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Upper Mississippi River-Illinois Waterway Investments: Legislation in the 109th Congress

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Summary

The Upper Mississippi River and Illinois Waterway (UMR-IWW) is at the center of a debate over the future of inland navigation, the restoration of rivers used for multiple purposes, and the reliability and completeness of the U.S. Army Corps of Engineers analyses justifying investments. Consequently, authorization of investments in navigation and ecosystem restoration of the UMR-IWW played a role in Water Resources Development Act (WRDA, H.R. 2864) debates in the 109th Congress; among the topics debated were the cost, urgency, necessity, and national benefit of expanded UMR-IWW navigation capacity and ecosystem restoration, given the constraints and competition for Corps construction funding. During the 109th Congress, the House and Senate both passed a Water Resources Development Act bill (H.R. 2864); conferees were named, but no further action was taken.

The UMR-IWW is a 1,200-mile, 9-foot-deep navigation channel created by 37 lock-and-dam sites and thousands of channel training structures built beginning in 1822. The UMR-IWW makes commercial navigation possible between Minneapolis and St. Louis on the Mississippi River, and along the Illinois Waterway from Chicago to the Mississippi River. It permits upper midwestern states to benefit from low-cost barge transport. Since the 1980s, the system has experienced increasing traffic delays, purportedly reducing competitiveness of U.S. products in some global markets. The river is also losing the habitat diversity that has allowed it to support an unusually large number of species for a temperate river. This loss is partially attributable to changes in the distribution and movement of river water caused by navigation structures and operation of the 9-foot navigation channel.

In December 2004, the Corps' Chief of Engineers approved a UMR-IWW 50-year framework for navigation and ecosystem restoration investments, as laid out in a Corps final feasibility report. This framework consists of combined navigation investments ($2.4 billion) and ecosystem restoration investments ($5.3 billion), to be accomplished through incremental implementation. For the first increment, the Chief recommends authorizing $1.88 billion (50% from the Inland Waterway Trust Fund and 50% from federal general revenues) for seven new locks and small-scale navigation measures, and $1.46 billion ($1.33 billion from federal general revenue and $0.13 billion from nonfederal partners) for ecosystem restoration.

The House and Senate versions of WRDA would have authorized investments in navigation ($2.03 billion) and ecosystem restoration ($1.58 billion) for the UMR-IWW. The language would have authorized most of the initial set of activities recommended in the Corps' feasibility report. This CRS report compares the bill language from the 109th Congress with the Corps' feasibility report.

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Introduction

In September 2004, the Army Corps of Engineers released its *Final Integrated Feasibility Report and Programmatic Environmental Impact Statement for the UMR-IWW System Navigation Feasibility Study*.[1] This study set out a 50-year plan for combined navigation investments ($2.4 billion) and ecosystem restoration investments ($5.3 billion) for the Upper Mississippi River-Illinois Waterway (UMR-IWW). From the 50-year plan, the Corps recommended authorization of a first increment of investments — $1.88 billion for seven new locks and small-scale navigation measures, and $1.46 billion for ecosystem restoration. The feasibility report was approved by the Corps' Chief of Engineers in December 2004.

The 109th Congress considered authorizing these investments during its consideration of a Water Resources Development Act (WRDA, H.R. 2864). H.R. 2864 would have authorized investments in navigation ($2.03 billion) and ecosystem restoration ($1.58 billion). During the 109th Congress, the House and Senate both passed H.R. 2864; conferees were named, but no further action was taken. The House and Senate versions of the bill would have authorized most of the initial set of activities recommended in the Corps' feasibility report. This report provides background on UMR-IWW navigation, ecosystem conditions, and the Corps' feasibility report. Then, it compares the plan recommended in the Corps' feasibility report to the WRDA legislation considered in the 109th Congress.

UMR-IWW Background

Navigation Conditions

The UMR-IWW is a 1,200 mile, 9-foot-deep navigation channel created by 37 lock-and-dam sites and thousands of channel training structures. The UMR-IWW makes commercial navigation possible between Minneapolis and St. Louis and along the length of the Illinois Waterway. Five of the nation's top agricultural production states — Iowa, Illinois, Minnesota, Missouri, and Wisconsin — have relied on the UMR-IWW system as a principal conduit for export-bound agricultural products — mostly bulk corn and soybeans. The low-cost, high-volume UMR-IWW system has

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[1] Hereafter referred to as Corps, *Final Feasibility Report and PEIS*. Available at [http://www2.mvr.usace.army.mil/umr-iwwsns/documents/FINAL_FES_EIS_Report_Cover(2004).pdf], visited on December 18, 2006.

helped U.S. agricultural products compete in international markets. Commercial users of the waterway contend that this competitiveness is in danger because of increasing transit delays.

Most of the lock-and-dam infrastructure of the UMR-IWW navigation system was built by the Corps in the 1930s. These 600-foot locks require the now-prevalent 1,100-foot barge tows to split in half and pass through in two steps. This decoupling contributes to wait times at some locks; the Corps reports that the UMR-IWW system has over half (19 of 36) of the most delayed locks of the country's inland waterways.[2] Commercial users advocate for expanded lock capacity with new 1,200-foot locks parallel to the existing 600-foot locks (keeping both operational). They contend that commercial UMR-IWW barge operators have been paying a fuel tax into the Inland Waterway Trust Fund (IWTF)[3] for making this type of infrastructure investment. In contrast, a taxpayer advocacy group, Taxpayers for Common Sense, and some environmental groups have argued that inexpensive small-scale measures — like traffic scheduling, congestion tolls, and switchboats — could manage demand and reduce lockage delays; and unlike new locks that would take years to design and build, small-scale measures would be implemented quickly at a fraction of the cost.[4] Navigation investment supporters contend that the usefulness of small-scale measures is limited in practice. Some environmental groups are also concerned that additional stress, caused by construction activities and increases in barge traffic above current levels, could accelerate ecosystem decline. (For a discussion of the environmental impacts of incremental navigation improvements and traffic on the UMR-IWW, see CRS Report RL32470, *Upper Mississippi River-Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, coordinated by Randy Schnepf.)

Opponents of expanding capacity contend that the improvements are not economically justified based on current agricultural and transportation trends and

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[2] Ibid., p. 57.

[3] The IWTF is funded by a 20-cent-per-gallon diesel tax paid by barge operators of vessels engaged in commercial transportation on designated waterways. The IWTF pays half the cost of new construction and major rehabilitation of barge infrastructure. In recent years, collections have exceeded expenditures, so there is a growing unspent balance in the fund. For further information on the IWTF, see archived CRS Report RL32192, *Harbors and Inland Waterways: An Overview of Federal Financing*, by Nicole T. Carter and John F. Frittelli, available from the authors.

[4] *Twice-Cooked Pork: The Upper Mississippi River-Illinois Waterway Navigation Study*, a report prepared by a coalition of interest groups opposed to large-scale lock expansion; available at [http://www.environmentalobservatory.org/library.cfm?refID=36178], visited on December 18, 2006. Hereafter referred to as *Twice-Cooked Pork.* In response to *Twice-Cooked Pork*, the Midwest Area River Coalition 2000 (MARC 2000) — "a coalition of shippers, carriers, agricultural, industrial, environmental and government interests to promote Midwest economic growth by responsibly developing and improving the UMR-IWW" — released an opposing report, available at [http://www.marc2000.org/Documents/Twice_Cooked_Pork_vs_Reality_Final.pdf], visited December 18, 2006.

costs.[5] They contend that steady barge traffic on the UMR-IWW since the mid-1980s indicates that foreign demand for U.S. feedstuffs is stagnant. Navigation proponents counter that barge traffic has been steady recently *because* of delays; that is, delays are forcing grain shippers to switch to alternate transportation modes to ensure timely arrival at downriver processing plants or gulf ports. Navigation supporters cite that, since the late 1940s, the UMR-IWW has experienced substantial traffic growth — from less than 10 million metric tons in the mid-1940s to more than 80 million metric tons in the 1990s. For an analysis of the historic trends and the prospect for future traffic, see CRS Report RL32470, *Upper Mississippi River-Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, coordinated by Randy Schnepf.

Although 1,200-foot locks are expected to reduce current waiting times at locks, they are not expected to eliminate all lock delays, because decoupling is only one cause of delay. Lock delays also occur because of closures for operation and maintenance and the variability in demand — more than one boat arriving at the same time results in a queue, and the seasonality of crop harvesting assures strong autumn demand. The Corps has not published an estimate of the proportion of delays expected to be eliminated by new locks.

Ecosystem Decline

The Upper Mississippi River System (UMRS) — an ecosystem defined as including the UMR-IWW navigation system, and the aquatic and terrestrial habitats and species that are critically important to the river floodplain ecosystem[6] — is losing the habitat and habitat diversity that support the ecosystem's diverse species. Two structural elements — dams and locks that facilitate navigation, and flood reduction levees — have changed the riverine ecosystem's structure and functions, altering basic processes and habitats by modifying water levels and their fluctuations. The UMRS provides habitat and food to at least 485 species of birds, mammals, amphibians, reptiles, and fish, including 10 federally listed endangered or threatened species and 100 state-listed threatened or endangered species. It is a critical migration corridor for 40% of North America's waterfowl and shorebirds, and home to at least 118 fish species and almost 50 freshwater mussel species.

In WRDA 1986 (P.L. 99-662), Congress declared the UMRS a nationally significant ecosystem and a nationally significant commercial navigation system, and created the Environmental Management Program (EMP) for conducting habitat rehabilitation/enhancement projects and long-term resource monitoring for the UMRS. The ecosystem encompasses four federal fish and wildlife refuges, and three national parks lie within or immediately adjacent to the river system. The UMRS ecosystem also is viewed as significant because of the economic value of its heavy recreational use. Annually, there are 12 million daily visits for recreation in the UMRS; boating, sightseeing, sports fishing, hunting, and trapping are some of the

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[5] *Twice-Cooked Pork.*

[6] The lateral boundaries of the UMRS are defined by the full extent of the floodplains — toe-of-bluff to toe-of-bluff, varying from 300 to 500 meters (1,000 feet to 1,600 feet) wide. Corps, *Final Feasibility Report and PEIS*, p. 113.

popular recreational uses.[7] It is estimated that recreational activities generate $1.2 billion and over 18,000 jobs annually.[8]

According to the Corps, current environmental investments — $33.9 million annually, on average, in federal and state funds — are inadequate to prevent continued degradation. Side channels, backwater, and wetlands are filling in with sediment. The ecosystem is also experiencing a loss of connectivity of the floodplain to the river, impeded fish migration, loss of island habitat, and loss of native plant community diversity and abundance. Although the navigation system and levees significantly altered conditions, they are not the only stressors causing decline. The Mississippi River and Illinois River have a long history of impaired water quality largely caused by contamination from agricultural, industrial, residential, and municipal sources,[9] as well as increased sedimentation and altered runoff patterns from land use changes.

Environmental groups seek investments in ecosystem restoration that will support a mosaic of habitats and river management that more closely resembles a natural hydrograph and river-floodplain connectivity. Some cite the loss of migratory birds in the areas of the Illinois River and the Middle and Lower Mississippi River as examples of a possible outcome if investments are not made. Environmental groups want to reverse ecosystem decline and to increase the services and benefits provided by a healthy ecosystem (e.g., recreational uses).

UMR-IWW Feasibility Study Evolution

To inform the congressional decision on whether to authorize UMR-IWW investments, the Corps conducted a feasibility study. The Corps' feasibility study, begun in 1993 to investigate the long-run navigation needs of the UMR-IWW, has been the subject of controversy. In February 2000, a Corps economist approached the U.S. Office of Special Counsel, an independent federal investigative and prosecutorial agency that protects government whistleblowers, contending that the Corps manipulated a benefit-cost analysis to support UMR-IWW lock improvements.

The feasibility study was temporarily halted while the allegations were investigated by the Army Inspector General (IG), and available study documents were reviewed by the National Research Council (NRC) of the National Academy of Sciences. The IG's investigation found no incidents of fraud or waste; it did reveal serious misconduct and improprieties with the study and suggested an institutional bias that favored large-scale projects.[10] The NRC pointed out several flaws in the economic modeling methodology and data used for navigation estimates, including

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[7] Ibid., pp. 146-147.

[8] Ibid., p. 147.

[9] Ibid., p. 127.

[10] U.S. Dept. of the Army, *U.S. Army Inspector General Agency Report of Investigation (case 00-019)* (Washington, DC: Dec. 2000).

overly optimistic river traffic projections.[11] It also criticized the Corps for limiting the study's environmental analyses to incremental effects of expanding navigation capacity. In response, in 2001, the Corps reformulated the economic analysis and added an ecosystem restoration component to the study.

The NRC continues to review the study. A second NRC panel produced a report in early 2004 that reviews the reformulated study,[12] and another report in October 2004 that comments on an April 2004 draft Corps feasibility report (which is similar to the final feasibility report).[13] The NRC suggested in its reports that, until small-scale measures were investigated and implemented where feasible, it would be impracticable to evaluate the benefits of new locks and lock extensions. Following on the earlier reports, the October 2004 report found "economic feasibility for any of the navigation alternatives has therefore not been demonstrated"; and the NRC panel concluded that "many of the flaws and omissions in this study can be corrected in the course of implementation by the application of adaptive management principles."[14]

Final Feasibility Report. In September 2004, the Corps released a final feasibility report based on the results of the reformulated study. It recommended a 50-year plan for combined navigation efficiency and ecosystem restoration investments. The Corps proposed authorization of a first increment of measures as well as a dual-purpose (navigation and ecosystem restoration) management of the UMR-IWW. The Corps' navigation improvement plan would cost an estimated $2.4 billion over 50 years, while the ecosystem restoration plan would cost an estimated $5.3 billion over 50 years. The Corps recommended that Congress authorize a first increment of the navigation measures at $1.88 billion and a first 15-year increment of ecosystem restoration measures at $1.46 billion. Although the Corps did not implement small-scale measures as the NRC suggested, the agency evaluated them as part of the reformulated study. A few of the small-scale measures that were studied were included in the Corps' recommendation for navigation investments.

In addition to supporting navigation and ecosystem restoration investments, the Corps recommended creating a structure for UMR-IWW investments and operations consisting of three basic elements:

- adding ecosystem restoration as a UMR-IWW project purpose, creating a dual-purpose navigation and restoration authority;
- approving a combined navigation and ecosystem restoration plan as a framework; and

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[11] NRC, *Inland Navigation System Planning: The Upper Mississippi River-Illinois Waterway* (Washington, DC: National Academy Press, 2001).

[12] NRC, *Review of the U.S. Army Corps of Engineers Upper Mississippi-Illinois Waterway Restructured Study: Interim Report* (Washington, DC: National Academy Press, 2004). Hereafter referred to as Early 2004 NRC report.

[13] NRC, *Review of the U.S. Army Corps of Engineers Upper Mississippi-Illinois Waterway Feasibility Study: Second Report* (Washington, DC: National Academy Press, 2004). Hereafter referred to as October 2004 NRC report.

[14] October 2004 NRC report, p.8.

- adaptively implementing navigation investments and adaptively managing ecosystem restoration investments.[15]

According to the Corps, these three elements would allow the agency to proceed with operational changes and near-term investments for navigation and ecosystem restoration. Investments would be part of a long-term river management framework that minimizes risk by establishing a process to incorporate acquired information into ongoing decision-making and phased authorizations.

Feasibility Report Review. The Corps' Chief of Engineers in a December 2004 "Chief's report" approved the UMR-IWW feasibility report. A Chief's report contains a final feasibility report (including studies of engineering feasibility and analyses of benefits and costs), environmental studies, and the Chief's recommendation on how to proceed. The Corps' UMR-IWW feasibility report has also been reviewed for compliance with Administration policy by the Assistant Secretary of the Army (Civil Works). In contrast to the Corps' Chief of Engineers, who has signed off on the proposed project, the Assistant Secretary of the Army (Civil Works) reportedly chose to support proceeding with design, and recommended waiting until additional economic data and analysis are available before initiating construction.

The formal Corps project development and authorization process typically has Congress authorizing a project based on a Chief's report that has been reviewed for compliance with Administration policy by the Assistant Secretary of the Army (Civil Works), then the Office of Management and Budget (OMB).[16] In recent years, Congress increasingly has authorized projects based on informational copies of the Chief's report, before complete reviews by the Assistant Secretary and OMB; however, a majority of projects are still authorized after full executive branch review. Supporters of exceptions from the standard process generally contend that the completion of the Administration's reviews and the timing of authorizing legislation are not always synchronized, and that exceptions provide the flexibility to bridge the two schedules when most of the Corps' analysis is already complete. Environmental and taxpayer groups have been critical of exceptions to the Corps' standard process; they contend that authorizing without complete Administration review rushes projects through review, that congressional decisions are made with incomplete information, and that reviewers may be pressured to make favorable recommendations.

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[15] Part of the Corps' definition of adaptive management is:

> An approach to natural resources management that acknowledges the risk and uncertainty of ecosystem restoration and allows for modification of restoration measures to optimize performance. The process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans, using the resulting information to improve the plans. (Corps, *Final Feasibility Report and PEIS*, p. 611)

[16] For more information on the Corps' project development and authorization process, see CRS Report RL32604, *Army Corps of Engineers Water Resources Activities: Authorization and Appropriations*, by Nicole T. Carter.

Navigation Investments

The UMR-IWW feasibility report evaluating the federal interest in investments in navigation improvements is atypical in some respects. The analysis had to account for a complex set of risks and uncertainties resulting from a 50-year planning horizon for the extensive UMR-IWW system. For the *Final Feasibility Report and PEIS*, the Corps used a scenario-based approach, rather than forecasting navigation demand over 50 years (which the Corps was doing prior to the criticism in 2000 and 2001). The scenario approach examined UMR-IWW movements for five traffic scenarios based on differing world trade, crop area, crop yield, and consumption patterns.

The Corps used the scenarios to arrive at a preferred navigation plan and to make three general findings. First, no single navigation alternative was a clear best choice across a range of economic conditions.[17] Second, the preferred navigation alternative depended on two variables: (1) traffic forecasts derived from future trade scenarios, and (2) price sensitivity of shippers.[18] Third, "the risks are high if no action is taken and high traffic occurs. Risks are also high if a large investment is made and increases in traffic do not materialize."[19] Stated another way, the Corps found every alternative (including no action) to contain risk in the face of an uncertain future. Meeting a fundamental criterion for federal involvement — that national economic development benefits exceed costs — depends on what the future holds. For example, according to the Corps' analysis, if UMR-IWW traffic continues at the fairly constant level of the last 20 years, costs of large-scale measures would likely exceed benefits.[20] If navigation traffic on the system increases (i.e., follows the longer 50-year growth trend), benefits probably will exceed costs.[21] These findings are useful for understanding why proceeding with navigation capacity expansion remains controversial. For a discussion of the difference of opinion on the urgency of new locks, the feasibility of using alternatives to new locks for reducing delays, and the confidence level in the Corps analysis, see CRS Report RL32470, *Upper Mississippi River-Illinois Waterway Navigation Expansion: An Agricultural Transportation and Environmental Context*, coordinated by Randy Schnepf.

The Corps usually recommends authorization of an entire project that it has analyzed and compared to alternatives. Because the UMR-IWW is an extensive navigation system, the Corps analyzed and compared alternative 50-year packages of projects for navigation and ecosystem restoration, and it recommended that Congress approve the combined plans as a framework and authorize a subset of initial projects, with the implication that it would be asked later to authorize the remaining projects in the 50-year plan.[22] The subset of projects was not analyzed as

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[17] Corps, *Final Feasibility Report and PEIS*, pp. x, 437-438, and 493.

[18] Ibid., pp. 462 and 493.

[19] Ibid., p. 493.

[20] Ibid., p. 458.

[21] Ibid., p. 459.

[22] A similar approach was used for the Corps' first large-scale ecosystem restoration effort (continued...)

a stand-alone plan. For example, the Corps feasibility report did not have a benefit-cost analysis for the first increment of navigation activities as a subset of the analysis of the 50-year plan. The report also did not present a cost-effectiveness analysis for the first increment of ecosystem restoration projects.

Corps Navigation Plan

Adaptive Implementation. The *Final Feasibility Report and PEIS* stated that sufficient analysis had been completed to support an initial navigation investment to be implemented using an adaptive approach that minimizes risk by controlling the magnitude of investment decisions.[23] The Corps recommended authorization of an initial set of navigation investments from its 50-year navigation plan, including seven new 1,200-foot locks; authorization for the remaining navigation investments, which consist primarily of extending five 600-foot locks to 1,200 feet, would be sought in later legislation. To support this adaptive approach, the Corps recommended the continued study and monitoring of UMR-IWW navigation to produce the data to feed into an adaptive implementation approach.

In another departure from standard practice, the Corps recommended that the seven new locks be reconsidered after congressional authorization, as additional information becomes available. The Corps would transmit reports to the Administration and Congress containing acquired information. First, the Corps would produce a notification report at the end of the first phase of lock design, and before the award of a construction contract. The notification report would present all new information resulting from monitoring river traffic and markets, and results of any improved models and analysis. The Corps' recommendation was to break up preconstruction engineering and design work for the seven new locks into two segments — first the design work on three locks, followed by the design work on the remaining four locks. The design work for the first three locks was estimated to take three years following initiation of appropriations, so the Corps anticipated a notification report in 2008 if the full annual appropriations were received starting in 2005. The Corps estimated that it would spend $30 million on pre-construction engineering and design for the first three lock sites. The second report would come five to seven years into implementation (i.e., 2010 to 2012), when the Corps submits a reevaluation report upon the development and use of "new and widely accepted models"; the report would conclude with a recommendation to Congress on whether to continue, stop, or delay lock construction.

A third report would be an updated feasibility report for the 50-year plan evaluating investments in a second increment of measures; the second increment of navigation measures would consist primarily of five lock extensions upstream of the new locks on the Mississippi River. The Corps anticipated that this report would be written 16 years into implementation (i.e., around 2021).

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[22] (...continued)
in the Florida Everglades, where WRDA 2000 (P.L. 106-541) approved the final feasibility report as a framework, authorized a few specific projects under the framework, and established a process for developing and authorizing additional projects.

[23] Ibid., p. 493.

First Increment. The Corps' 50-year navigation plan consists of small-scale measures (structural and nonstructural, including switchboats[24]) and large-scale improvements — seven new locks and five lock extensions. The plan would have a "first cost" (i.e., design and construction costs) of $2.4 billion plus annual switchboat costs of $18 million. In the *Final Feasibility Report and PEIS*, the Corps recommended that Congress approve the 50-year plan as a framework and authorize a first increment of $1.88 billion (to be paid 50% from federal general revenue funds and 50% from the Inland Waterways Trust Fund, consistent with standard policy for inland waterway projects). The first increment would include seven new locks and small-scale measures for use during lock construction. The seven new locks would be 1,200-foot locks parallel to existing 600-foot locks.

The $1.88 billion authorization proposed by the Corps would cover the first costs for authorized navigation measures; like most Corps authorizations, the authorized amount would not reflect operation and maintenance (O&M) expenses. O&M for inland waterways is a 100% federal responsibility. The O&M for the recommended navigation measures would be $7.8 million annually; the federal government would be responsible for this amount as well the $115 to $126 million spent annually on O&M of the existing UMR-IWW navigation system.

If fully funded, the Corps estimated that it would take 13 years for each lock to proceed to completion from the start of pre-construction engineering and design. The first three of the seven new locks would be complete at the earliest by 2019; the remaining four locks would be started three years later and completed no earlier than 2022.

Environmental Mitigation. The *Final Feasibility Report and PEIS* assessed and set out a process and specific measures for mitigating impacts directly associated with navigation in its preferred alternative. The Corps concluded that the impacts of large-scale UMR-IWW navigation improvement measures could be mitigated; it stated that by using mitigation, the net effect from both increased traffic and site-specific impacts would be no loss to the five principal areas of concern — fisheries, submerged aquatic plants, backwaters, secondary channels, and historic properties.[25]

Proposed Legislation and Corps Navigation Plan

As recommended by the Corps, the House and Senate versions of H.R. 2864 in the 109th Congress would have authorized seven new locks and small-scale and non-structural measures (see **Table 1**). One difference between the two versions was that the Senate-passed language directed that the investments be implemented in "general conformance" with Corps documents, while House-passed language directed that

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[24] Switchboats would be used to assist tows, by managing the second half of their hauls as they move the first half through the 600-foot locks, resulting in a shorter lockage time. Switchboats would be employed as hired vessels permanently stationed on both the upstream and downstream sides of a lock.

[25] Corps, *Final Feasibility Report and PEIS*, p. 419. The Corps did not established specific mitigation actions; instead, it identifies potential mitigation measures for each river reach.

implementation be "substantially in accordance with the [Corps documents] and subject to the conditions described therein."

Table 1 identifies major components of the Corps' recommendation and the related provisions of H.R. 2864. Although the Corps' recommendation and the bill language are similar in many respects, there are differences. For example, the bill language included neither an adaptive implementation process, nor a continued monitoring and study provision, except for development and testing of a lock appointment scheduling system.

Table 1. Corps Navigation Plan and H.R. 2864 Provisions

	Corps' Preferred Navigation Alternative	H.R. 2864 (109th Congress)
Reference to Feasibility Report or Plan	Dual-purpose plan approved as a framework.	House — Authorized activities to be carried out "substantially in accordance with the [Corps documents] and subject to the conditions described therein." Senate — Authorized activities to be carried out in "general conformance" with the feasibility report.
Adaptive Implementation	16-year process with three reporting requirements.	No comparable provision.
First Increment: Small-Scale and Non-Structural Measures	$218 million (50% IWTF and 50% general funds (GF)).	$235 million (50% IWTF and 50% GF).
Mooring Facilities	At 7 locks.	At 7 locks.
Switchboats	At 5 locks for 15 years during construction of 7 new locks.	At 5 locks.
First Increment: Large-Scale Measures	$1,660 million (50% IWTF and 50% GF), including mitigation.	$1,795 million (50% IWTF and 50% GF), including mitigation.
New Locks	Seven 1,200-foot locks.	Seven 1,200-foot locks.
Continued Study and Monitoring	5 activities, one of which is development of a lock appointment scheduling system.	1 activity — development and testing of a lock appointment scheduling system.
Total Navigation Authorizations	$1.878 billion (50% IWTF and 50% GF).	$2.030 billion (50% IWTF and 50% GF).

Source: Congressional Research Service.

Ecosystem Restoration Investments

The Corps' Upper Mississippi River System restoration plan is unusual in that the investments are aimed at benefitting a diverse set of species. Most of the Corps' other environmental investments have been for project *mitigation*, often targeted at specific threatened or endangered species. For the UMRS, the Corps is proposing a large-scale *restoration* effort that is not directed at specific species, but at providing habitat and habitat diversity to benefit populations of multiple native species in situ. (For a more detailed discussion of the ecosystem restoration proposal, see CRS Report RL32630, *Upper Mississippi River System: Proposals to Restore an Inland Waterway's Ecosystem*, by Kyna Powers and Nicole T. Carter.) The Environmental Management Program for the UMRS, authorized in WRDA 1986, has allowed the Corps to test the impacts of measures similar to those proposed for the UMRS. However, since large-scale implementation of these measures may produce uncertain outcomes, the Corps is recommending an adaptive management approach. Since the UMRS restoration plan is among the first large-scale restoration efforts being planned across the country, it raises numerous unanswered policy questions — which were not addressed in H.R. 2864 and thus are not addressed in this report — including:

- What distinguishes ecosystem restoration from mitigation for past and ongoing damages of navigation projects?
- What qualifies as restoration? For example, is a system that needs regular intervention, such as dredging, "restored"?
- Is restoration a feasible goal for a waterway managed for intensive commercial navigation? Is dual-purpose management for ecosystem restoration and navigation possible for a high-use commercial waterway?
- How should federal appropriations be distributed among the universe of ecosystem restoration projects nationally? For example, how does restoration of the UMRS rank compared to the restorations of the California Bay-Delta, the Chesapeake Bay, coastal Louisiana, Florida Everglades, the Great Lakes, and the Missouri and Rio Grande Rivers?

Corps Ecosystem Restoration Plan

The final feasibility report recommended an ecosystem restoration plan for combating the environmental damage resulting from ongoing navigation O&M and other factors degrading the UMRS ecosystem. It recommended a long-term (50-year) restoration framework, an adaptive management approach, and authorization of a 15-year first increment of activities. The restoration goals of the plan are[26]

- maintain viable populations of native species in situ;
- represent all native ecosystem types across their natural range of variation;

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[26] Ibid., p. 171.

- restore and maintain evolutionary and ecological processes (e.g., disturbance regimes, hydrologic processes, nutrient cycles, etc.); and
- integrate human use and occupancy within these constraints.

The Corps limited its ecosystem restoration plan to the navigation project and study, and to addressing the cumulative impacts of operations of federal projects and other stressors without reducing the benefits of existing federal projects. As such, restoration measures are constrained because they cannot impede navigation, and they are limited to the UMR-IWW and its floodplain (rather than the larger watershed). For example, dramatic water level changes that could produce substantial restoration benefits are not in the Corps' plan because they would interfere with navigation. Another consequence of limiting restoration to the navigation project and study is that some of the stressors leading to degradation were not considered in the preferred plan. The recommended UMRS restoration plan does not include changes to land use practices, flood protection practices that isolate the river from its floodplain on a large-scale, or significant alterations to navigation infrastructure. For example, the Corps' plan includes backwater dredging measures; dredging addresses the symptom of elevated sedimentation, but not the land use practices that can cause it. Directly changing land use is outside the scope of the navigation study and navigation project. Because only some of the stressors causing ecosystem degradation are managed under the Corps plan, not all of the ecosystem's natural river processes would be restored, resulting in the need for regular human intervention to sustain some restoration benefits.

15-Year Restoration Increment. In the final feasibility report, the Corps proposed that Congress authorize an initial 15-year, $1.46 billion increment of the Corps' 50-year, $5.3 billion ecosystem restoration plan. The $1.46 billion would cover the first costs (i.e., design and construction) for the authorized activities, and would be split $1.33 billion (93%) federal and $0.13 billion (7%) nonfederal. This cost-share arrangement is unusual. For most Corps' ecosystem restoration projects, a cost-share of 65% federal and 35% nonfederal is applied to the project.[27] The cost-share arrangement proposed by the Corps for the UMR-IWW drew attention because it distinguished between activities that have the 65%-35% split and activities that will be 100% federal. In general, the 100% federal components address impacts of the existing 9-foot navigation project, or are on federal land.

According to the Corps, measures in the 15-year increment were selected to provide (1) the best return on investment, (2) the best gains in habitat diversity, and (3) additional knowledge that will facilitate implementing the 50-year plan.[28] The Corps also favored measures for which planning, design, construction, and monitoring could occur during the 15-year window. However, some organizations

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[27] Another exception is the Corps only other *large-scale* restoration effort — the Florida Everglades restoration. The Everglades restoration was split 50% federal and 50% nonfederal. The Everglades ecosystem was harmed by operations of federal projects and encompasses extensive federal lands. For information on Everglades restoration, see CRS Report RS20702, *South Florida Ecosystem Restoration and the Comprehensive Everglades Restoration Plan*, by Pervaze A. Sheikh and Nicole T. Carter.

[28] Corps, *Final Feasibility Report and PEIS*, pp. 511-512.

argued that 15 years would be insufficient to demonstrate substantial improvements. Unlike the analysis of the 50-year ecosystem restoration options, the final report did not analyze in detail the ecosystem benefits expected from the 15-year increment; it also did not present alternative 15-year increments, or a cost-effectiveness analysis of the 15-year increment.

The recommended 15-year increment included 225 measures, from the 1,010 measures in the 50-year plan. The 225 measures were grouped into three main categories of activities:

- *Fish Passage and Dam Operations*. Fish passage construction at four dams and fish passage planning and design at two dams ($209 million), and new dam operating procedures (and related land acquisition or easements) at two dams ($41 million) — $250 million total, 100% federal.
- *Programmatic Restoration Authority*. Programmatic authority to implement island building, floodplain restoration, water level management, backwater restoration, side channel restoration, wing dam/dike alternation and shoreline protection — $935 million total, not to exceed $25 million/measure, 100% federal.
- *Land Acquisition*. Land acquisition of 35,000 acres from willing sellers, for floodplain connectivity and wetland and riparian habitat protection and restoration — $277 million total, 65% federal.[29]

The $935 million in programmatic restoration authorization included $136 million for adaptive management and $136 million for restoration monitoring and evaluation. The recommended $1.46 billion did not include O&M expenses. O&M for ecosystem restoration for Corps projects is typically a 100% nonfederal responsibility. Because some of the projects would be managed by federal agencies, their O&M would be a federal responsibility. O&M costs (which would be incurred over the 50-year planning horizon) for the 15-year increment were estimated at $61.5 million annually, with an expected split of $9.6 million federal and $51.9 million nonfederal.

Proposed Legislation and Corps Restoration Plan

The House and Senate versions of H.R. 2864 during the 109th Congress were largely similar to the Corps' recommendations: they would have authorized the same projects and had the same cost-share arrangement. Although the Senate version would have required that restoration be implemented in accordance with the general framework outlined in the *Final Feasibility Report and PEIS* and the House version would have required that restoration be implemented in accordance with *Upper Mississippi River and Illinois Waterway System: Report of the Chief of Engineers*, there were some differences between the Corps' 15-year increment and the proposed authorizing language (see **Table 2**). For example, the total authorization of $1.58 billion would have been $0.12 billion more than the amount in the Corps' feasibility report.

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[29] Ibid., p. 522.

Table 2. Corps Restoration Plan and H.R. 2864 Provisions

	Corps' Preferred Plan	H.R. 2864 (109th Congress)
Ecosystem Restoration Authority	Ecosystem restoration as a project purpose.	Required that UMR-IWW operations be modified to address cumulative environmental impacts and improve ecological integrity consistent with requirements to avoid any adverse effects on navigation.
Reference to Feasibility Report or Combined Plan	Combined plan approved as a framework.	Authorized activities to be carried out in accordance with the general framework outlined in the Feasibility Report (Senate)/ Chief's Report (House).
Initial 15-Year Authorized Activities	(a) Fish Passage and Dam Operations, (b) Programmatic Restoration Authority for multiple project types, (c) Land Acquisition limited to 35,000 acres.	List of 15 project types to be carried out in accordance with the general framework outlined in the final feasibility report.
Adaptive Management	Corps recommended an adaptive management strategy that includes organizations (River Management Council, Science Panel, and River Management Teams), systemic studies, & evaluation of restoration measures.	Established an Advisory Panel to provide guidance in the development of each quinquennial report. (See "Continued Study and Monitoring" for complementary provisions.)
Continued Study and Monitoring	Report after 15 years.	Implementation report by June 30, 2007 (House)/ 2008 (Senate), and every 5 years after that. Reports would have included baselines, benchmarks, and priorities, and measures in progress to meet the objectives.
Cost Share	Mixture of 100% federal elements, & ones shared 65% federal & 35% nonfederal.	Same as recommended by the Corps.
Total Ecosystem Restoration Authorizations	$1.46 billion (Est. $1.33 billion federal & Est. $0.13 billion nonfederal)	$1.58 billion (federal/nonfederal split not available)
Appropriations Limitation	— No comparable provision. — Individual measures limited to $25 million. Authorization of $209 million for fish passage and $41 million for dam point control.	— Land acquisition limited to $35 million per year. — Individual measures limited to $25 million. Authorization of $226 million for fish passage and $43 million for dam point control.

Source: Congressional Research Service.

The Corps recommended an adaptive management approach for the ecosystem restoration plan. Although the legislative language in H.R. 2864 made no mention of adaptive management, the language would have required some complementary measures. The House version would have required an ecosystem restoration implementation report by June 2007 (June 2008 in the Senate version), and every five years thereafter; the report was to include baselines, benchmarks, goals, and priorities for restoration projects and to measure the progress in meeting goals. The language also would have authorized an advisory panel similar to the science panel, which was one of 12 elements of the adaptive management strategy outlined in the final feasibility report.[30] Because the bill language did not specifically authorize the adaptive management approach, it was uncertain if the Corps would have had the authority to implement the $136 million adaptive management program and the complementary $136 million monitoring and evaluation that the agency recommended.

Similarly, the Corps recommended adding ecosystem restoration as a project purpose;[31] the H.R. 2864 language would have required the Corps, "consistent with requirements to avoid adverse effects on navigation," to modify UMR-IWW operations to address cumulative environmental impacts and improve ecological integrity and to carry out ecosystem restoration projects. The language did not explicitly add ecosystem restoration as a project purpose of the UMR-IWW. The implications of this for managing for both navigation and restoration were unclear.

Another distinction was that H.R. 2864 would have authorized a lump sum of $1.58 billion with one primary limitation, that land acquisition be limited to $35 million annually. In the final feasibility report, the Corps made no recommendations on an annual limitation on land acquisition; instead it recommended a cap of 35,000 acres on land acquisition. The final report provided a breakdown of the $1.46 billion among three categories of restoration activities — fish passage and dam operations, programmatic restoration authority, and land acquisition.

Project Design. H.R. 2864 would have required that, before an individual restoration project begins construction, the Secretary establish restoration performance measures (including a baseline indicator) and target goals. The language also would have required that the design of these projects include a monitoring plan for the performance measures, including a timeline for project completion. The provisions appeared to be aimed at addressing concerns over what would be achieved under both the first increment of authorized activities and the longer, 50-year plan, and when restoration would be complete. These provisions complemented the Corps' recommendation for an adaptive management approach, which required establishing baselines and monitoring performance to incorporate new information into ongoing investments.

Linked Progress. H.R. 2864 would have required the Corps to establish milestones for the ecosystem restoration and navigation projects. The language also would have required the Secretary of the Army to determine if the projects were

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[30] Ibid., p. 516.

[31] Ibid., p. 491.

being carried out at "comparable rates." If the projects were not moving toward completion at a comparable rate, annual funding would have been adjusted to promote comparable progress. The provision appeared to be an attempt to address concerns about ecosystem restoration investments being outpaced by navigation investments.

Similar provisions were included in legislation proposed in the 108th Congress. At that time, some environmental groups were willing to accept new locks if ecosystem restoration also was authorized and funded; they wanted investments in restoration and navigation linked. They feared that if the two were not linked, ecosystem restoration could have been authorized, but could receive minimal appropriations. Navigation and agricultural interests expressed their dissatisfaction with linking navigation and restoration progress; they consider navigation and ecosystem restoration investments as separable. They did not want navigation construction slowed due to constrained federal appropriations for ecosystem restoration, in light of the multiple multibillion dollar, large-scale restoration projects already underway or under development nationally. They also contended that linking might delay progress of lock construction, thus extending the environmental and traffic disturbances caused by construction. Linked progress ultimately is a policy decision of how Congress wants to direct its appropriations.

Differences. While the House and Senate versions of H.R. 2864 were largely similar, the two had subtle differences. For example, the advisory panel established under the House language would have had one chairperson — the Secretary of the Army; in the Senate version, the Secretary of the Army and Secretary of the Interior were co-chairpersons. Further, the comparable progress provisions of the House and Senate versions differed. The House version would have explicitly required the Secretary of the Army to submit annual reports to Congress describing whether projects were being carried out at comparable rates; the Senate language did not include this provision.

Project Ranking. H.R. 2864 would have required the Secretary of the Army — in collaboration with the advisory panel that the bill established — to develop a ranking system for restoration projects emphasizing projects that restore natural river processes. Project ranking based on restoring natural river processes appeared to be an attempt to promote projects that trigger "self-repair and self-maintenance over large areas at relatively modest cost."[32] These provisions could have given priority to water level management and other dam alterations, floodplain measures such as levee modifications and removals, and alteration of river training structures such as wing dams and dikes.

The impact that these provisions would have had on the implementation of the Corps' final plan is uncertain. It could have given priority to a single aspect of a project, rather than facilitating multiple objectives. Prioritizing projects that restore natural river processes might not have been appropriate for all river reaches, especially lower reaches that are more altered than less-disturbed upper reaches. A greater number of engineered restoration activities were recommended by the Corps

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[32] Early 2004 NRC report, p. 19.

in the lower basin, which is more heavily developed and leveed, than in the upper basin. For example, the Corps recommended artificially mimicking a natural hydrograph to restore ecological processes (e.g., pumping water out of areas with water levels raised by dams) for reaches where natural river restoration options were limited by the navigation system and development. A solution using a more natural river process might have decreased water levels (by altering dam operations), thus harming navigation; this option was not considered in the Corps plan because the agency considered it outside the scope of the feasibility study and navigation project.

Conclusions

The Corps' feasibility report recommended a first increment of investments in navigation ($1.88 billion) and ecosystem restoration ($1.46 billion); the recommendation was for these investments to be made using an adaptive approach and as part of a long-term framework for dual-purpose operations. The recommendation was to improve navigation efficiency by building seven 1,200-foot locks to reduce delays caused by decoupling of barge tows. The ecosystem restoration proposal was to address cumulative impacts degrading the UMRS ecosystem, including the ongoing effects of O&M of the navigation system. Recommendations for restoration activities were limited geographically to the UMR-IWW and its floodplain and to the scope of the navigation project and its feasibility study; a more comprehensive watershed approach was not part of the plan recommended in the feasibility report.

H.R. 2864 would have authorized many of the elements of the Corps' recommendation for the first increment of investments. The language would have authorized seven new navigation locks, small-scale navigation measures, and related environmental mitigation. The adaptive implementation process that the Corps recommended in its feasibility report to integrate new information into the decision on lock construction was not explicitly adopted in bill language. Instead, the Senate version directed that the investments be implemented in "general conformance" with Corps documents, while the House version directed that implementation be "substantially in accordance" with Corps documents.

Drawing from the Corps' recommendations, H.R. 2864 would have authorized ecosystem restoration activities to be carried out in accordance with the framework in the feasibility report, and these activities would have required operational changes to the UMR-IWW consistent with requirements to avoid any adverse impact on navigation. Additionally, H.R. 2864 contained three provisions related to implementation of ecosystem restoration. One provision appeared to require comparable funding requests to be made based on the rate of progress for navigation and restoration projects. The other two provisions would have required outcome-oriented project design for ecosystem restoration projects, and the development of a ranking system for restoration projects that prioritizes natural river processes.