Inland Waterways

C-

GRADE COMPARISON

2025: C-

2021: D+

Photo: Aerial view of barges docked at the shore of the Mississippi River; dvande

INLAND WATERWAYS

EXECUTIVE SUMMARY

The U.S. inland waterways span the Mississippi River and its tributaries, to the Great Lakes, the Columbia–Snake River system of the Pacific Northwest, the Sacramento and San Joaquin Rivers on the West Coast, as well as the Gulf and Atlantic Intracoastal Waterways. The system is the hidden backbone of the nation's freight network, which serves both our industrial and agricultural sectors. Inland waterways also provide flood mitigation and drought relief through dams that are responsible for providing municipal and industrial water supply for 136 multifunction reservoirs.[1] Operated and managed by the U.S. Army Corps of Engineers (USACE), in coordination with the Maritime Administration (MARAD), the system encompasses 12,000 miles of inland navigation and 11,000 intracoastal channels.[2] Inland waterways play a vital role in the global supply chain by moving $158 billion of goods annually, facilitating the transport of one-third of the nation's gross domestic product (GDP).[3] Inland waterways allow commodities to move cost-effectively, reducing the strain on congested roadways and rail systems, and with fewer greenhouse gas emissions.[4] Federal funding has increased in recent years, but a $7.5 billion backlog for construction projects remains, causing ongoing lock closures.[5]

BACKGROUND

The U.S. has two major navigable river systems: the Mississippi and Columbia–Snake Rivers. The former comprises the Mississippi, Arkansas, Illinois, Ohio, Missouri, and Tennessee Rivers, and Gulf Intracoastal Waterway, whereas the latter includes the Columbia and Snake Rivers.[6] Congress authorizes and funds the USACE to oversee the planning and construction of water resource projects and maintenance of navigation improvements and other infrastructure.[7] **The complete inland waterway system contains 25,000 miles of navigable waterways and channels, including 237 lock chambers at 192 sites and 1,072 coastal, Great Lakes, and inland harbors that directly serve 45 states and territories.[8]**

Fuel-Taxed Inland Waterways Systems

Source: U.S. Army Corps of Engineers

CAPACITY AND CONDITION

As part of the inland waterways system, dams and navigation locks enable shallow draft operations on many major rivers, manage the river's flow, and preserve navigation.[9] A critical carrier of commodities, approximately 465 million tons valued at over $158 billion, move on the waterways system annually. The system facilitates the transportation of diverse commodities across many sectors, including agriculture, construction, manufacturing, and energy, and represent one-third of U.S. GDP.[10] In 2022 alone, a combined 210 million metric tons of agricultural exports and imports were transported via the network.[11] Alleviating pressure from the nation's roadways and freight rail system, one barge efficiently and cost-effectively carries the equivalent of 70 tractor trailers.[12] More than 4% of the nation's freight tonnage uses a waterway.[13]

However, the age and capacity of the lock and dam infrastructure inhibit commercial navigation,[14] with 80% of the lock and dam infrastructure on the inland waterways system exceeding its 50-year design life in 2024.[15] When a lock or dam reaches a state of poor repair, traffic on the inland waterways is disrupted to allow for scheduled maintenance or unscheduled repairs.[16] Although scheduled delays impose a financial loss to shippers and consumers, an even greater cost occurs from unscheduled delays caused by maintenance issues. It can interrupt business operations for entire supply chains for weeks or months. **In 2020, locks experienced 9,147 periods of unavailability, of which 6,361 were scheduled shutdowns and 2,786 were not planned, resulting in an average delay of 172.2 minutes.[17]**

Since 2022, decreased rainfall and drought conditions upstream have led to low water levels on the Lower Mississippi River,[18] which in turn hampered the flow of freight. Droughts upstream limit the ability of USACE to release headwaters and store waters in tributaries to mitigate the low flow conditions downstream, meaning what affects upstream areas ultimately impacts downstream waterways. In 2023, low water coincided with peak shipping season for U.S. corn and soybeans, the nation's largest export crops. At that time, 69% of the transport on the Lower Mississippi below Lock and Dam 27 near Granite City, Illinois, were soybeans and 30% corn.[19] As a result, models showed that Brazil's global export market share would have risen from 51% to 68%, with the U.S. world market share declining from 38% to 28%. The case underlies the need to invest in the U.S. inland waterways' capacity to remain a global trade competitor.

FUNDING AND FUTURE NEED

Major rehabilitation and new construction projects for inland waterways are funded through federal general funds and revenue from the Inland Waterways Trust Fund (IWTF). The IWTF receives revenues from a tax (a.k.a. the inland waterway user fee) on commercial barge fuel throughout federally designated waterways.[20] The fund pays some construction costs as well as significant rehabilitation on those waterways. In addition, individual projects can receive funding through supplemental federal appropriations, which provide additional funding during a fiscal year; in modern practice, this is typically in response to urgent and unanticipated needs such as natural disasters and urgent military operations.[21]

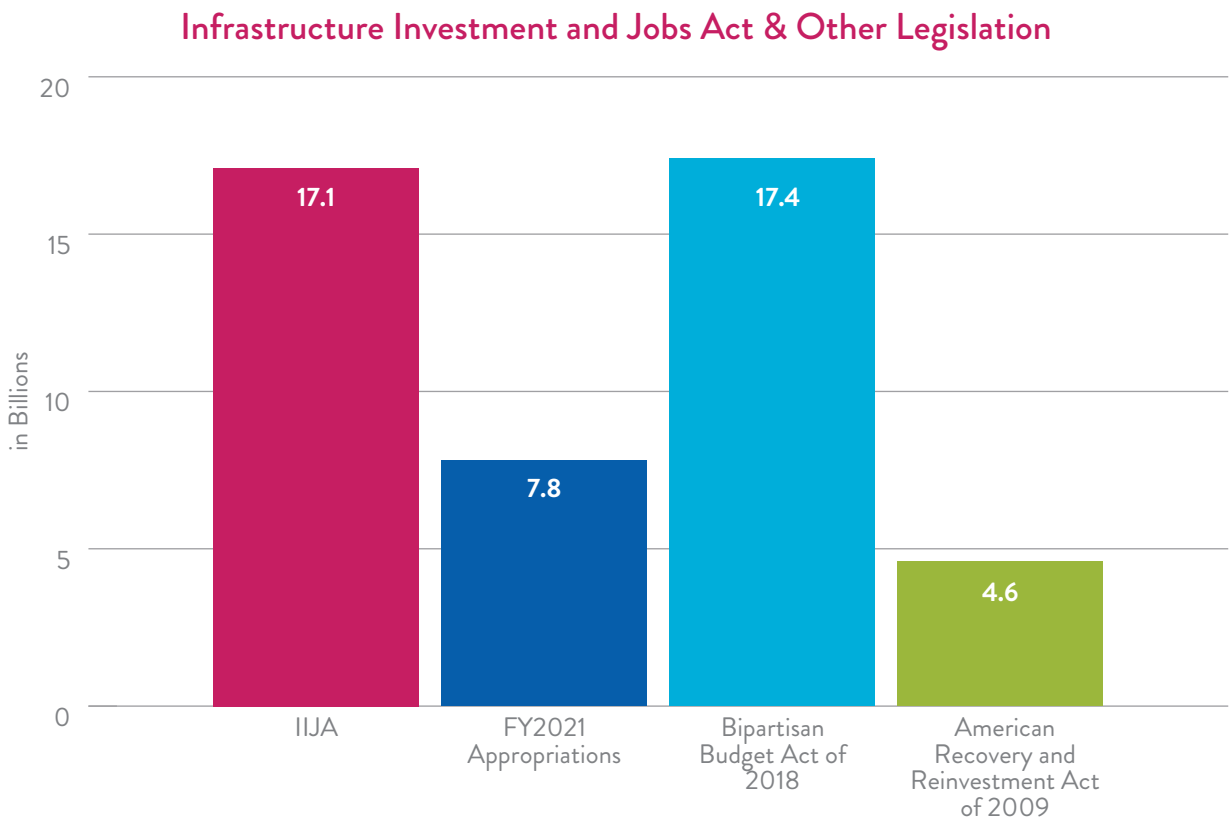
During 2021–2022, critical federal laws positively impacted investment in the nation's water resources infrastructure. The Infrastructure Investment and Jobs Act of 2021 (IIJA) provided $17.1 billion in supplemental appropriations to various USACE accounts, with 68% going to USACE's "Construction" account, amounting to $11.62 billion.[22]

Every two years, Congress passes the Water Resources Development Act (WRDA), a comprehensive legislative package that provides for the conservation and development of water and related resources.[23] Congress has kept this biennial schedule approving WRDA on a bipartisan basis since 2014.[24] WRDA 2022 revisited how much federal funding for inland waterways projects should come from the government's general fund versus the IWTF. Initially, federal funding for such projects required 50% general funds and 50% IWTF funds. In 2024, Congress changed this formula to 75% general funds and 25% IWTF funds. With a greater reliance on general funds, IWTF funding can in turn support more projects.[25]

However, challenges remain in the form of sustained funding. First, the IIJA and WRDA authorized funding levels are tied to the appropriations process and can be impacted by various spending amounts approved by Congress. In addition, according to the Inland Waterways Users Board and since the passage of IIJA, the USACE determined that, based on the funding received, program-wide cost overruns will make IIJA funding insufficient to complete any of the seven priority projects. IIJA funding was based on original project cost estimates that did not reflect current inflation and market conditions, labor shortages, and other impacts from the COVID-19 pandemic.[26]

Stiff trade competition with Brazil is one example of why the U.S. needs the inland waterway system to be modernized. The top two producers in the world soybean market, the U.S. and Brazil, compete for the same overseas markets.[18] For both countries, the competitiveness of their soybean exports depends on low transportation costs to critical markets, primarily China and Europe.

Brazil's decades-long efforts have improved its transportation cost competitiveness, and it has been the top exporter of soybeans since 2013.[19] Therefore, if portions of the inland waterways system close due to outages, it will impede the export of goods or require those goods to be transferred to other modes, which is less efficient and more costly, thus reducing profitability.



Source: U.S. Army Corps of Engineers

OPERATION AND MAINTENANCE

The upkeep of the inland waterways—such as lock repairs and dredging—is funded through annual appropriations. Dredging removes sediments and debris from the bottom of lakes, rivers, harbors, and other water bodies and is essential to maintain or increase the depth of navigation channels, anchorages, or berthing areas, which is necessary for the safe passage of boats and ships.[27] In addition to annual appropriations, the IIJA provided $4 billion to the USACE Operation and Maintenance account and $808 million to its Mississippi River and Tributaries account.[28]

With the deferred maintenance backlog standing at $7.5 billion, funding shortfalls exist, posing the potential for unnecessary delays in planned and unplanned maintenance activities. Access to sufficient financing, regardless of timing in the fiscal year, is crucial to mediate unexpected emergencies caused by low water events like those seen in 2022 and 2023.[29] Delays and closures caused by the age and capacity of the lock and dam infrastructure result in an average delay of 172 minutes (nearly 3 hours), affecting 47% of vessels.[30] Challenges also persist in rising and declining water levels due to extreme weather events and workforce shortages delaying project construction.[31]

Photo: Coast Guard USACE monitor construction on Calcas

PUBLIC SAFETY

Transportation using the nation's inland waterways has the lowest injury and fatality rates in comparison with other freight transportation modes. There are 96 rail and 1,145 tractor-truck injuries for every one barge injury. Similarly, for one barge transportation fatality, there are 26 fatalities related to rail and 120 deaths related to trucks.[32] According to the Bureau of Transportation Statistics, in 2022, there were five fatalities caused by freight vessels in comparison to 626 deaths by freight rail.[33] From a technology standpoint, modernization of the national maritime systems is needed to monitor the status of aids to navigation and ports, to predict and assess risk, identify and respond to evolving cyber threats, and intercept noncompliant vessels. The U.S. Department of Homeland Security's Science and Technology Office commissioned a study[34] in 2021 to better understand how commercial port operators deploy their Informational Technology and Operational Technology systems, the resiliency of these systems and what improvements can be made to reduce vulnerabilities in U.S. ports, evaluate the effectiveness of current protections and mitigations, and harden the maritime port infrastructure against cyber intrusions and disruptions.

RESILIENCE AND INNOVATION

Changing climates across the U.S. are contributing to less predictable water levels and impacting the efficiency of the inland waterway system. In 2023, drought affected virtually the entire midwestern U.S., and rainfall in the eastern states was below regular averages.[35] Water levels on the Mississippi and Ohio rivers fell at an alarming rate. Near the city of Cairo, the level of the Ohio River dropped six feet in one week, and there was a further decline of four feet before the end of the month.[36] On the Mississippi, the water receded three feet in the St. Louis area and about six feet around Memphis. In response, barges must carry less cargo to reduce their drafts, and barge tows must be reduced in number and length. Because of the low water levels, some parts of the waterway system were not navigable by barges, leading to higher transportation costs, because barges and vessels may be loaded to less than capacity because of low water.[37] The record-low water levels in the Mississippi River disrupted the transportation of agricultural goods, costing about $1 billion in losses.[38] Vessel operators, the Coast Guard, and the USACE partnered to avoid more damaging disruptions on the system and kept cargo moving, although at a slower pace with smaller loads.

To monitor the water levels on the inland waterways, USACE uses a geographic information system (GIS). Their GIS allows them to record, analyze, and visualize data about the river and the forces that affect its flow. However, no universal system yet exists for reliably tracking the commodity movements and delays of the inland waterway system in real time. Federal funding for new and existing federal navigation project designations of high-, medium-, and low-use waterways as well as private investment decisions hinge on tonnage reporting. The USACE Geospatial Open Data Portal provides shared and trusted USACE geospatial data, services, and applications for use by partner agencies and the public. Both academic and private sectors are also advancing in-tracking shipping vessel data.[39] Innovations can be critical for more efficient product delivery and traffic control, including real-time vessel tracking and location prediction using Automatic Identification System (AIS) data or vessel traffic data.[40] Supported by University of Arkansas researchers, recent advancements have been made using traffic cameras and machine learning techniques to identify vessel types.[41]

In addition, interest grows in using hydrogen energy as fuel for vessels operating on inland waterways, primarily due to its potential for significantly reducing emissions and providing a cleaner alternative to traditional diesel fuel. In August 2023, a new fuel utilizing hydrogen energy began powering barges in the Mississippi River. The alternative fuel is part of an effort among many local organizations, including the Port of South Louisiana and GNO Inc., to reduce the regional maritime industry's carbon footprint. The H2TheFuture project is a larger plan to create a clean hydrogen energy cluster in south Louisiana.[42]

RECOMMENDATIONS TO RAISE THE GRADE

- Sustain IIJA-authorized funding for the U.S. Army Corps of Engineers to address operations, maintenance, and backlog needs, emphasizing the system's resilience to mitigate changing climates.
- Ensure federal funding at authorized appropriations is disbursed for inland waterways projects.
- Continue enactment of the Water Resources Development Act biennially.
- Safeguard and fully use the Inland Waterways Trust Fund in the annual appropriations process.
- Foster greater coordination, communication, and collaboration with USACE and the private sector for tracking inland waterway traffic.

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Photo: Barge; U.S. Department of Agriculture