



# RESTORING AMERICA'S RIVER

Using the  
Water Resources  
Development Act  
To Mend the  
Upper Mississippi River

*Prepared by the Nicollet Island Coalition  
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The **Nicollet Island Coalition** is a diverse group of environmental, conservation, and taxpayer advocate organizations. Our mission is to restore the ecological diversity of the Upper Mississippi River while maintaining navigation infrastructure through sound economic decisions.

## Nicollet Island Coalition Members



*Izaak Walton League of America*



*Institute for Agriculture and Trade Policy*



*Missouri Coalition for the Environment*



*National Wildlife Federation*



*Prairie Rivers Network*



*River Alliance of Wisconsin*



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## EXECUTIVE SUMMARY

In the 1930s, America was in turmoil due to the Great Depression. Jobs were in short supply, so Congress fast-tracked large, government-funded construction projects – including a lock and dam system on the Upper Mississippi River and Illinois Waterway (UMR-IWW) – to drive economic recovery. Commercial navigation on the UMR-IWW had all but disappeared after the region’s timber boom ended at the close of the 1800s – that is, until Congress authorized construction of new locks and dams and a system for barge transportation.

Unfortunately, the structures built to facilitate barge navigation on the Mississippi River significantly damaged river ecosystems. The UMR-IWW no longer fluctuates seasonally. Floods do not provide access to calm backwaters for fish to rear their young. Low flows that provide the right conditions for native aquatic plants to gain hold and grow have dramatically decreased. Native aquatic species – and the fish and wildlife that depend on them – are being threatened by significant habitat degradation. Gone are the small islands where migrating ducks and geese built their nests and hatched their young. Increased sedimentation is smothering native plants and fish habitat alike.

Transportation on the river is important for the region, but it is not a growing sector of the transportation industry. Traffic plateaued in the 1980s, and since the mid-1990s, commercial navigation on the UMR has continuously declined and is expected to remain low in the decades to come. Despite this decline in barge traffic, the U.S. Army Corps of Engineers (Corps) proposed a series of massive new lock projects on the UMR-IWW. As part of the Navigation and Ecosystem Sustainability Program (NESP), the Corps proposed constructing seven new 1,200-foot locks on the UMR and handcuffed river restoration funding to this expansion of navigation infrastructure. New construction on the river would further damage water quality and fish and wildlife habitat while providing questionable benefits for the American people.

In 2010, the Nicollet Island Coalition (NIC) released a report, *Big Price-Little Benefit: Proposed Locks on the Upper Mississippi and Illinois Rivers Are Not Economically Viable*, documenting the unsubstantiated economic justification for the proposed 1,200-foot locks. The report detailed declines in barge traffic that have left the lock-and-dam system operating well below its current capacity, negating the need for expanded lock capacity.

Our report helped drive a new conversation about NESP. The program has not been funded since Fiscal Year 2011 and today the Corps is drafting a new direction for NESP. Although the new NESP strategy is not finalized, preliminary discussions indicate that many of the concerns expressed in NIC’s 2010 report should be addressed. This encouraging news comes as Congress considers the Water Resources Development Act (WRDA) – multi-year legislation that governs construction of navigation, flood control, and other water resource infrastructure and environmental restoration conducted by the Corps.

In this report, the Nicollet Island Coalition reviews how existing federal programs can be used to restore the UMR-IWW and create more diverse local economies along the river while maintaining the river’s role in America’s transportation system. As the next Water Resources Development Act is drafted, this report will provide Congress and taxpayers with environmentally and economically sound recommendations for improving these programs.

NIC has identified several actions that Congress should take through the Water Resources Development Act and related legislation to improve Upper Mississippi River restoration and river resource management. The recommendations are grouped into those related to navigation, restoration, and planning.

**Navigation** has been important for the economy in the Midwest. Many farms export grain via the Mississippi River, and other businesses move coal, fertilizer, and aggregates around the region on the river. However, navigation traffic plateaued in the 1980s and has been in decline since the mid-1990s. Due to these declines, projects that expand navigation infrastructure are not smart investments. Congress should deauthorize projects that are not economically justified, adequately fund rehabilitation and maintenance projects to prevent lock closures, deauthorize outdated and unfunded projects, and protect taxpayers from paying an unfair proportion of these costs.

To achieve needed changes, the Nicollet Island Coalition recommends the following actions:

- 1. Deauthorize the Navigation and Ecosystem Sustainability Program (NESP).** As part of this effort, Congress should
  - a. **Move the restoration component of NESP to the Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP).**
  - b. **Separately authorize and fund non-structural navigation improvements.**
- 2. Provide adequate and on-time funding for maintenance, rehabilitation, and construction.**
- 3. Deauthorize outdated and unfunded water resource projects.**
- 4. Protect taxpayers by not authorizing amendments to the Inland Waterways Trust Fund that shift more of the cost burden onto taxpayers.**

**Restoration** on the UMR is primarily accomplished through the Upper Mississippi River Restoration-Environmental Management Program. This program is complemented by the smaller Illinois River Basin and Kaskaskia River Basin Restoration Programs. These three programs are improving habitat through restoration projects and increasing our understanding of the UMR ecosystem through monitoring. However, comprehensive restoration can be significantly improved if Congress adopts the following policy changes:

- 1. Increase funding for restoration programs.**
- 2. Expand the geographic area under the authority of the Upper Mississippi River Restoration-Environmental Management Program to include bluffs and tributary confluence deltas.**
- 3. Reconnect and restore floodplains through the Upper Mississippi River Comprehensive Plan.**
- 4. Fund conservation programs authorized in the federal Farm Bill.**
- 5. Re-couple conservation compliance with crop insurance in the Farm Bill.**

**Planning** is guided by the federal *Principles and Guidelines* document that was last updated in 1983. A new version is currently being considered by the White House Council on Environmental Quality. However, the final document must require the Corps to plan projects that effectively address the nation's water resource needs while promoting accountability, modernization, prioritization, and equality. Project planning must not pit environmental protection against economic development. Long-term economic success depends on sustained environmental health, and most infrastructure projects can be modified to accomplish both objectives.

Water planning guidelines should be improved in the following ways:

**1. Adopt a plan-selection process that mandates federal water projects serve the national interest as defined by law and policy by ensuring**

- a. **Projects utilize non-structural measures, water efficiency, and/or restoration of natural systems whenever practicable.**
- b. **Projects protect and restore ecosystem functions and processes and environmental quality.**
- c. **Projects increase the resilience of natural and human communities to climate change.**
- d. **Projects prohibit certain types of activities that are not in the public interest, including projects that preclude ecologically sound river flows or induce development in floodplains or at-risk coastal areas.**

**2. Require selection of the “least environmentally damaging approach” to solving a water resources problem.**

**3. Require that federal investments in restoration activities restore, enhance, and protect ecosystem functions and processes, which will improve ecosystem health, sustainability, and resilience and be cost-effective.**

**4. Require the use of the most up-to-date scientific and economic knowledge.**

**5. Ensure Corps planning accounts fully for all project costs and benefits.**

By implementing these changes, Corps water resource development programs can maximize funding for habitat restoration, minimize large-scale construction, and improve the planning process to reduce errors in projecting costs. Not just in the UMR basin, but throughout the nation, current and future generations will enjoy rivers with clean water, healthy habitats, and diverse natural resources.



# INTRODUCTION

## Brief History of the Upper Mississippi River

The Mississippi River is the largest river in North America and has the third largest drainage basin in the world. It is also a national monument of significant cultural importance. The river once formed the border of our young nation. For European settlers, its banks were first the farthest reach of the frontier and then the gateway for those seeking a better life in the New West. Native Americans and settlers used it as a highway, one that linked the East Coast to the Rocky Mountains and the frozen north to the Gulf of Mexico. The Mississippi has been the muse for writers, musicians, and artists. It brought economic prosperity to the residents along its banks by facilitating commerce and providing plentiful natural resources.

The Mississippi River flows 2,300 miles from Lake Itasca, Minnesota, past New Orleans, Louisiana, where it discharges into the Gulf of Mexico. The section known as the Upper Mississippi River (UMR) extends from the river's headwaters in Minnesota down to the

confluence of the Ohio and Mississippi Rivers south of Cairo, Illinois (see figure 1), a journey of 1,200 miles. Today, there are 30 million people living in the UMR watershed, and about half of them rely on drinking water from the UMR and its tributaries (McGuiness, 2000).

Approximately 9,000 years ago, as glacial ice first covered and then retreated over northern portions of the United States, moving ice and torrents of melted water carved a massive river valley, which in its early years held substantially larger volumes of water than the UMR we know today. As the young river aged, it meandered across a broad floodplain. Natural fluxes in water levels, flows, and sediment deposition created a rich river mosaic that included small braids of streams, islands, backwaters, side channels, and sloughs (Fremling, 2005).

While humans have long depended on the Mississippi for communication and trade, the river was not heavily exploited for economic purposes until American colonists began to move into the river valley. As early settlers moved west, the Mississippi River became a critical part of the America's growing economy. With the increased need to transport people and goods on the UMR, boatmen found moving up and down the river a challenge. The UMR was full of sandbars, and the water levels were unpredictable due to floods and droughts. The U.S. government stepped in to improve river navigation. The Army Corps of Engineers (Corps) – as directed by Congress – proceeded to dig channels, build dams, straighten the riverbed, and build levees that severed the connection between the river and the land around it (Fremling, 2005).

In the early 1800s, the Corps' first efforts to "improve" the UMR consisted of removing large dead trees, known as "snags," caught along the river banks as well as huge islands of snags that could damage boats traveling on the river. By the mid-1800s, political support had

Figure 1: The Upper Mississippi River Basin



Source: U.S. Army Corps of Engineers, 2013

## Figure 2: River Training Structures



Chevron



Benway Weir



Wing Dikes

Source: U.S. Army Corps of Engineers, 2013

increased for creating a navigation channel that was four-and-a-half-feet deep using periodic dredging and “river training structures” such as dikes (see figure 2 for examples). Congress approved a six-foot-deep channel project in the early 1900s, using the same maintenance methods. In the 1930s, Congress approved alterations that would result in the most significant impacts to the UMR: A nine-foot-deep navigation channel and a series of locks and dams (Fremling, 2005).

The Corps initially opposed the nine-foot channel project, with its associated locks and dams, because of the significant construction costs and ecological consequences. Rock Island District Engineer Major Charles Hall, who surveyed the Mississippi River from St. Louis to Minneapolis, concluded that the project was not economically warranted, stating that the potential traffic was “entirely insufficient to repay the minimum cost of the proposed improvement.” Major Hall also concluded that the project would drive wildlife away and create sewage disposal problems for towns along the river. Major Hall had the support of early conservation

groups, including the Izaak Walton League of America. The League’s national president wrote a letter to the Corps’ Chief of Engineers in June 1929 expressing concern over the proposed lock and dam system, saying it would destroy “one of the largest and one of the most potentially productive wildlife refuge and recreational areas on

the entire continent.” Although Major Hall initially had the support of the Corps’ Chief of Engineers, General Edgar Jadwin, the Major was dismissed in 1929 after the Army received complaints from prominent grain terminal investors and members of Congress who favored the river project (Hoops, 1993).

“In the past, those opposing complete development on biological grounds have been inarticulate and, consequently, helpless. The engineer’s duty in a gathering like this is to present the case in clear language, in order that all intelligent portions of the electorate may form their own opinion on the merits of the case. It is possible, by engineering means, to decide whether a proposed improvement is economically justifiable. It is certainly impossible to determine by engineering means whether certain advantages to water-borne commerce justify a partial destruction of existing wild life. The public can, however, properly demand that the biological effects of a proposed movement be stated before it is adopted.”

—Major Charles Hall, Rock Island District Engineer, at the American School of Wildlife Protection in McGregor, Iowa, August 1929

Herbert Hoover, known as the “Great Engineer,” was an important proponent of the project, stating his support throughout his 1928 presidential campaign. Although President Hoover cleared his administration of dissenting opinions in the fall of 1929, in the wake of the stock market crash, he refused to provide funding to complete the project. Congress ultimately approved the project in the Rivers and Harbors Act of 1930, but disagreements over “pork-barrel spending” keep Congress from funding the project in full. The project languished until funding was provided by President Franklin D. Roosevelt as part of the New Deal public works program in 1933 (Hoops, 1993).

Completed in 1940, the nine-foot channel project cost \$164 million. It includes a series of 37 locks and dams, located on the UMR upstream from St. Louis and on the Illinois River, which create pools to sustain the navigation channel. These pools must be maintained by continuous dredging. The Corps modified the stretch of the UMR from St. Louis, Missouri, down to Cairo, Illinois – often referred to as the Middle Mississippi – with training structures and removed natural meanders to shorten the river, which disconnected it from adjacent floodplains.

The changes to these three river sections – which together constitute the Upper Mississippi River-Illinois Waterway (UMR-IWW) – resulted in significant destruction of fish and wildlife habitat and the benefits the river provides to millions of Americans.

## Engineering Habitat Destruction

The Upper Mississippi and Illinois Rivers were once renowned for their abundant game and fish populations, attracting sportsmen and tourists from around the world. The UMR is a critical flyway for birds migrating throughout the Americas. It is used by 60 percent of all bird species in North America, including 40 percent of all North American waterfowl. The river is home to 25 percent of all fish species in North America, 27 species of freshwater mussels, 45 amphibian and reptile species, and 50 mammal species. It provides critical habitat for approximately 390 state and 40 federal threatened and endangered species that are endemic to the UMR basin (McGuiness, 2000).

However, the dams, chevrons, levees, canals, and other modifications made to the Upper Mississippi River significantly altered the river’s habitats and natural functions. The locks and dams essentially turned the stretch of river between the Twin Cities and St. Louis into a string of connected pools. Most small islands where migrating ducks and geese built their nests and hatched their young are covered with water and eroded away. Shallow ripples of fresh, cool water essential to hatching and juvenile fish are filled with silt or drained for development.

The pools keep sediment contained in the upper reaches of the river rather than letting it flow down to the Gulf of Mexico (where it is needed to help replenish eroding coastal wetlands). The Comprehensive Master Plan for the Upper Mississippi River System stated that “the most pervasive and damaging problem for the UMR system as a





diverse, vital natural ecosystem is excessive sedimentation from upland and stream bank erosion in the watershed” (Upper Mississippi River Basin Commission, 1982). Although reducing sedimentation has been the primary focus of many restoration programs, the projects are never large enough to reduce sedimentation basin-wide.

The trapped sediments never dry out and consolidate – a process necessary for native vegetation to take root (Johnson and Hagerty, 2008). Research shows a direct relationship between the availability of underwater plants such as wild celery and migrating duck populations. Comparisons of canvasback duck populations in Lake Onalaska (located in the pool created at Lock and Dam 7) found a decrease from 107,500 ducks in 1979 to 49,575 ducks in 1992. According to researchers, the strongest factor in this decline was the scarcity of wild celery plants (Varro, 2003). And without these plants on the riverbed, more soil erodes, creating even worse water conditions.

Nutrient pollution is another well-publicized threat to water quality. During low flows on the UMR, excess nutrients create algae blooms that can suffocate aquatic organisms. High levels of nutrients can also affect drinking water flavor and odor. Especially high nitrogen levels can cause the deadly “blue-baby syndrome” (in which an infant’s blood cannot carry enough oxygen to cells and tissue) – leading communities to install expensive nitrogen removal facilities.

In many reaches of the river, the floodplain is disconnected from the UMR by levees. In the Middle Mississippi and Lower Illinois Rivers, for example, levees cut the river off from 60 to 70 percent of its floodplain (Johnson and Hagerty, 2008). Most of these levees protect agriculture or urban areas, but they offer a false sense of security. Levees and other flood control structures encourage floodplain development, which

increases flood losses when the levees fail. Flood damages in the 2000s totaled \$10 billion, the highest amount in history and almost double the flood damages in the 1990s (Committee on U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning, 2012).

Probably the most well-known ecological threat to the UMR is the invasion of non-native species. Billions of dollars are spent annually to combat aquatic invasive species. Most non-native species enter the UMR from the Great Lakes through the Chicago Area Waterway System, which was created, in part, to facilitate shipping between the Great Lakes and the UMR (Great Lakes and Mississippi River Interbasin Study Team, 2012). But some invasives, including Asian carp, enter the system from the Lower Mississippi River. Currently, 50 percent of the fish biomass in the UMR is non-native fish – most of them common carp (Johnson and Hagerty, 2008).

Despite so many threats to ecosystem health in the UMR, some pristine areas have been restored. Five wetland areas in the Upper Mississippi River watershed – an unprecedented number for one region – have been designated as Ramsar Convention Wetlands of International Importance:

- Cache River and Cypress Creek Wetland, which includes 60,000 acres in southern Illinois around the Cache River State Natural Area and Cypress Creek National Wildlife Refuge
- Upper Mississippi River Floodplain Wetland, which includes more than 300,000 acres in the Upper Mississippi River National Wildlife and Fish Refuge and Trempealeau National Wildlife Refuge along the Minnesota, Wisconsin, Illinois, and Iowa borders
- Horicon Marsh, which includes almost 32,000 acres in Wisconsin at the headwaters of the Rock River



- Emiquon Complex, which includes 17,000 acres of backwaters and wetlands along the Illinois River south of Peoria
- Dixon Waterfowl Refuge at Hennepin and Hopper Lakes, which includes 2,700 acres of wetlands also along the Illinois River north of Peoria.

Ramsar designation recognizes the importance of these wetlands for sustaining biological diversity and human life and is yet another signal of the importance of maintaining and restoring the UMR watershed.

Although many agencies and groups are working to restore the UMR, the Corps of Engineers has authority over the nation's large rivers and other water resources to create and maintain infrastructure, manage flood risks, encourage recreation, and protect the environment – which gives the Corps authority to restore natural functions of the UMR if directed to do so. The Water Resources Development Act (WRDA) establishes and directs the Corps' responsibilities for UMR programs and planning priorities.

## Restoring the River Through the Water Resources Development Act

The Water Resources Development Act, first enacted in 1974, provides Congressional authority for the Corps to study water resource problems, construct projects, and make major modifications to projects. The last WRDA was passed by Congress in 2007 and continues to govern Corps activities today. With the national need for new flood risk prevention and water resource projects, Congress is currently debating the next Water Resources Development Act. This presents an opportunity to address crucial UMR ecosystem and restoration issues – today and in the future.

Installation of navigation infrastructure has caused irreversible damage to the unique and valuable natural resources of the Upper Mississippi River. It is a mistake we should not repeat. Congress and taxpayers need information and recommendations to make good river management decisions and smart investments. In this report, the Nicollet Island Coalition (NIC) identifies Water Resources Development Act programs that affect the Upper Mississippi River basin and makes recommendations to Congress concerning these programs. Our recommendations are divided into three categories:

**Navigation:** UMR navigation has always been a government-supported industry, using federal tax dollars to pay for dredging channels, constructing and maintaining locks and dams, and even purchasing the first barges to haul freight on the river. As our country focuses on reducing budget deficits and citizens demand that natural resources be conserved for future generations, it is time for Congress to reevaluate the justification for expanding the UMR's navigation system. Barge traffic is declining and the industry is not able to pay its share of construction costs for new infrastructure. To avoid increasing taxpayer subsidies, which already pay for more than 90 percent of the cost to maintain and construct the inland waterway system, Congress should prioritize improving maintenance of existing infrastructure rather than spending billions of dollars on additional infrastructure where additional capacity is unnecessary.

**Restoration:** Programs such as the Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP) are vital to ensure ecosystems that have been degraded by navigation infrastructure and pollution are restored and protected. While our recommendations, if adopted, would significantly contribute towards UMR restoration, they are focused on policy changes that can be accomplished through

the Water Resources Development Act. Full restoration of the UMR can only be achieved by implementing additional land use conservation efforts throughout the basin. Because the major land use in the basin is row-crop agriculture, the Nicollet Island Coalition supports maintaining and strengthening conservation programs in the federal Farm Bill to reverse the negative water-quality and ecosystem-health impacts caused by nutrient and sediment runoff created by industrial agricultural practices.

**Planning:** The 1983 *Principles and Guidelines* (P&G) define how projects, such as navigation infrastructure and habitat construction, are to be planned and evaluated. Planning under the P&G requires the Corps to develop project alternatives that compare scenarios such as taking no action, building structures, modifying operations, and everything in between. To compare these project alternatives, the Corps evaluates each alternative with two types of analysis. The National Economic Development quantitative model looks at what is considered traditional economic benefits and drawbacks such as transportation efficiency and business success. The Environmental Quality qualitative analysis evaluates environmental concerns and resources. Often, this method of analysis justifies environmental losses by demonstrating an exaggerated economic benefit, which does not incorporate the loss of ecosystem benefits. The P&G must be updated to ensure the Corps plans and constructs projects that protect the environment. The new P&G must require selection of environmentally preferable alternatives, and the National Economic Development and Environmental Quality models must be replaced with analysis that collectively evaluates ecosystem services and economic development.

If Congress incorporates the recommendations from this report into the next WRDA as well as the funding recommendations for annual appropriations, restoration along the UMR will advance significantly.



# NAVIGATION

## Early History

Humans have traveled the Mississippi River for thousands of years. American Indians settled along the river's length, depending on river for trade and communication with other settlements. French fur traders established trade routes and posts along the Mississippi and Illinois Rivers starting in the 1600s. After the War of 1812, settlers poured into the Upper Mississippi River valley from the Ohio River, establishing many of the cities and towns we know today. St. Louis, destined to become a major trade and travel hub, attracted hundreds of thousands of settlers within the first 50 years of its founding (Fremling, 2005).

In 1824, Congress authorized the Army Corps of Engineers to manage the country's inland waterways for commercial navigation. Navigation grew dramatically on the Upper Mississippi River in the late 1800s. This growth was largely due to the newly established lumber industry. Giant rafts of logs that were lashed together in Minnesota, Wisconsin, and northern Illinois and Iowa were floated down to mills in cities such as Rock Island and St. Louis. But this boom was short lived – commercial lumber traffic declined around 1900 as northern forest timber was exhausted (Tweet, 1975).

In the late 1800s and early 1900s, most agricultural exports were shipped by rail. When bumper crops in 1906 exceeded the rail industry's ability to ship grain, farmers started looking for a new method of shipment. Although the Upper Mississippi River offered one option, grain shipping traffic did not immediately increase on the UMR because there were no grain terminals along the river. In addition, barges were considered “too large, too underpowered, and too clumsy to haul freight profitably.” Later, men were not available to work river shipping crews due to World War I (Tweet, 1975).

In 1925, the Inland Waterways Corporation (a federal corporation supervised by the Secretary of War) began a campaign to re-introduce the Mississippi as an iconic, reliable, cheap, and easy mode of transportation. The barge industry lobbied farmers heavily to support river navigation, selling it as a more reliable means of transporting grain than rail shipments. One year later, the federal government gave the Inland Waterways Corporation authority and funding to purchase and run barges on the Mississippi River. River traffic began to pick up and the first grain-to-barge terminals were built, many of them on the river south of St. Louis where navigation was more reliable (Tweet, 1975).

In 1930, Congress authorized the Corps to create a nine-foot-deep channel for barge traffic on the Upper Mississippi and Illinois Rivers modeled on the Ohio River's navigation system (built between 1885 and 1929). Due to the UMR's natural and unpredictable water flows, creating and maintaining a nine-foot channel could not be done by dredging alone; it would require large locks and dams. In a span of 10 years, the Corps built 29 locks and dams on the UMR and 8 on the Illinois River to ensure water depth sufficient for barge traffic, creating the Upper Mississippi River-Illinois Waterway (UMR-IWW) (Fremling, 2005). (See figure 3 for the locations of the locks and dams.)

After completion of the UMR-IWW system in 1940, river traffic above St. Louis continued to be stagnant due to the economic impacts of World War II (Tweet, 1975). It was not until 1950 that traffic began to grow quickly and substantially, until it plateaued in the 1980s. However, even with this traffic increase, shipping on the UMR-IWW has always remained well below the design capacity of the lock system.

Figure 3: Map of Locks and Dams on UMR-IWW



Source: U.S. Army Corps of Engineers, 2012

## Navigation Today

All of the UMR-IWW locks and dams were built with an initial 50-year design life, but to date, only two structures near St. Louis have been replaced. Since construction of the nine-foot channel, traffic has never been constrained by the infrastructure. Yet the navigation industry continuously pushes for dramatic new projects that cannot be financed.

While the navigation industry is responsible for funding half of all new construction and rehabilitation costs for the nation’s navigation infrastructure, the operations and maintenance costs are fully funded by taxpayers. Congress has failed to fund necessary maintenance for years, which drives up rehabilitation and construction costs. Instead of asking Congress to prioritize funding to effectively maintain the existing system – and despite declining traffic – the navigation industry continues to push for new and expanded locks. NIC believes the navigation industry’s proposals are excessive and unnecessary and ignore what is really needed to benefit both navigation on the UMR-IWW and the river’s natural environment.

## Rehabilitation and Maintenance

Most UMR-IWW locks and dams were designed with a 50-year “life expectancy,” and most of these projects reached that milestone in the 1980s and 1990s. How are they still operating 70 to 80 years after construction? The majority of the locks and dams on the UMR-IWW have undergone rehabilitation, which can extend the life span of locks and dams by 30 to 50 years – at a fraction of the cost of replacing the structures. The average cost for a rehabilitation project is \$25 million (see figure 4) – pennies compared with the cost of replacing locks and dams, which can run from \$1 to \$3 billion per project (IMTS Capital Investment Strategy Team, 2010).

Like any other machine (cars, furnaces, etc.), locks and dams last longer with regular maintenance. However, Congress has not adequately invested in ongoing maintenance. Without these investments, lock and dam performance drops, causing significant delays or unexpected closures. In the Upper Mississippi alone, the maintenance backlog is approximately \$3 billion (Deschenes, 2013). The national construction backlog is \$3.8 billion for

## CORPS BUDGET DEFINITIONS

**Operations:** Day-to-day operating activities of structures such as locks and dams.

**Maintenance:** Routine fixes to prevent degradation or damage to structures.

**Investigation:** Planning and designing construction projects.

**Rehabilitation:** Maintenance that exceeds \$8 million to upgrade a structure.

**Construction:** Building structures, which can include structural modifications such as rehabilitation.

**New Start:** A new construction project that has not received construction funding in previous fiscal years.

Figure 4. UMR-IWW Lock Rehabilitation and New Life Expectancy

Lock and Dam	Cost (in millions)	Year Completed	Expected Lifespan
Illinois Waterway (4 Rehabs)	\$27.2	1996	2026-2046
3	\$71.2	2009	2039-2059
11	\$47.3	2008	2038-2058
12	\$14.7	2003	2033-2053
13	\$20.7	1996	2026-2046
14	\$20.0	2000	2030-2050
15	\$25.9	1996	2026-2046
19	\$31.6	2008	2038-2058
25	\$25.9	2000	2030-2050
27	\$37.3	2011	2041-2061

Source: IMTS Capital Investment Strategy Team, 2010

Timely rehabilitation and maintenance should be the focus of the Corps and Congress for the Upper Mississippi and Illinois Rivers.



**“It’s not age. It’s the rate of deterioration.”**

—Major General John W. Peabody, president of the Mississippi River Commission, on lock and dam construction needs, UMRBA meeting, May 23, 2012

projects currently underway (IMTS Capital Investment Strategy Team, 2010), and Congress has authorized an additional \$60 billion of work through past WRDAs (Committee on U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning, 2012).

Timely rehabilitation and maintenance should be the focus of the Corps and Congress for the UMR-IWW. If Congress appropriated adequate funding for ongoing maintenance and timely rehabilitation, unexpected closures and construction could be prevented. The current “fix it as it breaks” model is driving costs up and diminishing the efficiency of the entire system.

### Capacity and Traffic

All of the locks on the UMR-IWW system are functioning well below capacity – many working at less than half their capacity. Commercial tonnage at the two busiest locks on the UMR – Melvin Price Locks and Dam in East Alton, Illinois, and Lock 27 in Granite City, Illinois – is at the lowest level of demand since operation of new 1,200-foot locks began there in 1990. These locks both have an annual capacity of more than 100 million tons and could increase current traffic loads by 15 to 30 million tons before capacity would be strained.

There are also dramatic differences in lock demand between locks located just north of St. Louis and those further upstream. Upper St. Anthony Falls Locks and Dam in Minneapolis, Minnesota, is the uppermost lock on the Mississippi River – about 600 miles north of Lock and Dam 25, which is located near Winfield, Missouri, and is the most southerly lock above the confluence with the Illinois River. The volume of cargo shipped through St. Anthony has dropped from 2.8 million tons in 1993 to only 810,000 tons in 2012. At Lock and Dam 25, above the confluence with the Illinois River, traffic dropped from 53 million tons in 1993 to 22 million tons in 2012.

Since 1993, the volume of cargo shipped on the Illinois River has also declined. At the upper end of the river, cargo tonnage at the Lockport Lock and Dam in Grafton, Illinois, has dropped from a high of almost 20 million tons in 1993 to just over 10 million tons in 2012. During the same time period, cargo shipped on the lower Illinois River at La Grange Lock and Dam (near Beardstown, Illinois) has dropped from a high of approximately 77.9 million tons in 1995 to 24.5 million tons in 2012.

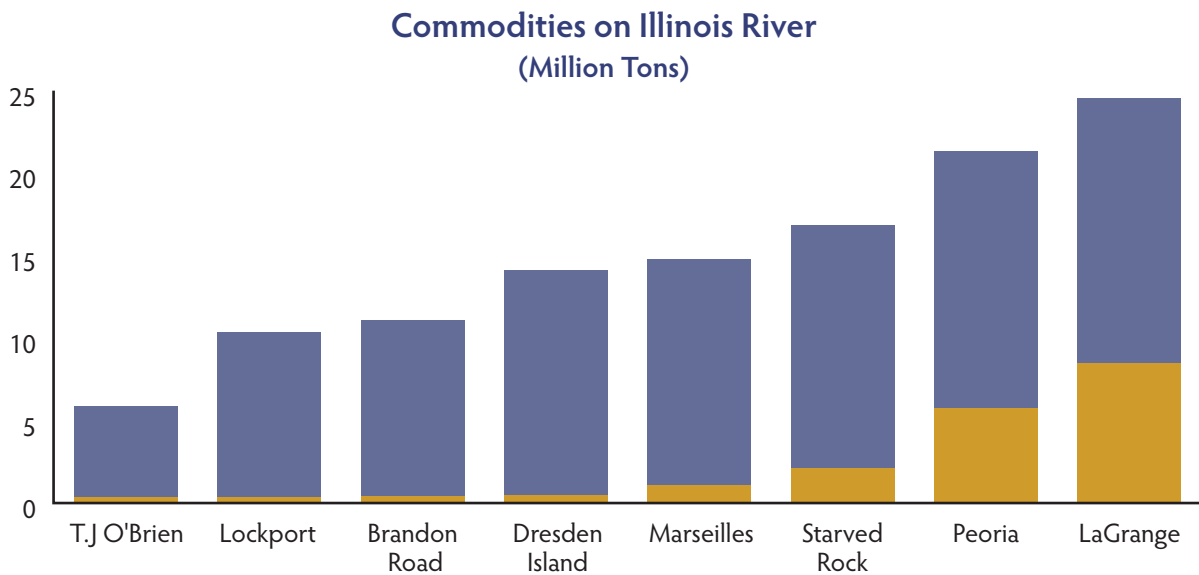
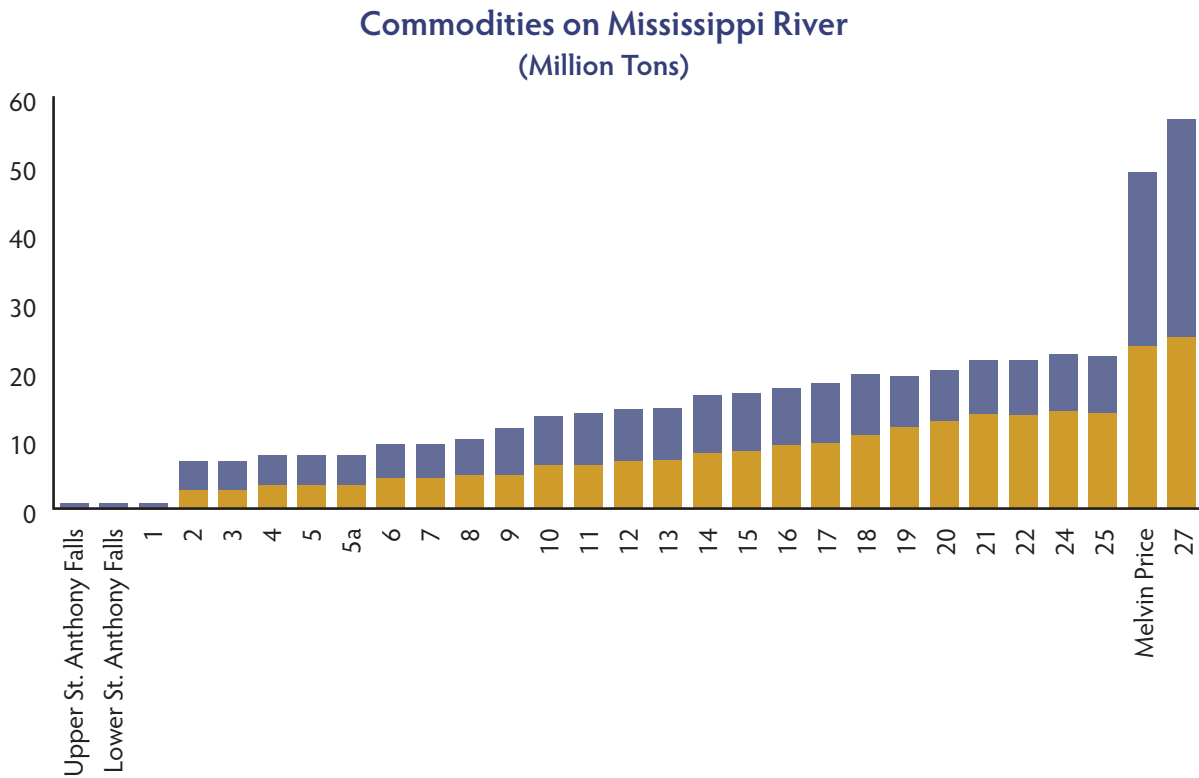
It is also worth noting that almost no food and farm products are shipped on the upper reaches of the Mississippi and Illinois Rivers. Commodity cargo picks up downstream, but food and farm products are never more than 50 percent of the bulk tonnage moved on the rivers. For years, the commercial barge industry has insisted on more and larger navigation construction projects based on their assertion that these projects are needed to support the Midwest’s growing need for grain shipping. In reality, farm commodities average 45 percent of the overall commercial tonnage on the UMR-IWW (see figure 5).

### Funding

The average cost to expand a lock is \$270 million and the cost to replace a lock and dam ranges from \$1 to \$3 billion. Rehabilitation, on the other hand, averages just \$25 million per project. The Corps needs \$3.8 billion to complete all the construction and rehabilitation projects ongoing in the nation today. Most of that funding is needed to complete new lock and dam projects on the Ohio River.

The Ohio River projects are prime evidence of failure by the Corps to accurately project the real costs of new projects and failure by Congress to generate meaningful revenue to complete projects on time. For the past decade, the Corps has focused on a series of lock and dam replacements and expansions on the Ohio River, which recently have seen cost overruns of 250

Figure 5. Volume of Total Shipments (as measured at each lock) and Portion of Farm Products in 2012



Source: U.S. Army Corps of Engineers, 2013

■ Farm Commodities      ■ Other Commodities

**Figure 6. Waterway Projects and Cost Overruns on the Ohio River (in millions)**

Facility	Original Estimate	Current Estimate	Overrun from Original Estimate	Percentage Overrun
Lower Monongahela River Locks and Dam	\$556	\$1,439	\$883	259%
Olmsted Locks and Dam	\$775	\$2,900	\$2,125	374%

Sources: Schmid, 2011; Rohde, 2012



percent and more (see figure 6). These unreasonable overruns impact more than the Ohio River projects – they also take funding away from needed rehabilitation projects on the Mississippi River.

Lock and dam construction and rehabilitation is funded using a combination of taxpayer dollars and monies from the Inland Waterways Trust Fund (IWTF). Authorized in 1986, the IWTF is funded by a \$0.20 per gallon tax on fuel used by barges and is allocated to pay half of the construction and rehabilitation costs for locks and dams. The IWTF generates approximately \$80 million annually. However, its surplus began to seriously decline in Fiscal Year 2003 as navigation project expenditures exceeded revenue. By 2009, the IWTF was essentially bankrupt. In response to this financial crisis, the Inland Marine Transportation System (IMTS) Capital Investment Strategy Team, a focus group established by the Inland Waterways Users Board, prepared a 20-year strategy of new investments and funding mechanisms to “address” the continued rising costs of the Corps’ backlog of projects. However, instead of finding dedicated funds from river users to complete the \$3.8 billion worth of projects on the ground today, the group focused on shifting more costs onto taxpayers to expand the system’s capacity by building new locks. This plan would add \$15.2 billion to the list of uncompleted projects on the ground today (IMTS Capital Investment Strategy Team, 2010).

### Expansion

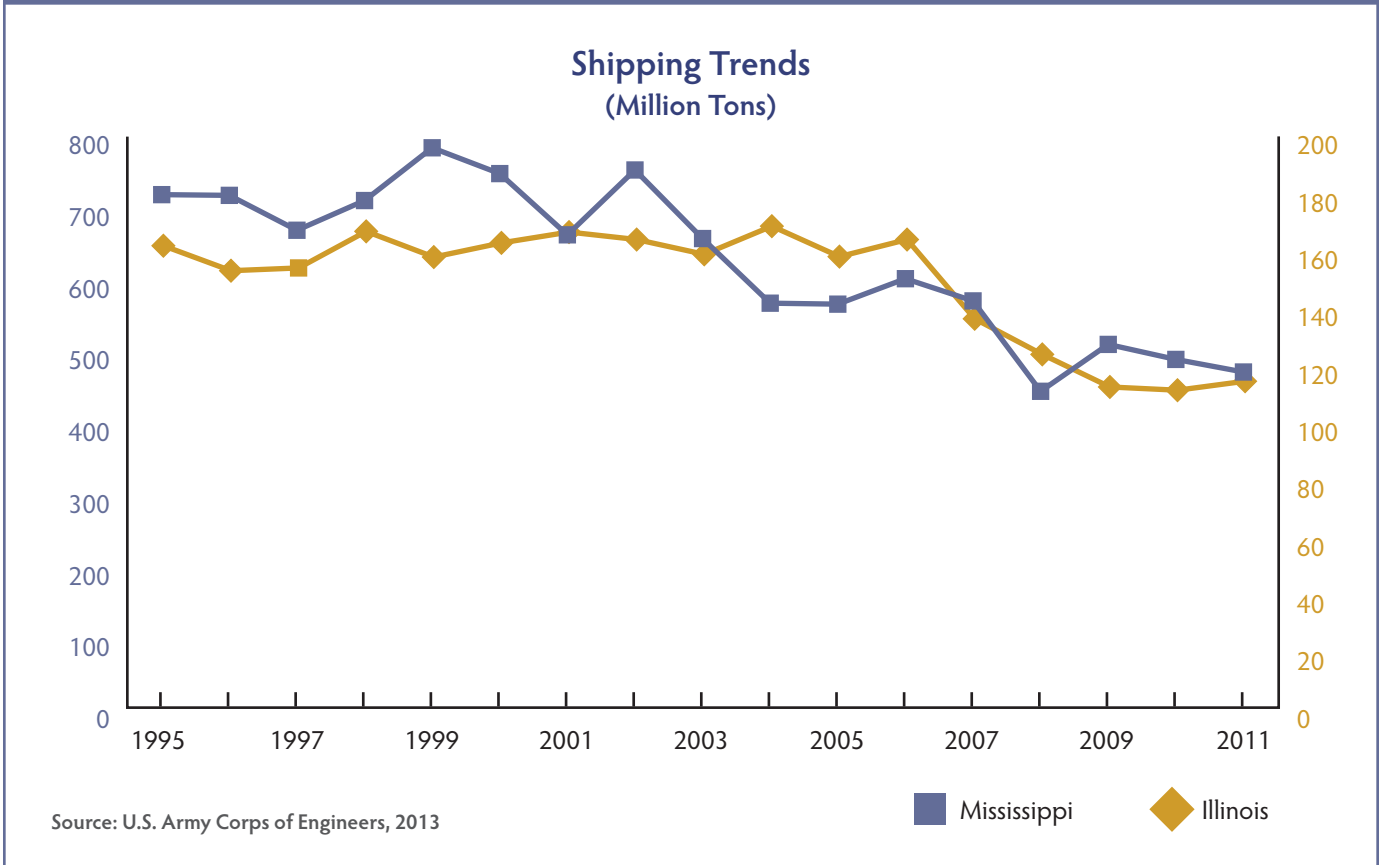
The 2007 Water Resources Development Act authorized the Navigation and Ecosystem Sustainability Program (NESP), a Corps program focused on expanding UMR-IWW shipping capacity. The primary means for this expansion is seven new 1,200-foot locks – five on the Upper Mississippi River and two on the Illinois River. These projects are out of step with today’s realities. Water resource development should be focused on public safety concerns, address the existing environmental impacts from navigation structures, and prudently use taxpayer dollars.

The Corps’ economic analysis showed that construction of the seven new 1,200-foot locks would not generate enough return on taxpayer investments to justify building them. Department of the Army and the White House guidelines specify that public projects should provide at least \$1.50 in benefits for every \$1 spent (Hon. John Paul Woodley) – which is a 1.5 ratio. But the benefit-cost ratio predicted for navigation projects proposed in NESP would be significantly less than 1.0 in most scenarios and less than 1.3 even under the most favorable conditions.

Congress authorized this program before it was approved by the Corps or the Corps economic analysis was completed. To date, the Secretary of the Army (Civil Works) has not approved the program or submitted a request for expansion of the UMR-IWW



Figure 7. Traffic on the Upper Mississippi River-Illinois Waterway



locks. Thanks to education efforts by the Nicollet Island Coalition and other groups, Congress has not provided any funds for the program since FY 2011. Even though NESP has not received funding for the past two years, the barge industry continues to push for expansion of the UMR-IWW navigation infrastructure.

### Navigation Programs

Despite the lack of industry funding and the excess navigation capacity within the existing UMR-IWW system, navigation interest groups continue to insist that locks on the Upper Mississippi and Illinois Rivers should be expanded through NESP. Their primary argument for the expansion is shipping delays, which they attribute to outdated locks with insufficient capacity.

The Nicollet Island Coalition’s 2010 report, *Big Price-Little Benefit: Proposed Locks on the Upper Mississippi and Illinois Rivers Are Not Economically Viable*, examined lock capacity and other UMR-IWW navigation issues and found that the proposed lock expansion could not be justified due to multiple factors:

- Barge traffic on the UMR-IWW plateaued in the 1980s and began to decline in the mid-1990s (see figure 7). Most locks currently in operation have excess capacity of more than 50 percent, which would accommodate any reasonable future increase in lock demand.

- Due to the lack of consistent funding, the Corps has been unable to keep current on necessary maintenance of the UMR-IWW lock and dam system. This large and growing backlog creates a perpetual problem that new construction does not solve. Because basic maintenance is necessary for any lock in use, new construction only adds another expense to existing unmet maintenance funding needs.
- Several non-structural and small-scale measures – including barge traffic appointment scheduling, mooring cells, and switch boats – have been identified by the Corps as measures that can reduce barge

## Figure 8: Examples of Small-Scale and Non-Structural Measures



Mooring cells (\$58,000 to \$1.2 million) are buoys or wires away from the lock that allow the barges to be lined up and ready to lock through if the lock is not immediately available.



Extended lock walls (\$114 to \$160 million) provide space immediately outside the lock where barges can tie up and split if they are too large for the lock.



Switch boats or helper boats (\$2 to \$4 million) help barges split the tow and help move the barges out of the lock chamber and to a mooring cell while the tow prepares for the next lock-through. Some boats may also help barges move through swift currents or ice.

Source: U.S. Army Corps of Engineers, 2012

lockage delays (see figure 8). These measures need to be instituted and evaluated before the Corps proceeds with any new lock construction. After non-structural and small-scale measures are in place, the Corps should complete another benefit-cost analysis for the new locks that incorporate these alternatives.

- The barge industry asserts that shipping by barge is significantly more fuel efficient than rail transportation and therefore less polluting. More complete analysis of transportation fuel efficiency demonstrates that this claim is incorrect because it ignores the use of highly efficient rail systems (unit trains) and does not take into account that barges travel more miles because they must follow the course of the river, unlike the more direct routes trains use to get to the same destination.

- The Corps' economic analysis shows new construction of seven 1,200-foot locks will result in a negative return on investment. Based on two decades of flat or decreasing barge traffic, the proposed new locks will likely result in a loss of 80 cents for every dollar provided by taxpayers. Of additional concern is the fact that other Corps lock projects currently underway exceed their initial cost estimates by double and triple the estimated amounts.
- Previous WRDA legislation established the Inland Waterways Trust Fund (IWTF), financed by barge industry contributions, to pay 50 percent of the cost of new inland waterway navigation construction and major rehabilitation of existing navigation infrastructure. Today the IWTF is essentially bankrupt. Without reform,

the cost to taxpayers for approved but unconstructed projects will continue to escalate.

Congress must stop giving a blank check to an unprofitable industry – an industry that cannot even make adequate contributions toward its required cost share for lock and dam rehabilitation and construction. Before projects like NESF should even be considered, the IWTF needs to be reformed to ensure consistent and adequate funding from the navigation industry, not only to clear up the backlog of construction projects but to provide funding increases tied to inflation and other cost increases.

As the country focuses on reducing the federal deficit, we cannot afford to deepen our debt on projects like NESF – projects that are not justified and are consistently plagued by cost overruns totaling billions of dollars. Following are additional details on NESF and the IWTF.

## Navigation and Ecosystem Sustainability Program

### Title VIII, Water Resources Development Act of 2007

**Summary:** Title VIII of WRDA 2007 authorized the Navigation and Ecosystem Sustainability Program (NESP). NESP authorizes construction of new 1,200-foot locks adjacent to existing locks at seven sites on the Upper Mississippi and Illinois Rivers, implementation of small-scale and non-structural measures to improve navigation (see figure 8 for examples and associated costs), and environmental restoration.

**Geographic Area:** The Upper Mississippi River (UMR) System – 1,200 miles and 2.7 million acres, including adjacent floodplains – runs from Minneapolis, Minnesota, to Cairo, Illinois; the Illinois Waterway from Chicago to Grafton, Illinois; and navigable portions of the Minnesota, St. Croix, Black, and Kaskaskia Rivers. Restoration work includes the river and floodplains from toe to bluff and the tributaries at the confluences (see figure 9).

**Authorized Funding:** \$3.921 billion (total)

**Historic Average Annual Appropriation:** \$5.4 million, half for restoration and the other half for navigation.

**FY 2012 Appropriation:** \$0

**Funding Source:** Restoration projects are federally funded in full when they

- Are in the navigable channel (including any area below the ordinary high water mark)
- Are in a backwater connected to the navigation channel
- Modify the operation of navigation structures
- Are located on federal property

Figure 9: Geographic Area of NESP



Restoration projects outside of these areas are cost shared at 65 percent federal and 35 percent non-federal sponsors, which is usually the states but can be a non-government organization.

Navigation construction projects are cost shared at 50 percent by the Inland Waterways Trust Fund and 50 percent by taxpayers. Non-structural navigation projects are 100-percent funded by taxpayer general revenues.



NESP has never been included in any president's budget request. Funding for the program has always been earmarked by Congress.

**Project Approval Process:** For restoration projects, the NESP Science Panel identifies the guiding principles and goals for restoration, which are adopted by the Navigation and Ecosystem Coordinating Committee. Projects are identified within 4 floodplain reaches and 12 geographic reaches that cover the UMR watershed and are evaluated and prioritized every 4 years. The prioritized list of projects is finalized and approved by staff at the Corps of Engineers headquarters and the Corps' Mississippi Valley Division.

Unlike restoration projects, which are routinely vetted by biologists and ecosystem specialists at the U.S. Fish and Wildlife Service, Environmental Protection Agency, and state natural resource agencies, large navigation projects such as the ones contained in NESP are authorized by Congress without similar input or evaluation. The Corps originally supported expanding locks from Dubuque south. However, in 2000, an economist for the Corps blew the whistle on the economic justification for the project. He was fired from his position for his actions, but an investigation ordered by the Assistant Secretary at the Army (Civil Works) confirmed that the Corps had manipulated the economic justification (*St. Louis Post-Dispatch*, 2000). Throughout the following decade, the Corps edited and altered the lock expansion plan to include seven new 1,200-foot locks and created a restoration component. The plan has continued to be criticized by environmental groups, the National Research Council, and the Assistant Secretary of the Army (Civil Works) (Walker, 2010).

**Program Benefits:** Under NESP, ecosystem restoration funding is authorized at \$100 million per year, well above Upper Mississippi River Restoration-Environmental Management Program funding of \$33.2 million per year. The additional funds can provide many needed environmental benefits on the river. NESP is also authorized for a much larger restoration area beyond the 9-foot channel, reaching from toe to bluff, including the historic floodplain, tributary confluences, and adjacent riparian bluffs. This is a significant improvement compared to the UMRR-EMP program, which is confined to the channel.

**Program Shortfalls:** While the ecosystem restoration component of this program is beneficial, restoration on-the-ground is held hostage by navigation expansion. The commitment of \$100 million per year for restoration is dependent on construction for navigation being funded for an equal amount. Since the navigation projects are not economically justified, they have not been funded. As a result, the ecosystem restoration component has not been funded either. Barge traffic is declining and the locks are currently functioning well below their capacity. This situation is not expected to change, so the opportunity to design more geographically expansive and comprehensive restoration projects allowed under NESP will be lost if the restoration component is not moved into the UMRR-EMP program.

## Inland Waterways Trust Fund

### Section 104, Water Resources Development Act of 1986

**Summary:** The Inland Waterways Trust Fund was created in 1986 to support lock and dam construction and rehabilitation on the Inland Waterway System. A tax on inland waterways commercial transportation fuel funds the account. Since 1994, the fuel tax has been \$0.20 per gallon.

**Geographic Area:** The Inland Waterway System, which includes the navigable rivers and coasts of the United States that support commercial transportation (figure 10).

**Average Annual Revenue:** \$83.6 million

**Average Annual Expenditures:** \$107.7 million (without cost share)\*

**Project Approval Process:** Annually, the Inland Waterways Users Board (IWUB) – a 10-member board of barge company representatives established by the federal government to advise the government about spending on waterway projects – recommends projects to the Assistant

Secretary of the Army (Civil Works), Congress, and the Corps of Engineers. The process was established in 1986 to give the navigation industry a strong role in the project prioritization process. The IWUB is also staffed and supported by the Corps.

**Program Benefits:** The IWTF collects contributions from the navigation transportation industry to pay half the cost of lock and dam construction and rehabilitation. This mechanism is a good framework to collect much of the needed revenue to maintain the infrastructure needs of the nation.

**Program Shortfalls:** The revenue collected by the IWTF is not adequate to complete needed construction and rehabilitation projects (see figure 11). Construction is restricted and delayed every year by the amount collected from the fuel tax. Because construction is cost-shared between taxpayers and navigation businesses, the annual investment in the lock and dam system is twice the amount collected by the Fund, or about \$160 million. But this amount is not enough to clear the \$3.8

billion backlog of projects on the ground today, let alone start work on the \$60 billion worth of infrastructure projects authorized by Congress. Additionally, these funds do not cover any of the cost of maintenance, which is about \$465 million annually and 100-percent federally funded (Committee on U.S. Army Corps of Engineers Water Resources Science, Engineering, and Planning, 2012).

Since the 1930s, almost every President and Congress have proposed alternative methods to fund inland waterway navigation. However, it wasn't until 1986 that Congress passed legislation requiring the navigation industry to pay part of the annual costs for the system (but only about 10 percent overall). Recent proposals by government agencies and interest groups to address the shortfall in industry funding include:

- Charging fees to lock through at each lock
- Taxing commodities shipped via barge
- Increasing the navigation fuel tax
- Removing some projects from the cost-share list, making these projects fully funded by taxpayers

The last two of these proposals have been pushed by the IWUB. In 2010, the Board prepared a 20-year investment strategy called the Inland Marine Transportation Strategy Capital Projects Business Model (commonly known as the IMTS Team report). The report outlines a new strategy for inland waterway infrastructure investment, but the recommendations are far from a solution. The strategy recommends changing the Inland Waterways Trust Fund cost-share mechanism by:

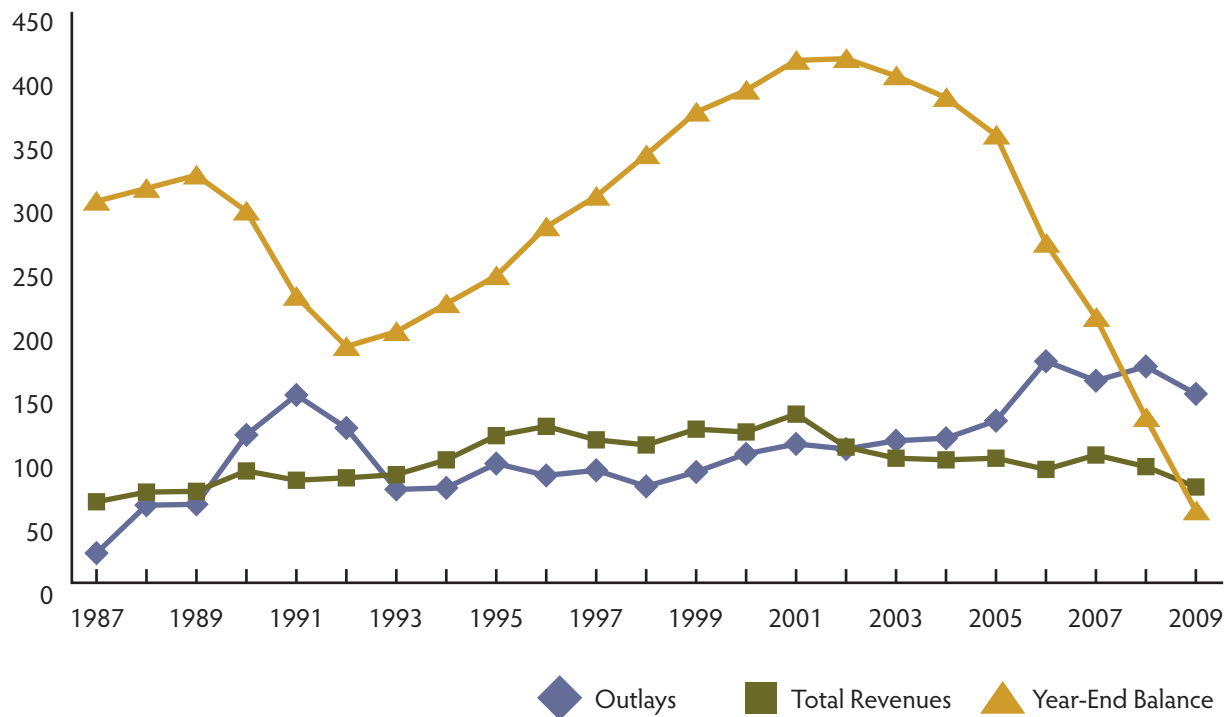
- Eliminating navigation cost-share toward dam construction and rehabilitation

Figure 10: Inland Waterway System of the United States



\*Some additional funding has been available for the Trust through an initial grant from the General Treasury of \$300 million and dividend accumulation.

Figure 11. Inland Waterways Trust Fund Value and Revenue (in millions)



Source: IMTS Capital Investment Strategy Team, 2010

- Eliminating navigation cost-share on cost overruns
- Increasing the fuel tax up to \$0.29 per gallon
- Eliminating navigation cost-share for lock rehabilitation projects estimated to cost less than \$100 million

Changing the cost-share mechanism will shift billions of dollars in navigation infrastructure projects costs onto taxpayers. The IMTS Team identified almost 150 construction projects that may be necessary over the next 20 years at a total cost of more than \$15 billion. Currently, all of these projects are subject to the 50-50 cost-share model that requires the navigation industry to pay half of the project costs.

But the IMTS Team proposes eliminating cost-share for project overruns, rehabilitation projects, and dam construction. Under these proposed changes to the cost-share model, taxpayers will be responsible for about \$11 billion of the \$15 billion total.

Of particular concern is the proposed elimination of cost-share for project overruns. In recent years, new Corps construction projects have seen cost overruns of more than 250 percent. If current projects are an indicator of future trends, taxpayers could be on the hook for \$20 to \$50 billion while the navigation industry's contribution would be frozen at just \$4 billion. Since the federal government is already struggling to fund maintenance and construction of the Inland Waterway

System, saddling taxpayers with additional costs and overrun expenses is not the solution.

Without major changes to the navigation industry cost-share requirements, the industry cannot generate even the \$4 billion it proposes to spend over the next 20 years. Increasing the fuel tax to \$0.29 per gallon would result in funding of only \$110 million per year for the IWTF – far short of the amount proposed in this very uneven cost-share and even further short of the current 50-50 cost-share amount needed to address the backlog of construction projects.

By allowing IWTF funds to be spent only on lock expansion and new starts, these projects will rise to the top of congressional

funding priorities, and needed rehabilitation will be de-emphasized. In addition, no lock rehabilitation project has ever cost more than \$100 million – the threshold the barge industry proposes for cost sharing to kick in. In fact, the average cost of a rehabilitation project is \$25 million. Setting the threshold for cost sharing so high essentially eliminates the cost share for rehabilitation work – forcing taxpayers to fund all rehabilitation costs.

## Recommendations

Navigation has been an important driver for the economy in the Midwest. Many farmers export grain via the Mississippi River and other businesses move coal, fertilizer, and aggregates around the region using the river. However, navigation traffic has been declining since the mid-1990s, so expanding navigation infrastructure is not a smart investment. Congress should deauthorize projects that are not economically justified, adequately fund rehabilitation and maintenance projects to prevent lock closures, deauthorize outdated and unfunded projects, and protect taxpayers from sharing a more unfair burden of these costs.

To achieve these needed changes, the Nicollet Island Coalition recommends the following actions:

**1. Deauthorize the Navigation and Ecosystem Sustainability Program (NESP).** Congress should deauthorize Title VIII of the Water Resources Development Act of 2007. This program cannot be justified economically and it has not been funded since Fiscal Year 2010. As part of this effort, Congress should

a. **Move the restoration component of NESP to the Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP).** While NIC strongly opposes NESP, the significant environmental restoration component of the program should be retained by moving those

projects to the UMRR-EMP. This will require expanding the geographic area authorized for UMRR-EMP and increasing annual funding.

b. **Separately authorize and fund non-structural navigation improvements.** Create a new authority for the Corps of Engineers to plan, construct, and implement non-structural and small-scale navigation improvements throughout the basin. This authorization should not be tied to any new navigation infrastructure expansion or restoration projects.

**2. Provide adequate and on-time funding for maintenance, rehabilitation, and construction.** Lock and dam maintenance projects are under-funded and behind schedule. This causes unscheduled lock closures that delay shipments and increase costs for barge companies. Delayed or inadequate funding is also the main cause of cost escalations during project construction. Congress should work to resolve funding shortfalls by generating dedicated revenue from users to properly maintain the infrastructure.

**3. Deauthorize outdated and unfunded water resource projects.** If an authorized construction project has not received funding from Congress in five fiscal years, it should be deauthorized as required by Section 1001 of WRDA 1986. Too often, the Corps shifts available funding to projects not funded by Congress to complete controversial work and keep old authorizations alive.

**4. Protect taxpayers by not authorizing amendments to the Inland Waterways Trust Fund that shift more of the cost burden onto taxpayers.** Barge transportation is already the most heavily subsidized mode of transportation in the country, and taxpayers should not be asked to pay even more when the current infrastructure meets capacity and is able to accommodate growth. Despite many secondary uses that are facilitated by

No lock rehabilitation project has ever cost more than \$100 million – the threshold the barge industry proposes for cost sharing to kick in.

## WRDA 1986, Section 1001 as amended:

(b)(2) Every year... the Assistant Secretary of the Army (Civil Works) shall transmit to Congress a list of projects or separable elements of projects which have been authorized, but have received no obligations during the 5 full fiscal years preceding the transmittal of such list.... A project or separable element included in such list is not authorized after the date which is the last date of the fiscal year following the first fiscal year in which the list is so transmitted if funds have not been obligated for construction of such project or element during such period.

or dependent on the system's locks and dams, their primary purpose is to maintain minimum water levels for navigation. It is the responsibility of the navigation industry to pay a meaningful share for a system designed for its benefit.



# RESTORATION

## Historical Background

When Europeans first arrived in the Upper Mississippi River basin, resources were so abundant that no one imagined the river and its bounty would ever be exhausted. By the late 1800s, the health of the river and its ecosystem were noticeably declining. Seemingly endless natural resources – northern timber, flocks of passenger pigeons that filled the skies – were gone. Pristine farmland was eroding downstream, and the river tourism industry had to hire staff to rescue fish to save declining populations during low water years (Fremling, 2005).

Into this already degraded landscape came a project that would change the river basin forever. In 1930, Congress authorized the Army Corps of Engineers to create a nine-foot-deep channel for barge traffic on the Upper Mississippi and Illinois Rivers. Although the Corps and conservation groups like the Izaak Walton League were concerned about the impacts of the proposed channel on natural resources and fish and wildlife, the U.S. Fish and Wildlife Service (then the U.S. Commission on Fish and Fisheries) supported the project. The League testified before Congress that the locks and dams would create pools that would destroy the river (Tweet, 1975). When the dams were initially built, the resulting behind-dam pools created an open water environment in which floodplains, marshes, and islands were flooded (as shown in figure 12). These changed conditions allowed exponential growth of opportunistic plants and aquatic life. Fishing in the pools behind the dams was phenomenal for the first decade. The UMR's productivity – the ability for the ecosystem to produce and sustain populations of plants and animals – peaked in the 1960s. Over time, water quality decreased and the open water habitat worsened. As a result, species diversity dropped and this “new” ecosystem declined (Fremling, 2005).

## Natural Resource Concerns

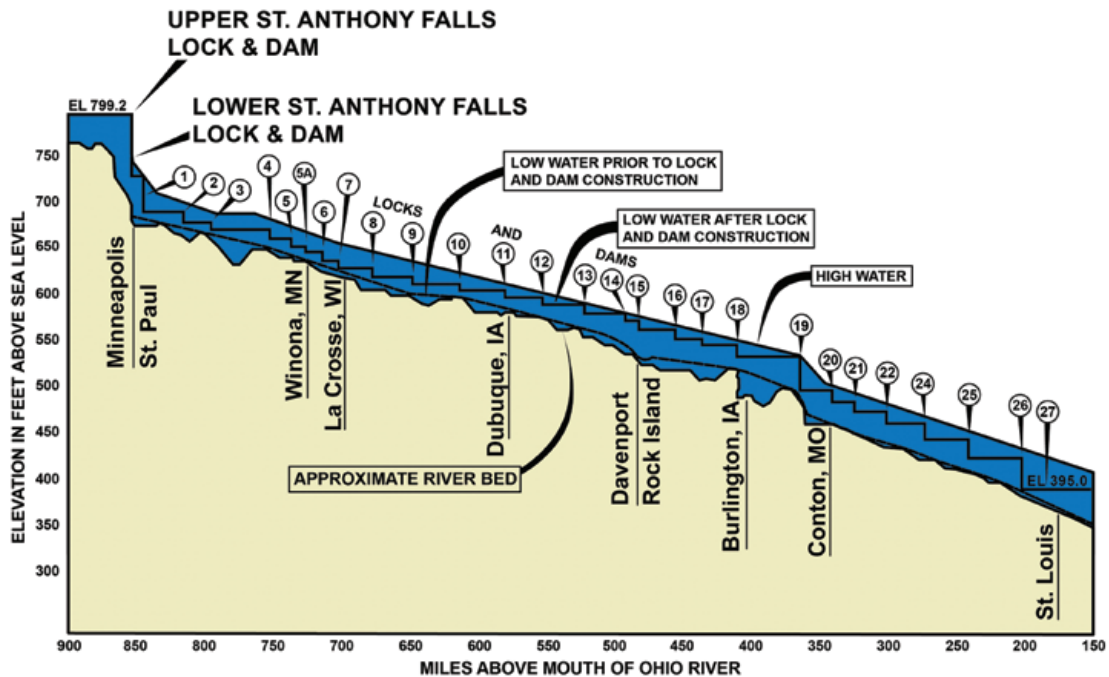
Navigation infrastructure and other modifications to the Upper Mississippi River are the direct causes of the UMR's environmental decline. Since completion of the lock and dam system, the river has been filling with sediment, smothering fish and aquatic plant habitat, reducing water depth, and causing the health of the ecosystem to decline to the point that it no longer supports many native fish and other species of wildlife (Fremling, 2005).

Before the dams were built, the river's backwaters fluctuated on a frequent basis. During high water, they connected to the river, allowing fish to access sheltered areas for breeding. Summer droughts transformed the backwaters into disconnected and calm lakes, safe for growing fish. These wildly variable flow patterns created shallow and deep areas – the perfect dynamic conditions for native fish lifecycles (Fremling, 2005).

Constructing the dams in this environment has had a continuing negative impact on water and habitat quality. Dams keep currents and water levels steady. Sediment that enters the river from tributaries is not able to compact during low water or flush out of the system because the dams eliminate seasonal river fluxes. The trapped sediment accumulates and settles as slush in the channels, sloughs, and backwaters – filling deep holes, preventing aquatic plants from taking root, and degrading natural nurseries for fish nesting, spawning,



Figure 12. Stairway of Water: A cross-section of the UMR between St. Louis and Minneapolis



Source: U.S. Army Corps of Engineers, 2012

and early growth. For decades, the sediment has been filling in the deep areas along the UMR used by fish over the winter. Suspended sediment decreases light penetration in the river water, hindering photosynthesis and reducing visibility for hunting fish. In many backwaters, the water depth decreases until it is too shallow for fish habitat but is an ideal home for “nuisance plants” that can cause large fluctuations in levels of dissolved oxygen that fish need to survive (Fremling, 2005).

Habitat degradation from the dams is hurting native species across the food chain. Clams, mussels, and crustaceans that live on the bottom of the river can suffocate in the sediment-filled water. These invertebrates are an important food source for fish, other crustaceans, and birds such as diving

ducks that feed heavily on fingernail clams. Additional habitat for migrating birds and other wildlife has been lost due to drainage and conversion of wetland and floodplain acres for agricultural use.

The degraded conditions also provide an environment in which invasive species can thrive and successfully reproduce. As the populations of invasive species increase, they out-compete native species for food, damage infrastructure, and harm fisheries. For example, zebra mussels (figure 13) appeared in the Great Lakes basin in 1988, released from ships that emptied their ballast water there. These invasive mussels quickly spread into the Mississippi River basin through the Illinois River in the early 1990s. Native mussel populations at that time were already stressed from the habitat

damage caused by dam construction and erosion. The appearance of zebra mussels created new survival problems for native species because the zebra mussels latch on to any hard surface – including native mussels, which are then slowly choked to death. This single invasive species creates a significant economic burden: Governments and the private sector spend \$3.4 billion annually on zebra mussel mitigation (Lodge and Finnoff, 2008).

Asian carp are the latest invasive species to grab wide-spread national attention (figure 13). The carp were brought into the United States in the 1960s and 1970s for use in aquaculture, mostly on fish farms located on the Lower Mississippi River floodplain. They have been found in Lower Mississippi River tributaries since the early 1970s and

## RESTORATION THROUGH THE FARM BILL

Sediment in the Upper Mississippi River comes primarily from tributaries and farm fields. Although habitat enhancement projects benefit wildlife, they do not address sedimentation at its source. Conservation programs in the Farm Bill need to be strengthened and expanded or most of the habitat enhancement projects on the UMR will not have a long lifespan because sediment continues to fill the system. Reducing sedimentation will not only improve wildlife habitat in the Upper Mississippi backwaters and tributaries but also reduce the amount of non-point-source pollutants like nitrates and phosphates that wash into the water.

Strengthening the “conservation compliance” component of the Farm Bill is essential for restoration of the Upper Mississippi River. Conservation compliance requires farmers who receive support from Farm Bill payment programs to develop conservation plans to prevent soil erosion on highly erodible lands and to reduce wetland drainage. However, many existing programs with conservation compliance components are expected to be eliminated in the next Farm Bill. In their place will likely be a greatly expanded federal crop insurance program that does not currently have a conservation compliance component. In effect, by losing our current farm payment structure, we will lose a significant tool to reduce sedimentation. Conservation compliance must be recoupled with taxpayer subsidies for crop insurance premiums to help conserve valuable natural resources and the Mississippi River.

We must also protect other critical Farm Bill programs – such as the Conservation Stewardship Program and Conservation Reserve Program – that make up the Farm Bill’s Conservation Title. These programs help farmers put practices into place that protect soil, improve water quality, and maintain wildlife habitat on both working lands as well as land not well suited to agricultural production.

Coupling restoration with efforts to prevent further damage to water quality and fish and wildlife habitat will ensure longer-lasting, cost-effective success.

have since made their way upstream to the Upper Mississippi and Illinois Rivers (Kelly et al, 2011). Asian carp are known to jump out of the water into boats and knock boaters into the water. They are voracious eaters, competing with native fish for food, and are prolific breeders. Recent research shows that the lock and dam system creates the perfect habitat for Asian carp. The dams on the Upper Mississippi River-Illinois Waterway all but eliminate natural water level fluctuations on the river, creating calm pools for carp spawning. A recent study noted that during several flood years when the river fluctuated greatly, Asian carp populations dropped in the Illinois River. If the dams were not in place, the carp would be less successful (Hoff, Pegg, and Irons, 2011).

Billions of dollars are spent every year mitigating the ecological consequences of invasive species, so stakeholders are looking at more aggressive ways to prevent the spread of aquatic invasives, including the possibility of closing locks in Illinois and Minnesota.

**Figure 13: Damaging Invasive Species in the UMR**



Asian Carp

*Photo by Chris Young*



Zebra Mussels

*Photo by U.S. Fish and Wildlife Service*

## Restoration Programs

Outside of efforts focused on invasive species, there are several programs working to restore the UMR's habitat and native species. The Corps is responsible for maintaining the environmental health of the nation's water resources as well as navigation. Protecting and restoring the Upper Mississippi River was a priority identified by Congress when it declared the region a "nationally significant ecosystem" in WRDA 1986.

Three WRDA-authorized programs focus exclusively on restoration in the Upper Mississippi River basin, and one additional program is focused on reducing flood damage by reconnecting the river's floodplains. The most comprehensive of these programs is the **Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP)**. Two similar programs are specific to the state of Illinois: The **Illinois River Basin** and the **Kaskaskia River Basin Restoration Programs**. The **Upper Mississippi River Comprehensive Plan (UMRCP)** focuses on reconnecting floodplains in the basin as a cost-effective and environmentally sensitive means to reduce flooding.

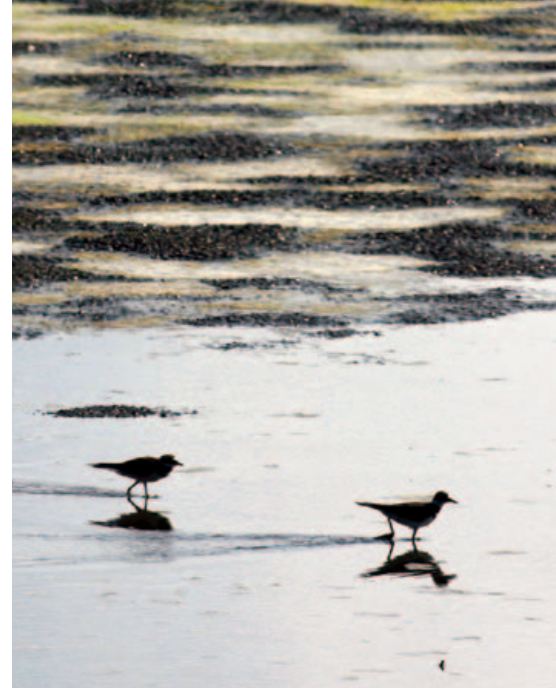
The UMRR-EMP is by far the largest and most successful of the UMR restoration programs. This first-of-its-kind river restoration program has two components: Habitat Rehabilitation and Enhancement Projects (HREPs) and Long Term Resource Monitoring (LTRM). HREPs have restored more than 100,000 acres of habitat on the UMR at a cost of less than \$3,000 per acre. These projects focus on restoring and maintaining wet prairie, forest, deep water habitat, native aquatic vegetation, and wetlands. LTRM – a monitoring, research, and data management program – has contributed significantly to management and restoration dialogue by developing a database of more than 7 million measurements and publishing more

than 30 scientific manuscripts since 2004 (U.S. Army Corps of Engineers, 2010).

One shortcoming of UMRR-EMP is that it is restricted geographically to the channel of the Mississippi and Illinois Rivers. By comparison, the Illinois River Basin and Kaskaskia River Basin Restoration Programs include all backwaters, side channels, tributaries, and tributary watersheds within the basins, which allows these restoration programs to address environmental problems at their source, helping to prevent further degradation of the watersheds.

Most restoration programs on the UMR focus on sediment removal, but impacts from navigation infrastructure and levees that separate floodplains from the river are also major threats to wildlife. In its natural state, the Mississippi River fluctuated seasonally during snow melts and spring and fall rains. Backwaters, wetlands, and sloughs would become flooded with high water pulses and disconnected during summer droughts. This provided diverse habitat ranging from calm, shallow lakes and ponds to powerful rapids over rocky outcrops throughout the floodplain. To tame the Mississippi for navigation, side channels and backwaters were cut off from the main stem. Levees built for flood control in fact drained land that was rapidly developed for agriculture and to accommodate city sprawl. Throughout the UMR basin, only half of its floodplain remains connected to the river (on average), and that disconnect increases as the river moves south.

Congress authorized the Upper Mississippi River Comprehensive Plan to reduce the risk of flood damages on the Upper Mississippi and Illinois Rivers. The preferred alternative developed by the Corps was to purchase land behind the levees where the cost of repairing the levee exceeded the value of the land.



WRDA is an "authorization" bill – it establishes policy and programs and authorizes specific federal funding amounts that can be allocated to implement those programs and policies. However, the actual funds are made available through an annual "appropriations" process in Congress. Appropriations bills determine how much can be drawn from the U.S. Treasury and spent on a program in a given fiscal year. Appropriations bills are not required to provide the same amount of funding outlined in an authorization bill – and very often do not.

The Corps would only purchase land from willing sellers but would also decline to repair agricultural levees if the repair cost exceeded the value of land. Unfortunately, the program never reconnected any of the UMR to its floodplain and Congress did not include funding for the program in Fiscal Year 2012.

These four river restoration programs are the most direct way to invest in ecosystem restoration in the UMR. The projects will help improve both the river basin's environment and the economy by:

- **Increasing recreation.** Improving habitat on the river increases tourism as people flock to the river for fishing, boating, hiking, bird watching, and other outdoor sports. Tourism on the UMR alone provides \$6.6 billion in revenue annually (McGuiness, 2000).
- **Protecting and restoring native habitat.** The Mississippi River basin is a significant flyway for migratory birds and home to many species of

flora and fauna. By protecting habitats that support aquatic species and other wildlife, we promote the ecosystem services of a healthy, functioning river, which will return its investment through flood damage reduction, water quality improvements, commercial fishing success, and other benefits. An article in *Nature* estimated that floodplains provide \$7,923 per acre in services annually (Costanza et al, 1997). Between Cairo, the Twin Cities, and the Illinois River, the UMR floodplain is 2.57 million acres (McGuiness, 2000), which means that the economic benefits of restoring the river and its floodplain could translate to \$20.4 billion annually, without including the benefits from the river itself.

- **Fighting invasive species.** Improving habitat for native species will help them out-compete non-native plants and wildlife. Invasive species in the Great Lakes cost the region

\$200 million annually (Lodge and Finnoff, 2008).

- **Creating jobs.** Each new restoration project is a construction contract, and workers will be employed to complete large projects along the river. By the Corps' estimate, a fully funded UMRR-EMP will support almost 1,000 employees, from engineers to construction workers. A fully funded Illinois River Basin Restoration Program will employ 750 people annually. Additionally, a healthy ecosystem will support and create tourism-related jobs.

Following are quick facts about the Upper Mississippi River, Illinois River Basin Restoration, and the Upper Mississippi River Comprehensive Plan authorizations. Because the Comprehensive Plan for the Kaskaskia River Basin Restoration has not been developed, that program is not discussed in detail here.



## Upper Mississippi River Restoration-Environmental Management Program

### Section 1103, Water Resources Development Act of 1986

**Summary:** The program was authorized in 1986. Initially, the language authorized the completion of the Comprehensive Master Plan for the Management of the Upper Mississippi River System. Once the plan was finished, Section 1103 granted the Army Corps of Engineers authority to implement the plan through two programs: Habitat Rehabilitation and Enhancement Projects (HREPs) and Long Term Resource Monitoring (LTRM), known collectively as the Upper Mississippi River Restoration-Environmental Management Program. The HREPs (listed in figure 14) restore segments of the river. LTRM is supported by the U.S. Geological Survey (USGS) and six research stations on the river (locations shown in figure 15) that monitor environmental trends and make recommendations to the Corps and other river managers to improve ecological health.

**Geographic Area:** The navigable reaches of the Mississippi River north of Cairo, Illinois, and the Illinois River, including portions of Illinois, Missouri, Iowa, Wisconsin, and Minnesota.

**Authorized Funding:** \$33.187 million annually (no expiration)

**Historic Average Annual Appropriation:** \$20 million (historic funding levels shown in figure 16)

**FY 2012 Appropriation:** \$17.785 million

**Funding Source:** Federal funding for UMR-EMP comes from general revenue, but support also comes from the UMR states. For HREPs, the Corps provides 65 percent of the funding on non-refuge projects and the rest is provided by a non-federal sponsor, mostly state governments.

Figure 14: Upper Mississippi River Habitat Rehabilitation and Enhancement Projects (completed or in progress)



**Figure 15: Location of Long Term Resource Monitoring Field Stations**



Source: U.S. Army Corps of Engineers, 2013

On national wildlife refuges, the Corps provides 100 percent of funding. After a project is complete, the non-federal sponsor is responsible for 100 percent of site operation and maintenance. On national wildlife refuges, the cost-share sponsor is the U.S. Fish and Wildlife Service (USFWS). USFWS estimates that it contributed \$2.5 million for operation and maintenance on HREPs between Fiscal Years 2004 and 2009, and states have spent approximately \$19.4 million since 1985. All LTRM funds go to USGS to manage the program, while the field stations are staffed by scientists from state agencies, USGS, and USFWS (U.S. Army Corps of Engineers, 2010).

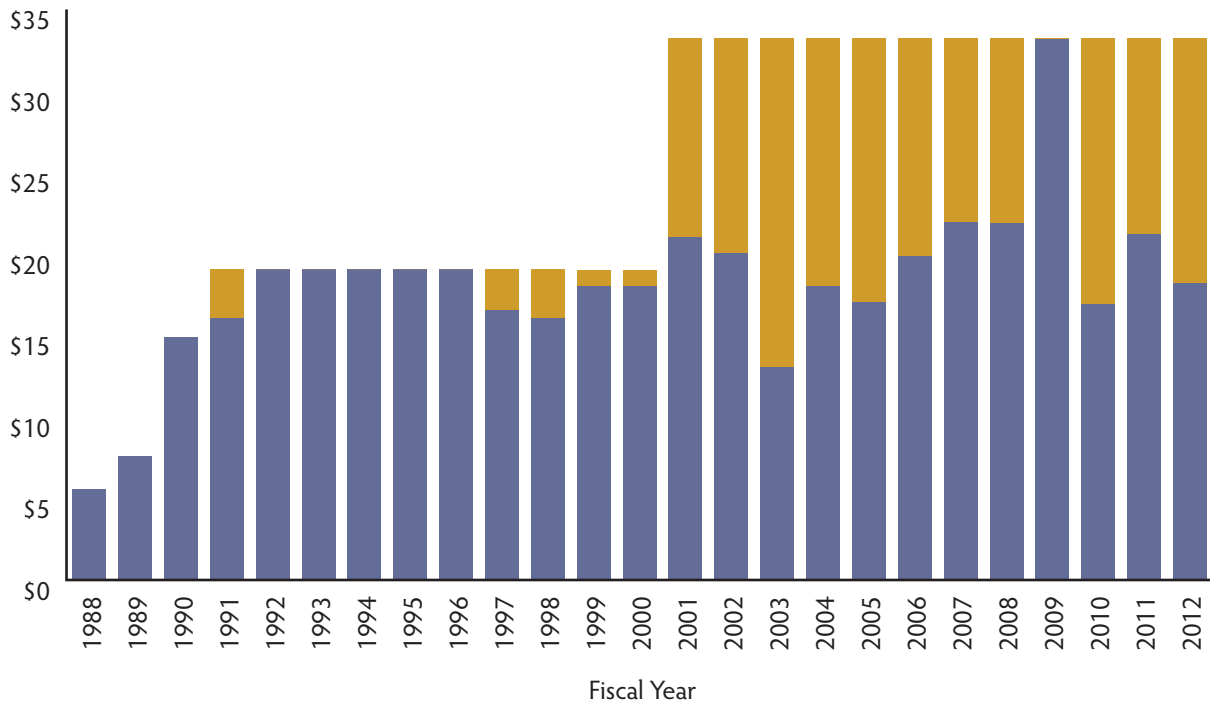
**Project Approval Process:** Program priorities are discussed by the UMRR-EMP Coordinating Committee, and LTRM-specific issues are focused on by a separate committee of researchers. Both of these groups are made up of diverse stakeholders from states agencies, the U.S. Environmental Protection Agency (EPA), USFWS, and USGS. They work through consensus building and discussions on budgetary and policy issues. District Ecological Teams, composed of natural resource managers, recommend projects based on ecological needs. Next, a System Ecological Team considers the District Ecology Team recommendations and prioritizes projects. At the final stage, the Mississippi Valley Division of the Corps reviews regional needs, available funding, construction capability, geographic distribution, and project sponsorship (U.S. Army Corps of Engineers, 2010).

**Program Benefits:** HREPs have restored more than 100,000 acres in the river corridor, making it the most successful restoration program on the river. LTRM is an excellent program component that provides independent, science-based research to help inform management decisions.

**Program Shortfalls:** This program is hindered by inadequate funding levels. The program is authorized to receive \$33.187 million annually and only reached that appropriation in 2009 under the American Revitalization and Reinvestment Act. Additionally, the 1986 program design overlooked important ecosystem components. The tributaries are the primary source of sediment pollution in the UMR, but the program is not authorized to work in the tributary confluence deltas to capture that sediment before it enters the Mississippi River. The Mississippi River bluffs provide essential habitat for migrating wildlife and birds such as bald eagles. However, the limited geographic scope of UMRR-EMP will not allow restoration activities in these areas.



**Figure 16. Upper Mississippi River Restoration-Environmental Management Program (in millions)**



Source: Hubble, 2011

■ Appropriated Funds    ■ Authorized Funds



## LIFE AT A LONG TERM RESOURCE MONITORING STATION

Growing up in the Alton area, the Mississippi River has been a constant in my life. Some of my favorite memories from childhood – looking at the eagles, fishing, duck hunting – involve the river. So protecting this vital resource has been an interest of mine from a young age. The catalyst that forged this interest into a passion was when I started taking biology, field biology, and environmental geography classes at Lewis and Clark Community College. I realized that I wanted my career to have a positive effect on the river that influenced me so much.

After completing my Associate Degree at Lewis and Clark Community College, I graduated from Southern Illinois University–Edwardsville with a Bachelor of Science degree. My first job after graduation was with the Illinois Natural History Survey at the Great Rivers Field Station. I was an hourly Field Technician working on the Long Term

Resource Monitoring component of the Upper Mississippi River Restoration-Environmental Management Program. My duties included assisting researchers with the collection and laboratory processing of water quality, invertebrate, aquatic vegetation, and fish population data from the Mississippi River and lower reaches of the Illinois River. I learned how to navigate the river, drive and trailer boats, electrofish, and set hoop and fyke nets. I also gained experience in all aspects of river research and conservation. It was my dream job and confirmed that I had chosen the right career path.

One of my favorite aspects of my job is education and outreach. We set up booths at the Lewis and Clark Community College “Waterfest” and Two Rivers Family Fishing Fair at Pere Marquette State Park and talk about the fish of the river. We show live fish to kids and adults alike – some who have never touched a fish before. The excitement

on their faces and the connection we create between those local people and the river in their backyards is priceless. My Field Technician job turned into a permanent position with Illinois Natural History Survey at the National Great Rivers Research and Education Center, where the education and outreach opportunities are endless. I take pride in what I do, knowing that it will help conserve a waterway that is so precious to me. That pride and passion is being passed on to my children, who can’t wait to hear about what I did at work and whose favorite summer activity is watching my boat pass by and, if they are lucky, seeing me pull a net while they wave from the road.

— Megan Cowen, Long Term Resource Monitoring Station, Illinois Natural History Survey





Pool 5 from Mike's Dock in 2001



Pool 5 from Mike's Dock in 2008

## A FAMILY CABIN ON POOL 5

**M**y family has owned land and a cabin on the Weaver Slough (Minnesota) side of Pool 5 for about 100 years. My grandfather loved to fish and hunt ducks. He owned a piece of hunters' heaven when the nine-foot channel dams flooded the backwaters and woods of the Upper Mississippi River. I grew up loving that old cabin and all it provided for my environmental conscience. During the 1970s and 80s, my river family watched the serious decline of water quality and good wildlife habitat in "our pool." I was a young and insistent river activist who challenged "standard operating procedures" by many agencies that were responsible for the UMR system. The realization of this being a resource-wide problem was my incentive to speak up for the river. Those efforts and contacts got me a seat on the Water Level Management Task Force as a citizen member – mostly because I showed up at a meeting and wouldn't leave.

The Task Force is a multi-agency group affiliated with the Corps of Engineers. The group deals with water levels and river structure use for more than just navigation. The task force was proposing using the lock-and-dam system to recreate some of the natural and historic water level and flow

conditions that promoted a healthy river environment. Using the tool of water level drawdowns to improve and restore habitat had not been done on this size and nature of river before. Thus it is very difficult to plan for and even more difficult to implement.

I learned a lot of scientific information and was often very frustrated by the government mandates and inability to adapt to the management policies of the various agencies other than commercial navigation use of the UMR. Learning the budgeting and funding mechanisms of the Corps and other state agencies was a great lesson for me in politics that shouldn't have as much to do with ensuring business profits as it does with protecting and preserving for all users one of our nation's greatest assets: The Upper Mississippi River.

Hope for my Pool 5 family cabin and property came with the Water Resources Development Act of 1986, when the Upper Mississippi River Restoration-Environmental Management Program was created. The first large-scale project proposed by the Water Level Management Task Force was an experimental, pool-wide one-and-half-foot drawdown during 2001 and 2002 on Pool 8. The planning

and implementation took years but the results were obvious: Emergent plant growth quickly returned. Public support was widespread and we quickly proposed to repeat the project. After several years of research and planning, I was happy to see Pool 5 selected for the second large scale, one-and-half-foot drawdown in 2005 and 2006. I co-chaired a Citizen Committee to engage and educate the public and sportsmen on the habitat rehabilitation project. We met with and involved most of the businesses, residents, and many users of the pool via educational handouts and public meetings. After two successive summers of drawdowns, the wildlife habitat in Pool 5 flourished and recreation on the river exploded. Fishing from our cabin on the river is wonderful and we now spot many more migrating birds and waterfowl. Even some of the naysayers I worked with in the beginning have become converts to adaptive water level management to benefit UMR habitat and thus wildlife and fish. I couldn't be happier with our restoration efforts and the contribution of the UMRR-EMP habitat program to fish and wildlife.

—Mike Kennedy, Member,  
Izaak Walton League of America

## Illinois River Basin Restoration Program

### Section 519, Water Resources Development Act of 2000

**Summary:** The Illinois River Basin Restoration Program authorized development and implementation of the Illinois River Basin Restoration Comprehensive Plan. The Comprehensive Plan identifies sedimentation as the biggest threat to the Illinois River and outlines 16 restoration projects that will greatly reduce sedimentation and improve habitat.

**Geographic Area:** The Illinois River, its backwaters, side channels, and all tributaries – including their watersheds – that drain into the Illinois River (figure 17).

**Authorized Funding:** \$100 million over 4 years

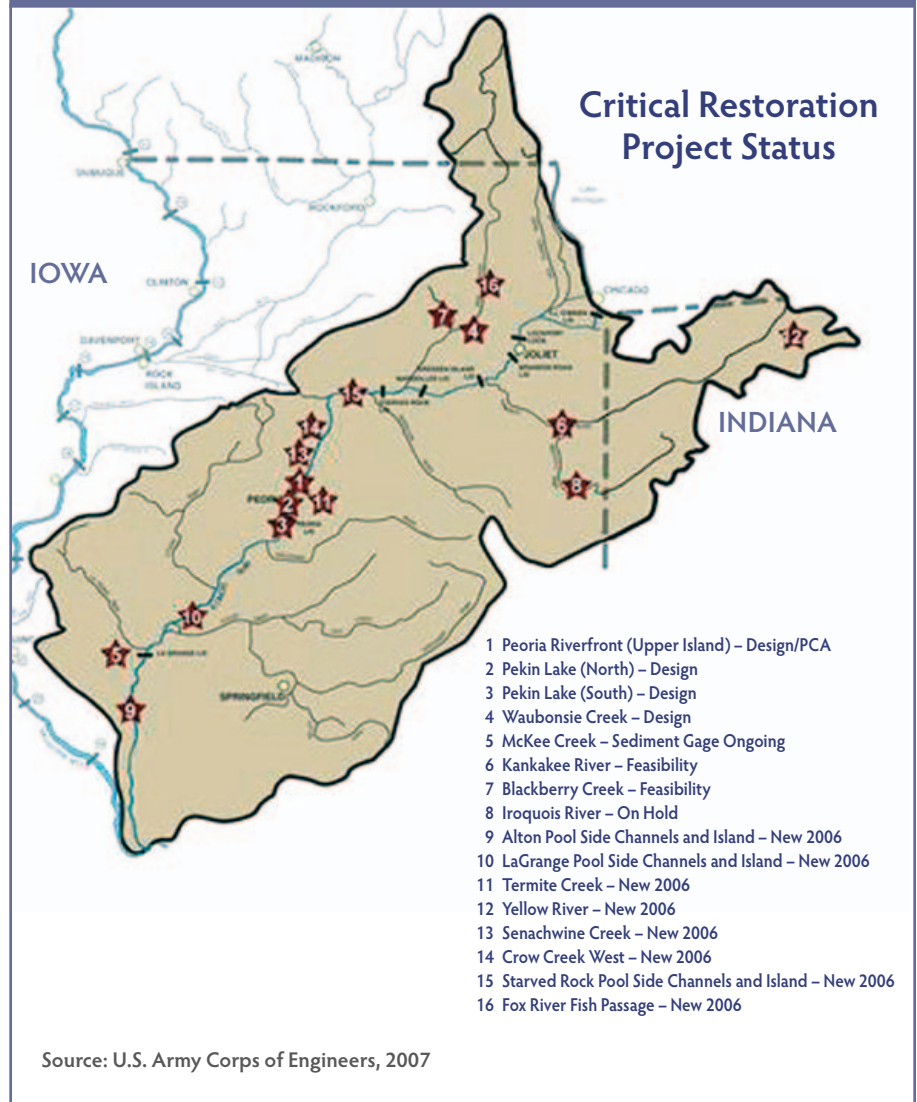
**Historic Average Annual Appropriation:** \$470,000

**FY 2012 Appropriation:** \$400,000

**Funding Source:** Federal funding for the Illinois River Basin Restoration Program comes from general appropriations. All projects are cost-shared at 65 percent federal and 35 percent non-federal (usually the state of Illinois). Operations and maintenance after a project is complete is the responsibility of the non-federal sponsor. Up to 80 percent of the non-federal cost share may be in-kind.

**Project Approval Process:** Sixteen critical restoration projects were initially identified in the Comprehensive Plan. New projects may be identified and submitted by regional planning teams for the Upper Illinois, Fox, Middle Illinois, Kankakee, Upper Kankakee, and Lower Illinois Rivers. Projects are identified and submitted to the Illinois River Team, which evaluates and discusses the proposed projects with the Science Advisory Committee and the Illinois River Coordinating Council at public meetings. After significant public involvement and vetting, projects are

Figure 17: Critical Restoration Projects Identified in the Illinois River Basin Restoration Comprehensive Plan



submitted to the Steering Committee of state and federal agencies for final approval.

**Program Benefits:** This program establishes a framework that incorporates public involvement and third-party review at various stages before project implementation. It is a good model for project identification and planning, and the geographic scope of the area also allows the Corps of Engineers flexibility to work outside of the main channel and implement

projects to address problems – including sedimentation – at the source.

**Program Shortfalls:** This program has consistently received minimal funding from general investigations – funding that can only be used for the project planning stage. Construction has begun on one project using American Recovery and Reinvestment Act funds, but this did not guarantee additional construction funds to move more projects forward.

## Upper Mississippi River Comprehensive Plan

### Section 459, Water Resources Development Act of 1999

**Summary:** The Upper Mississippi River Comprehensive Plan (UMRCP) provides authority for the Corps to facilitate and provide technical support for the development of flood risk management strategies and plans. The authorizing language calls for a plan to address water-resource and related land-resource problems and opportunities in the Upper Mississippi River basin in the interest of flood risk management through structural and nonstructural flood risk management and floodplain management strategies, continued maintenance of the nine-foot channel, management of bank caving and erosion, watershed nutrient and sediment management, habitat management, and steps to meet recreation needs. The plan was finalized in 2008 and included 12 possible plans for flood management. Out of these, the Corps chose *Alternative H*, which includes an optional buy-out component permitting the federal government to purchase land behind levees where the cost of the land is less than the cost of repairing the levee, which would also help reconnect the floodplain to the river. If the landowner did not opt to participate in the buy-out, no federal assistance would be provided to maintain the levee. Federal assistance would be granted where the protected land was more valuable than the cost of maintaining the levee.

**Geographic Area:** The entire Upper Mississippi River basin (see figure 18).

**Authorized Funding:** Not specified, but the Corps analysis of *Alternative H* estimated \$5 billion total would be needed to implement the plan.

**Historic Average Annual Appropriation:** To date, the Corps has received almost \$5 million to complete the plan, but no additional funding for feasibility studies has been appropriated.

**FY 2012 Appropriation:** \$0

**Funding Source:** To date, the planning work has been entirely funded by the federal government. Feasibility studies for specific projects will be cost shared at 50 percent federal and 50 percent non-federal sponsor.

**Project Approval Process:** Projects are vetted and approved through a local collaborative team that works with stakeholders to identify needs and solutions. Feasibility studies and planning is completed with non-federal, local sponsors. Once a project is approved locally, it is sent up through the Corps districts with final approval from the Corps' headquarters in Washington, DC.

**Program Benefits:** The UMRCP offers a compromise between environmental, agricultural, and development interests and a much-needed opportunity for reconnecting large areas of floodplain to the UMR. By establishing guidelines for floodplain buyouts and continued levee repair, the Corps has developed a good model for a voluntary restoration program while restricting federal payments to repair environmentally damaging levees.

**Program Shortfalls:** Since the 1999 authorization, Congress has provided sporadic and limited funding for the UMRCP. To date, funding has been limited to developing the UMRCP report, but no funds have been provided for its implementation.



**Figure 18: Study Area for the Upper Mississippi River Comprehensive Plan**





## Recommendations

The Upper Mississippi River Restoration-Environmental Management Program and Illinois River Basin Restoration Program are funded and actively improving the ecosystem through many restoration projects. However, comprehensive restoration can be significantly improved if Congress adopts the following policy changes:

**1. Increase restoration funding.** The UMRR-EMP should be fully funded to its authorized annual level of \$33.187 million to expand restoration projects on the river. Once UMRR-EMP is working at full capacity, Congress should consider fully transferring the restoration component of the Navigation and Ecosystem Sustainability Program into UMRR-EMP by increasing the authorization for UMRR-EMP to \$100 million. The Illinois River Basin Restoration and Kaskaskia River Basin Restoration Programs should also be funded at the authorized levels so project planning can continue and more projects can break ground.

**2. Expand the geographic area under the authority of Upper Mississippi River Restoration-Environmental Management Program to include bluffs and tributary confluence deltas.** Limiting the area of authority to the main channel limits the ability of the Corps of Engineers to address problems at the source. Instead of preventing erosion at the source, the Corps continuously dredges the channel. Illinois River Basin Restoration and Kaskaskia River Basin Restoration Programs cover the entire watershed and tributaries. Expanding the program to capture sediment at the tributary confluence deltas would allow the Corps to prevent ecosystem problems. Restoring bluffs will create diverse fish and wildlife habitats throughout the UMR basin.

**3. Reconnect and restore floodplains.** The Corps specifically selected *Alternative H* in the Upper Mississippi River Comprehensive Plan, which allows land buyouts and restores some floodplains, especially in the Lower Illinois and Middle Mississippi Rivers region. This program has

not been funded beyond plan completion. Congress should either appropriate adequate funding to continue the UMRCPP or expand authority for the UMRR-EMP to address floodplain reconnection issues.

**4. Fund conservation programs in the Farm Bill.** The Farm Bill is the single most important mechanism for reducing soil erosion, sedimentation, and nutrient runoff in the Mississippi River basin. It will be even more challenging to restore the Mississippi River if farmers do not receive assistance to reduce erosion and runoff from farm land. Farm Bill Conservation Title programs, including the Conservation Stewardship Program and the Conservation Reserve Program, must be adequately funded to help decrease agriculture's impact on the health of the Mississippi River.

**5. Re-couple conservation compliance with crop insurance in the Farm Bill.** Conservation compliance requires that farmers receiving commodity and other traditional Farm Bill payments implement basic soil erosion prevention practices on highly erodible lands. If the next Farm Bill eliminates these payment programs, it will dramatically undermine the conservation compliance system. We must require that farmers receiving crop insurance premium subsidies – which are projected to become the largest source of federal support for farmers – comply with basic soil conservation standards. The way to accomplish this is to re-couple crop insurance premium support with conservation compliance.



## PLANNING

The 1983 *Principles and Guidelines* define how projects such as navigation infrastructure and habitat construction are to be planned and evaluated. Planning under the *Principles and Guidelines* requires the Corps to develop project alternatives that compare scenarios such as taking no action, building structures, modifying operations, and everything in between. To compare project alternatives, the Corps evaluates each with two types of analysis. The National Economic Development (NED) quantitative model looks at what is considered traditional economic benefits and drawbacks such as transportation efficiency and business success. The Environmental Quality (EQ) qualitative analysis evaluates environmental concerns and resources. Often, this method of analysis justifies environmental losses by demonstrating an exaggerated economic benefit, which does not incorporate the loss of ecosystem benefits. The *Principles and Guidelines* must be updated to ensure the Corps plans and constructs projects that protect the environment. New water planning guidelines must require selection of environmentally preferable alternatives, and the National Economic Development and Environmental Quality models must be replaced with analysis that collectively evaluates ecosystem services and economic development.

### The 1983 “Principles and Guidelines”

Authorized under the Water Resources Development Act, the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies* document (which is known simply as the *Principles and Guidelines*) outlines federal objectives for water resource planning. The document has four sections: A Statement of Principles, standards to guide project development, National Economic Development benefit evaluation procedures, and Environmental Quality benefit evaluation procedures (Committee on Improving Principles and Guidelines for Federal Water Resources Project Planning, 2010).

Since 1983, there have been many changes to water resource needs stemming from newly recognized threats to water quality and quantity, a significant national shift away from large infrastructure projects, and a new focus on restoring natural ecosystems. However, the 1983 *Principles and Guidelines* fail to reflect advancements in economic and environmental sciences and technologies, new environmental laws, and changes to watershed management that accommodate multiple water resources users. In addition, the *Principles and Guidelines* emphasize short-term economic benefits over other important national interests such as environmental protection and long-term sustainability of ecosystems. Decision-making is heavily weighted on quantifiable economic benefits, which uses a deficient benefit-cost analysis as the primary driver and final arbiter of plan selection while environmental impacts are considered but not quantified.

Recognizing that the *Principles and Guidelines* enshrine an outdated process that unnecessarily pits economics against restoration, Congress directed the Corps – through the 2007 WRDA (Section 2031) – to revise the *Principles and Guidelines* with input from stakeholders. The White House Council on Environmental Quality took the lead in updating the *Principles and Guidelines* with significant input from a broad set of interested parties, including environmental groups. The Council prepared alternative draft *Principles and Guidelines* in 2009 and 2013. Although these drafts attempted to move project



planning beyond simply maximizing National Economic Development to include social and ecological benefits, several key issues have not been addressed.

## Current Shortfalls

In 2010, the National Academy of Sciences published a review of the Council's proposed update to the *Principles and Guidelines*. The National Academy raised serious concerns about the 2009 draft, stating that the draft lacked clarity and consistency in how it would guide federal water resources planning and decision-making. To adequately reform the *Principles and Guidelines*, future drafts must place more emphasis on revising the management of existing projects and respect the diverse mandates and authorities of various federal agencies while strengthening interagency collaboration. The 2013 draft attempts to strengthen interagency collaboration and introduces a new decision-making tool to maximize "public good." The "public good" assessment will quantify ecosystem services and, conceptually, applies several recommendations from the Academy. However, the new draft lacks clarity and cannot be instituted without significant changes and guidance for agencies.

To aid the development of water planning guidelines, the Academy identified prominent issues for water resource planning today that reflect both current environmental realities and advances in the science of resource management. These issues should be directly addressed in the water planning guidelines' standards:

- Integrating floodplain management, risk management, public safety, and ecosystem values
- Updating aging water control infrastructure and port and inland navigation facilities

- Accommodating diverse stakeholder preferences in operational decisions
- Integrating social and cultural values into technical aspects of water project decision-making
- Addressing rapid population growth and increasing water demands
- Solving the challenge of increasing demand for water resources projects and the diminishing ability to fund such projects
- Reallocating water resources to new uses, including ecosystem restoration
- Improving water quality, especially in areas affected by non-point-source pollution
- Preparing for more extreme climate events and changing climate conditions
- Fulfilling legal obligations to protect endangered species while simultaneously meeting demands of traditional water users

The National Academy also recommended that the NED and EQ benefit-cost analyses not be the primary drivers of the project selection process because the models have inherent limitations that make them inappropriate as precise decision tools. Benefit-cost analysis cannot provide a clear picture of whether an activity is a national priority, complies with law and policy, protects the environment, distributes benefits or costs in an equitable manner, or is appropriate for federal investment (Committee on Improving Principles and Guidelines for Federal Water Resources Project Planning, 2012).

## Calculating True Costs and Benefits

The National Economic Development benefit-cost evaluation in the 1983 *Principles and Guidelines* evaluates traditional economic measures – trade, commerce, and business – in monetary values. However, it does not effectively measure the monetary benefits derived from ecosystem restoration or economic losses from environmental degradation. Environmental benefits are unnecessarily separated into the qualitative Environmental Quality analysis. This separate evaluation process does not allow equitable ecosystem services to be evaluated with other economic benefits. Ecosystem services should be considered within the same tool as other economic benefits. For example, wetlands help cleanse water through filtration, reducing the need for costly additional water treatment (such as nitrate removal) for drinking water downstream. In addition, when a river has access to its floodplain, flood crests are much lower and flood damages are lessened throughout the river basin.

Accounting for ecosystem services in any quantitative cost-benefit model is essential to promote environmental protection in the decision-making process. However, qualitative analysis must persist as part of the water planning guidelines reform. Other non-monetary benefits such as protection of culture and community improvements should be part of an alternative evaluation of quality benefits. Currently, all environmental benefits are measured separately, without identifying the monetary values of those benefits, while other cultural and community resources are left out of the equation entirely. To determine the true costs and benefits of water resources projects, all traditional and environmental economic benefits must be incorporated into an economic model that can accommodate future advances



in the fields of environmental economics. Similarly, a qualitative model must not be limited to environmental benefits as it is now. A qualitative model must also account for cultural and community resources or other unique attributes of the project site.

Additionally, reform of the project planning process must also update cost estimates to reflect more realistic and accurate estimates of true costs. Large navigation infrastructure projects currently underway – such as those on the Ohio River – or recently completed by the Corps have seen cost escalations of more than 250 percent. The Corps must plan more realistically, which includes accounting

for possible funding shortfalls, operations and maintenance, and decommissioning. Currently, the Corps planning process assumes consistent funding through project completion. However, Congress rarely provides the anticipated funds necessary to complete projects on schedule, and revenue shortfalls from the Inland Waterways Trust Fund create construction delays. Reviewing various funding timeframes and the costs after project completion will provide a more realistic cost-benefit analysis. With an improved planning document, the Corps will have better guidance on planning projects with positive returns on investments, helping the federal government reduce the national deficit.

## Planning on a Smaller Scale

Another method to improve cost savings requires a significant shift toward smaller-scale projects and a more environmentally sound infrastructure. Many non-structural solutions are less expensive and less environmentally harmful alternatives to large-scale construction projects. Several non-structural and small-scale measures – including barge traffic appointment scheduling, mooring cells, and switch boats – have been identified by the Corps as measures that can reduce barge lockage delays. In fact, the National Research Council reported in 2001 that lock delays on the UMR-IWW could be reduced by implementing such measures. However, no such measures have been implemented to date, and no formalized appointment scheduling of any kind is practiced on the UMR-IWW system.

Not only are small-scale and non-structural measures more cost effective, they are often environmentally preferable. Helper boats and scheduling can prevent construction on the river, which also protects aquatic habitats already under threat from extensive dredging and water level changes. Any new water planning guidelines must prioritize small-scale and non-structural measures to protect both the environment and the federal budget. The Corps should complete new cost-benefit analyses that incorporate these alternatives before considering new locks or other construction measures on the UMR-IWW.

## Recommendations

It is important to finalize water planning guidelines that require the Corps to plan projects that effectively address the nation's water resource needs while promoting accountability, modernization, prioritization, and equality. Project planning must not pit environmental protection against economic development. Long-term economic success can only be realized





within a healthy environment. In addition, both objectives can be accomplished and can complement one another.

It is time to move beyond short-sighted proposals that create faulty structures that not only damage the environment but require continuous maintenance and, ultimately, replacement. On the UMR alone, half of the floodplains have been lost to urban and agricultural development. This translates to a \$10.18 billion economic loss annually (McGuinness, 2000, and Costanza, 1997). Water planning and management should move toward maximizing ecosystem services that are more self-sustaining and save money. The *Principles and Guidelines* document needs to be updated to reflect the current economic conditions and knowledge about environmental benefits.

The ongoing revision of the federal water resources planning principles and guidelines provides an unparalleled opportunity to protect people, wildlife, and the economy while effectively addressing the nation's many pressing water resources needs. The administration should seize this opportunity to make water resources planning work for people and wildlife for decades to come.

Water planning guidelines should be improved in the following ways:

**1. Adopt a plan-selection process based on compliance with law and policy.** The new planning guidelines should abandon the current reliance on benefit-cost analysis as the fundamental guide for federal water resources planning and instead utilize legal and policy requirements to provide clear guidance for determining whether a project or program is in the national interest and whether it is an appropriate federal investment. For example, the four-step process outlined below uses criteria established by existing laws and policies to provide clear direction for plan development and selection. This process

would ensure federal water projects serve the national interest as defined by law and policy.

**Step 1: Select a plan that utilizes non-structural measures, water efficiency, and/or restoration of natural systems whenever practicable.**

Such plans would include upstream wetland and river restoration instead of new levees, purchase of flowage easements instead of new structural flood projects, water conservation instead of new reservoirs, and modernizing operation of existing projects instead of constructing new projects.

**Step 2: Select a plan that protects and restores ecosystem functions and processes and that protects and increases environmental quality over one that does not.**

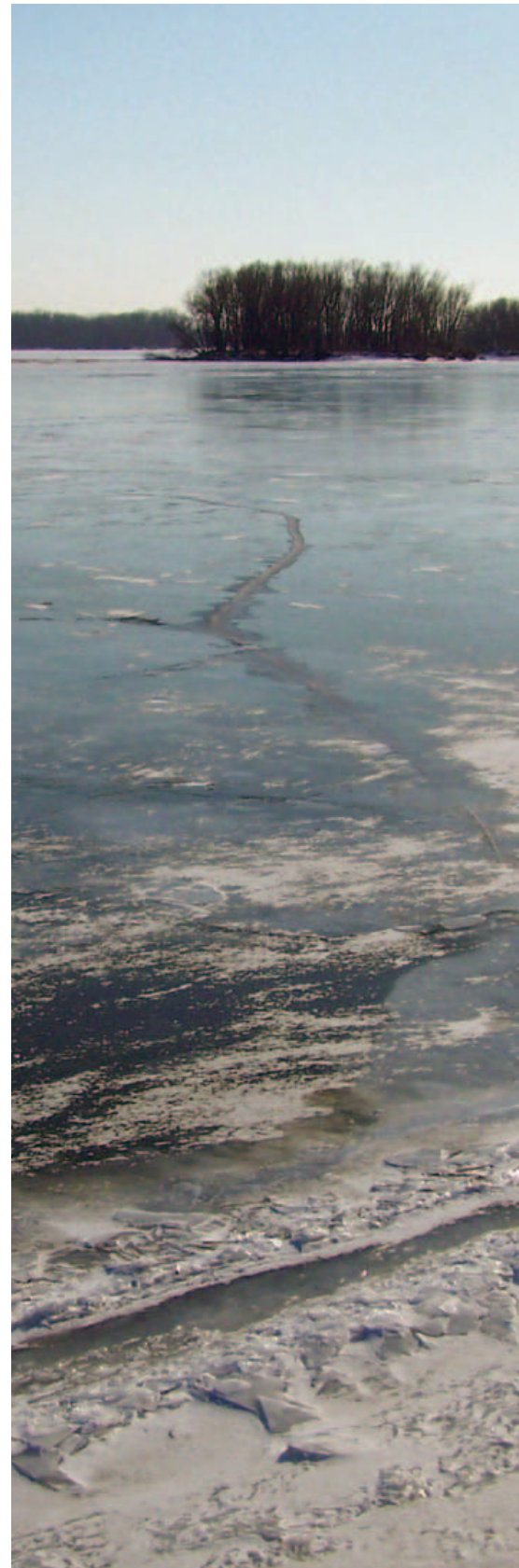
Such plans would include levee setbacks, reestablishing natural channels, and locating projects outside of sensitive areas.

**Step 3: Select a plan that increases the resiliency of natural and human communities to climate change over one that does not.**

Such plans would include locating projects outside the floodplain, creating opportunities for natural coastal migration instead of coastal or beach armoring, and re-operating reservoirs to account for climate change.

**Step 4: Prohibit certain types of activities that are not in the public interest, including projects that preclude ecologically sound river flows or induce development in floodplains or at-risk coastal areas.**

Prohibited plans would include new reservoirs that would prevent maintenance of sound river flows and new levees to protect undeveloped floodplain areas.



**2. Require selection of the “least environmentally damaging approach” to solving a water resources problem.**

Federal law and policy – and common sense – make clear that there is no justification for utilizing a structural solution when a non-structural or restoration approach will solve the problem and protect the environment. Where structural solutions must be used, the guidelines should require use of the smallest scale project possible. Small-scale navigation solutions are typically cheaper than traditional structural approaches, and the smaller footprint helps protect the environment (especially compared with a new lock) and allow tows to move through locks more quickly, without idling, saving fuel and reducing emissions. Focusing on small projects to rehabilitate and maintain infrastructure will extend the life expectancy of those projects, reducing the need for costly replacement and expansion. To protect the environment and protect taxpayers from unnecessary expenses, non-structural and small-scale solutions should be implemented and evaluated before large-scale construction projects are proposed.

**3. Require that federal investments in restoration activities restore, enhance, and protect ecosystem functions and processes, which will improve ecosystem health, sustainability, and resilience and be cost-effective.** The new planning guidelines should ensure that ecosystem restoration projects effectively restore ecosystem functions and processes to produce healthy and self-sustaining systems.

**4. Require the use of the most up-to-date scientific and economic knowledge.** The *Principles and Guidelines* are the basis for planning, evaluating, and designing Corps water resource development projects, whether for navigation, flood damage reduction, or restoration purposes. The revised *Principles and Guidelines* must reflect

current knowledge and understanding of ecosystem functions and the importance of those functions to public safety, fish and wildlife, and the economy. The new guidelines should ensure that river construction and management activities protect and restore the ecosystem.

**5. Ensure that Corps planning accounts fully for all project costs and benefits.**

Proper calculation of benefits and costs associated with proposed projects is integral to ensuring better management of taxpayer resources. All too often, projected project benefits never materialize while costs increase substantially. In addition, the calculation of project costs currently does not account for the loss of vital natural resources. Healthy natural systems provide vital services to people and wildlife, and these ecosystem services should be accounted for in project planning. For example, wetlands help cleanse water through filtration, reducing the need for costly additional water treatment

(like nitrate removal) for drinking water downstream. When the river has access to the floodplain, flood crests are much lower and flood damages are smaller. Loss of ecosystem services should be included in evaluation of project costs, and increases in such services should be included in the evaluation of project benefits.

It is critical to base an evaluation of project costs on realistic funding levels. Funding delays have been a primary and predictable reason for escalating cost overruns. Evaluation of project costs also must include entire lifetime costs (construction, maintenance, rehabilitation, and decommissioning). In addition, because water resources are part of an integrated system, proposed projects must not be evaluated in isolation – they must include analysis of how proposed projects will affect other projects and resources in other locales. Finally, the Corps should limit multi-year projects that cannot be fully funded prior to the projects’ start.





## CONCLUSION

The Upper Mississippi River is one of the most visited areas in the United States for recreation, with some 12 million visitors annually. The visitors who come to hunt, fish, boat, hike, bird watch, or otherwise enjoy the natural beauty of the river contribute more than \$6.6 billion annually to the region's economy and keep 143,000 people employed along the river corridor (McGuinness, 2000). The river basin is a critical flyway for birds migrating through North America – it is used by 60 percent of all bird species in North America, including 40 percent of waterfowl. It also provides critical habitat for threatened and endangered fish and wildlife species.

However, the Upper Mississippi River has suffered substantially from navigation infrastructure. It is time to reexamine our concept of river management and stop expanding infrastructure that is environmentally damaging and economically unjustified. It is time to be fiscally responsible and reduce the long-term deficit and debt. Instead of expanding navigation infrastructure on a system functioning well below capacity, Congress should turn attention to restoration projects that have real environmental and economic benefits and maximize the benefits associated with navigation through investments that will make the current system function more efficiently. We need to consider alternative financing methods to maintain the current infrastructure and develop low-cost alternatives when infrastructure needs to be replaced or expanded. We need to acknowledge the economic benefits and opportunities offered by other federally funded UMR-IWW programs. For example, restoration projects also require new construction, but they can provide a larger number of benefits, from local and regional economic development to tourism and outdoor recreation.

The Nicollet Island Coalition has identified priority actions that will improve Upper Mississippi River restoration and resource management:

### Navigation

#### **1. Deauthorize the Navigation and Ecosystem Sustainability Program (NESP).**

As part of this effort, Congress should

- a. **Move the restoration component of NESP to the Upper Mississippi River Restoration-Environmental Management Program (UMRR-EMP).**
- b. **Separately authorize and fund non-structural navigation improvements.**

#### **2. Provide adequate and on-time funding for maintenance, rehabilitation, and construction.**

#### **3. Deauthorize outdated and unfunded water resource projects.**

#### **4. Protect taxpayers by not authorizing amendments to the Inland Waterways Trust Fund that shift more of the cost burden onto taxpayers.**



**Restoration**

- 1. Increase funding for restoration programs.**
- 2. Expand the geographic area under the authority of the Upper Mississippi River Restoration-Environmental Management Program to include bluffs and tributary confluence deltas.**
- 3. Reconnect and restore floodplains through the Upper Mississippi River Comprehensive Plan.**
- 4. Fund conservation programs authorized in the federal Farm Bill.**
- 5. Re-couple conservation compliance with crop insurance in the Farm Bill.**

**Planning**

- 1. Adopt a plan-selection process that mandates federal water projects serve the national interest as defined by law and policy by ensuring**
  - a. **Projects utilize non-structural measures, water efficiency, and/or restoration of natural systems whenever practicable.**

- b. **Projects protect and restore ecosystem functions and processes and environmental quality.**
  - c. **Projects increase the resilience of natural and human communities to climate change.**
  - d. **Projects prohibit certain types of activities that are not in the public interest, including projects that preclude ecologically sound river flows or induce development in floodplains or at-risk coastal areas.**
- 2. Require selection of the “least environmentally damaging approach” to solving a water resources problem.**
  - 3. Require that federal investments in restoration activities restore, enhance, and protect ecosystem functions and processes, which will improve ecosystem health, sustainability, and resilience and be cost-effective.**
  - 4. Require the use of the most up-to-date scientific and economic knowledge.**
  - 5. Ensure Corps planning accounts fully for all project costs and benefits.**

By implementing these changes, Corps water resources development programs can maximize funding for habitat restoration, minimize large scale construction, and improve the planning process to reduce errors in projecting costs. Not just in the UMR basin, but throughout the nation, current and future generations will enjoy rivers with clean water, healthy habitats, and diverse natural resources.



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# GLOSSARY OF ACRONYMS

**EQ:** Environmental Quality

**IWTF:** Inland Waterways Trust Fund

**NED:** National Economic Development

**NESP:** Navigation and Ecosystem Sustainability Program

**UMR:** Upper Mississippi River

**UMR-IWW:** Upper Mississippi River-Illinois Waterway

**UMRCP:** Upper Mississippi River Comprehensive Plan

**UMRR-EMP:** Upper Mississippi River Restoration-Environmental Management Program

**WRDA:** Water Resources Development Act

## Nicollet Island Coalition Members

*Izaak Walton League of America*  
*Institute for Agriculture and Trade Policy*  
*Missouri Coalition for the Environment*  
*National Wildlife Federation*  
*Prairie Rivers Network*  
*River Alliance of Wisconsin*  
*Sierra Club*  
*Taxpayers for Common Sense*

