Federal lands not owned by either the Fish and Wildlife Service or the Corps of Engineers do not categorically qualify for 100 percent Federal funding. Nor are such Federal land holdings sufficiently large to warrant seeking a change in the EMP authority to permit construction of HREPs at full Federal expense on these lands. Thus, any HREP proposed on such lands would need to be evaluated case-by-case, on its own merits, and in conjunction with the Federal agency that owns the land.

## HREP Operation and Maintenance

Section 107(b) of the Water Resources Development Act of 1992 assigns sole responsibility for operation and maintenance of EMP habitat projects to the agency that manages the lands on which the project is located. Thus, the U.S. Fish and Wildlife Service and the five States have assumed O&M responsibilities for all HREPs. However, the O&M burden for the States and the

Fish and Wildlife Service is increasing because of the growing number of projects that have been completed. It is anticipated that adaptive management will help reduce future project O&M costs, as more experience is gained in the design and management of HREPs and the use of natural river functions is increased. However, the cumulative O&M burden will certainly increase. O&M costs for HREPs on refuge lands totaled over \$360,000 in FY 2003. With the addition of new projects, the Fish and Wildlife Service’s annual O&M costs are expected to grow to \$566,000 by FY 2013.

It has been particularly difficult for the Fish and Wildlife Service to secure adequate funding to meet its O&M obligations. This could potentially jeopardize the effectiveness of HREPs on refuges. It may also affect the success of the overall environmental restoration effort on the UMR, because such a large part of the UMR is within the refuge system.

## Delegated Authority for HREPs

Since inception of the EMP in 1986, there have been 40 HREP projects completed, with another 24 projects underway. As more expertise and experience have been gained by the HREP teams, more construction approval authority has been delegated. In 1993, approval authority for HREPs costing less than \$2 million was delegated to the Division level. In 2000, as a result of a recommendation in the 1997 EMP Report to Congress, authority to approve the construction of HREPs with a cost under \$1 million was delegated to the District Commanders and approval authority for projects less than \$5 million was delegated to the Division Commander. Headquarters still retains approval authority for projects with costs that exceed \$5 million and for all projects that raise policy issues, regardless of project cost.

Since increased delegation of authority in 2000, six projects have been approved at the Division level, saving approximately six months in the approval process for each project. Two other projects have been approved by the Rock Island District, saving an additional 2-3 months per project, relative to Division-level approval. The time savings achieved through delegated authority reduce project costs and accelerate construction schedules. Project teams are also increasingly experienced with conducting habitat evaluation procedures to predict and maximize probable project outcomes. Value engineering and Independent Technical Review (ITR) of work at the Districts have documented the District teams’ ability to maximize project design, value, and efficiency, while maintaining quality control standards.

The approval authority for HREPs does not currently parallel the approval authority for projects in the Corps of Engineers’ Continuing Authorities Program (CAP). In particular, CAP projects with construction costs estimated to be less than \$5 million and using relatively standard restoration practices are approved at the District level. Construction approval for projects greater than \$5 million or incorporating untested practices or policies is a Division responsibility.

# HREP Rehabilitation (Infrastructure Repair)

To date, existing HREPs have weathered floods and storms quite well, including the major flood of 1993. Any necessary rehabilitation has been handled on a case-by-case basis. However, it is inevitable that some HREPs will suffer damage due to major floods. As part of their program review, the EMP partners agreed that clarifying the policy regarding rehabilitation of HREPs would be helpful.

Rehabilitation of HREPs is currently dealt with through individually signed agreements between the project sponsor and the Corps of Engineers. These agreements are governed by the legal authority and Corps policy in place at the time of the agreement. Federal cost share policy related to construction, rehabilitation, and O&M of HREPs was established by Water Resources Development Act of 1986 at 25 percent non-Federal and 75 percent Federal. The Water Resources Development Act of 1992 increased the cost share for O&M to 100 percent for the agency that manages the land; but the law was silent on rehabilitation. The Water Resources Development Act of 1999 altered the cost share for construction, but was silent on both rehabilitation and O&M. Because rehabilitation requirements have changed over time and there are numerous project sponsors with which the Corps has executed project cooperation agreements (PCAs) or Memoranda of Agreement (MOAs), there is considerable variability in how project rehabilitation has been handled. To date, that variability has not been a significant problem because little rehabilitation of HREPs has been required. However, it can often be difficult to distinguish rehabilitation from routine O&M, major repair resulting from disaster, and modifications to address design deficiencies.

The Corps of Engineers' and EMP partners' jointly held understanding regarding HREP rehabilitation guidance is that:

- Rehabilitation is remedial work in response to damage from a major storm or flood event. It does not include modifications to address design deficiencies.
- Decisions regarding whether individual HREPs should be rehabilitated will be made on a case-by-case basis, in consultation with the project partners.
- Typically, rehabilitation will take precedence over new construction. However, if a major flood event results in the need for rehabilitation of numerous projects throughout the river system, the EMP Coordinating Committee will be consulted on the budgetary implications and options.
- A reasonable interpretation of existing statutory language, in combination with language in existing and proposed MOAs and PCAs, suggests that the responsibility for funding HREP rehabilitation is as follows:
  - for cost shared projects, mutually agreed upon rehabilitation will be cost shared the same as the original construction;
  - for refuge projects, mutually agreed upon rehabilitation will be 100 percent Federally

funded from EMP appropriations [Note: Although not addressed in statutory language, MOAs, or PCAs, EMP partners also agreed that if emergency flood recovery funds are available from other sources (e.g., USFWS or FEMA), those funds should be used to the fullest extent possible to rehabilitate HREPs.]; and – if existing PCAs or LCAs define rehabilitation responsibilities differently from above, those agreements will take precedence.

## Land Acquisition

The original EMP authorization did not specifically address the subject of acquiring lands and easements for habitat projects. The EMP land acquisition policy established by the Corps of Engineers in 1994 allows land acquisition from willing sellers, within certain limits, as a technique for habitat restoration and protection. However, the authority to acquire land has not been extensively used.

The 1994 EMP policy allows land acquisition as a technique for habitat restoration and protection within the following limits:

- It is primarily for fish and wildlife preservation, enhancement or restoration purposes.
- It is cost efficient compared to other habitat enhancement techniques.
- The land acquisition component has a non-Federal sponsor to acquire the land, fulfill the construction cost sharing requirements, and assume full responsibility for all project operation and maintenance activities for fish and wildlife on such land.
- The project or any portion thereof for which lands are to be acquired is cost shared.
- Similar to the Section 1135 program, cost sharing for habitat projects that include components of both land acquisition and construction would consist of a lands, easements, rights-of-way, relocation and dredged material disposal area (LERRD) credit applied to the non-Federal sponsor's portion of the cost share requirement. If the value of the LERRD contribution exceeds the non-Federal share, the Federal government would reimburse the difference to the non-Federal sponsor.
- Lands purchased for inclusion in a national wildlife refuge would be acquired under the existing programs and authorities of the U.S. Fish and Wildlife Service.
- Any land acquired must include active construction and/or operation and maintenance measures to improve the value of the fish and wildlife habitat over its value in its current condition.
- No greater than 10 percent of the total allowable program funds for HREPs would be used for land acquisition from 1995 through 2002.

The Upper Mississippi River system is a patchwork of land ownership and management responsibilities, but the major focus of the EMP has been on habitat projects located in areas where Federal and State land holdings already exist. The ability to

acquire lands and easements is an important factor in habitat restoration and protection, particularly for large-scale habitat projects in river reaches with little public land. In particular, the lack of public land below St. Louis, in the pools south of Rock Island, and in much of the Alton Pool limits the habitat improvements that can be made in these areas without land acquisition.

While neither the EMP authorizing legislation nor the Corps' 1994 acquisition policy prohibit land acquisition, it has not been widely employed in the EMP. Other factors, such as the ability and/or willingness of States to cost share, the availability of other program funding options, overall HREP funding limitations, and general lack of understanding regarding the land acquisition policy seem to explain why projects involving significant land acquisition have not been actively pursued through EMP. In the future, EMP partners anticipate making more use of floodplain acquisition and easements from willing sellers, in combination with other restoration techniques.

## HREP Planning and Prioritization

Early HREPs were identified, evaluated, and prioritized by regional interagency and interdisciplinary groups operating within each of the three Corps Districts. These groups relied on locally available data and professional expertise from a range of disciplines to ensure a sound basis for planning and prioritizing HREPs. As the EMP matured, internal program needs, as well as external demands for fiscal accountability, drove efforts to make the HREP planning process more rigorous and transparent. Moreover, lessons learned from earlier HREPs, advances in information technology, and enhanced understanding of the UMRS afforded opportunities to enhance the scientific basis of future projects.

One of the first enhancements was the Habitat Needs Assessment (HNA), the development of which was recommended in the 1997 Report to Congress and subsequently mandated in the Water Resources Development Act of 1999. The initial HNA was completed in October 2000 and will continue to be refined.

In addition to the HNA, several other planning tools have been or are being developed, including Environmental Pool Plans and evaluation criteria and procedures for HREPs. Environmental Pool Plans developed in each of the three Corps Districts identify desired future habitat conditions for each pool and for defined reaches of the Open River, without consideration of specific authorities or implementation vehicles. The HREP Planning and Sequencing Framework, which was endorsed by the EMP

partners in November 2003, sets forth the planning steps and evaluation criteria to be used to identify and sequentially implement HREPs throughout the river system. Finally, an Independent Technical Advisory Committee is being formed, which may have recommendations regarding the use of these or other new planning and science tools.

## Coordination between the LTRMP and Other Programs

The LTRMP was designed to monitor certain environmental trends within the UMRS and to provide sound scientific information to help develop and design HREPs. In particular, the LTRMP has four long-term goals: (1) understanding the UMRS ecosystem, (2) monitoring trends and effects on selected resources, (3) developing resource management alternatives, and (4) organizing and distributing scientific river information. To date, the primary focus of the program has been monitoring — specifically, the collection of data related to aquatic vegetation, fish, macroinvertebrates, and water quality. In addition, the LTRMP has compiled both current and historical data and information related to bathymetry, land use/land cover, wildlife, floodplain forests, and water levels and discharge.

The primary users of LTRMP data are the five States' river resource managers, the Fish and Wildlife Service, and the Corps of Engineers. In addition, other State and Federal agencies have expressed an interest in the program, based upon their need for the data being collected and desire to utilize the extensive network of field stations and expertise that has been assembled. The existing LTRMP could be modified to meet the needs of these other agencies and programs. While doing so may help leverage additional funding and expand the number of LTRMP participants, it could potentially redirect the program from its originally authorized purpose or dilute the program's current efforts.

There are significant UMRS data needs that the LTRMP was not designed to address because they are beyond either the geographic scope or management focus of the EMP. These include such parameters as contaminants, endangered species, a variety of wildlife, and basin scale influences. Yet, there is often an assumption that these needs are being satisfied by the LTRMP. While the LTRMP should not necessarily be reshaped to accommodate all river-related science needs, it is critical that such needs be fully identified and an integrated strategy devised to address them.





# Chapter 4

## Conclusions and Recommendations

Preparation of this Report to Congress has given EMP partners an opportunity to critically evaluate the status and progress of the EMP subsequent to the 1997 Report to Congress and the overall accomplishments of the program since its inception in 1986. During this process, all aspects of the program were critically examined. This chapter reflects the outcome of those efforts and is divided into two sections: Conclusions and Recommendations.

The Conclusions reflect key lessons learned, observations regarding program strengths and accomplishments, program adjustments that have been made to improve effectiveness, and issues that need further evaluation. Recommendations address issues that require action, ranging from changes in program authorities to management changes.

## Conclusions

### Overall Program

- **The EMP has contributed significantly to the environmental sustainability of the Upper Mississippi River System (UMRS).** Through the EMP, approximately 67,000 acres of habitat have been rehabilitated or enhanced and understanding of the river ecosystem has been significantly enhanced. The program's accomplishments have brought national attention to the UMRS, its ecological challenges, and the creative solutions being pioneered.
- **The EMP combines action and learning.** Prior to the EMP, there was little experience on how to combine a habitat restoration program in a dynamic river system with a data collection and monitoring program. Lessons learned from past projects are being used to modify and improve the design, construction, and operation of future Habitat Rehabilitation and Enhancement Projects (HREPs). This adaptive approach is key to the EMP's success.
- **The EMP is part of an integrated approach to addressing ecosystem needs on the Upper Mississippi River System.** The EMP can and does make significant contributions to ecosystem restoration and scientific understanding of the river, but it cannot, and should not, attempt to meet all river resource needs. The size and complexity of the Upper Mississippi River and its watershed, along with its diverse uses, require many agencies and programs to address river issues and needs.
- **The EMP is partnering with other programs to enhance its effectiveness and leverage resources.** HREPs, combined with upland erosion control projects or navigation channel maintenance efforts, are a powerful habitat restoration tool. Long Term Resource Monitoring Program (LTRMP) data and analyses, when combined with research and modeling done by other agencies, enhance river management and expand scientific understanding.
- **The EMP has pioneered new techniques and contributed substantially to the state-of-the-art in ecosystem restoration and monitoring of large river systems.** With an increasing emphasis on using natural river dynamics to restore habitat, the EMP has pioneered new island construction techniques and water control structures. The LTRMP has used cutting-edge geographic information system (GIS) technology, monitoring equipment, and data protocols to improve data accuracy and reduce overall costs.
- **The EMP is consistent with, and was a precursor to, several important national policies and regional approaches related to large river systems.** The Corps of Engineers' Environmental Operating Principles, the Navigation Study's environmental sustainability objectives, Environmental Pool Plans, and the U.S. Fish and Wildlife Service's Comprehensive Conservation Plans can all be complemented by the work being done under the EMP.
- **The EMP has effectively utilized Federal appropriations to meet program objectives. An assessment of future capabilities indicates that both program components have the capability to effectively utilize appropriation levels at the fully authorized program amount of \$33.3 million.** Both the HREP and LTRMP components have executed their budgets consistently near 98 percent and have demonstrated the ability to efficiently utilize additional funds. Annual funding fluctuations have been challenging, given that both the HREP and LTRMP components require reasonably stable funding to function optimally. Flexibility and a long-term perspective on priorities allow both elements to make effective use of all available resources.

## Habitat Rehabilitation and Enhancement Projects (HREPs)

- **The majority of HREPs have proven to be durable and have survived several floods.** Construction in large river environments is challenging under any conditions. HREP engineers have used traditional shoreline stabilization techniques (e.g., riprap) and have introduced more passive or sensitive techniques as well (e.g., sacrificial berms, willow plantings, etc.) to maximize sustainability and minimize maintenance.
- **The objectives of HREPs have evolved through lessons learned from past projects and new information on river habitat needs and habitat forming processes.** Original HREP objectives were narrowly focused on target species as representative of larger multiple species communities. Later planning incorporated the diverse range of plants and animals found to benefit from these efforts. It is now common to see a variety of non-game or threatened species identified as restoration targets. Habitat outcomes and project effects on critical ecosystem processes are also important factors in HREP planning.
- **The new HREP planning and sequencing process builds upon the EMP's previous strengths, while incorporating new tools and knowledge.** As such, it will help ensure that quality projects meet habitat needs at site-specific, pool, reach, and system scales. In addition to helping address internal program management needs, the new HREP Planning and Sequencing Framework reflects a continuing commitment to the public for program and fiscal accountability.
- **The Habitat Needs Assessment (HNA) data and decision-support tools are proving to be very useful planning aids.** As the first systemic assessment of UMR habitat needs, the HNA is being used in conjunction with other emerging and existing tools, including Environmental Pool Plans and comprehensive refuge plans, to help identify habitat requirements. In accordance with the program authorization, the HNA will continue to be maintained and refined.
- **Corps-owned General Plan (GP) lands managed by States or the Fish and Wildlife Service qualify for 100 percent Federal funding. Projects on other Federal lands within the floodplain may qualify for 100 percent Federal funding, but the determination will be made case-by-case.** GP lands managed by the Fish and Wildlife Service or States are considered to be lands "managed as a national wildlife refuge" under Section 906(e) of the 1986 Water Resources Development Act. However, lands owned by Federal agencies other than the Fish and Wildlife Service or the Corps of Engineers do not necessarily fall under the Section 906(e) provisions. Also of note, those other Federal land holdings are not particularly extensive.

- **To date, HREPs have not made extensive use of land acquisition.** Currently there are no legal or policy impediments to giving the local sponsor credit for the acquisition of lands or easements from willing sellers, as long as the restoration project also includes active construction or operation and maintenance measures to improve habitat. However, the authority to acquire land has not been extensively used. In the future, EMP partners anticipate making more use of floodplain acquisition and easements from willing sellers, in combination with other restoration techniques.

## Long Term Resource Monitoring Program (LTRMP)

- **The LTRMP is a multi-dimensional program, which includes monitoring, applied research, and evaluation of management alternatives.** Each of these elements is crucial because monitoring data alone are not sufficient. Data must be combined with analysis and research to yield information that is management-relevant. The LTRMP's flexibility to allocate resources among its core elements is key to its success in addressing critical science questions on the UMRS.
- **LTRMP data and analyses have contributed substantially to scientific understanding of ecological processes on the UMRS.** This increased understanding is critical to ongoing habitat protection and improvement efforts, including HREPs and channel maintenance, and will be important to future efforts, such as navigation-related mitigation and adaptive management.
- **The LTRMP's efficiency and effectiveness have been enhanced by refinements to its monitoring design and methods.** Changes made to sampling techniques, protocols, and technology between 2000 and 2003 reflect the desire not only to increase efficiency and lower cost, but also to enhance the program's ability to detect trends.
- **Many useful analyses that were not previously feasible are now possible.** Now that LTRMP has collected at least 10 years of data on water quality, fish, vegetation, and macroinvertebrates, it is possible to study trends and conduct research that was not previously feasible. For example, LTRMP long-term data have been valuable to understanding the ecological effects of unpredictable events, such as floods, and provide similar value as an early warning system for invasive species.

# Recommendations

- **The EMP should continue to serve ecosystem restoration and resource monitoring needs on the Upper Mississippi River System. In particular:**
  - **The LTRMP should continue to focus on effective and efficient monitoring, management-relevant issues, multi-scale evaluations and trend information, and developing innovative tools for data access and interpretation.**
  - **The HREP program should continue to use a combination of established and innovative restoration techniques to address vital habitat needs on the UMRS, using the full range of available tools and experience gained from existing projects.**
- **The EMP authority should be amended to specifically allow nongovernmental organizations (NGOs) to serve as non-Federal sponsors of HREPs.** Such a provision is consistent with other Corps of Engineers' ecosystem restoration authorities, would help leverage scarce resources, and would offer a potentially more efficient approach to accomplishing projects that involve land acquisition.
  - **In implementing NGO-sponsored projects, it is further recommended that (1) the general public be offered the same level of access to the project area as is afforded to any special group; (2) NGOs be held to the same requirements as other non-Federal sponsors, including requirements related to O&M responsibilities and confirmation of financing ability; (3) the approval of the local and/or State government be required; and (4) the membership of the EMP Coordinating Committee (EMP-CC) remain unchanged.**
- **Funding for the operation and maintenance (O&M) of HREPs should be coordinated in annual Federal budgets to ensure that the U.S. Fish and Wildlife Service has the resources needed to operate and maintain the growing inventory of HREPs on the refuge lands it manages.** After 16 years, the O&M costs associated with the EMP are increasing, primarily as a result of the growing number of projects that are now complete. This is problematic for the U.S. Fish and Wildlife Service, which has responsibility for O&M of the greatest number of HREPs. In FY 03, O&M costs for HREP projects on Federal refuge lands exceeded \$360,000 and are expected to grow substantially. The U.S. Fish and Wildlife Service is a key partner in the EMP program as a whole and must be able to meet its HREP obligations on refuges.
- **The U.S. Geological Survey (USGS) and the U.S. Environmental Protection Agency (USEPA) should jointly convene an interagency science planning process to identify the full range of data and information that are needed to support environmental management decisions for the Upper Mississippi River System and its watershed.** There are significant UMRS data needs that the LTRMP was not designed to fulfill because they are beyond either the geographic scope or management focus of the EMP. These include such parameters as contaminants, endangered species, a variety of wildlife, and basin scale influences. Yet, there is often an assumption that these needs are being satisfied by the LTRMP. While the LTRMP should not necessarily be reshaped to accommodate all river-related science needs, it is critical that such needs be fully identified and an integrated strategy devised to address them. A basin-wide science planning process to accomplish that goal should involve all Federal and State agencies with river management responsibilities, in addition to other scientists, academic institutions, and stakeholders in the region. Given the scope of such an assessment, it should be supported with resources outside of EMP.
- **Authority for project approval of HREPs with estimated construction costs less than \$5 million and using standard restoration practices should be delegated to the Corps of Engineers' Districts. Approval authority for projects with estimated construction costs greater than \$5 million or incorporating untested practices or policies should be delegated to the Mississippi Valley Division.** The delegation of some HREP approval authority in 1993 and 2000 has resulted in significant efficiencies. Additional delegation would further streamline project implementation and thereby reduce program costs.







# Attachment A

## Letters of Support







## United States Department of the Interior

**FISH AND WILDLIFE SERVICE**  
Bishop Henry Whipple Federal Building  
1 Federal Drive  
Fort Snelling, MN 55111-4056

IN REPLY REFER TO:

FWS/NWRS-RFO

JUL - 2 2004

Brigadier General Robert Crear, Commander  
Mississippi Valley Division, U.S. Army Corps of Engineers  
P.O. Box 80  
Vicksburg, Mississippi 39181-0080

Dear Brigadier General Crear:

From the inception of the Environmental Management Program (EMP) in 1986 to today, the U.S. Fish and Wildlife Service (USFWS) has been an active partner and advocate for EMP. We are pleased to endorse the EMP Report to Congress and state our agreement with the recommendations contained therein.

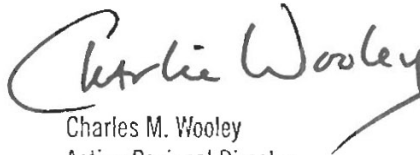
Our continued support for EMP is based on the program's long list of environmental successes and accomplishments related to project planning, design, construction, and monitoring techniques to restore and protect fish and wildlife habitat on the Upper Mississippi River System (UMRS). The habitat projects constructed under the EMP authority have produced a wide array of environmental benefits that address the needs of migratory bird species, interjurisdictional fish and threatened and endangered species. As the EMP program has matured, project planning and design has shifted towards addressing some of the larger ecosystem-wide needs of the UMRS. We have seen an increasing emphasis on using natural river dynamics to achieve habitat project goals. We applaud and whole-heartedly support this programmatic shift to an ecosystem-based approach to management.

The UMRS is an enormously complex and dynamic large river ecosystem that coexists with an equally complex system of human uses. River managers, including USFWS managers and biologists, and stakeholders up and down the UMRS recognize there is no one-size-fits-all solution to meeting the river's environmental needs. No one agency, let alone a single program, has the range of authorities needed to address such diverse needs as improving water quality, restoring floodplain connectivity, protecting and restoring habitat, reducing navigation system impacts, addressing exotic species, and protecting threatened and endangered species. The EMP is one approach for addressing the UMRS' habitat needs. It is not the sole solution for achieving long-term ecosystem sustainability, but is one of several key programs and authorities. The EMP program has successfully organized a variety of agencies and organizations on the UMRS into a partnership

focused on achieving long-term and broad-scale ecosystem restoration. This partnership has recognized the tremendous ecological restoration and maintenance needs of the UMRS and the need for broader collaboration with other stakeholders, such as the commercial navigation industry. The sense of partnership, collaboration, and mutual respect that has been the cornerstone of the EMP program is a noteworthy accomplishment and can serve as a model for future cross agency and programmatic coordination. We are particularly pleased with the working relationships that have been established between our agency and the U.S. Army Corps of Engineers.

Today, the EMP continues to build upon its legacy of environmental successes and project innovation. As the program moves forward with an adaptive management approach some of the ecological concerns of the UMRS will be more effectively addressed. As a partner in this program, we are pleased to endorse the EMP Report to Congress.

Sincerely,

A handwritten signature in dark ink that reads "Charlie Wooley". The signature is fluid and cursive, with a large initial "C" and a long, sweeping underline.

Charles M. Wooley  
Acting Regional Director

cc:

Colonel Robert L. Ball, District Engineer and Commander, St. Paul District

Colonel Wayne Gapinski, District Engineer, Rock Island District

Colonel C. Kevin Williams, District Engineer and Commander, St. Louis District

United States Department of Agriculture



Natural Resources Conservation Service  
Midwest Regional Office  
2820 Walton Commons West, Suite 123  
Madison, WI 53718-8797  
608-224-3000

To: Col. Duane P. Gapinski, District Engineer  
US Army Corps of Engineers  
Rock Island District  
Clock Tower Building  
P.O. Box 2004  
Rock Island, IL 61204

Date: July 28, 2004

Thank you for the opportunity to participate in development and review of this Report to Congress concerning the Environmental Management Program.

We certainly endorse and applaud your successes in improving the Upper Mississippi River environment conditions. We also appreciate your efforts to collect and share long-term monitoring data within the Upper Mississippi River Basin. Many of your efforts and projects compliment conservation priorities and projects of the Natural Resources Conservation Service and our partners.

This Report contains valuable information about coordinated efforts to address aquatic and wildlife habitat needs within the Upper Mississippi River Basin. Providing information about future projects will allow increased coordination of conservation efforts by members of the Upper Mississippi River Basin Association and other partners.

Again, thank you for the opportunity to be involved in the preparation of this Report. We look forward to continuing our conservation efforts with the US Army Corps of Engineers and the Upper Mississippi River Basin Association in the future.

A handwritten signature in cursive script that reads "Gary D. Wooten".

GARY D. WOOTEN  
Midwest Regional Technology Specialist







**United States Department of the Interior**  
**U.S. GEOLOGICAL SURVEY**  
**Upper Midwest Environmental Sciences Center**  
**2630 Fanta Reed Road**  
**La Crosse, Wisconsin 54603**

July 12, 2004

Colonel Duane P. Gapinski, District Commander  
US Army Engineer District, Rock Island  
Clock Tower Building  
P.O. Box 2004  
Rock Island IL, 61204-2004

Dear Colonel Gapinski:

I am writing in support of the 2004 Report to Congress on the Environmental Management Program (EMP) for the Upper Mississippi River System. As the Science Advisor for the EMP partnership, the U.S. Geological Survey (USGS) was pleased to participate in the preparation and review of this report. We believe that the report presents an accurate assessment of the EMP that will provide useful information to Congress, resource managers, and the public regarding the capabilities and effectiveness of this program.

As the report indicates, the EMP is a unique program that uses a combination of habitat restoration, long term monitoring, and data analysis to help managers optimize both the ecological and social benefits derived from the Upper Mississippi River System. This combined approach is necessary in complex large rivers systems that are greatly affected by regional factors, such as floods and land use and local factors, such as dams, pollution, and navigation. The Habitat Rehabilitation and Enhancement Projects of the EMP constitute multiple management experiments. The Long Term Resource Monitoring component provides the information needed to assess the river's response to variation in local and regional factors and to determine the combined effectiveness of rehabilitation projects. The Report to Congress provides many examples of how this information has allowed managers to learn from their management decisions and improve their management approaches. The EMP's work to date represents the beginning of what is proving to be a very effective marriage of science and management.

The EMP has developed a science-based management approach that is a model for others around the world. The USGS thinks that this approach, as described in the Report to Congress, is the most effective way to provide the science-based information needed to improve management of the Upper Mississippi River System. This approach can be transferred to other large rivers within the United States and the world. The USGS is glad to be part of the partnership implementing this cutting-edge program and fully endorses the content and recommendations of the EMP Report to Congress.

Sincerely,

Leslie Holland-Bartels, PhD  
Center Director







UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII  
901 NORTH 5TH STREET  
KANSAS CITY, KANSAS 66101

27 JUL 2004

OFFICE OF  
THE REGIONAL ADMINISTRATOR

Colonel Duane P. Gapinski, District Engineer  
United States Army Corps of Engineers  
Rock Island District  
Clock Tower Building  
P.O. Box 2004  
Rock Island, IL 61204

Dear Colonel Gapinski:

I am writing in support of the 2004 Report to Congress on the Environmental Management Program (EMP) for the Upper Mississippi River System. As a member of the EMP Coordinating Committee, the United States Environmental Protection Agency (EPA) participated in the preparation and review of the 2004 Report to Congress. Staff from EPA Regions 5 and 7 assisted Army Corps of Engineers staff in its preparation and worked closely with the United States Geological Survey (USGS) staff to ensure that issues associated with the water quality monitoring and assessment needs of the Upper Mississippi River System are integrated into this report. The Long Term Resource Monitoring component of the EMP serves as the most comprehensive source of environmental data for this complex ecosystem.

EPA works with the five state water quality management agencies within the Upper Mississippi River basin to implement the requirements of the Clean Water Act. EPA and its state partners have recognized that there is a limited amount of water quality monitoring and assessment data available for the main channel of the Upper Mississippi River. The Long Term Resource Monitoring (LTRM) component of the EMP provides water quality data which aids us in fully implementing our shared responsibilities under the Clean Water Act. The 2004 Report to Congress includes a recommendation that the USGS and EPA jointly convene an interagency science planning process to improve and strengthen the current LTRM by identifying the full range of data and information that are needed to support all environmental management decisions for the Upper Mississippi River System. EPA strongly supports this recommendation.

EPA hopes to continue to work with the state and federal members of the EMP Coordinating Committee to improve the content and approach of the EMP. The 2004 Report to Congress documents the accomplishments and improvements achieved under the EMP since 1997 and fully endorses its content and recommendations.

Sincerely,

*for - James B. Gulliford*  
James B. Gulliford  
Regional Administrator

cc: Bharat Mathur  
Acting Regional Administrator, EPA Region 5





## Illinois Department of Natural Resources

One Natural Resources Way • Springfield, Illinois 62702-1271  
<http://dnr.state.il.us>

Rod R. Blagojevich, Governor

Joel Brunsvold, Director

June 11, 2004

Col. Duane P. Gapinski, District Engineer  
US Army Corps of Engineers  
Rock Island District  
Clock Tower Building  
P.O. Box 2004  
Rock Island, IL 61204

Re: EMP - RTC

Dear Colonel Gapinski:

I would like to thank the US Army Corps of Engineers for the opportunity to participate in the development and review of the Report to Congress.

I would like to take this opportunity to formally endorse the overall contents of the Report to Congress. I especially wish to recognize the opportunity provided to partners to communicate on the Program's status and effectiveness, and the chance to collaborate on key issues and concerns with all partners.

Of key importance to Illinois is the work on refinement of LTRM Monitoring Protocols. As a long term monitoring program, it is critical to maintain appropriate full funding of the stations to maintain data integrity and usefulness.

EMP has been successful in both the LTRMP and HREP. If the EMP could ever realize full appropriation of funding, the products from both programs would be enhanced and accelerated.

Two key points I would like to emphasize at this time are:

1. Support for the separation of the EMP from the Mississippi Navigation Study, at least for this report. It is realized that as the Navigation Study is completed and approved there is the very good possibility that EMP may or will become an integral part of the Ecosystem Restoration part of the Navigation program.
2. Support for delegation to the Corps Districts for approval of HREP projects at less than \$5M. This, in addition to approval by the Mississippi Valley Division of projects greater than \$5M would result in quicker on-the-ground construction.

Again, I wish to express my support and satisfaction with the EMP-RTC Process and the Report resulting from these efforts.

Sincerely,

Brian Anderson, Director  
Office of Resource Conservation  
Department of Natural Resources

CC: Jim Mick  
Scott Stuewe  
Rick Mollahan

Printed on recycled and recyclable paper







THOMAS J. VILSACK, GOVERNOR  
SALLY J. PEDERSON, LT. GOVERNOR

## STATE OF IOWA

DEPARTMENT OF NATURAL RESOURCES  
JEFFREY R. VONK, DIRECTOR

July 23, 2004

Colonel Duane P. Gapinski  
District Commander  
U.S. Army Corps of Engineers  
Rock Island District  
P.O. Box 2004  
Clock Tower Building  
Rock Island, IL 61204-2004

Dear Colonel Gapinski:

The Iowa Department of Natural Resources would like to take this opportunity to support the Environmental Management Program and endorse the recommendations found in the 2004 Report to Congress. Iowa DNR staff and representatives to the Upper Mississippi River Basin Association especially thank the Corps for the cooperative process that allowed partners to provide input for the report.

Iowa feels very fortunate to be a vital part of EMP, one of the nation's outstanding ecosystem restoration programs. The Mississippi River and its health are critical to the state and to the country, as Congress recognized when it designated the Mississippi a nationally significant ecosystem. So far EMP has improved habitat for wildlife and fish on 67,000 acres through completed habitat projects, which also benefit local and regional residents and their economies. Scientific monitoring and analysis accomplished through this program are imperative if we are to make the best management and policy decisions.

The 2004 Report to Congress contains several key recommendations the Iowa DNR strongly supports, most notably the continuance of EMP. Iowa understands the Navigation Study most likely will affect the EMP program in the future, but until such time we support EMP in its present form. We note that the lack of full appropriation at the \$33.52 million level, and in recent years a severely reduced level of funding, has hampered the full potential of this program.

Iowa supports amending the EMP authorizing language to allow nongovernmental organizations the ability to serve as cost share partners for habitat projects.

Page 2  
July 23, 2004

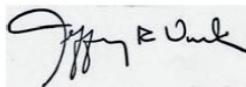
The Iowa DNR supports adequate operation and maintenance funding for the Fish and Wildlife Service to effectively manage habitat projects on refuge lands.

Iowa would benefit greatly if increased habitat project approval authority was delegated to the U.S. Army Corps of Engineers Mississippi Valley Division and its three upper river Districts.

Iowa supports USGS and EPA developing an interagency science planning process to identify the necessary data and information to make sound environmental management decisions.

The Iowa Department of Natural Resources is pleased to support the 2004 Report to Congress, and takes this opportunity to thank the Corps of Engineers for the opportunity to partner in this important program.

Sincerely,

A handwritten signature in black ink, appearing to read "Jeffrey R. Vonk", is written over a light gray rectangular background.

Jeffrey R. Vonk  
Director



## Minnesota Department of Natural Resources

### OFFICE OF THE COMMISSIONER

500 Lafayette Road  
St. Paul, Minnesota 55155-4037

June 24, 2004



Col. Duane P. Gapinski, District Engineer  
US Army Corps of Engineers  
Rock Island District  
Clock Tower Building  
P.O. Box 2004  
Rock Island, IL 61204

Dear Colonel Gapinski:

The Minnesota Department of Natural Resources wishes to express our support for the recommendations brought forth in the Environmental Management Program (EMP) 2004 Report to Congress. Extensive effort between the five states in the Upper Mississippi River Basin, the U.S. Army Corps of Engineers, the U.S. Geological Survey, and the U.S. Fish and Wildlife Service was made to develop the report. The agencies worked cooperatively through policy issues to develop recommendations that would be most beneficial to the Upper Mississippi River Environmental Management Program (EMP).

The EMP has been instrumental in improving our understanding of the Upper Mississippi River ecosystem. The Long Term Resource Monitoring Program (LTRMP) component of EMP is especially important and has provided information critical to Mississippi River natural resource management and protection.

Data from LTRMP are used to develop water quality standards; monitor long-term changes in water quality, vegetation, fish, and invertebrates; and aid in management planning. Pool plans, water level drawdowns, and habitat restoration projects have relied heavily on LTRMP information. This information is invaluable in explaining changes to our constituents when management actions are needed or proposed. A continuously funded LTRMP will provide information that will become increasingly valuable over time. Other important areas such as hydrology, floodplain connectivity, tributary impacts, and sedimentation could be addressed through the program if additional funding becomes available.

DNR INFORMATION: 651-296-6157, 1-888-646-6367 (TTY: 651-296-5484, 1-800-657-3929) FAX: 651-296-4799

AN EQUAL OPPORTUNITY EMPLOYER  
WHO VALUES DIVERSITY



PRINTED ON RECYCLED PAPER CONTAINING A  
MINIMUM OF 10% POST-CONSUMER WASTE



Colonel Gapinski  
June 22, 2004  
Page Two

EMP is an excellent partnership that is working to improve our understanding of the Upper Mississippi River and the actions needed for restoration. Full funding for this program and its components, such as the LTRMP, are critical to the Upper Mississippi River ecosystem. We look forward to continuing our work with staff from LTRMP field stations in all of the Upper Mississippi River states, scientists at UMESC, and our other state and federal agency partners.

Collaborative efforts, such as the development of the Report to Congress and implementation of the EMP will continue to improve the Mississippi River and its habitat. Thank you for the opportunity to comment on this important program.

Sincerely,



Gene Merriam  
Commissioner

c: Mark Holsten, DNR Deputy Commissioner  
Kent Lokkesmoe, DNR Director of Waters



# MISSOURI DEPARTMENT OF CONSERVATION

## Headquarters

2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180  
Telephone: 573/751-4115 ▲ Missouri Relay Center: 1-800-735-2966 (TDD)

JOHN D. HOSKINS, Director

July 19, 2004

Colonel Duane P. Gapinski, District Engineer  
U.S. Army Corps of Engineers  
Rock Island District  
P.O. Box 2004  
Clock Tower Building  
Rock Island, IL 61204

Dear Colonel Gapinski:

The Missouri Department of Conservation (Department) is pleased to endorse the Environmental Management Program's (EMP) 2004 Report to Congress and offer our support for the report's conclusions and recommendations. As Missouri's representative on the Environmental Management Program's Coordinating Committee, the Department was an active participant in the report's development and review. We appreciate the collaborative atmosphere under which the report was prepared.

The Environmental Management Program is very important to the Department. This unique program is responsible for identifying and completing on-the-ground habitat restoration projects that will enhance fish and wildlife habitat in the Upper Mississippi River System. The EMP is also responsible for ensuring that information to enhance understanding of river habitat conditions is gathered and shared.

Habitat Rehabilitation and Enhancement Projects (HREP) have restored and protected approximately 65,000 acres of river and floodplain habitat in the Upper Mississippi River System. This is only a small fraction of the restoration work needed to reverse the long decline in the river's ecosystem. Without the EMP, this enhancement and restoration of fish and wildlife habitat would not have occurred. The Department, in collaboration with Illinois Department of Natural Resources and the Rock Island and St. Louis Districts of the Army Corps of Engineers, has identified many additional restoration projects. We especially look forward to completing HREPs on the unimpounded portion of the river below St. Louis, where little effort has been expended to date because of lack of public lands. Recommendations included in the Report to Congress will enhance development and completion of future restoration projects that are necessary to continue the river system's ecological rehabilitation.

The Long Term Resource Monitoring Program (LTRMP) is one of the premier monitoring programs of its kind in the country and it is the primary driver for gathering information on the Upper Mississippi River System. This information is used by river managers and scientists to understand the river system, forecast future conditions, provide early warning of potential problems (e.g., invasive species; impacts to endangered species), identify habitat restoration sites, and evaluate aquatic biota trends. This program has been instrumental in focusing Department progress toward our own monitoring efforts statewide. For example, we have adopted its field station structure in expanding our Resource Science Division to investigate forest, grasslands, and agricultural systems.

## COMMISSION

STEPHEN C. BRADFORD  
Cape Girardeau

ANITA B. GORMAN  
Kansas City

CYNTHIA METCALFE  
St. Louis

LOWELL MOHLER  
Jefferson City



Colonel Duane P. Gapinski  
Page Two  
July 19, 2004

Over the last several years, efficiencies have been made within the LTRMP in response to decreased funding, while ensuring that the data collected is statically rigorous to detect meaningful trends. As with any long-term monitoring program, many years of data collection are necessary before we begin to realize the vast potential of the information. We are now exploring data analyses, which are enhancing our understanding of the river's biological systems. We need to ensure this program remains strong and receives the funding it needs to continue meeting its goals. We look forward to continuing the successful LTRMP with our partners.

In addition to the program components described above, the EMP has also helped foster a collaborative atmosphere whereby state and federal agencies work together on understanding, restoring and improving natural resource conditions in the Upper Mississippi River System. The organizational structure of the EMP-Coordinating Committee (EMP-CC) has proven to be very successful and has produced solid results. We recommend that the EMP-CC partners be fully involved in discussions and deliberations concerning EMP modifications that may result from implementation of Upper Mississippi River – Illinois Waterway Navigation Feasibility Study (Study) recommendations and that they participate in the development of any new oversight committee that may be formed to implement ecosystem mitigation and restoration goals identified in the Study.

The EMP is fully authorized at \$33.52 million. Funding at this level will allow the EMP to meet its full potential. Full funding will result in further addressing the backlog of habitat enhancement projects needed to stem the river system's decline and maintenance of a sound long-term resource monitoring program necessary to evaluate biological trends and provide information necessary for river managers.

In closing, the Department supports the 2004 Report to Congress and its recommendations. We appreciate the collaborative efforts of the U.S. Army Corps of Engineers, states and other partnership members in the development of the report and in the implementation of the Environmental Management Program on the Upper Mississippi River.

Sincerely,

*for John D. Hoskins, Deputy Director*  
JOHN D. HOSKINS  
DIRECTOR

- c: Holly Stoerker, Upper Mississippi River Basin Association  
Gretchen Benjamin, EMP-CC Representative, Wisconsin Dept. of Natural Resources  
Scott Stuewe, EMP-CC Representative, Illinois Dept. of Natural Resources  
Tim Schlagenhaft, EMP-CC Representative, Minnesota Dept. of Natural Resources  
Diane Ford-Shivvers, EMP-CC Representative, Iowa Dept. of Natural Resources  
Roger Perk, U.S. Army Corps of Engineers, Rock Island District  
Mike Wells, Department of Natural Resources



## State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Jim Doyle, Governor  
Scott Hassett, Secretary

101 S. Webster St.  
Box 7921  
Madison, Wisconsin 53707-7921  
Telephone 608-266-2621  
FAX 608-267-3579  
TTY 608-267-6897

July 6, 2004

Colonel Duane P. Gapinski  
District Commander  
U.S. Army Corps of Engineers - Rock Island District  
P.O. Box 2004  
Rock Island, Illinois 61204-2004

Dear Colonel Gapinski:

The Wisconsin Department of Natural Resources is pleased to endorse the Environmental Management Program's (EMP) 2004 Report to Congress and to offer our states' support for the report's recommendations. As active partners in the report's development, we are confident that it represents a comprehensive evaluation of the EMP and a sound vision for its future.

The EMP provides an important opportunity for the state and federal partners to work as a collaborative team to develop the best habitat restoration and long term monitoring program on the Upper Mississippi River. Throughout the Upper Mississippi River over 40 habitat projects have been built to date restoring over 65,000 acres. In the border waters of Wisconsin, over \$34 million has been spent on 17 projects to improve water quality and habitat for fish and wildlife. These improvements also create direct benefits for the citizens of Wisconsin through recreational opportunities and the boost to the local tourism economy.

One example of dramatic change in Wisconsin, is the restoration work done near Stoddard Wisconsin, in an area known as Pool 8 Islands – Phase II. The habitat flourished in response to several restoration techniques that were implemented, the fish and waterfowl returned and so did the anglers, in huge numbers. In addition, the design of this project was so advanced that it was honored by two awards, Minnesota's Society of Professional Engineers "Seven Wonders of Engineering" and the 2004 Chief of Engineers Environmental Award of Excellence. Wisconsin citizens have witnessed the value of this program in our own backyard.

This program also provides dollars for scientists to conduct long term research on water quality, fish and plants of the river. River managers use this information to determine the long-term health of the river and decide best how to restore degraded river habitat. Where there was once little river-wide data on the Upper Mississippi River there is now over 2 million bits of information safely housed in the computer system but it is vital to continue gathering this information because we are just starting to detect river trends.

EMP has been able to make great strides during its 15-year existence but it has never been fully funded at the \$33 million per year. Currently, this program has numerous backlogged habitat projects that are ready for construction as soon as the dollars become available. Likewise, the long-term resources monitoring program has been cut drastically over the past few years due to inadequate funding. Valuable data about weather extremes were lost and can never be retrieved. North American's largest river ecosystem certainly deserves to be funded to the level that congress authorized the program.



Colonel DuWayne Gapinski, July 6, 2004


In specific to this report, Wisconsin endorses the conclusions and recommendations contained in the 2004 Report to Congress. In particular, the recommendations include the following key actions:

- Continue the EMP, with its extraordinarily effective habitat restoration and resource monitoring programs
- Amend the EMP authorizing language to permit non-governmental organizations to serve as cost-share partners for habitat projects
- Coordinate budgeting efforts to ensure that the Fish and Wildlife Service has adequate resources to operate and maintain the growing inventory of habitat projects on refuge lands
- Encourage the U.S. Geological Survey and the U.S. Environmental Protection Agency to convene an interagency science planning group and process to identify the full range of data and information needed to help make environmental management decisions
- Increase the habitat project approval authority delegated to the Corps' Mississippi Valley Division and its three upper river Districts

The EMP is an exemplary program. Full funding at the authorized level of \$33.52 million and implementation of the recommendations outlined above will permit the EMP to realize its full potential and contribute to balanced management of one of the nation's truly great river systems.

Wisconsin supports the 2004 Report to Congress and its recommendations. We are appreciative of the partners involved in the program and the strong commitment to the natural resources of the Upper Mississippi River from those partners.

Sincerely,



Scott Hassett  
Secretary

CC: Holly Stoerker, UMRBA, 415 Hamm Building, 408 St. Peters St, St. Paul, MN, 55102  
Tim Schlagenhaft, MNDNR, 2300 Silver Creek Rd, Rochester, MN, 55906  
Todd Ambs, WDNR, PO Box 7921, Madison, WI 53707-7921  
Scott Humrickhouse, WDNR, 1300 West Clairemont Ave., Eau Claire, WI 54702-4001  
Janet Sternberg, MO DOC, PO Box 180, Jefferson City, MO 65102  
Scott Stuewe, IL DNR, One Natural Resources Way Springfield, IL 62702  
Diane Ford-Shivers, IA DNR, Henry Wallace Office Building, Des Moines, IA 50319  
Roger Perk, USACE – RID, PO Box 2004, Rock Island, IL, 61204-2004

# Mississippi River Citizen Commission

678 Nixon Street  
Winona, Minnesota 55987  
507-454-3111

<http://mrcrcitizen.com>

*Consultants: William G. & Anne G. Galt, Inc. (wggalt.com); Mark Schmitt, Inc. (mshmitt.com); and David A. Galt, Inc.*

July 14, 2004

Marvin E Hubbell  
I/TRMP Manager, PM-M  
Clock Tower Building  
PO Box 2004  
Rock Island IL 61204-2004

Dear Mr. Hubbell

The Mississippi River Citizen Commission has reviewed the Draft 2004 EMP Report to Congress. The report is well done and is a clear statement regarding the progress, success and potential of EMP to secure a bright future for the Mississippi River. We are ardent supporters of EMP as a science-based partnership that has deep and strong public support. The President's budget request for 2005 is the level of funding that EMP requires to carry out the mandated public purpose of the program.

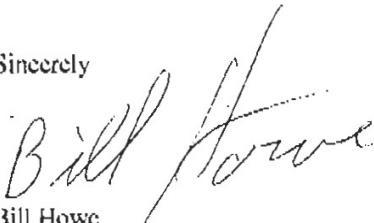
We strongly encourage that the report include more discussion of the downside of inadequate funding: the curtailment of HREP projects, the pending loss of science expertise, the reduction in data collection and analysis, the real impact of data gaps on the analysis of status and trends, the lessening of return on past investment in EMP, the growing concern of citizens and the river community on the unfulfilled Congressional commitment to a balanced federal river management program.

The last 15 years have seen a more targeted and effective water quality/watershed management approach being implemented by local, state and federal agencies for public benefit. There are still the challenges of dealing with emerging problems such as invasive species and new sources of water quality degradation.

The EMP partners implementation of public involvement is a basic strength of EMP and is greatly appreciated and supported. Continued public interest and commitment is clear evidence of the social, economic and environmental importance of the River. The existence of EMP and its tie to the public has had a significant impact on the level of public and agency understanding of river issues and great progress has been evident in public discussion of issues. We would even say that the democratic process has been furthered because the public and decision makers both have much better and more accessible information with which to make decisions.

Thank you for the opportunity to comment.

Sincerely

  
Bill Howe





July 8, 2004

Colonel Duane P. Gapinski, District Engineer  
U.S. Army Corps of Engineers  
Rock Island District  
Clock Tower Building, P.O. Box 2004  
Rock Island, Illinois 61204-2004

Dear Colonel Gapinski:

The Nature Conservancy is pleased to provide this letter of support for the recommendations contained in the U.S. Army Corps of Engineers' Report to Congress on the Upper Mississippi River Environmental Management Program (EMP). As you know, the Upper Mississippi and Illinois Rivers are critical segments of one of the world's major river ecosystems. The rivers are home to a diversity of native species of fish, mussels, amphibians, and birds and support a rich landscape including floodplain and upland forest, marsh, wet and upland meadow, and prairie. The EMP has played a vital role for helping to restoring and monitoring the health of these diverse rivers, and implementation of the recommendation contained in the report would make it stronger and more effective.

The Conservancy is a global organization dedicated to preserving the plants, animals, and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive. The Conservancy has about one million individual members and over 1900 corporate sponsors worldwide. To date, the Conservancy has protected more than 15 million acres in the United States and an additional 102 million acres internationally through our work with local partners around the globe. Our conservation work is grounded in strong science, strong partnerships with local landowners and stakeholders, and tangible results on the ground.

Recently, the Conservancy identified the Upper Mississippi and Illinois rivers, along with the freshwater ecosystems in the basin, as a globally important large-floodplain river system and is committing substantial resources to its protection and restoration. The Conservancy views the EMP as complimentary to our efforts. In particular, the implementation of the Corps' recommendation to amend EMP authority to allow non-governmental organizations (NGO), such as the Conservancy, to serve as nonfederal cost-share partners would create an important opportunity. It would allow the Conservancy, Corps, and other NGOs to undertake habitat restoration projects together, expanding the resources and expertise available to each of us for restoring and protecting the health of the Upper Mississippi and Illinois rivers.

The Conservancy is also excited to see the Corps affirming in the report that EMP funds can be used for land acquisition and that the Corps and its partners will more actively pursue these kinds of habitat projects in the future. The Conservancy sees these kinds of projects are excellent cost-sharing opportunities with the Corps.

Finally, the Conservancy would like to thank the Corps and its partners under the EMP for their hard work on managing and implementing the EMP. It has been a very successful program. The Conservancy looks forward the implementation of the Corps' recommendations and the opportunities for collaboration that will create.

Respectfully,



Michael A. Reuter  
Chief Conservation Officer





Upper  
Mississippi River  
Basin Association

ILLINOIS, IOWA, MINNESOTA, MISSOURI, WISCONSIN

July 6, 2004

Colonel Duane P. Gapinski  
District Commander  
U.S. Army Corps of Engineers  
Rock Island District  
P.O. Box 2004  
Clock Tower Building  
Rock Island, Illinois 61204-2004

Dear Colonel Gapinski:

The Upper Mississippi River Basin Association (UMRBA) is pleased to endorse the Environmental Management Program's 2004 Report to Congress and to offer the States' enthusiastic support for the report's recommendations. As active partners in the report's development, we are confident that it represents a comprehensive evaluation of the EMP and a sound vision for its future.

The States are especially satisfied with the collaborative effort that went into assessing the program and developing the Report to Congress. That process provided the entire EMP partnership with a valuable opportunity to reflect on the program's current status, its accomplishments and effectiveness, and its future direction. As a result, the EMP partners and stakeholders were able to resolve a variety of long-standing implementation issues, and identify key recommendations for Congressional action.

Since its inception, the EMP has clearly established itself as vital to balanced management of the Upper Mississippi River System. The promise of the program's early years has been more than realized, with significant returns on investment including habitat improvements and increased scientific understanding. Of particular note are several important accomplishments since the EMP's 1999 reauthorization. Among these, the program partners have completed the first systemic Habitat Needs Assessment and developed a new Planning and Sequencing Framework for habitat projects, designed to build on established and successful planning processes, while ensuring greater transparency and consideration of habitat needs at multiple spatial scales. Refinements to the Long Term Resource Monitoring Program's monitoring protocols have improved efficiency in the face of declining real dollars available to the program. New data access and analysis tools are allowing resource managers, scientists, and the public to gain important insights from the LTRMP's growing data records.

415 Hamm Building  
408 St. Peter Street  
St. Paul, Minnesota 55102  
Phone: 651-224-2880  
Fax: 651-223-5815  
[www.umrba.org](http://www.umrba.org)



The States are confident that the EMP stands poised to continue its invaluable contributions to the Upper Mississippi River System. However, we are also aware that the 2004 Report to Congress comes at a time of considerable uncertainty, with the outcome of the Corps of Engineers' ongoing Navigation Feasibility Study and subsequent Congressional action as yet unknown. While the results of the Navigation Study may well have implications for the EMP's future, the UMRBA believes the interrelationship of these programs is best addressed in the broader context of the Navigation Study. Thus, the UMRBA supports the EMP partnership's original decision to confine this 2004 Report to Congress to evaluating and making recommendations concerning the EMP in its present form. This comes with the expectation that the States and other EMP partners will be fully involved in subsequent deliberations concerning EMP modifications related to implementation of Navigation Study recommendations.

It is with this understanding that the UMRBA fully embraces the conclusions and recommendations contained in the 2004 Report to Congress. In particular, the recommendations include the following key actions:

- Continue the EMP, with its effective habitat restoration and resource monitoring programs
- Amend the EMP authorizing language to permit nongovernmental organizations to serve as cost share partners for habitat projects
- Coordinate budgeting efforts to ensure that the Fish and Wildlife Service has adequate resources to operate and maintain the growing inventory of habitat projects on refuge lands
- Encourage the U.S. Geological Survey and the U.S. Environmental Protection Agency to convene an interagency science planning process to identify the full range of data and information needed to make environmental management decisions
- Increase the habitat project approval authority delegated to the Corps' Mississippi Valley Division and its three upper river Districts

The EMP is an exemplary program. However, full funding at the authorized level of \$33.52 million and implementation of the recommendations outlined above are needed for the EMP to realize its full potential and contribute to balanced management of one of the nation's truly great river systems.

In closing, I would like to reiterate the UMRBA's support for the 2004 Report to Congress and its recommendations. The States sincerely appreciate the Corps of Engineers' commitment to collaboration, not only in development of this report, but more broadly in implementation of the EMP.

Sincerely,



Gary R. Clark  
Chairman

# Attachment B

## Upper Mississippi River System Environmental Management Program Authorization

Section 1103 of the Water Resources Development Act of 1986 (P.L. 99-662) as amended by:

Section 405 of the Water Resources Development Act of 1990 (P.L. 101-640),

Section 107 of the Water Resources Development Act of 1992 (P.L. 102-580),

Section 509 of the Water Resources Development Act of 1999 (P.L. 106-53), and

Section 2 of the Water Resources Development Technical Corrections of 1999 (P.L. 106-109).

### SEC. 1103. UPPER MISSISSIPPI RIVER PLAN.

- (a) (1) This section may be cited as the “Upper Mississippi River Management Act of 1986”.
- (2) To ensure the coordinated development and enhancement of the Upper Mississippi River system, it is hereby declared to be the intent of Congress to recognize that system as a nationally significant ecosystem and a nationally significant commercial navigation system. Congress further recognizes that the system provides a diversity of opportunities and experiences. The system shall be administered and regulated in recognition of its several purposes.
- (b) For purposes of this section --
  - (1) the terms “Upper Mississippi River system” and “system” mean those river reaches having commercial navigation channels on the Mississippi River main stem north of Cairo, Illinois; the Minnesota River, Minnesota; Black River, Wisconsin; Saint Croix River, Minnesota and Wisconsin; Illinois River and Waterway, Illinois; and Kaskaskia River, Illinois;
  - (2) the term “Master Plan” means the comprehensive master plan for the management of the Upper Mississippi River system, dated January 1, 1982, prepared by the Upper Mississippi River Basin Commission and submitted to Congress pursuant to Public Law 95-502;
  - (3) the term “GREAT I, GREAT II, and GRRM studies” means the studies entitled “GREAT Environmental Action Team--GREAT I--A Study of the Upper Mississippi River”, dated September 1980, “GREAT River Environmental Action Team--GREAT II--A Study of the Upper Mississippi River”, dated December 1980, and “GREAT River Resource Management Study”, dated September 1982; and
  - (4) the term “Upper Mississippi River Basin Association” means an association of the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, formed for the purposes of cooperative effort and united assistance in the comprehensive planning for the use, protection, growth, and development of the Upper Mississippi River System.
- (c) (1) Congress hereby approves the Master Plan as a guide for future water policy on the Upper Mississippi River system. Such approval shall not constitute authorization of any recommendation contained in the Master Plan.
- (2) Section 101 of Public Law 95-502 is amended by striking out the last two sentences of subsection (b), striking out subsection (i), striking out the final sentence of subsection (j), and redesignating subsection “(j)” as subsection “(i)”.
- (d) (1) The consent of the Congress is hereby given to the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, or any two or more of such States, to enter into negotiations for agreements, not in conflict with any law of the United States, for cooperative effort and mutual assistance in the comprehensive planning for the use, protection, growth, and development of the Upper Mississippi River system, and to establish such agencies, joint or otherwise, or designate an existing multi-State entity, as they may deem desirable for making effective such agreements. To the extent required by Article I, section 10 of the Constitution, such agreements shall become final only after ratification by an Act of Congress.
- (2) The Secretary is authorized to enter into cooperative agreements with the Upper Mississippi River Basin Association or any other agency established under paragraph (1) of this subsection to promote and facilitate active State government participation in the river system management, development, and protection.
- (3) For the purpose of ensuring the coordinated planning and implementation of programs authorized in subsections (e) and (h)(2) of this section, the Secretary shall enter into an interagency agreement with the Secretary of the Interior to provide for the direct participation of, and transfer of funds to, the Fish and Wildlife Service and any other agency or bureau of the Department of the Interior for the planning, design, implementation, and evaluation of such programs.
- (4) The Upper Mississippi River Basin Association or any other agency established under paragraph (1) of this subsection is hereby designated by Congress as the caretaker of the master plan. Any changes to the master plan recommended by the Secretary shall be submitted to such association or agency for review. Such association or agency may make such comments with respect to such recommendations and offer other recommended changes to the master plan as such association or agency deems appropriate and shall transmit such comments and other recommended changes to the Secretary. The Secretary shall transmit such recommendations along with the comments and other recommended changes of such association or agency to the Congress for approval within 90 days of the receipt of such comments or recommended changes.
- (e) Program Authority
  - (1) Authority
    - (A) In general. The Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, may undertake, as identified in the master plan.
      - (i) a program for the planning, construction, and evaluation of measures for fish and wildlife habitat rehabilitation and enhancement; and
      - (ii) implementation of a long-term resource monitoring, computerized data inventory and analysis, and applied research program.
    - (B) Advisory committee. In carrying out subparagraph (A)(i), the Secretary shall establish an independent technical advisory committee to review projects, monitoring plans, and habitat and natural resource needs assessments.
  - (2) REPORTS. — Not later than December 31, 2004, and not later than December 31 of every sixth year thereafter, the Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, shall submit to Congress a report that —
    - (A) contains an evaluation of the programs described in paragraph (1);
    - (B) describes the accomplishments of each of the programs;
    - (C) provides updates of a systemic habitat needs assessment; and
    - (D) identifies any needed adjustments in the authorization of the programs.

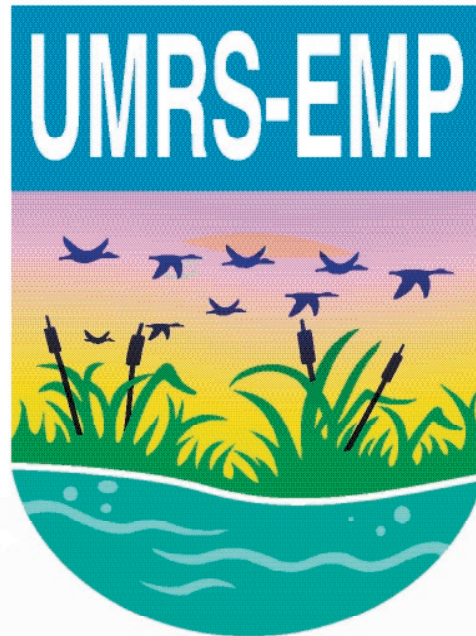
- (3) For purposes of carrying out paragraph (1)(A)(i) of this subsection, there is authorized to be appropriated to the Secretary \$22,750,000 for fiscal year 1999 and each fiscal year thereafter.
- (4) For purposes of carrying out paragraph (1)(A)(ii) of this subsection, there is authorized to be appropriated to the Secretary \$10,420,000 for fiscal year 1999 and each fiscal year thereafter.
- (5) Authorization of appropriations.—There is authorized to be appropriated to carry out paragraph (1)(B) \$350,000 for each of fiscal years 1999 through 2009.
- (6) Transfer of amounts.—For fiscal year 1999 and each fiscal year thereafter, the Secretary, in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, may transfer not to exceed 20 percent of the amounts appropriated to carry out clause (i) or (ii) of paragraph (1)(A) to the amounts appropriated to carry out the other of those clauses.
- (7) (A) Notwithstanding the provisions of subsection (a)(2) of this section, the costs of each project carried out pursuant to paragraph (1)(A)(i) of this subsection shall be allocated between the Secretary and the appropriate non-Federal sponsor in accordance with the provisions of section 906(e) of this Act; except that the costs of operation and maintenance of projects located on Federal lands or lands owned or operated by a State or local government shall be borne by the Federal, State, or local agency that is responsible for management activities for fish and wildlife on such lands and, in the case of any project requiring non-Federal cost sharing, the non-Federal share of the cost of the project shall be 35 percent.  
(B) Notwithstanding the provisions of subsection (a)(2) of this section, the cost of implementing the activities authorized by paragraph (1)(A)(ii) of this subsection shall be allocated in accordance with the provisions of section 906 of this Act, as if such activity was required to mitigate losses to fish and wildlife.
- (8) None of the funds appropriated pursuant to any authorization contained in this subsection shall be considered to be chargeable to navigation.
- (f) (1) The Secretary, in consultation with any agency established under subsection (d)(1) of this section, is authorized to implement a program of recreational projects for the system substantially in accordance with the recommendations of the GREAT I, GREAT II, and GRRM studies and the master plan reports. In addition, the Secretary, in consultation with any such agency, shall, at Federal expense, conduct an assessment of the economic benefits generated by recreational activities in the system. The cost of each such project shall be allocated between the Secretary and the appropriate non-Federal sponsor in accordance with title I of this Act.  
(2) For purposes of carrying out the program of recreational projects authorized in paragraph (1) of this subsection, there is authorized to be appropriated to the Secretary not to exceed \$500,000 per fiscal year for each of the first 15 fiscal years beginning after the effective date of this section.
- (g) The Secretary shall, in his budget request, identify those measures developed by the Secretary, in consultation with the Secretary of Transportation and any agency established under subsection (d)(1) of this section, to be undertaken to increase the capacity of specific locks throughout the system by employing nonstructural measures and making minor structural improvements.
- (h) (1) The Secretary, in consultation with any agency established under subsection (d)(1) of this section, shall monitor traffic movements on the system for the purpose of verifying lock capacity, updating traffic projections, and refining the economic evaluation so as to verify the need for future capacity expansion of the system.  
(2) Determination.  
(A) In general. The Secretary in consultation with the Secretary of the Interior and the States of Illinois, Iowa, Minnesota, Missouri, and Wisconsin, shall determine the need for river rehabilitation and environmental enhancement and protection based on the condition of the environment, project developments, and projected environmental impacts from implementing any proposals resulting from recommendations made under subsection (g) and paragraph (1) of this subsection.  
(B) Requirements. The Secretary shall (i) complete the ongoing habitat needs assessment conducted under this paragraph not later than September 30, 2000; and (ii) include in each report under subsection (e)(2) the most recent habitat needs assessment conducted under this paragraph.
- (3) There is authorized to be appropriated to the Secretary such sums as may be necessary to carry out this subsection.
- (i) (1) The Secretary shall, as he determines feasible, dispose of dredged material from the system pursuant to the recommendations of the GREAT I, GREAT II, and GRRM studies.  
(2) The Secretary shall establish and request appropriate Federal funding for a program to facilitate productive uses of dredged material. The Secretary shall work with the States which have, within their boundaries, any part of the system to identify potential users of dredged material.
- (j) The Secretary is authorized to provide for the engineering, design, and construction of a second lock at locks and dam 26, Mississippi River, Alton, Illinois and Missouri, at a total cost of \$220,000,000, with a first Federal cost of \$220,000,000. Such second lock shall be constructed at or in the vicinity of the location of the replacement lock authorized by section 102 of Public Law 95-502. Section 102 of this Act shall apply to the project authorized by this subsection.







**US Army Corps  
of Engineers®**



**U.S. Army Corps of Engineers  
Environmental Management Program  
Regional Program Manager  
P.O. Box 2004  
Clock Tower Bldg.  
Rock Island, Illinois 61204-2004**