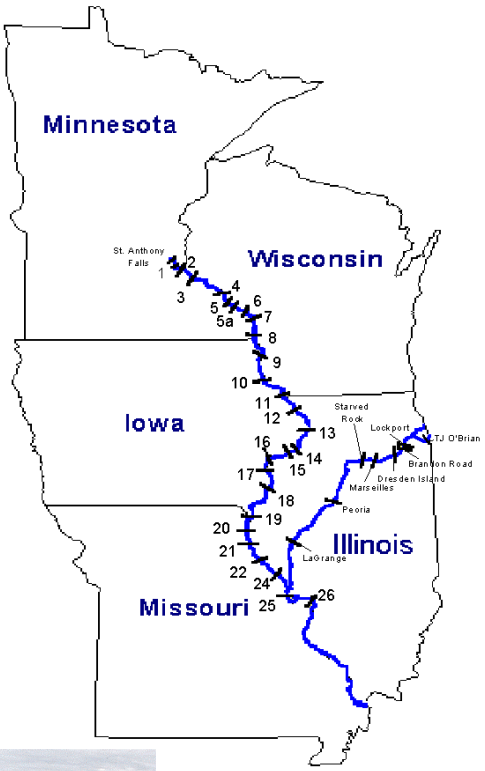
A Preliminary Description of Habitat Objectives (And Estimated Costs) Needed to Achieve a Desired Level of Ecosystem Integrity on the Upper Mississippi River System



Upper Mississippi River Conservation Committee

Rock Island, Illinois

June 2002

Preliminary Report

A Preliminary Description of Measures (and estimated costs) needed to achieve a desired level of ecosystem integrity on the Upper Mississippi River system

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I. A New Direction For Navigation and Ecosystem Management on the Upper Mississippi River System

Since it was organized in 1943, the Upper Mississippi River Conservation Committee (UMRCC) has been an advocate for the conservation of Upper Mississippi River (UMR) natural resources. Most, if not all of these natural resources have been strongly impacted by the management actions of the Upper Mississippi River Nine-foot Channel Navigation System[1]. Although alteration of the river began in the early 1800s, Congress first directed the Corps of Engineers to begin dredging, clearing, and snagging on the UMR in 1866. Over time, additional navigation projects further compromised the integrity of the River's natural resources. Not until the passage of the National Environmental Policy Act in 1969 were the negative effects of navigation first documented. The Water Resource Development Act of 1986, which authorized the Environmental Management Program (EMP) was arguably the first river-wide program authorized to restore its degraded habitats. WRDA '86 was also Congress' first declaration that the UMRS was "...a nationally significant ecosystem and nationally significant transportation system" which implied that it should be managed as such. Unfortunately, management of UMRS natural resources lags 100+ years behind that of commercial navigation. To achieve equality of purpose between navigation and natural resource management will require significant revision of existing policies and authorities in addition to costly management measures on both public and private lands. This document will describe the key elements of a system-wide management and habitat restoration strategy intended to achieve a desirable state of natural resources on the UMRS.

Although the preparation of this document was spurred by the Corps of Engineers Upper Mississippi River Systemic Navigation Study, some of these actions fall outside the purview of navigation responsibility. The purpose of this report is to present a preliminary list of actions that Upper Mississippi River managers and biologists believe are needed to assure the long-term integrity of UMR fish and wildlife. This list is incomplete. For example, UMRS watershed measures needed to achieve main stem water quality objectives are not presented here. The UMRCC has stated previously that it does not oppose economically justified navigation improvements. Neither does it espouse any judgement regarding the economic justification of UMR navigation improvements (i.e. 1,200 ft. long locks). The UMRCC objective is to achieve a state of UMR river management that recognizes the equality of purpose between commercial navigation and natural resources that ensure the long-term integrity of the UMRS ecosystem. UMRCC biologists documented that the fish and wildlife resources of the UMR are in decline (USGS 1999, UMRCC 2000, USFWS 2002). Some of this decline is attributable to causes other than navigation, but a significant share of the responsibility lies with the operation and

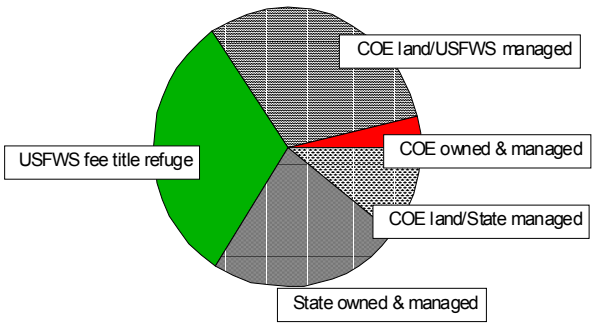
[1]The Upper Mississippi River System (UMRS) includes the Illinois Waterway, the Mississippi River from Twin Cities to the mouth of the Ohio River at Cairo, Illinois, and its navigable tributaries

maintenance (O&M) of the UMRS navigation system.

River biologists have repeatedly been asked to provide a list of actions needed to restore UMR natural resources to a desired state. Biologists have been reluctant to do so, out of concern that limited understanding of the river's complex ecology would result in an incomplete restoration plan. Such a reluctance is understandable when one recognizes that system-wide monitoring/research of UMR natural resources has only been in place since 1986. However, over the last 16 years, our knowledge about the UMR's ecosystem (and experience restoring its components) have enabled managers to begin compiling a list of measures and information needs to better quantify what must be done to reverse continued habitat loss.

This report presents estimated annual costs for management actions that must be implemented in order to maintain and restore UMRS natural resources. It would be tempting to sum the total annual costs of the management actions presented here and arrive at a lump sum annual cost to restore the UMRS ecosystem. Such a calculation would be short-sighted since management actions will change according to the river's future condition. Any summation of actions presented here should not be construed to represent an ecosystem restoration plan for the UMRS. Although it does highlight certain critical actions which must be part of any such plan, such an "ecosystem plan" is yet to be developed. The UMRCC anticipates that such a plan will be completed as part of future revisions/addendums to the recently completed Habitat Needs Assessment (HNA) (USACE 2000a) report and Environmental Pool Planning efforts. Given this caveat, it will be evident that any significant effort to reverse the long term decline in the river's fish and wildlife habitats will require: (1) a significantly higher financial investment than now exists, (2) implementation of a variety of habitat restoration measures and (3) significant changes in federal authorities, policies, and management frameworks. Rather than implement "mitigation plans" of long-term questionable value, water resource planners, engineers, biologists and managers now espouse a more holistic approach (i.e. adaptive management) based on science, monitoring, experience, and social expectations. Such an approach will require a long-term dedication (funding) to natural resource restoration/management for as long as there is an authorized commercial navigation project, even if there are no additional navigation improvements on the UMR.

Figure 1 - Management Responsibilities for Public Lands on the UMRS



II . A Nationally Significant Resource in Decline

According to the HNA (Theiling et al 2000), the UMRS floodplain consists of 2,643,376 acres of public and private land. Approximately 44% (1,166,691 acres) is agricultural and another 32.5% of the floodplain acreage is comprised of open water and forest habitats (405,922 acres forest and 452,587 acres open water). The remaining percentage are other habitat types and developed lands. The Nine-foot Channel Navigation Project extends 854 river miles from the Mouth of the Ohio River to St. Anthony Falls in Minneapolis, Minnesota and 327 river miles on the Illinois Waterway Project between Chicago, Ill and Grafton, Illinois.

A 1995 study (Carlson et al 1995) conducted by the St. Paul District, through the Environmental Management Program, estimated that these resources conservatively provided $1.2 billion per year in recreational benefits. The Upper Mississippi River National Wildlife Refuge is just over 250,000 acres and has 3.5 million visitors per year. In comparison, Everglades National Park is approximately 1.4 million acres in size and has slightly more than 1 million visitors annually. The majority of the approximately 425,000 acres of UMRS public lands along the floodplain are managed by the Corps of Engineers, the US Fish and Wildlife National Wildlife Refuges (NWR), and the five UMRS state natural resource agencies (Figure 1).

In 1993 the UMRCC published a document entitled "Facing The Threat: An Ecosystem Management Strategy for the Upper Mississippi River" which called attention to UMR biologists' findings that fish and wildlife resources of the Upper Mississippi River are declining. The report advised that unless significant restorative actions are taken soon, the river ecosystem will decline to a state from which it could not recover. In January 2000, the UMRCC published another report entitled "A River That Works and a Working River". This report prepared in cooperation with the National Audubon Society documents the ongoing decline in the condition of the UMR ecosystem. The UMRCC report notes five major changes/modifications that have caused the most detrimental changes. These include: (1) loss of floodplain connectivity due to extensive levee construction, (2) impounding the river from construction of the locks and dams, (3) river channelization activities related to navigation, (4) degraded water quality in UMR tributary streams, and (5) invasion of exotic species through man-made navigation projects.

A variety of essential terrestrial and aquatic habitats are declining along the entire UMRS. A 1999 report (prepared in collaboration with the Corps of Engineers, State Natural Resource Agencies, US Fish and Wildlife Service, and US Geological Survey) (USGS 1999) documented changes such as the loss of bottomland forests and side-channel habitats.

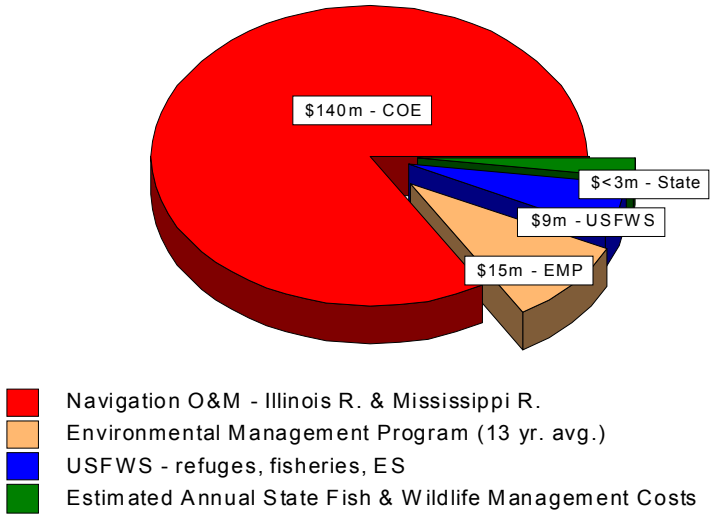
In the upper navigation pools, bottomland forests are the most common habitat type second only to open water. The alarming deterioration of these forests is documented in a UMRCC report now in preparation entitled "Upper Mississippi and Illinois River Floodplain Forests." According to the HNA (Theiling et al 2000), there are approximately 400,000 acres of bottomland hardwood forest along the Upper Mississippi and Illinois Rivers established shortly after the river was impounded. Impoundment and ongoing water regulation has severely

suppressed forest regeneration. Without a system-wide forest management program, the UMRS landscape will likely experience a serious decline in recreational and habitat quality.

Along the unimpounded "Middle Mississippi River (MMR)" from St. Louis south there has been a dramatic loss of aquatic habitats due to levee construction and navigation related channelization. Degenhart (1973) estimated that 50% of the aquatic area once present had been converted to agricultural fields. In 1797 it is estimated that there were 55 side channels in the MMR. Today there are only 25 remaining (USACE 2000b) and these are predicted to disappear in the next 100 years (Simons, et al 1974). There are other less noticeable changes, such as river water levels, that have far reaching habitat effects. Wlosinski (1999) found that water surface elevations in the MMR from the 1880s to present had decreased significantly for the same discharge (i.e. altered natural hydrograph).

The USGS "Status and Trends Report" advocated that restorative action was necessary if the ecological integrity of the UMR was to be preserved. Among UMR biologists and managers there is no longer a debate about whether or not the UMR ecosystem is in decline. The debate is about how much more degradation it can withstand until its ecological integrity collapses like the Illinois River did in the 1940s. There are several reasons for continued natural resources decline. These include insufficient habitat improvement funding, policy and authority obstacles, and a complex management framework that inhibits progress toward habitat goals. The discrepancy of funding between navigation and natural resources management is enormous (Figure 2). The figure does not include the approximately $1 billion lock and dam rehabilitation program which is rehabilitating the 39 navigation project lock and dam structures on the Upper Mississippi and Illinois Rivers. Nor does it include the recent replacement of lock and dam 26 (Melvin Price L/D) which is another approximately $1 billion. The combined annual navigation maintenance budget for the three UMR Corps Districts is approximately $140 million. Of that amount, less than $2 million is allocated for natural resource management.

Figure 2 - Approximate Annual Costs for UMRS Natural Resources & Navigation



After 70+ years of improvements, maintaining the Nine-foot Channel Navigation Project has

largely assumed a maintenance posture. However, this is not the case with respect to natural resource management. Numerous reports document the continued loss of habitat on the UMRS. This habitat loss has been frequently mentioned as a concern by the public (USACE 2000a). Reaching a desired UMRS habitat condition, which would then require only "habitat maintenance," will require a significant financial investment such as commercial navigation received over its history. By all accounts, UMRS natural resource quality will continue to decline at current funding levels. The Environmental Management Program (EMP), has demonstrated its capability to restore and enhance habitats, but lacks the scope (even if funded at its current $33.3 million annual authorization) to reverse the systemic decline in natural resources by itself.

III. Ecosystem Sustainability - What is Needed to achieve a sustainable ecosystem?

In July 1994, an international conference on Large Floodplain Rivers was held in La Crosse, Wisconsin. World experts on such large floodplain rivers such as Brazil's Amazon, gathered to share their expertise. Several of these experts were asked to "synthesize the guiding principles of floodplain river ecology required to establish a scientific basis for addressing river management issues". These experts identified five key principles of river management:

$ "River form and condition is a function of the totality of many actions and processes that occur in the basin, stream network, and floodplain" - This principle speaks to the fact that in preserving the ecological integrity of a river, we must also take action in the watershed and floodplain as well.

$ "The degree of connectivity between the main channel and its floodplain is a primary structural attribute of river ecological integrity" - Achieving a healthy river ecosystem is impossible unless a functional floodplain exists.

$ "The annual flood pulse, channel-forming floods, and infrequent droughts are major driving factors in floodplain river ecosystems" - Restoring/simulating drought and flood conditions is absolutely essential to maintaining productive and diverse habitats that serve many purposes.

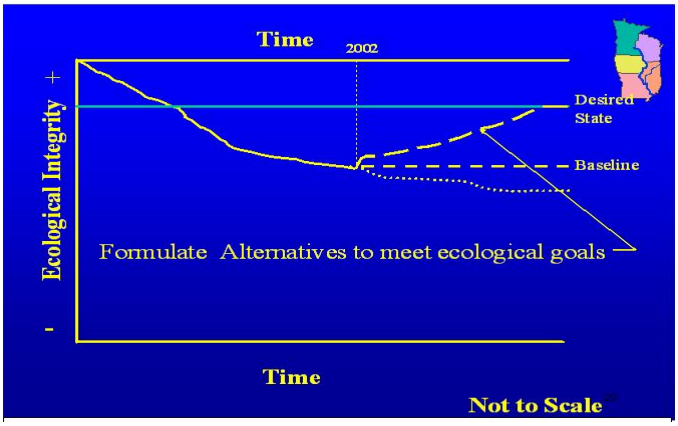
$ "Rivers and their fauna are very resilient and measures to improve or rehabilitate them, if taken before critical levels are reached, can produce rapid positive responses within the system" - Although UMRS natural resources are declining, actions to restore/enhance and maintain them can be effective.

$ "Ecosystem reaction to stress is often expressed catastrophically through critical breakpoints that only can be determined retroactively" - That a breakdown in a system is likely can be anticipated, but foretelling the actual time when it will occur is far more difficult. Delaying critical management actions puts the UMRS ecosystem at risk of a greater calamity from which it might not recover, or would be prohibitively expensive to do so.

The management actions and habitat needs described in this report seek to apply these five principles to management of the Upper Mississippi River System. These principles are very similar to the criteria of ecosystem health used in the Status and Trends Report prepared by the US Geological Survey (USGS 1999). Figure 3 illustrates the relative decline in habitat quality over the last several decades. It also shows, that without corrective measures, it will continue to decline (descending dotted yellow line). There are essentially three steps to achieving a desired level of natural resource health: (1) Take actions to stabilize the river's current baseline condition (horizontal dashed line), (2) identify goals and objectives, plus measures needed to restore the ecosystem to a desired state, and implement them (ascending dashed line), and (3) institute a habitat maintenance program to sustain the desired level once achieved (solid blue horizontal line).

Once the decline in the River's condition has been halted, managers can begin to work toward desired objectives that consider multiple uses. Biologists do not believe it practical (politically or biologically) to restore the river to a state that existed prior to human settlement (top-most yellow horizontal line in Figure 3). Habitat restoration goals (solid blue line in Figure 3) fall far short of recreating the river's original state. Restoring the river to a desired condition will take many decades. While Environmental Pool Plans begin to define that condition, additional years of planning and public involvement, followed by a process of adaptive management to implement necessary restoration measures (the dashed yellow line on Figure 3) will be needed. In the meantime, there are actions which can stop the ongoing habitat decline. Otherwise the river's resource's will continue to degrade as indicated by the descending dotted yellow line in Figure 3.

Figure 3 - Theoretical Representation of Upper Mississippi River Ecological Integrity (source: US Army COE)



Although river biologists and managers do not seek to restore the river to a pristine and free flowing condition, there are certain un-impounded river habitats that must be restored (i.e. islands, backwater lakes, wetlands, riffle habitats, bottomland forests, unimpeded fish movement between pools, and gravel and sand bars) in order to preserve UMRS animal and plant diversity. Although impoundment eliminated or reduced these critical habitats, it also created new habitats (i.e. wetlands favorable for migratory birds, deep water habitats valued by recreational boaters) the public wishes to see maintained. Ideally, biologists would like to restore critical habitats lost by impoundment, but also maintain some of the habitats impoundment created. Biologists and river engineers believe such a goal is possible, but will demand a paradigm shift in management and funding. The habitat measures which are quantified in the following sections are fiscally impractical in the short-term, and will require prioritizing specific actions. But given the significant habitat losses incurred over the previous

125 years of development they are somewhat modest.

In its report, "*A River that Works and a Working River"* (UMRCC 2000) the UMRCC described nine major components of a strategy needed to sustain UMRS natural resources:

1) Improve water quality for all uses

2) Reduction in erosion and sediment impacts

3) Return of natural floodplain to allow channel meanders and habitat diversity

4) Provide for seasonal flood pulse effect and periodic low flows to improve nutrient base, plant growth and succession

5) Enable connectivity of backwaters to main channel

6) Provide for opening of side channel, create islands, shoal, and sandbar habitat

7) Manage channel maintenance and disposal to support ecosystem objectives

8) Sever the pathway for exotics into and spread within the UMRS

9) Provide native fish passages at dams

Table 1 lists a number of habitat restoration and maintenance actions needed to achieve these nine elements of a sustainable UMRS ecosystem. Along with the list of potential management objectives, estimated costs are provided for some of these measures. The primary justification for the habitat objectives in Table 1 comes from the Habitat Needs Assessment report (USACOE 2000a). Several of the actions presented in Table 1 also compensate/mitigate for impacts attributable to commercial navigation traffic or operation and maintenance of the Nine-foot Navigation Channel. Implementation of these habitat objectives is justified under the National Environmental Policy Act and the Fish and Wildlife Coordination Act. Wherever possible, costs were calculated using actual construction costs from similar projects. All of the costs, unless noted otherwise are in year 2002 dollars. Habitat objectives were calculated over a fifty year period for purposes of comparison to Corps of Engineers projects which typically are based on a fifty year life. Annual costs also include a 35% contingency and a 35% planning and design cost. **A full explanation of the habitat costs are presented in Appendix A.**

This report does not provide detailed biological justification for these recommended actions beyond that already cited. More than sufficient documentation has been published by the natural resource agencies responsible for managing UMRS natural resources.

Table 1 - UMRS Habitat Restoration Needs (and estimated costs in year 2002 dollars over 50 years) Identified in the Habitat Needs Assessment Report Relative to Existing Land Cover Types						
Habitat Type	**UMRCC Goal Addressed** **(See goal description on page 10 of report)**	**Objective Needed to Stabilize (S), Restore (R), or Maintain (M) Habitat**	**Habitat Restoration Objective**	**Justification** **(HNA, FWCA, NEPA, See Foot note)**	**Existing Geomorphic Land classes (acres) (source: Habitat Needs Assessment Technical Report, October 2000)**	**Average Annual Restoration Cost ($/yr for 50 years** **(See Appendix A for cost explanation)**
Main Channel	***2,3,5,6,7,9***	***S,R,M***	1,700 acres	HNA, NEPA, FWCA compensation for navigation impacts	main channel - 42,114 channel border - 86,012	See Foot note 1
Secondary Channel	***3,5,6,7***	***S,R,M***	27,000 acres	HNA, NEPA, FWCA compensates for navigation O&M impacts	secondary - 47,719 tertiary - 2042	$41,844,600
Contiguous Backwater	***1,2,3,5,6***	***S,R,M***	55,500 acres	HNA, NEPA, FWCA compensates for navigation O&M impacts	contiguous - 51,134 shallow aquatic - 36,768 impounded - 59,611	$210,332,457
Isolated Backwater & Oxbow lakes	***1,2,3***	***S,R,M***	24,000 acres	HNA, FWCA	26,213	$121,176,000

Island Restoration	***1,2,3,5,6,7***	***S,R,M***	24,000 acres	HNA, NEPA, FWCA compensates for navigation O&M impacts	101,518	$113,076,000
Forest, Prairie, and Wetland Restoration	***1,2,3,6,7***	***R,M***	400,000 acres	HNA, NEPA, FWCA compensates for navigation O&M impacts	forest - 443,315 prairie - 54,454 wetland (shallow aquatic)- 37,023	$124,267,500
Maintain Existing Habitats	***1,2,3,5,6,7***	***S,M***	1,121,608 acres floodplain	HNA, NEPA, FWCA compensates for navigation O&M impacts	1,121,608 acres - exclusive of agricultural & developed lands or lands not classified	$70,030,626
Habitat Needs Identified, but not quantified, in the HNA and Other Needed Actions						
Floodplain Land Use change	***1,2,3,5,6,7,8***	***R,M***	700,000 acres	HNA, NEPA & FWCA	Agriculture - 1,166,691	$36,883,875
Fish, Mussel & Migratory Bird Habitat	***3,5,***	***R,M***	200 miles	HNA, NEPA & FWCA compensates for navigation O&M impacts	open water - 452, 587	$35,717,760
Modification of Lock & Dam Operation	***2,3,4***	***S,R,M***	9 pools per year	NEPA & FWCA compensates for navigation O&M impacts	34 lock & dams (29 on UMR & 5 on Illinois R.)	$23,743,750

					Illinois R.)	
Modification of Wing Dam & Dike Fields	***1,3,5,6***	***S,R,M***	500 structures	NEPA & FWCA compensates for navigation O&M impacts	>3,000 dikes and closing dams in UMRS	$2,538,600
Improve Fish Passage	***3,9***	***3,9***	34 lock & dams	NEPA & FWCA compensates for navigation O&M impacts	34 lock & dams (29 on UMR & 5 on Illinois R.)	$30,423,600
Counteract Exotic Species	***3,8***	***3,8***	full-length of UMRS navigation channel	NEPA & FWCA compensates for navigation O&M impacts	1,200+ miles of UMRS navigation channel	
Stabilize Shorelines	***1,2,5,6,7***	***S,M***	1,420 miles	NEPA & FWCA compensates for navigation O&M impacts	1,200+ miles of UMRS navigation channel	$26,512,877
Improve Dredged Material Disposal Capability	***1,2,3,5,6,7***	***S,R,M***	full-length of UMRS navigation channel	NEPA & FWCA compensates for navigation O&M impacts	1,200+ miles of UMRS navigation channel	$13,500,000
Monitoring & Information Needs	***1,2,3,4,5,6,7, 8,9***	***S,R,M***	essential to adaptive management	NEPA & FWCA compensates for navigation O&M impacts	1,200+ miles of UMRS navigation channel	$44,000,000
Barge Fleeting Plan	***1,2***	***S,M***	full-length of UMRS navigation channel	NEPA & FWCA compensates for navigation O&M impacts	1,200+ miles of UMRS navigation channel	
Actions to Offset Baseline Traffic	***1,2,3,4,5,6,7, 8,9***	***S,M***	full-length of UMRS	NEPA & FWCA compensates for	1,200+ miles of UMRS	

			navigation channel	navigation traffic impacts	navigation channel	
Restore Floodplain Connectivity	***1,2,3,4,5,6,9***	***R***		HNA	1,121,608 acres - exclusive of agricultural & developed lands or lands not classified	$7,605,225
1 - Main channel Restoration costs/actions accomplished under Modification of Wing Dam and Dike Fields, Improve Dredged Material 1,121,608 acres - exclusive of agricultural & developed lands or lands not classified Disposal Capability, and Fish and Mussel Habitat ***HNA = Habitat Needs Assessment, FWCA = Fish and Wildlife Coordination Act, NEPA = National Environmental Policy Act***						

There are several obstacles to achieving the identified habitat restoration objectives. Some of these require immediate attention, others will need to be addressed in the coming years.

Funding - Achieving the habitat objectives identified here will require a substantial increase in natural resource management funding. Current state and federal natural resource budgets cannot meet these objectives. Even though much of this restoration should be funded by navigation interests, innovative means to finance the non navigation share of ecosystem restoration must be investigated.

Mitigate the Adverse Effects Of Commercial Navigation Traffic - Biologists believe that operation and maintenance of the existing navigation project creates impacts of more lasting consequence than those generated by commercial traffic. However, traffic impacts are significant enough that a very sizeable mitigation program will be needed to mitigate traffic increases attributed to additional navigation improvements, such as 1,200 ft. long locks. Preliminary traffic impact assessments conducted by the Corps of Engineers prior to the Interim Report Process estimated that these costs could be well over $150 million depending upon the improvements. For the purpose of this report, the UMRCC makes no specific recommendation regarding appropriate actions (or funding) to mitigate for impacts caused by future navigation improvements. The UMRCC assumes that an appropriate mitigation plan will be formulated during the Corps of Engineers forthcoming feasibility study, but at this point we do not have recommendations regarding how mitigation should be implemented.

Employ an adaptive management philosophy for navigation impact mitigation - Traffic increases associated with the proposed improvements will likely occur over several decades. Consequently, adverse impacts generated by increased traffic will occur over a similar time frame. Corps' mitigation plans traditionally requires that mitigation be implemented concurrently with construction. This procedure works well when impacts occur at one point in time. For example, when a project eliminates 10 acres of prairie, replanting a 10 acre prairie may be all that is required. Such a process will not be effective for the navigation impacts (e.g. loss of larval fish from propeller entrainment) identified in the Corps' study because the majority of these impacts will likely occur decades after navigation improvements are constructed. Designing and completing a mitigation plan prior to the time that impacts occur could result in mitigation actions that fail to be effective because of changing habitat conditions. One example of changing river conditions is the invasion of the Asian carp species. As recently as a decade ago, biologists would have been excited at the prospect of fish passage at Lock and Dam 19 near Keokuk, Iowa. Enthusiasm for fish passage at L/D 19 has waned because the dam may now be acting to slow the spread of exotic fishes. UMR biologists strongly advocate for an adaptive mitigation approach which allows both implementation and evaluation to assure effective mitigation. Effective monitoring of ongoing habitat improvement measures is an indispensable component of adaptive management. The Long Term Resources Management (LTRM) element of the Environmental Management Program has experienced a significant decline in its capability to monitor UMRS natural resources because of declining funds. LTRM capability

must be restored and expanded to meet navigation impact/mitigation monitoring needs.

Establish a new institutional framework - Next to securing funding for habitat restoration and maintenance, and revising current authorities, developing and implementing an integrated river management framework may the next biggest challenge. Water resources planning and management on the UMRS is fragmented and dominated by a narrowly defined navigation authority. Since the dissolution of the Upper Mississippi River Basin Commission in the early 1980s, there has been no governing body which has presumed to act on behalf of all of the river's multiple uses (navigation, fish & wildlife, recreation etc.). There are many river-oriented organizations along the length of the Upper Mississippi River System. Except for the Corps of Engineers, virtually none of them have the authority to make decisions that weigh the needs of one purpose versus another. By virtue of its historic mandate to operate and maintain the navigation channel above all other purposes however, the Corps' decision making process has been skewed in favor of navigation. A collaborative management framework that mandates equal consideration of navigation and natural resource purposes is required. Such a framework does not now exist. A completely new top to bottom restructuring is not necessarily needed. At the field level, there are several existing coordination forums of State and federal representatives that are working very well. These groups need to be legitimized and empowered as part of the comprehensive management framework.

Make needed changes in federal policy and authority - Several critical habitat management objectives are stymied by restrictive policies and limited authorities. The authority (Rivers and Harbors Act of 1928) by which the Corps of Engineers operates and maintains the navigation channel does not allow the Corps to perform habitat management as an authorized project purpose. The only exceptions are funds for mitigating adverse channel maintenance actions and a token amount for its forestry management program. The Corps' O&M authority must be revised to allow habitat restoration and maintenance as part of the Corps Operation and Maintenance Program. Increased funding in the Corps O&M annual appropriation is needed as well. One of the most critical authority revisions is the need to permit water level manipulations below the currently mandated operating level. Section 906(b) of the Water Resources Development Act of 1986 gives the Corps of Engineers the authority to restore habitats impacted by past project actions, however the Corps has chosen not to utilize this authority. The Corps should reconsider implementing this authority.

The inability of federal agencies to meld their natural resource program funds creates an obstacle to meeting habitat goals, particularly in transitional areas such as the floodplain. The need to achieve cross-cut budgeting among federal agencies is a significant policy challenge that needs attention. The ability to combine funding sources from such agencies as the Corps of Engineers, US Fish and Wildlife Service, Environmental Protection Agency, Federal Emergency Management Agency (FEMA), and Natural Resource Conservation Service (NRCS) is essential to implementing a comprehensive management plan for the UMRS. All of these agencies could be involved in the planning and design of a single project.

Expand US Fish and Wildlife Service Capability to Manage National Wildlife and Refuge and

other Federal Lands on the UMRS - The US Fish and Wildlife Service manages over 250,000 acres of refuge lands on the UMRS as well as having certain oversight responsibilities on the remaining federal lands. An expanded management capability in the Programs for Refuges, Fisheries, Ecological Services, and Law Enforcement are needed to help meet the stated habitat objectives in this report.

Conclusions

The scope of habitat management actions presented here is formidable. Restoring the UMRS to a desired condition could require 50, or even 100 years, but without these efforts the outcome is certain; the public's desire to maintain both a navigation system and desirable fish and wildlife habitats will not be met. Managing for both of these uses will require compromises and also some significant changes in funding, policy, authority, and institutional frameworks.

Halting the decline in UMRS natural resources and restoring the ecosystem to a desirable state will require the application of multiple programs across a range of landscapes for several decades to come. Specific goals and objectives should be developed through the environmental pool planning process in the coming years. These habitat objectives will be revised as our ecological knowledge improves, and according to societal demands. The management objectives described in this report are critical to: (1) stopping the ongoing degradation of UMRS natural resources, 2) restoring those resources to a desired level, and 3) actively maintaining existing and restored habitats, so society can meet its future needs. Procedures to implement these objectives should begin immediately.

What Next? - The UMRCC will continue working with all of the river interests to seek the appropriate funding, policies and authorities, and management arrangements to meet the habitat objectives listed in this report.

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