

# U.S. Inland Waterway Modernization: A Reconnaissance Study

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Transportation

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# Lock and Dam Modernization: A Reconnaissance Study

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## Contents

<b>■ Executive Summary .....</b>	<b>1</b>
Basis of Study .....	1
Current Issues and Conditions on the Waterways.....	1
Key Findings .....	5
Recommended Actions.....	6
U.S. Congress.....	6
The State of Iowa .....	7

## Figures

Figure 1: Lock and Dam Maintenance Hours per Year at the Mississippi River Locks.....	2
Figure 2: Lock and Dam Maintenance Hours per Year, Locks 9 – 19 .....	3
Figure 3: USACE Budget Authority–L&D Construction—FY 1994–FY 2013.....	3
Figure 4: USACE Total Budget Authority (Net)—FY 1994–FY 2013.....	4



## ■ Executive Summary

### Basis of Study

The Mississippi River system is of vital importance to the economy of the United States as it enables efficient movement of goods and services. Over the course of the last century, a network of federally owned locks and dams constructed and operated by the U.S. Army Corps of Engineers (USACE) have facilitated commerce along the river. Many of these facilities have reached or even far exceeded their designed life cycle and rehabilitation and modernization is becoming critical to keep the waterways commercially viable. As the state of Iowa has a vested interest in a viable waterway commerce and transportation system, the Iowa Department of Transportation is examining alternatives to the USACE's traditional approach to funding and implementing projects to help modernize and improve the inland waterway navigation system on the Upper Mississippi River System (UMRS). This study is intended to identify and discuss the viability of options available.

### Current Issues and Conditions on the Waterways

In 2009 The American Society of Civil Engineers' *Report Card for America's Infrastructure* [2] gave the nation's inland waterway infrastructure a report grade of D-. The inland waterways rely primarily on public investment and have suffered from chronic underfunding, seriously affecting the nation's potential to participate in the highly competitive global market for exportable commodities that will be in great demand in the future. This failure to adequately invest in a publically managed inland waterway system affects the nation's ability to export key commodities like grain, energy, and specialized manufactured goods. It also provides competing countries with an opening to capture market share, which in some cases is tied to long-term contracts. In contrast to the U.S.'s inland waterway system, the investment in the U.S.'s marine ports is dominated by public port authorities and private port-operating companies.

The U.S. economy relies on an efficient and low cost transportation network for movement of its domestic and export commodities. In particular, U.S. export commodities depend on the transportation network to offset higher wage levels and costs of production when compared with international competitors. If the nation does not invest in its waterways infrastructure, transportation costs will increase and export costs will therefore increase, and this increase in costs to export goods will affect the nation's ability to compete in global markets for goods produced in the U.S. If current needs and stagnant investment in inland waterways and marine ports continue, the nation's competitiveness will erode, affecting its ability to sustain well-paying jobs, especially in export sectors.

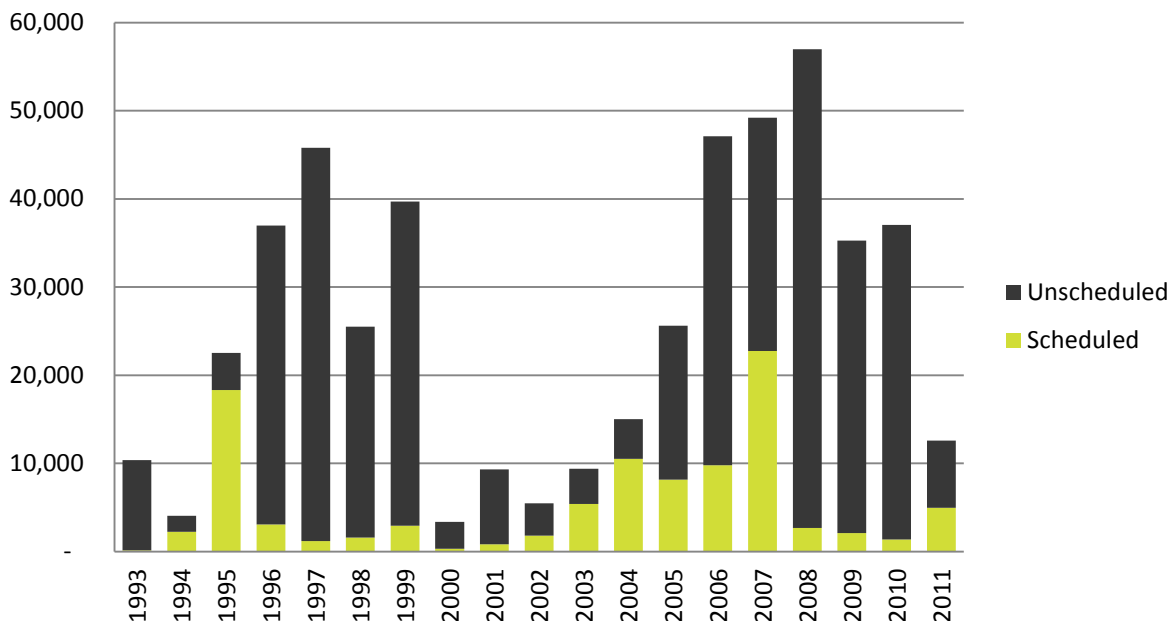
If the U.S. does no more than maintain its current level of investment in its inland waterways, the losses to its economy due to delays and constricted traffic will increase shipping costs annually. If our inland waterway system remains chronically underfunded, recent studies by the American Society of Civil Engineers [1] show that by 2020 the lost value of exports will be \$270 billion and will rise to almost \$2 trillion by 2040. Approximately \$1.3 trillion in business sales will be lost by 2020, rising to \$7.8 trillion by 2040. The cumulative loss in national GDP will be approximately \$700 billion by 2020 and reach \$4

trillion by 2040. It is projected that such a reduction in production, income, and spending will result in 738,000 fewer jobs in 2020, and that by 2040 the job losses will grow to almost 1.4 million – jobs lost due to the lack of U.S. competitiveness in global trade and because the nation’s households and businesses will be spending more for commodities that arrive by marine ports and are transported to market via inland waterways.

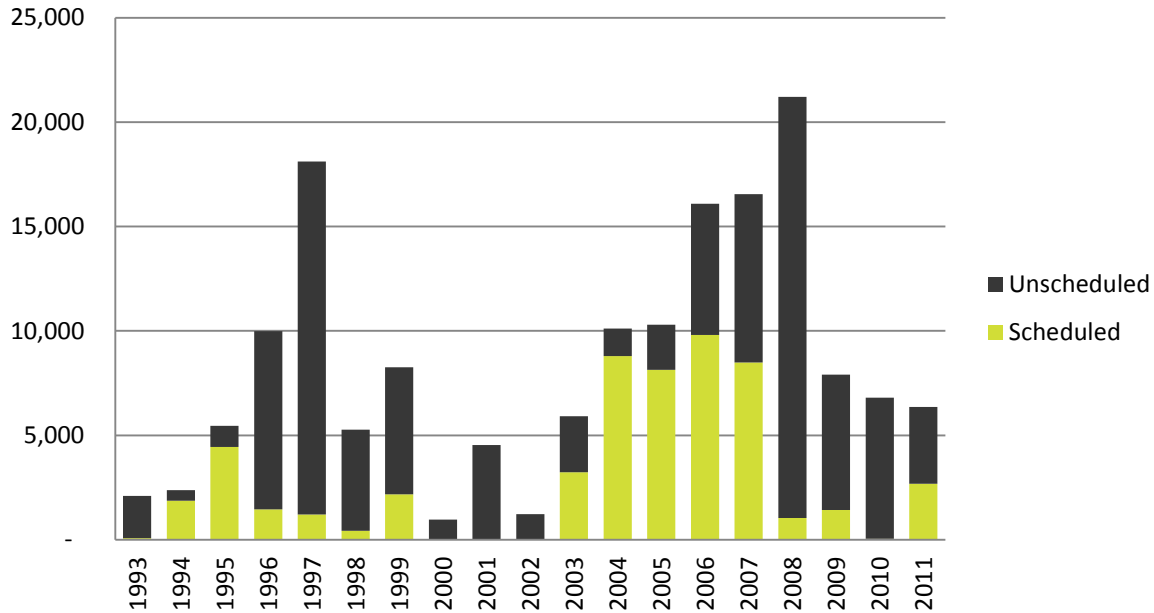
Shipping delays at the locks, both scheduled and unscheduled, are a significant threat to the performance of the inland waterway system (Figures 1 and 2). These delays are caused by the mechanical failures, structural maintenance and ‘bottlenecked’ congestion at the locks due to insufficient funding for their operation and maintenance needs (Figure 3).

When a lock or dam reaches a state of poor repair, waterborne traffic must stop to allow for more frequent scheduled maintenance. Although such anticipated or scheduled delay imposes some level of cost on industries that rely on waterborne commodities, an even greater cost is imposed when an unscheduled delay occurs. Unscheduled delays interrupt business operations for entire supply chains dependent on waterborne shipments. However, with adequate investment in maintenance and infrastructure modernization these delays are preventable.

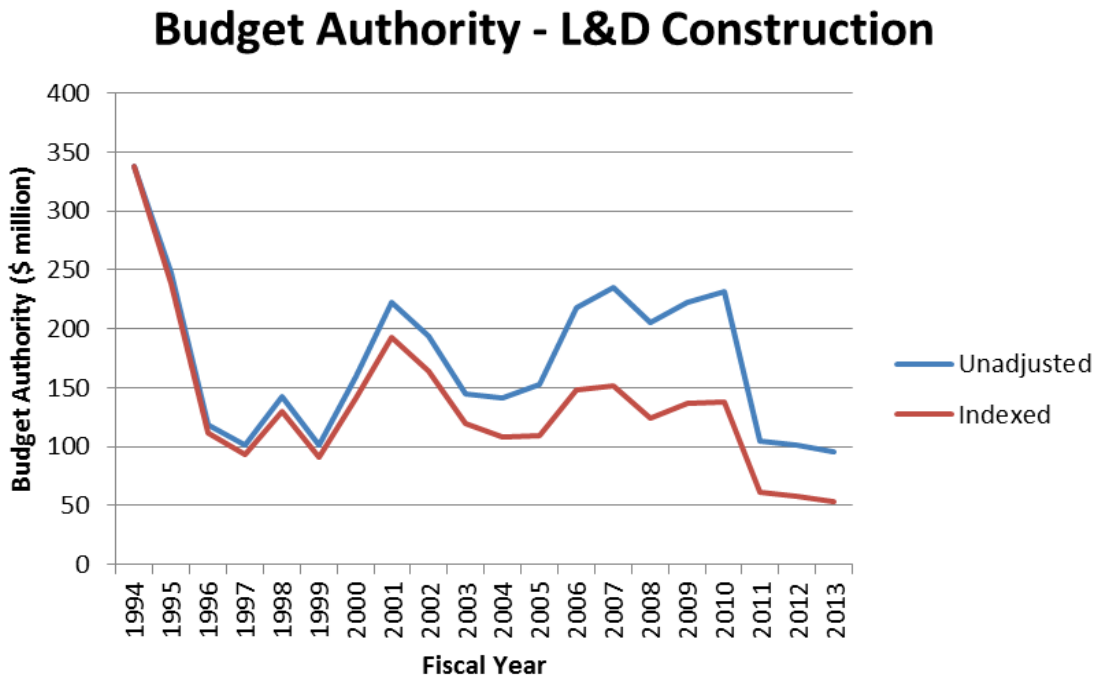
**Figure 1: Lock and Dam Maintenance Hours per Year at the Mississippi River Locks**  
Source of Data: USACE



**Figure 2: Lock and Dam Maintenance Hours per Year, Locks 9 – 19**  
 Source of Data: USACE



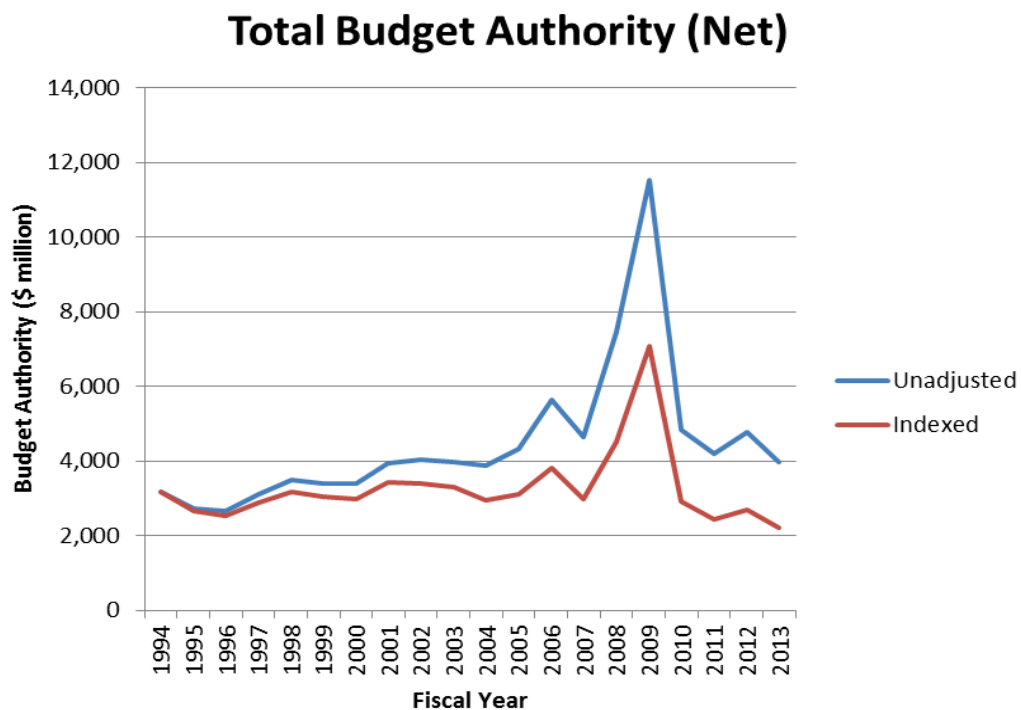
**Figure 3: USACE Budget Authority—L&D Construction—FY 1994–FY 2013**  
 Source: Texas Transportation Institute [18]



Based on USACE data trends, maintaining existing levels of unscheduled delays on inland waterways, and not further exacerbating delays, will require almost \$13 billion by 2020, and an additional \$28 billion by 2040. Current funding levels can support only \$7 billion through 2020 and an additional \$16 billion through 2040. Of these costs, 27 percent are projected for the construction of new lock and dam facilities, and 73 percent are estimated for the rehabilitation of current facilities. The demands for these funds will peak by 2020, when critical age and capacity thresholds are likely reached. [1]

Federal resources have been steadily dwindling since the 1980s and only limited funds have been available for water infrastructure operations, maintenance, and rehabilitation. This decline in federal funding for water resources infrastructure is especially evident when indexed for inflation, as shown in Figure 4.

**Figure 4: USACE Total Budget Authority (Net)—FY 1994–FY 2013**  
Source: Texas Transportation Institute [18]



Much of the USACE’s water resources infrastructure is deteriorating and wearing out faster than it is being replaced. Existing water infrastructure cannot be maintained with the annual funding being allocated by Congress. The USACE faces a massive backlog of authorized, unfunded projects; those that have begun often start and stop depending on whether money is available. Maintenance projects are frequently delayed, as was evidenced by the temporary closures of the system during the summer of 2012 during periods of extreme low flows on the Mississippi River. The most commonly cited example of this failed system of funding allocations is the Olmsted Lock on the Ohio River. Since the project began, it



has used up almost the entire USACE capital budget, leaving little to no allocations for other projects. Originally projected to cost \$775 million when it began in 1988, the project now has a price tag of \$3.1 billion and a construction plan expected to stretch on for another decade, resulting in even more cost. [19]

It is clear that failure or closure of a lock would cause increased costs to shippers, resulting in decreased cost advantages to Midwestern producers. Additionally, Midwest producers would still need to transport their goods, inadvertently leading to the long-term transport of goods shifting to road and rail. Deterioration of road and rail infrastructure would occur more quickly and would result in financial strains on state resources and railroad capital. Furthermore, the economic opportunity for U.S. exporters, in particular Iowa and other Midwestern grain producers, provided through expansion of the Panama Canal would be lost with abandonment of the inland waterway system. New approaches to fund operations, maintenance and infrastructure replacement are needed to keep water transportation viable as well as to take advantage of emerging opportunities such as the Panama Canal expansion.

## Key Findings

This study has resulted in several key findings:

1. No increase in the current funding plan will result in loss of economic benefits and a missed opportunity for Iowa to take economic advantage of the plans for expansion of the Panama Canal (i.e., opportunities to increase grain shipments).
2. Leveraging increased funding from traditional sources is the only practical option to deal with the funding issues in the short term.
3. If no new funding is identified, partial divestiture of the system where traffic does not warrant heavy operations should be examined to minimize economic loss and to potentially increase opportunities for USACE to redirect budget allocations. However, the impact and extent of divestiture would need to be carefully examined for other long-term impacts.
4. A public-private partnership to upgrade and then operate/maintain discrete elements of the waterway system is feasible if a dedicated funding source is found and assuming changes to current policies are made as outlined in the recommendations for 2013 WRDA in Appendix A. For consideration of user fees as a repayment source for availability payments, it should be noted that implementation of such fees would require policy action by the government to modify the prohibition on tolling in 33 USC 565.
5. Revenue bonding against existing and/or new IWTF (Inland Waterways Trust Fund) revenues could provide an infusion of large amounts of capital for lock and dam infrastructure projects. While this would result in higher borrowing costs, the benefits of executing projects sooner might outweigh these costs.
6. While augmentation of traditional (federal appropriations and user fees) funding sources by state/local entities would be beneficial (assuming legislative authorization) in both the near and long term, these additional public funding sources would not be a stand-alone solution. Rather,

this funding would be only part of a more comprehensive solution that includes increased and/or expanded user fees and federal appropriations.

New approaches to fund operations, maintenance, and infrastructure replacement are needed to keep water transportation viable. Funding, operations, maintenance and construction of water resources projects is typically authorized in a Water Resources Development Act (WRDA) bill. The last WRDA bill to be approved by Congress was in 2007. Section 221 of WRDA 2007 included enhanced opportunities for local project partners to be more involved in planning, design and construction of projects beyond the traditional cost share for Lands, Easements, Rights of Way, Relocations and Disposal (LERRDS). The draft 2013 WRDA bill, started in the U.S. Senate Environment and Public Works Committee, holds even greater promise for nontraditional approaches to water resources projects involving USACE.

Currently, the U.S. Senate is considering a WRDA bill for 2013 (see Appendix A). The draft bill evaluated in this discussion currently resides in the United States Senate Environment and Public Works Committee. An opportunity for a non-traditional approach, including alternative funding and operations, to management of the inland waterway system does exist within the draft 2013 WRDA.

Because operations, maintenance, rehabilitation and replacement of locks and dams is a primary USACE mission, Congress would need to authorize and appropriate all of the funds needed to permit, design and construct the necessary upgrades to the lock and dam system. Should a lock and dam rehabilitation be approved as a pilot project, funding appropriated by Congress would be passed through to the non-federal sponsor via the USACE.

## Recommended Actions

The State of Iowa has a sincere interest in seeing the continued maintenance, operations, and modernization of our nations' inland waterway navigation system. As such, it is proposed that the State undertake activities that may help the State realize improvements to the inland waterway navigation system. Recommendations for potential initial State actions are provided below.

### U.S. Congress

An opportunity to facilitate the future viability of this inland waterway currently exists with the draft WRDA of 2013. It is recommended that the State pursue actions to encourage Congress to:

1. Ensure passage of a WRDA in 2013.
2. Ensure the existence of opportunities for pilot programs that would allow non-federal sponsors the ability to rehabilitate, improve, operate and maintain federal projects. It is recommended that such opportunities be identified and presented to legislators for sponsorship.
3. Ensure opportunities for alternative project delivery and funding mechanisms (user fees, private investments) for existing and proposed civil works and navigation projects. Recommended

language changes to the WRDA bill that would facilitate these changes are included in Appendix A, along with a technical memorandum summarizing these recommendations.

4. Ensure adequate funding for both ongoing and pilot USACE Civil Works and Navigation programs.
5. Raise the excise tax on diesel fuel from \$0.20/gallon to \$0.30/gallon and index the tax for inflation, to provide more adequate funding for the Inland Waterway Trust Fund.
6. Authorize the USACE to study additional funding mechanisms (recreational fees, lockage fees, tonnage fees, etc.) to provide for more adequate funding for the Inland Waterway System.

### The State of Iowa

There are specific actions that the state of Iowa can take to protect and further its interests in the UMRS lock and dam system. Iowa should:

1. Explore the possibility of a coalition of Upper Mississippi River states (Minnesota, Wisconsin, Iowa, Illinois and Missouri) and inland waterway interest groups (agriculture producers/businesses, barge operators, shippers, environmental stakeholders) to drive a legislative agenda in Washington, DC to address funding and legislative changes needed to modernize the Upper Mississippi River System.
2. Express interest to the Secretary of the Army and seek non-federal sponsorship for implementation of a pilot project using the authority in Title II, Section 2025 of the draft WRDA 2013 bill.

Much remains to be decided with the federal government regarding the overall operation of an UMRS lock system and how operation of all or portions of this system by a non-federal sponsor would be regulated and governed. However, it is clear that the existing, inland waterway navigation system is nearing a tipping point in terms of funding for necessary repairs, maintenance and system enhancements.