

Collaborative Freight Planning & Economic Development

Maximizing State Marine Freight Planning





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About the Mid-America Freight Coalition (MAFC)

The industries and farms of the Mid-America region can compete in the marketplace only if their products can move reliably, safely and at reasonable cost to market.

State Departments of Transportation play an important role in providing the infrastructure that facilitates movement of the growing amount of freight. The Mid-America Freight Coalition was created to support the ten states of the Mid America Association of State Transportation Officials (MAASTO) region in their freight planning, freight research needs and in support of multi-state collaboration across the region.

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The Port of Cleveland (bottom)

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INTRODUCTION

The marine freight transportation systems in the MAASTO region are critical to the economic and transportation activities of the ten individual states, the region, and the nation. With increased maritime funding, the environmental benefits of the marine mode, and the possibility of the waterways absorbing commercial traffic from highways, state interest in understanding and capitalizing on these marine freight systems is increasing.

State participants in the Mid-America Freight Coalition (MAFC) cite peer-to-peer sharing, information exchange, and collaborative program and project development as major benefits of involvement with the coalition. Past MAFC and MAASTO collaboration in freight planning has demonstrated working together results in innovation and regional action. With the increasing pressure on highway freight corridors, a regional approach to multimodal freight movement and marine corridors is needed to ensure that the MAASTO region continues to provide safe and efficient freight movement. The development of marine corridors and ports is an opportunity to address additional freight loads, expand into logistics areas such as container on barge (COB), and provide for local and state economic development.

Across the nation, multistate collaborative freight planning efforts, sharing planning strategies, best practices, and program approaches have predominately been focused on highway corridors. With an increase in marine and port planning across the MAASTO States, incorporating the multistate corridor planning approach to marine planning can be expected to result in innovation, professional development in marine freight, advances in complex multijurisdictional projects, and increases in the safety and efficiency of freight movement on the region's marine freight corridors.

This project provides an assessment and evaluation of state marine and port planning efforts across the MAASTO region. Collaborative planning on the Upper Mississippi River and Great Lakes has been active but has not bridged the trade and facility development efforts completed independently in the states. A multistate collaborative review of state marine and port plans provides an opportunity to leverage collaboration and the shared experiences and knowledge of the region's planners. Planning best practices and strategies are identified from state practices, literature, and existing freight planning practices.

Multistate collaboration on freight markets and infrastructure development based on existing Marine Highway corridors provides an inroad to the funding, management, and operation of Marine Highways, similar to how highway corridors are managed. To the extent possible with natural resources, marine freight corridors should provide uniform, efficient, and modernized facilities if they are to be an effective and competitive part of the multimodal freight system.

The Maritime Freight System in the MAASTO Region

Maritime shipping is essential to the national economic well-being. It connects commodities, industry, farmers, and manufacturing to consumers in national and worldwide markets.

According to the U.S. Bureau of Economic Analysis, the marine economy accounted for \$361.4 billion and about 1.7 percent of the Gross Domestic Product (GDP) in 2020. Figure 1 details the advantages in load size and carrying capacity of the marine mode compared to highway and rail systems. The maritime freight system is the most environmentally efficient way to transport oversized, heavy, and bulky cargo.

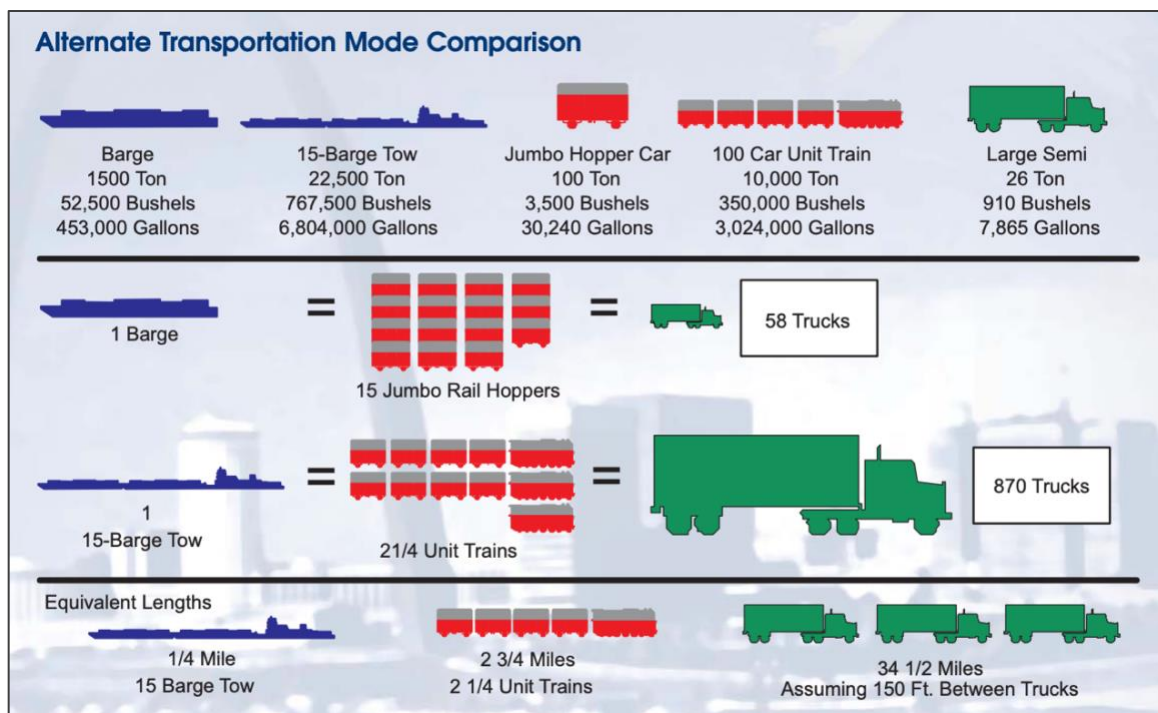


Figure 1: Alternative Transportation Mode Comparison

Source: USACE Inland Waterways Value to the Nation, 2000

While seasonality, longer transit times, and material handling impacts limit marine freight use in some cases, the benefits of an efficient and quality marine system make water movement attractive and efficient for large and bulky commodities.

The U.S. Marine Transportation System (MTS) encompasses a vast network of waterborne transportation consisting of three subsystems:

- The Inland Waterway System (IWS)
- The Great Lakes Navigations System (GLNS)
- Deep-water international waterways

According to *An Assessment of the U.S. Marine Transportation System: Report to Congress (2022)*, the entire U.S. MTS includes 25,000 miles of navigable channels, 239 locks at 193 locations, more than 3,700 marine terminals, 324 shipyards, and 45,000 aids to navigation. The MAFC portion of the MTS is system includes approximately 13,378 miles of navigable channels, 94 locks, 9 active shipyards, and 40 marine terminals.

The MAASTO region is the nation's hub of marine freight with extensive access to the U.S. Marine Transportation System. The Mississippi River System (MRS) includes all navigable tributaries such as the Missouri, Ohio, and Illinois Rivers. All MAFC states except Michigan have access to the Mississippi River System.

The GLNS is part of the greater international Great Lakes - St. Lawrence Seaway (GLSLS), an international waterway classified as a deep waterway on par with oceanic coastal ports for funding purposes. Six of the ten MAFC states have commercial access to one or more of the Great Lakes, and six of the eight U.S. states with Great Lakes access are in the MAFC region. The Great Lakes and St. Lawrence Seaway are the backbone of a \$6 trillion economy moving 400 million tons of goods annually and supporting 230,000 jobs and \$14 billion in wages [1].

The inland river system similarly supports a significant portion of the region's economy and is critical to the movement of commodities and bulk products, as well as project cargo. Research from a 2019 USDA report [2], shows that all MAASTO states benefit from the Inland Rivers' globally competitive shipping rates. As shown in Figure 2, agriculture relies on this river system to move over 60 percent of the nation's crop exports, as reflected by the density of corn and soybean production along the corridor.

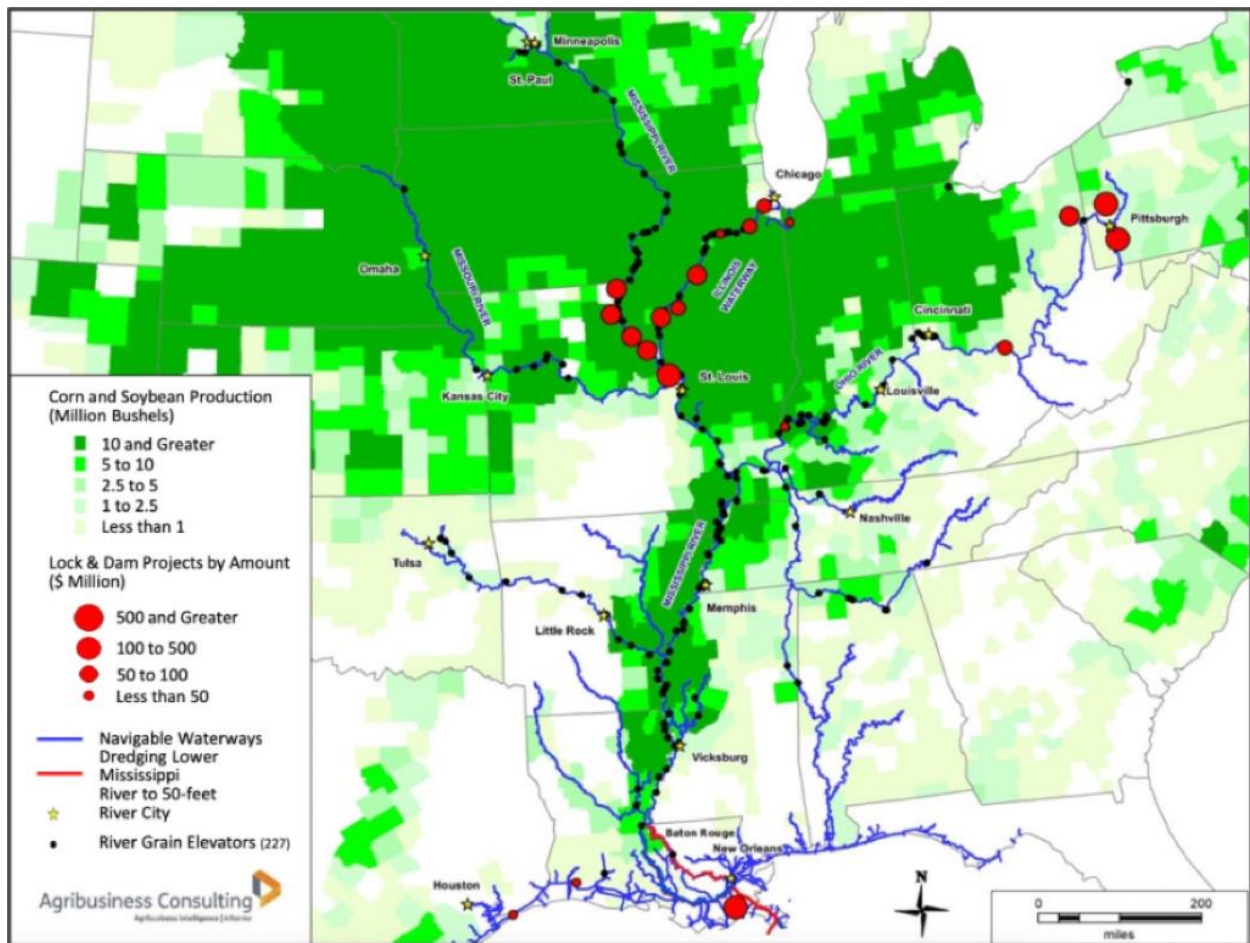


Figure 2: The Density of U.S. Corn and Soybean Production Areas in Proximity to the Navigable Waterways on the Mississippi River System

Source: U.S. Department of Agriculture 2019, Importance of Inland Waterways to U.S. Agriculture.

In addition to these economic benefits, six critical factors provide a rationale for the increased use of marine corridors for freight movements. These factors include:

- The environmental impacts of truck movements
- Increased congestion on highway freight corridors
- Increased trucking costs (including fuel)
- Workforce issues, especially with truck driver retention and shortages
- Newly available marine funding and programs
- The possibility of containerization of maritime freight movements

All these factors have led to a resurgence of interest in using and further developing marine freight corridors.

The Maritime Administration (MARAD) states that although the U.S. has a versatile and expansive network of navigable waterways with great potential for freight transport, many waterways are underused [3]. The National Freight Strategic Plan 2020 (NFSP) identified the major constraint facing marine freight transportation as increased delays at locks, which are primarily attributed to lagging infrastructure maintenance and out-of-date infrastructure [4].

The majority of the lock and dam system cannot accommodate the multiple barge tows and increased traffic levels during shipping seasons. If the waterways are going to be transformed into Marine Highways, the backlog of maintenance, reconstruction, dredging, and replacement projects for locks, dams, and channels of both the Great Lakes System and the inland rivers must be addressed. Similarly, local, state, and regional planning should provide user input and focus for these collaborative efforts.

These challenges to the marine freight system are acknowledged in the current transportation authorization, the Infrastructure Investment and Jobs Act (commonly referred to as the IIJA Act). IIJA Section 11114 135 STAT.480 highlights the focus on modernization and expansion of the marine infrastructure (ports, terminals, locks, etc.) to improve the U.S. marine freight competitiveness as well as offer relief to the increased congestion of the landside freight corridors. IIJA is expected to direct more than \$17 billion towards port infrastructure and waterways to address the needed repairs and maintenance backlogs from multiple funding programs. It also provides collaborative funding opportunities to encourage the establishment of an integrated multimodal regional freight network.

Project Objective

This project provides an assessment and evaluation of state marine and port planning efforts across the MASTO region. Currently, marine and port plans are completed by states with only minor multistate coordination. Collaborative planning on the Upper Mississippi River and Great Lakes has been active but has not bridged the trade and facility development efforts completed independently in the states. A multistate review of state marine and port plans provides an opportunity to leverage collaboration and the shared experiences and knowledge of the region's planners. Planning best practices and strategies are identified from literature and existing freight planning practices. Combined, the focus of the project supports the development of multistate marine freight corridors on existing Marine Highways.

Scope of Work

This project assesses and summarizes the marine, waterways, and port planning efforts across the MAASTO States. A review of state freight waterway programs is also included in the analysis. In this review, the planning practices, data, emphasis areas, stakeholders, and programs are detailed and compared to allow the states to understand the planning practices used across the region. Additionally, the various emphasis areas and efforts documented across the states are evaluated for linkages and potential collaborative opportunities.

This approach mirrors the MAASTO state collaboration that developed in support of freight planning, freight advisory committees, and freight programs in response to the USDOT national freight program.

This project provides a deeper understanding of marine freight planning across the region, provides for the identification of planning and program best practices, and supports the identification of potential collaborative efforts and projects that can provide corridor-wide impacts and greater marine freight development.

Organization of the Report

This report is organized by chapters with the following content.

Chapter 1 reviews marine freight policy and planning literature to understand the state agency organizational context and assess the planning directives and considerations recommended by relevant federal agencies.

Chapter 2 provides data on the commodities and tonnages moved on the marine system and establishes the importance and the potential for marine freight movement in the MAASTO region.

Chapter 3 provides a state-by-state description of state port and marine planning, programs, and organizational integration. This chapter provides an overview of the interest levels, and the maturity and integration of marine freight within each transportation agency.

Chapter 4 presents best practices and suggested practices for marine and port policy and planning, stakeholder involvement, and programs. These practices and innovations

were identified during interviews with state planners, federal agencies, and industry associations.

Chapter 5 summarizes the project's critical findings and provides direction for implementing corridor development ideas, future research, policy development, and greater collaboration.

Chapter 6 provides an overview of the critical planning factors and innovative collaborative approaches to marine corridor development. It provides a summary of the findings of the report.

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1. MARINE FREIGHT POLICY AND PLANNING

Unlike the long-term linkage between highways and highway departments, state departments of transportation have shorter histories in developing the relationships, policy, planning, and programs to support a marine freight system. This is the case in the MAASTO region. While the role of the state DOTs in supporting navigation has been increasing, most guidance for port planning and development has been directed at the ports and local entities. Further, the river, channel, or infrastructure management is under the authority of the U.S. Army Corps of Engineers (USACE) and the United States Coast Guard. These agencies have authority over management of infrastructure (such as locks, dams, navigation aids, and breakwaters), and channel and harbor maintenance (including dredging) to maintain navigable depths. MAASTO state DOTs have no ownership or management control over the corridors or ports. There is little planning or program guidance for states beyond the general principles and required components of U.S. DOT-accepted state freight plans.

As will be detailed in Chapter 4, the DOTs often rely on their peers and their peers' experiences in marine and port development as the primary source of guidance. It is critical to note here that the peer-to-peer sharing afforded by coalitions such as the MAFC is critical to innovation and advancements in planning, policy, and programs in developing transportation areas.

To better understand the existing planning and policy guidance, this chapter reviews and discusses various agency maritime resources and guidance. Successful approaches, innovations, and best practices are identified in this review.

Marine Freight Policy and Planning Landscape

Under the IIJA, addressing marine freight planning is a required component of a multimodal state freight plan. And while a separate, distinct marine freight plan is still not required for state DOTs, transportation authorization bills have laid the groundwork for state-level marine freight planning since 2012.

Three of the ten MAFC states (Illinois, Minnesota, and Ohio) have developed dedicated marine transportation system plans to provide an accurate, holistic view of the state-level waterway system and to support further development and market expansion. Iowa, Kentucky, Missouri, and Wisconsin have completed port economic or funding studies and include more extensive

marine reporting in their freight plans. The remaining three states, Michigan, Indiana, and Kansas, have maritime planning integrated into their freight plans.

With limited state planning guidance, the marine freight planning provisions of major federal transportation and water resource acts are reviewed below.

Moving Ahead for Progress in the 21st Century - 2012 (MAP-21)

The MAP-21 federal transportation Act was a significant milestone for the Nation's surface transportation program and placed more emphasis on freight needs than prior reauthorizations. These additions included several provisions to improve the condition and performance of the national freight network and support investment in freight-related surface transportation projects. Under MAP-21, the U.S. DOT was responsible for establishing a national freight policy, designating a national freight network, and developing the National Freight Strategic Plan. The states were encouraged to develop comprehensive and multimodal freight plans, including immediate and long-term planning activities and investments. The completion of state freight plans was linked to eligibility for matching funds. Generally, the language in MAP-21 remained highway-centric.

Fixing America's Surface Transportation Act - 2015 (FAST Act)

The FAST Act expanded the scope of the federal freight programming initiated in MAP-21 by expanding the role of multimodal systems and prescribing the components of freight plans. The FAST Act established a National Multimodal Freight Policy and Network that includes the inland and intracoastal waterways and ports are critical strategic freight assets. It created a discretionary freight-focused grant program and a National Highway Freight Program, investing ten billion in freight projects. More information on the policy can be found at <https://www.transportation.gov/freight>. The FAST Act recognized the importance of intermodal connectivity and funded approximately half a billion dollars in intermodal projects to provide for greater connectivity.

The FAST Act pointed to waterway transportation as an alternative mode to move heavy-resource-related materials. This was expected to mitigate freight related highway congestion by moving more goods to the waterways. By reducing the number of truck loads on the highways, there is an expected reduction in pavement deterioration, and decreased air quality impacts. Additionally, States were required to report performance metrics of the leading U.S. maritime

ports. Under the FAST Act, the Bureau of Transportation Statistics (BTS) was mandated to collect and annually report performance measures for the nation's top 25 ports.

The USDOT identified three additional components designed to encourage marine freight planning through the FAST Act, including:

- States could commission reports on port and waterway conditions.
- States were encouraged to incorporate the special needs of waterways and ports in their freight plans to move heavy resources.
- States could consider port and agency perspectives to plan and implement freight programs across the network of Marine Highways.

MAP-21 and the FAST Act made significant inroads to include multimodal freight systems as part of the National Freight Network and as a component of state freight planning. Inclusion of marine and rail in system planning expanded states' multimodal focus and abilities. The MAFC supported the adoption of these new freight planning practices across the MAASTO states by facilitating group discussions, tracking and sharing planning approaches, and identifying and sharing best practices.

Infrastructure Investment and Jobs Act - 2021 (IIJA)

After the expiration of FAST-ACT and MAP-21, IIJA, known as the Bipartisan Infrastructure Law, was signed in November 2021 to reauthorize surface transportation policy. IIJA is touted as a once-in-a-generation investment that aims to modernize infrastructure and improve the competitiveness of the national multimodal freight system. It highlights the economic competitiveness of marine freight in the global supply chain.

For the marine transportation system, IIJA invests over \$17.1 billion through the USACE to improve infrastructure at coastal ports, inland ports and waterways, and in support of maritime programs. Figure 3 details the investments.

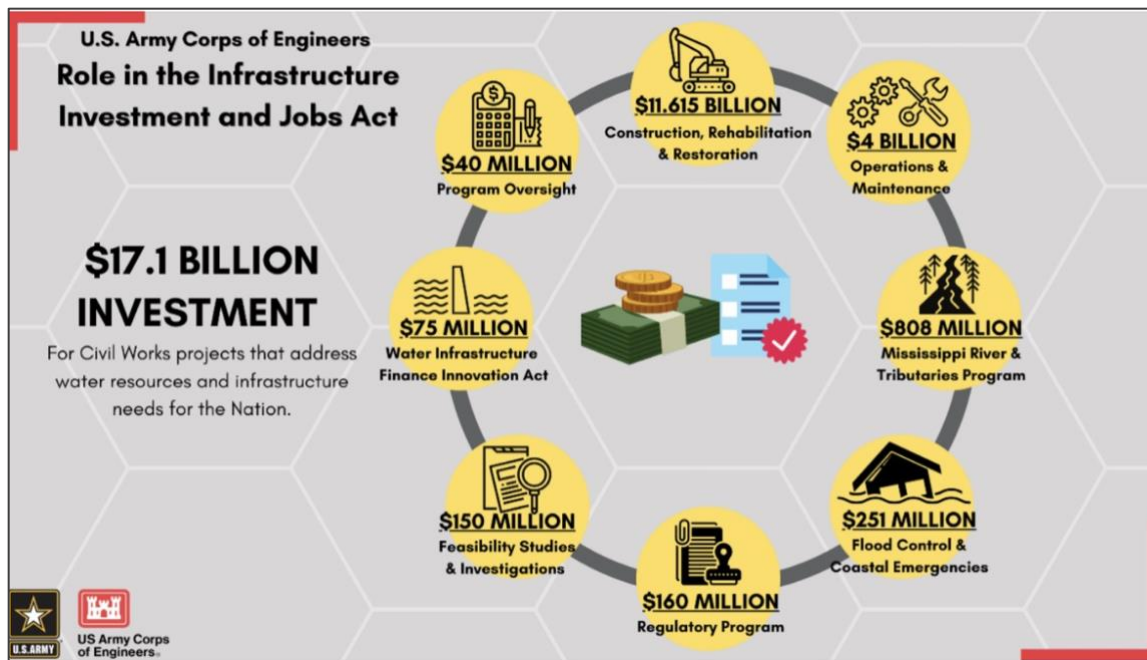


Figure 3: U.S. Army Corps of Engineers’ Role in IIJA

Source: <https://www.usace.army.mil/Missions/Civil-Works/Supplemental-Work/BIL/#:~:text=Infrastructure%20Investment%20and%20Jobs%20Acts%20provides%20more%20than%20%24881.9%20million%20in%20supplemental%20funding&text=The%20U.S.%20Army%20Corps%20of%20Engineers%20Pittsburgh%20District%20released%20its,Continuing%20Authorities%20Program%2C..>

Work/BIL/#:~:text=Infrastructure%20Investment%20and%20Jobs%20Acts%20provides%20more%20than%20%24881.9%20million%20in%20supplemental%20funding&text=The%20U.S.%20Army%20Corps%20of%20Engineers%20Pittsburgh%20District%20released%20its,Continuing%20Authorities%20Program%2C..

Among the “Other Programs” in IIJA, America’s Marine Highways Program (see page 15) will receive \$25 million. IIJA also includes Surface Transportation Reauthorization with baseline spending for the Nationally Significant Multimodal Freight & Highway Projects Program (INFRA) at \$960 million per year.

There is ample evidence that state DOTs are pressed to find funding to address surface transportation needs, and it is even more difficult to identify funds for those modes without dedicated user fees. IIJA reaches across this funding impasse and recognizes that freight is multimodal, and integrating the modes holds great potential to reduce carbon and congestion, create economic development, and ensure that these maritime freight systems are maintained and further developed to accommodate modern shipping needs. Table 1 summarizes the funding available from IIJA that is specific for ports or funding that ports are eligible for.

Table 1: Infrastructure and Investment Jobs Act (IIJA) Funding Opportunities

Type	Program Name	Normal Appropriation Per Year	IIJA Supplement Per Year FY22-26	New Funds	Eligibility
Port Specific	Port Infrastructure Development Program (PIDP)	\$234M	\$450M	-	Port equipment and facilities improvements
	Army Corps of Engineers Coastal Navigation Construction	\$2.75B	\$540M	-	Dredge and maintain federal coastal navigation channels
	America's Marine Highways	\$14.8M	\$5M	-	Promote sea freight transportation
	Port Truck Idling Program	-	-	\$80M	Reduce truck emissions at ports
	Electric or Low-Emitting Ferry Program	-	-	\$250M	Purchase of electric or near-zero emissions passenger ferries
Port Eligible	Rebuilding American Infrastructure with Sustainability and Equity (RAISE) & Infrastructure for Rebuilding America (INFRA)	\$1.75B	\$2.14B	-	Nationally significant transportation projects
	Consolidated Rail Infrastructure and Safety Improvements (CRISI)	\$625M	\$1B	-	Intermodal port projects
	National Infrastructure Project Assistance Program	-	-	\$5B	Large, complex projects, regional and national impacts.
	NEW. Promoting Resilient Operations for Transformative, Efficient, & Cost-saving Transportation (PROTECT) Grants	-	-	\$1.4B	Ensure resiliency to natural disasters.

Source: American Association of Port Authorities AAPA Infrastructure Investment and Jobs Act - What's In It For You Presentation

Water Resource Development of Act of 2022 (WRDA)

WRDA provides authorization for USACE's activities for flood control and dam safety, navigation, and ecosystem restoration throughout the country. WRDA is typically reauthorized every two years. Compared with prior WRDAs, WRDA 2022 includes more comprehensive provisions addressing the integrated planning of water resources, maintenance of navigation channels, green waterway infrastructure, and municipal engagement with the U.S.

Environmental Protection Agency (EPA). Provisions included in WRDA 2022 will support the marine freight activities in the MAFC region by:

- **Protecting the region from rising sea levels and climate change.** The Act directs water level management and maintenance of navigation channel projects on the Upper Mississippi River and Illinois Waterway and authorizes funding to construct the water level forecast models for the Great Lakes.
- **Providing more investments for environmental infrastructure and ecosystem projects.** The Act authorized more appropriations for ecosystem restoration activities in the Upper Mississippi River system and environmental infrastructure in northern Missouri. WRDA 2022 continues to support the Great Lakes and Mississippi River Interbasin Study in Illinois, and the Southeast Des Moines River project in Iowa.
- **Improving the operation, maintenance, and safety of waterways and water infrastructure.** An inland waterways regional dredging pilot program will be established under this Act to award combined operations, maintenance, and construction dredging contracts on inland waterways.

WRDA's holistic focus on navigation, environment, community, and economic development reflects waterways' broad influence on surrounding areas and economies.

Marine Freight Guidance Landscape

Comprehensive marine freight plans are a relatively new addition to state DOT planning and not mandatory. The lessons learned and practices developed during the maturation of state freight plans readily apply to marine freight systems. In addition to the direction provided with reauthorization, several agencies provide guidance for port development to a variety of clientele. These agencies and the potential support for state DOT activities are outlined below.

U.S. Department of Transportation (USDOT)

USDOT provides specific guidance for state freight plans and state freight advisory committees, originally established under MAP-21 and in the FAST Act. The recommendations on marine planning, policy, and programs in the guidance [5] are summarized to include: an

- **Maritime Mobility** - Port authorities, maritime and port industry associations, and other stakeholders should be included in planning activities to identify facilities with freight mobility constraints and develop collective solutions to increase maritime freight mobility.
- **Maritime Data and Statistics Accessibility** - Information on port and waterway conditions, commodities, and volumes should be available from port authorities, and stakeholders should be consulted to identify unique features that should be considered during planning.
- **Multi-modal Freight Connectivity** - Marine-related infrastructure (designated Marine Highway Network, ports, terminals, lock and dam systems, etc.) are critical components of the multimodal freight network. State freight plans should consider the needs and capacity of the entire freight system and improve the connectivity between different modes for safer and more efficient freight movement.
- **State Freight Advisory Committee (FAC)** - FACs should be representative of a cross-section of public and private sector marine freight stakeholders (e.g., ports, marine terminal operators, barge and vessel operators, maritime freight-related workforce, etc.).

USDOT has also collaborated with the American Association of Ports Authorities (AAPA) and MARAD to develop a port planning toolkit (see the section below).

While there needs to be more specificity on the process and factors to be included in a state marine and port plan, the implementation of multimodal state freight plans and including maritime stakeholders in FACs is a significant step and recognition of the importance of maritime freight.

Maritime Administration (MARAD)

To address the challenges facing marine corridors and markets and develop a robust and environmental-friendly Maritime Transportation System (MTS), MARAD created the Maritime Administration Strategic Plan (2017-2021). The four primary goals identified in the plan are:

1. Strengthen U.S. maritime capabilities essential to national security and economic prosperity.
2. Ensure the availability of a U.S. maritime workforce that will support the sealift resource needs of the National Security Strategy.

3. Support enhancement of U.S. port infrastructure and performance.
4. Drive maritime innovation in information, automation, safety, environmental impact, and other areas.

In 2007 MARAD created the Marine Highway Program. The Marine Highways were to be created on waterways parallel to major interstate landside freight corridors and were named after the interstate facility. For example, in the MAASTO region, there is M-70 for I-70, and it includes portions of the Ohio, Mississippi, and Missouri Rivers and roughly parallels I-70. On the Great Lakes, there is M-90 to move loads with similar origins and destinations of I-90. The program's purpose was to encourage modal shift. The program is intended to move freight from the highways to the parallel marine corridor. This would result in a decrease in freight congestion on major Interstates and a decrease emissions impacts of increasing highway freight movements.

There has been mixed success with the program. However, the Marine Highway Program has the potential to provide a base for region-wide collaboration on infrastructure and market development. The MARAD-named routes could act as a ready-to-go platform for the strategic development of marine freight corridors.

MARAD also manages three programs to support port and system development.

- Port Conveyance Program
This program facilitates transition of military ports and bases to public ports to support the marine system and aid local and regional economic development.
- National Port Readiness Network (NPRN)
This program ensures readiness of commercial ports to support force deployment during contingencies and other national defense emergencies.
- Port Infrastructure Development Program (PIDP)
This program provides support for port development, port expansion, and operation of port facilities.

MARAD was also a partner with the American Association of Port Authorities (AAPA) and USDOT in the development of an industry-designed Port Planning and Investment Toolkit.

U. S. Environmental Protection Agency (EPA)

The EPA provides guidance and programs focused on reduction of marine emissions and pollutants. And while the program's focus is limited, it does provide opportunities to upgrade

facilities and equipment that reduce pollutant discharge. EPA recognizes four pollution sources related to marine operations: 1) vessel discharges, 2) marine engines, 3) marinas, and 4) port operations.

EPA emphasizes the importance of effective port operation strategy to improve air and water quality in marine planning. The agency provides a series of port operation strategy fact sheets and funding opportunities, including:

- **Port Emissions Inventory Guidance**
This guidance describes how to estimate port-related and goods movement mobile source emissions. As decarbonization continues, this could prove helpful in developing emission inventories to improve port environmental performance.
- **Shore Power Technology Assessment at U.S. Ports**
Shore power is a successful tool for reducing vessel-based diesel emissions.
- **National Port Strategy Assessment**
EPA provides various strategies to reduce emissions from port-related equipment and transportation tools based on a national-scale port emission assessment.
- **Diesel Emissions Reduction Act (DERA) Funding**
DERA provides grants to port projects that implement cleaner technologies to reduce harmful emissions, improve air quality and protect human health.

For more detailed information about maritime EPA guidance, please refer to <https://www.epa.gov/vessels-marinas-and-ports>.

American Association of Port Authorities (AAPA)

AAPA, USDOT, and MARAD collaborated to develop the Port Planning and Investment Toolkit in 2014. The toolkit contains five modules, providing a framework and best practice examples for funding and/or financing freight transportation facilities and other port-related improvement projects. States could refer to this toolkit to evaluate the feasibility and estimate the financial performance of sponsored projects.

In addition, AAPA also provides legislative leadership to advance maritime policy, financing, and awareness of maritime activities.

American Great Lake Port Association (AGLPA)

AGLPA has provided strong support for continued funding for MARAD's Port Infrastructure Development Grant (PIDP) programs and supported an increase in the funding eligibility of the marine infrastructure for up to five percent of annual PIDP grants.

As an industry association, they focus on legislation and industry health and only provide minor planning support or direction.

Regional Guidance: Ohio-Kentucky-Indiana (OKI) Regional Council of Government

OKI is a metropolitan planning organization (MPO) and is included as a guidance example due to its success in working across agencies and state borders to create a regional freight plan with a prominent focus on maritime freight. OKI is updating its plan [6] with a regional multimodal freight plan to systematically examine current and future freight conditions. This new plan will highlight five key goal areas: safety, infrastructure condition, mobility and reliability, environmental sustainability, and economic competitiveness.

OKI has been awarded three America Marine Highway (AMH) grants to support M-70 barge service. To the region's benefit, OKI has demonstrated the abilities of local planning organizations, such as an MPO, to drive marine freight improvements successfully.

Marine Freight Policy and Planning in Europe

This section examines European Union (EU) policy and directives supporting commercial inland waterway transport that could provide lessons and best practices for consideration in the United States.

EU's policy, developed by the European Commission, is designed to improve the competitiveness of inland waterway transport in their integrated transport network with an emphasis on the environment. EU policy is encapsulated in an integrated European Action Programme for Inland Waterway Transport, *Navigation and Inland Waterway Action and Development in Europe (NAIADES)* to tap into the full potential of inland waterway transport. For more detailed information from the European Commission, please see https://transport.ec.europa.eu/transport-modes/inland-waterways/promotion-inland-waterway-transport_en.

The EU guidelines within NAIADES focus on the integration and competitiveness of the marine system within the larger system and fully support the EU environmental focus. General guidance is summarized below.

- Ports are often considered major sources of CO2 emissions that exacerbate climate change. EU set decarbonization and adaptation to climate change as priorities to facilitate sustainable port ecosystems within their legislative framework. See *Port Service Regulation* for details.
- The EU introduced a four-stage methodological framework for port and inland waterway operators to ensure the resilience of waterborne transport to climate change. The framework includes 1) identification of the susceptibilities of assets and operations caused by climate change, 2) collection of the climate information relevant for waterborne transport, 3) identification of the potential vulnerabilities and risks, and finally, 4) implementation of the adaptation strategies to address the identified risks.
- NAIADES emphasizes that better port management will attract more freight forwarding companies and host value-adding activities. It conducted a holistic review of the port management and best practices in the EU region through the *Danube Transnational Programme*.
- Six high-impact factors of port success are identified: 1) the socioeconomic structure of the country, 2) focused, consistent state strategic policy, 3) partnership factors, 4) organizational conditions, 5) ports services with the flexibility to handle unexpected business challenges, and 6) highly qualified and experienced personnel.

The guidance also focuses on the importance of training programs to provide a pipeline of qualified new employees. The practices make a strong case for investment in employees, and returns on that investment can happen in as little as one year and can continue as long as the employee remains in the field.

Table 2 summarizes the key points of EU policy (NAIADES) and guidance on inland waterway transport.

Table 2: Key Points of EU Policy and Guidance for Inland Waterway Transport

EU	Key Points
Policy	Attract new markets of waterborne transport.
	Improve maritime logistics efficiency and waterway infrastructure.
	Expand inland navigation network.
	Facilitate marine stakeholder engagement.
	Improve resilience of waterway transport to crisis.
Guidance	Ensure resilience of waterborne transport to climate change.
	Assure the environmental sustainability of the port operation.
	Upgrade human resources for better port management.

Source: NAIADES

Similar to the MAASTO states’ collaborative work and efforts to manage some aspects of freight corridors regionally, the EU has created the Trans-European Transport Network (TEN-T). The Ten-T includes both the inland and coastal ports and waterways. This integrated and linked multimodal system is part of their “unified network boosting growth and competitiveness in Europe’s Single Market.” See *European Commission, Mobility and Transport, Ports* for the policy.

In summary, there is a need for specific guidance for state DOTs to learn about port operations and organization, and port and marine freight corridor planning and development. The majority of the existing guidance is directed at ports and port management. The guidance provided and developed for MAP-21 and the FAST Act offers a sound foundation for state-level marine and port planning and development. Given the broad influence of waterways on the economy, community, and environment, a holistic planning framework is recommended and has proven successful in planning and development efforts in the U.S. and the EU.

2. MARINE FREIGHT CONDITIONS

This chapter provides an overview of the marine freight system and activity in the MAFC region and demonstrates a comprehensive approach to development baseline conditions for marine freight planning. The review includes a discussion of marine transportation systems, waterborne commerce, and the estimation of economic impacts for marine freight systems.

Marine Transportation System (MTS)

The Marine Transportation System of the MAFC region encompasses the network of waterborne transportation along inland river systems and the Great Lakes. As shown in Figure 4 and Table 3, the MAFC region has 9 designated Marine Highways affiliated with the region. Six of the ten MAFC states have commercial access to one or more of the Great Lakes, and six of the eight U.S. states with Great Lakes access are in the MAFC region. MAFC has approximately 9,240 miles of commercially navigable waterways and 113 public ports, according to the National Transportation Atlas Database (NTAD). Though MAFC has rich marine transportation resources, most MAFC ports are ranked low in tonnage as compared to the coastal system. This reflects the underutilized capacity of the system, the importance of coastal marine gateways, and presents an opportunity to increase the utilization of the MTS.

Based on region-wide access and current levels of commerce, there is ample opportunity to increase freight movements on the region's MTS. Infrastructure investments, awareness, and marketing will be required to develop the regional marine freight corridor system capabilities on these waterways.

Marine Highways

The MAASTO region has participated in the identification and sponsorship of MARAD Marine Highways on the region's waterways. Marine Highways were conceptualized as a way of decreasing freight related congestion, air quality issues, or other environmental challenges on the landside system (United States Marine Highway Program). The National Defense Act of 2023 expanded the program to include bulk, liquid and loose cargos ([The National Defense Authorization Act for Fiscal Year 2023](#)). Recognition as a Marine Highway opens eligibility for MARAD funding as it becomes available.

Importantly, the defined Marine Highway provides a corridor approach to waterways rather than a focus on individual port development. This is in line with the MAASTO states' efforts to manage freight corridors as multistate facilities with uniform, efficient, and safe services.

Figure 4 and Table 3 describe the Marine Highways in the MAASTO region.

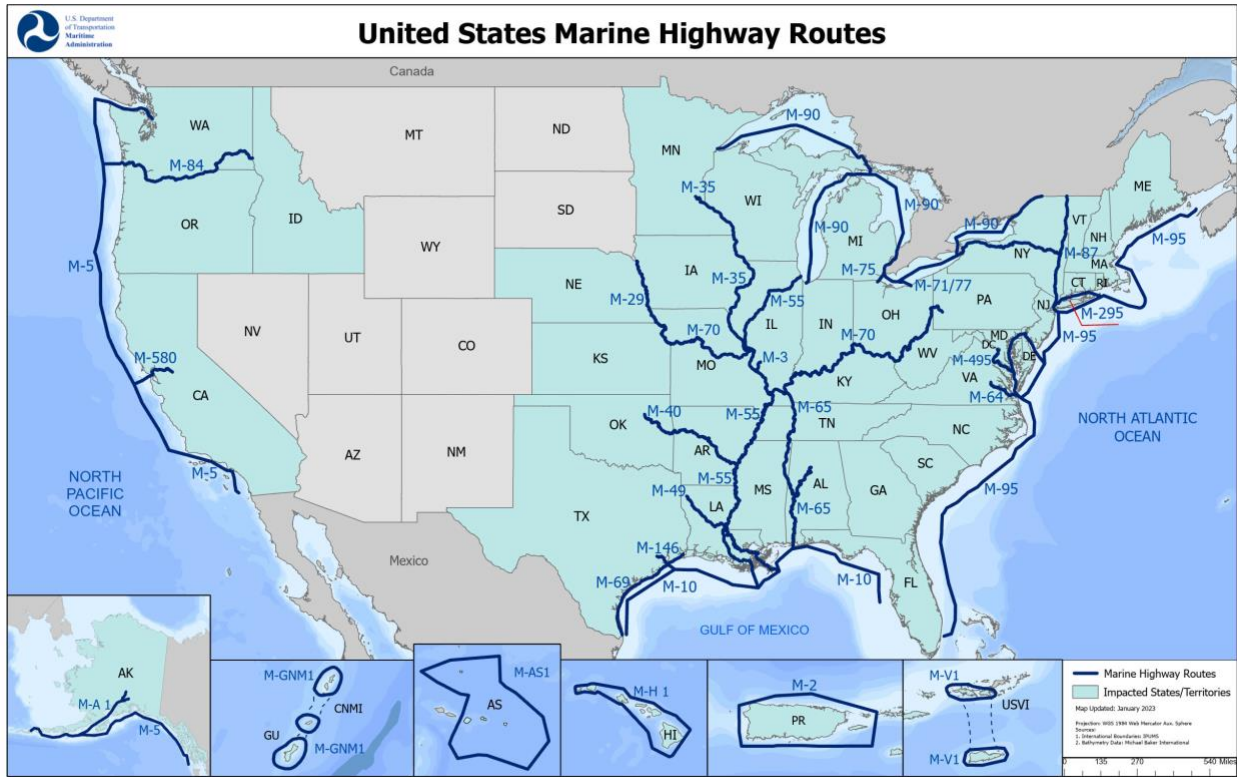


Figure 4: U.S. DOT Marine Highways Routes.

Source: United States Marine Highways. USDOT, Maritime Administration

Table 3. Overview of the Marine Highway System in the MAFC Region

State	Marine Highway Routes	Waterway System	Commercially Navigable Waterways		
			Miles	US Rank (2018)	# Public Ports
Illinois	*M-3 M-35 M-55 M-70 M-90	Mississippi, Ohio, Illinois, Kaskaskia Rivers and Great Lakes System	1,118	8	20
Indiana	M-70	Ohio and Great Lakes System	350	24	3
Iowa	M-29 M-35	Missouri River Mississippi River	490	19	3
Kansas	M-29	Missouri River	122		1
Kentucky	M-55 M-65 M-70	Mississippi, Tennessee and Ohio Rivers	1,590	4	10
Michigan	M-71/M-77 M-75 M-90	Great Lakes System	3,200		22
Minnesota	M-35 M-90	Mississippi River Great Lakes System	260	27	9
Missouri	M-29 M-55	Missouri and Mississippi Rivers	1,050	10	14
Ohio	M-70 M-75 M-71/M-77 M-90	Ohio River Great Lakes System	440	21	10
Wisconsin	M-35 M-90	Mississippi River Great Lakes System	230	29	8**
Subtotal MAFC	9		9,240		99
US Total	29				
MAFC Share	31.03%				

Source: National Transportation Atlas Database (NTAD), USACE, State Freight Plans

*M-3 is a newly designated Marine Highway route.

**Only includes ports that move significant freight volumes.

Waterborne Commerce

This section provides information about waterborne commerce in the MAFC region. Based on 2020 Waterborne Commerce data, Table 4 provides a state-by-state summary of tons shipped by categories. MAFC's overall share of the total U.S. maritime freight was at 19.41 percent.

MAFC states constitute 44.45 percent of domestic shipping and 27.36 percent of domestic receiving. MAFC states accounted for 1.79 percent of U.S. shipping tonnage and 2.33 percent of U.S. receiving tonnage. Three MAFC states, Kentucky, Illinois, and Ohio rank within the top ten states in waterborne shipping with rankings of 7, 8, and 9, respectively.

Table 4: CY 2020 Waterborne Commerce by State and MAFC Share (In Units of 1000 Tons)

States	Totals*	Shipping		Receiving		Intrastate	US Rank
		Domestic	Foreign	Domestic	Foreign		
Illinois	75,112	51,599	45	15,531	1,828	6,109	8
Indiana	50,608	16,638	43	31,035	513	2,379	12
Iowa	11,329	8,470	0	2,537	0	323	33
Kansas	57	32	0	26	0	0	44
Kentucky	76,730	39,129	0	22,178	0	15,422	7
Michigan	40,896	15,079	1,102	8,837	5,616	10,264	19
Minnesota	41,668	30,197	3,422	6,494	430	1,125	18
Missouri	45,012	32,875	0	6,341	0	5,797	14
Ohio	68,511	13,425	6,710	36,993	4,235	7,148	9
Wisconsin	22,266	11,375	3,822	4,716	2,252	100	26
Subtotal MAFC States	432,189	218,819	15,144	134,688	14,874	48,667	
Total U.S. (& Territories)	2,226,442	492,230	845,511	492,230	637,601	251,100	

MAFC Percent Share of U.S. Total	19.41%	44.45%	1.79%	27.36%	2.33%	19.38%	
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Source: Waterborne Commerce Statistics Center CY2020

The primary commodities on these corridors reflect traditional, high volume, low unit value marine commodities such as grains, metals, and aggregates. Petroleum, while not considered low value, is also a top commodity on the system. Table 5 shows that grains, iron/steel, and petroleum are top three commodities by tonnage. Petroleum, iron/steel and grain are also the top three commodities in terms of total value moved.

Table 5: Top Inland Waterways Commodities in the MAFC Region*

No.	by Tonnage		by Value	
	Commodities	Tonnage (Million Tons)	Commodities	Value (Billion \$)
1	Grains	99.68	Petroleum	15.51
2	Iron/steel	67.97	Iron/steel	14.94
3	Petroleum	63.78	Grains	3.88

Source: U.S. Army Corp of Engineers state Traffic Fact Sheet, at Waterways Council, Inc. at, <https://www.waterwayscouncil.org/waterways-system>

*Kansas traffic data not available.

Figures 5 and 6 provide graphic displays of the waterborne traffic and historic levels from 2016 - 2020 provided by the Waterborne Commerce Statistics Center. Figure 5 depicts MAASTO states' freight movements broken down by shipping types, including domestic or foreign shipping and receiving, and intrastate. Figure 6 depicts regional maritime volume information in tonnage.

The regional importance of the ports in MAFC states is overshadowed by the volume of international maritime trade flowing through oceanic coastal ports. From 2016 – 2020 MAFC states accounted for a minor portion of the nation's direct foreign trade. By contrast with foreign trade, MAFC states accounted for a substantial portion of the nation's domestic maritime freight movement, responsible for shipping about 44 percent and receiving around 27 percent.

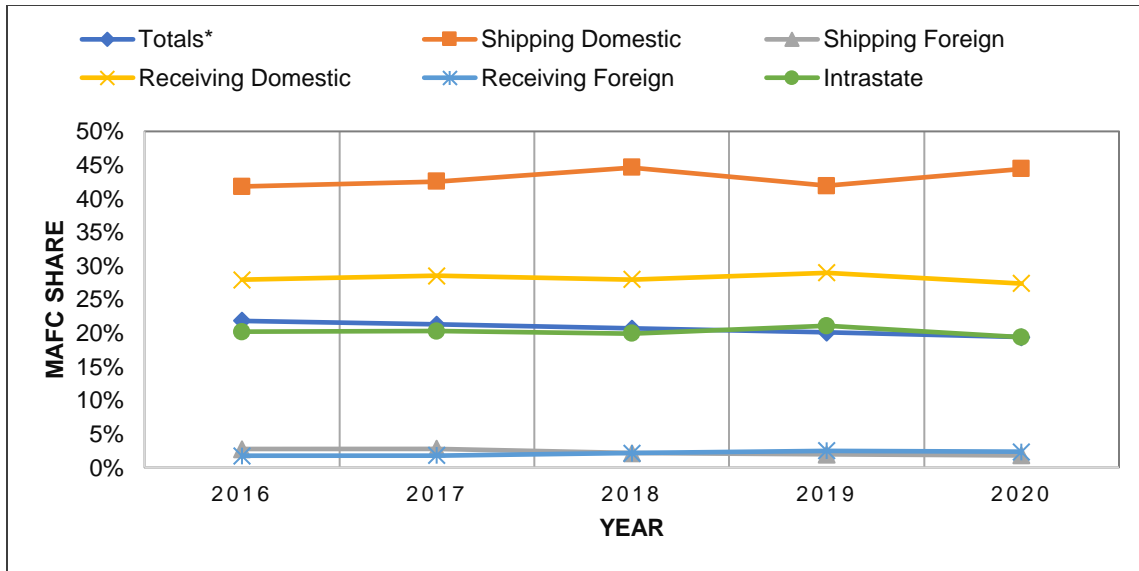


Figure 5: MAFC States' Share of Commerce, 2016 - 2020

Source: Waterborne Commerce Statistics Center 2016 - 2020

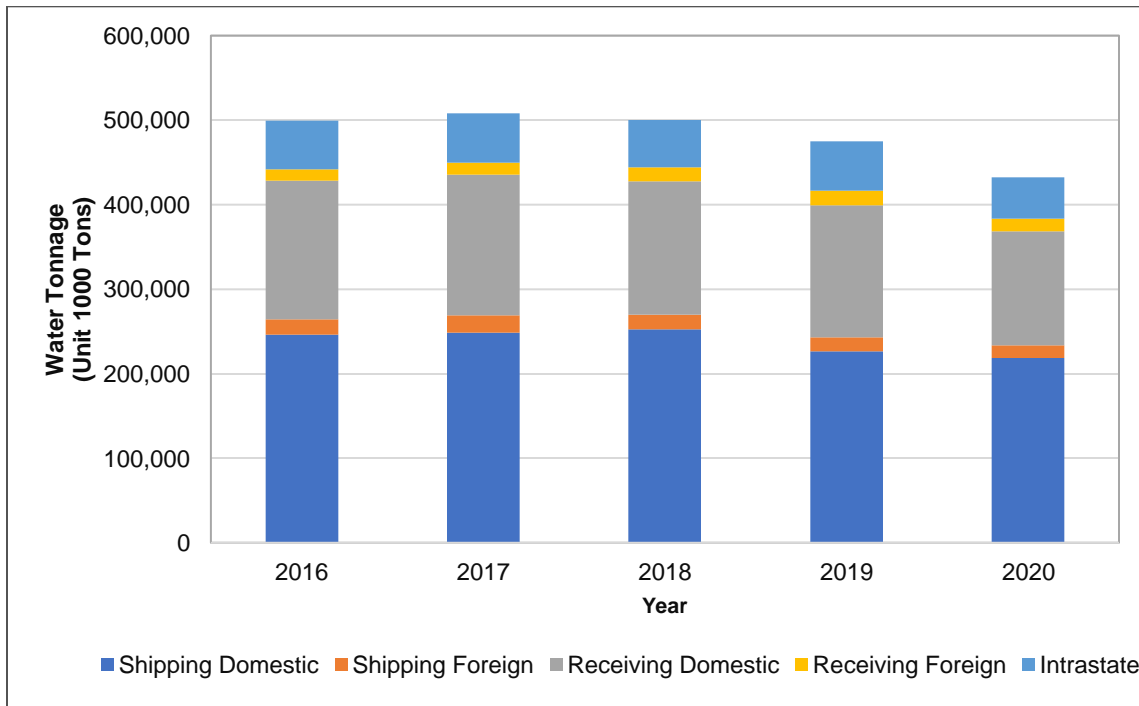


Figure 6: MAFC State Waterborne Tonnage 2016 – 2020

Source: Waterborne Commerce Statistics Center 2016 - 2020

Table 6 identifies the leading commodities on inland waterways, by tonnage and by value, for each of the ten MAFC states.

Table 6: Top Inland Waterways Commodities by Individual States (Handled 2018)

States	By Tonnage				By Value			
	Commodities	Tonnage (Million Tons)	Subtotal Tonnage (Million)	Subtotal Percent Share of Total Tonnage	Commodities	Value (Million \$)	Subtotal Value (Million)	Subtotal Percent Share of Total Value
Illinois	Food & food products	36.4	58	70%	Agricultural products	2,700.0	7,000.0	53%
	Coal, lignite, and coal coke	13.6			Basic chemicals used in consumer products	2,500.0		
	Petroleum products	8.3			Cereal grains	1,800.0		
Indiana	Coal, lignite, and coal coke	15.2	29	81%	Cereal grains	873.7	1,971.3	79%
	Sand, gravel, shells, clay, salt, & slag	7.7			Agricultural products	790.7		
	Food & food products	5.6			Base metals	306.9		
Iowa	Food & food products	5.9	7	66%	Agricultural products	1,200.0	2,023.6	77%
	Chemical fertilizers	1.1			Cereal grains	472.6		
	Sand, gravel, shells, clay, salt, & slag	0.33			Machinery	351.0		
Kansas	Crude Petroleum	18 thousand tons*	18 thousand tons	100%	Crude Petroleum	5.7	18 thousand tons	100%
Kentucky	Coal, lignite and coal coke	41.4	86	79%	Basic chemicals used in consumer products	2,600.0	22,600.0	54%
	Sand, gravel, shells, clay, salt, & slag	35.8			Gasoline	2,000.0		
	Petroleum products	8.7			Coal	18,000.0		

States	By Tonnage				By Value			
	Commodities	Tonnage (Million Tons)	Subtotal Tonnage (Million)	Subtotal Percent Share of Total Tonnage	Commodities	Value (Million \$)	Subtotal Value (Million)	Subtotal Percent Share of Total Value
Michigan	Non-metallic Minerals	25.0	na	42%	Metallic Ore	8,743	na	21%
	Coal	15.0	na	27%	Chemicals	759		18%
	Metallic Ore	12.0	na	20%	Coal	643		16%
Minnesota	Food & food products	6.0	10	63%	Cereal grains	689.3	1,997.3	84%
	Sand, gravel, shells, clay, salt, & slag	2.4			Agricultural products	680.3		
	Chemical fertilizers	1.7			Fertilizers	627.7		
Missouri	Sand, gravel, shells, clay, salt, & slag	13.0	28	70%	Basic chemicals used in consumer products	4,100.0	7,036.2	87%
	Food & food products	9.2			Cereal grains	2,400.0		
	Primary non-metal products	5.8			Agricultural & food products	536.2		
Ohio	Coal, lignite and coal coke	23.2	30	78%	Basic chemicals used in consumer products	1,300.0	2,785.2	61%
	Sand, gravel, shells, clay, salt, & slag	4.9			Other coal and petroleum products	848.7		
	Petroleum products	2.2			Coal	636.5		
Wisconsin	Food & food products	1.5	2	83%	Machinery	683.9	1,493.5	42%
	Coal, lignite and coal coke	0.8			Gasoline	432.8		
	Primary non-metal products	0.19			Electronics	376.8		

Source: Compiled from National Waterway Foundation, Waterways Council Inc., USACE, and State Freight Plans.

*Kansas 2023 Freight Plan list Crude Petroleum as the only product moved based on 2017 data.

See: https://www.ksdot.gov/Assets/wwwksdotorg/bureaus/burRail/Rail/Documents/2023/KansasStateFreightPlan_FHWA_Approved.pdf

The top commodities moved in the region support the major industries in the region and around the U.S. Table 7 displays the top five key industries supported by inland waterways in the MAFC region. According to the National Waterways Foundation reports, the inland waterways generate 354,760 direct jobs in these top five industries. Direct jobs are defined in the Cambridge study as number of inland waterways-supported jobs in the industry under evaluation.

Table 7: Key Industries Supported by Inland Waterways in MAFC Region (Handled 2018)

No.	Key Industries	Direct Jobs
1	Nondurable manufacturing	225,450
2	Chemical manufacturing	70,990
3	Nonmetallic mineral product mfg.	24,550
4	Mining (except oil & gas)	22,390
5	Crop production	11,380
Total		354,760

Source: National Waterways Foundation
Data does not include Michigan.

The key industries supported by marine freight in each state are reported in Table 8. The array of commodities reflects chemical manufacturing, crop production, aggregates, mining, and heavy goods manufacturing.

Table 8: Key Industries Supported by Inland Waterways in Individual States (Handled 2018)

States	Key Industries	Percent of Goods Shipped by Water in Given State	Direct Jobs
Illinois	Chemical manufacturing	6.6% of outbound	27,560
	Plastics & rubber products mfg.	6.0% of inbound	26,160
	Crop production	5.8% of outbound	1,900
	Nonmetallic mineral product mfg.	5.7% of outbound	8,870
	Mining (except oil & gas)	4.7% of outbound	3,590
Indiana	Oil & gas extraction	3.7% of outbound	132
	Construction	3.5% of inbound	124,700
	Nondurable manufacturing	2.9% of inbound	112,250
Iowa	Crop production	1.9% of outbound	3,310
	Plastics & rubber prods. Mfg.	1.3% of inbound	8,650
	Mining (except oil & gas)	1.0% of inbound	2,450
	Machinery manufacturing	1.0% of inbound	7,500
*Kansas	NA	NA	8,460
Kentucky	Utilities	37.4% of inbound	6,820
	Mining (except oil & gas)	27.4% of outbound	7,750
	Crop production	20.0% of outbound	3,270
	Chemical manufacturing	17.3% of inbound	12,560
	Nonmetallic mineral prod. mfg.	15.8% of outbound	7,470
**Michigan	Iron/Steel	30% of total	1,905
	Petroleum	14% of total	889
	Aggregates	10%	635
Minnesota	Crop production	26.1% of inbound	3,110
	Nondurable manufacturing	16.0% of inbound	79,800
	Primary metal manufacturing	7.5% of outbound	5,720
	Mining (except oil & gas)	5.3% of outbound	5,570
Missouri	Chemical manufacturing	32% of inbound	19,760
	Primary metal manufacturing	19% of inbound	6,460
	Crop production	12% of outbound	2,900
	Mining (except oil & gas)	10% of outbound	3,030
	Nonmetallic mineral prod. mfg.	8% of inbound	8,210
Ohio	Utilities	20.3% of inbound	13,180
	Chemical manufacturing	11.1% of inbound	30,870
	Nondurable manufacturing	4.6% of inbound	129,190
	Petroleum & coal products mfg.	3.8% of inbound	3,284
Wisconsin	Nondurable manufacturing	25.5% of inbound	33,400
	Construction	8.3% of inbound	66,600

Source: National Waterway Foundation, Waterways Council Inc., USACE and State Freight Plans

Economic Impacts

Marine transport is a dynamic part of the national economy and critical to port communities and the MAASTO states. Demonstrating the benefits of investments in, operation of, or loss of marine freight infrastructure is a commonly used planning tool. This type of economic information is also used by states to build awareness and market the mode.

One example of refinement in the economic accounting for marine freight activities is the Marine Economy Satellite Account (MESA) [7]. This is a customized data source that reflects the scope of marine economic activity. Based on the designated 10 categories of economic activities reported in the MESA, the marine economy accounted for 1.7 percent, or \$361.4 billion of current-dollar U.S. gross domestic product (GDP) in 2020 and 1.7 percent, or \$610.3 billion, of current-dollar gross output. The categories in the MESA economic activity statistics include:

- Living resources, marine
- Construction, coastal and marine
- Research and education, marine
- Transportation and warehousing, marine
- Professional and technical services, marine
- Minerals, offshore
- Utilities, coastal
- Ship and boat building, nonrecreational
- Tourism and recreation, coastal and offshore
- National defense and public administration

The MESA data reports that marine transport and warehousing accounted for \$53.5 billion, or 8.6%, of total maritime economic activity. This category ranked 4th in the 10 general categories of marine economy activities. Similar to the larger economy, marine transportation and warehousing declined 16 percent with the start of the pandemic in 2019.

According to MARAD, 99 percent of overseas trade enters or leaves the U.S. by ship. Considering all economic sectors, this waterborne cargo and associated activity contributes

more than \$500 billion to the U.S. GDP, generating over \$200 billion in annual port sector federal/state/local taxes, and sustaining over 10 million jobs [8].

Economic modeling and accounting have proven useful in demonstrating the value of the services provided by, investments in, or loss of marine infrastructure. Economic studies or assessment examples include work in Kentucky, Missouri, and Wisconsin where the states conducted studies used in agency planning, private sector marketing, and to support legislative agendas. See Chapter 4 for a discussion of these state studies.

Regional examples of state level economic benefits used by the Great Lakes Ports Association and the National Waterways Foundation are presented in Table 9. As industry associations, these groups have compiled information for marine stakeholders to advocate for investments in marine infrastructure. However, a uniform, valid, and reliable approach to understanding the economic benefits of these investments has not been applied across the MAASTO states. Given the uniqueness of each analysis approach, and the potential differences in data and modeling assumptions, these efforts are not directly comparable and are intended here as examples of marine planning applications. See the MAFC report on [Quantifying the Value of Multimodal Freight Investments](#) for more information on economic modeling uses in modal planning scenarios.

This information provided in Table 9 below is not comparable across states or regions due to variability in the data and methods used. Table 9 summarizes the direct and indirect economic impact of ports, inland waterways, and maritime-dependent industries in the individual states across the MAFC region. Data includes the number of newly generated jobs, personal income, gross state product, total output, and state and local tax revenue for 2018. While these regional analyses provide a summary of economic activity, states recognize the need for state specific analysis using current data and appropriate economic assumptions. State programs and investments are best served with customized economic modeling and accounting that ensure validity and reliability in the findings.

Table 9: Examples of Economic Impact of Ports, Inland Waterways, and Inland Waterways-Dependent Industries.

Section 1: American Great Lakes Ports Association Impact Findings*					
States	Jobs	Personal Income	Business Revenue	Local Purchases	Local Taxes Paid
Dollars in Billions					
Illinois	6,476	0.52	0.49	0.89	0.20
Indiana	66,158	4.90	1.13	2.60	2.30
Michigan	25,910	1.70	3.20	0.69	0.76
Minnesota	6,160	0.41	1.27	0.22	0.23
Wisconsin	7,484	0.48	1.19	0.21	0.24
Total	145,356	10.22	9.99	6.02	4.58
Section 2: National Waterways Foundation Mississippi River Impact Findings*					
States	Jobs	Personal Income	Gross State Product	Total Output	State & Local Tax Revenue
Dollars in Billions					
Illinois	236,000	15.5	38	132.6	2.1
Iowa	101,000	5.2	8	18.7	0.49
Kentucky	110,000	5.9	12	30.7	1.2
Minnesota	460,000	24.4	59	196.9	16
Missouri	140,000	8.3	13	37	0.93
Ohio	316,000	18.2	33.9	77.2	3.0
Wisconsin	235,000	14.1	22	49.4	1.1
Total	936,000	52	102	302	19
Section 3: Kansas Statewide Freight Plan					
States	Jobs	Personal Income	Gross State Product	Total Output	State & Local Tax Revenue
Dollars in Billions					
Kansas*	90	Not available	Not available	Not available	Not available

Source: American Great Lakes Ports Association (<https://www.greatlakesports.org/resource-types/economic-impacts/>), and the National Waterway Foundation (<https://www.nationalwaterwaysfoundation.org/news-and-updates/press-releases>).

*Data unavailable in a similar format across all states. Regions and states are not comparable due to variations in data and methodologies. Kansas information not available.

Economic analysis and accounting can play a critical role in developing support for maritime investments. Practitioners should carefully review the assumptions, data, methods, and findings of an economic analyses and avoid generalized models that are not refined, or that do not accurately reflect the conditions and economic opportunities of the project area.

In summary, the MAASTO region contains the majority of the Inland Waterways System. The commodities moved on the Great Lakes and Inland Rivers are critical to the nation and localities they service. This scenario is explored in a report for the U.S. Office of Homeland Security, *The Perils of Efficiency: An Analysis of the Unexpected Closure of the Poe Lock and Its Impact* [9].

The iron ore shipped from Lake Superior to the Great Lakes steel mills transits the Soo Locks, a set of locks owned and operated by the United States Army Corps of Engineers (USACE). An unanticipated closure of the Poe Lock, the only lock large enough at the Soo Locks to allow passage of the Lake Carriers carrying iron ore, would be catastrophic for the Nation.

Depending on what time of year the closure occurred, approximately 75 percent of the U.S. integrated steel production would cease within 2–6 weeks after the closure of the Poe Lock. Approximately 80 percent of iron ore mining operations, and nearly 100 percent of the North American appliances, automobile, construction equipment, farm equipment, mining equipment, and railcar production would shut down.

While infrastructure and operational investments are being made across the Great Lakes and Inland River System, failure of these systems would impose tremendous cost to the Nation's economy. The cost of modal changes for the marine commodities to trucking and rail, where possible, will further congest already burdened roads and rail.

3. MARINE FREIGHT PLANS AND PRACTICES

This chapter focuses on the critical elements of marine freight planning reflected in state freight plans, marine/port plans and studies, and federal guidance. The assessment focuses on the importance of and approaches to stakeholder involvement, the key components of marine and port development programs, and freight corridor development opportunities with multistate collaborations. These areas are most relevant, representing undeveloped and critical areas in the planning and development framework necessary for port and marine freight development. The assessment suggests opportunities to improve regional development based on the effectiveness of state practices, leveraging existing Marine Highway designations, and the collaborative context of the MAASTO states.

Stakeholder Engagement and the Freight Advisory Committee (FAC)

MAASTO DOTs have incorporated some form of a FAC in their freight and marine planning, some even prior to MAP-21. In addition to FACs that meet regularly and provide input to state DOTs across a variety of topics and issues, state DOTs also conduct public meetings, virtual meetings, and personal engagement with relevant agency representatives, partner associations, and system users to gather input and feedback.

Gathering input from different levels of marine freight sector users, providers, and regulators is necessary to identify the marine freight needs, barriers, and potential opportunities. Successful marine freight planning depends on effective facilitation of stakeholder involvement. Early and continuous stakeholder participation is encouraged through the various stages of the marine freight planning process.

This section provides background on the use of FACs in marine freight planning, effective stakeholder engagement strategies, and inventory of marine representation on the FACs operating in the MAFC states. This section also identifies and details best practices based on the member states' experiences and current development context.

Policy Review of FAC

MAP-21 and the FAST Act initiated the focus on freight plans and state FACs. Both have become institutionalized across the states and provide industries, related agencies, system users, and the professional/academic community the opportunity to express their perspectives regarding the agency's freight planning and outcomes. The IJJA also emphasizes the

importance of expanding stakeholders, including and benefiting disadvantaged populations. FACs also offer opportunities for agencies to provide information on their roles in multimodal freight and generate stakeholder support.

Each state FAC should reflect the common and important freight-related sectors in their state. Accordingly, MAASTO state FACs should have representatives from marine-related stakeholders, including the marine logistics sector, modal connections (trucking, rail, etc.), and marine users. Table 10 lists marine-related FAC representatives for each of the state FACs in the region as of late 2022.

For more information on FACs in each of the MAASTO states, see [MAASTO Regional Freight Alignment: Assets for Freight Movement and Economic Development. Chapter 3.7.1](#)

Engaging private sector commerce associations, economic development agencies and other 'partner' entities in the transportation planning and programming process is critical to identifying freight-specific needs and deficiencies [10].

Smith and Kale [11] describe several challenges and issues when involving the private sector in the public sector freight planning process. These factors include the ability of public agencies to convince private sector stakeholders to participate in freight planning activities, maintaining private sector interest over time, and lastly, difficulties in identifying appropriate representatives of the larger freight community.

The MAASTO states have largely overcome these potential limitations. This can be attributed to increasing awareness of freight's importance, and the state DOT's role in supporting freight development. The state's commitment to facilitating stakeholder participation through the FAC encourages those with a stake to get involved and then continue involvement.

Stakeholder fatigue can be minimized through timely meetings, and through meaningful stakeholder participation and contributions. Over time, as agencies have become proficient in freight planning and outreach, they have identified and recruited key representatives across the freight industry in their respective states.

Table 10: Maritime Industry Representation on MAFC State Freight Advisory Committees

State	No.	Maritime Representatives (as of late 2022)			
		Committee Member	Position	Organization	Sector
Illinois	2	Ivan Solls	Chairman	Illinois International Port District	Ports
		Dennis Wilmsmeyer		America's Central Port	Ports
Indiana	1	Jody Peacock		Ports of Indiana	Ports
Iowa	1	Ron White		Upper Mississippi River Regional Manager, Artco Fleeting Service	Industry
Kansas	0				
Kentucky	1	Brian Wright		Water Transportation Advisory Board	Government
Michigan	1			Port Authority Advisory Committee	Government
Minnesota	4	Deb DeLuca	Executive Director	Duluth Seaway Port Authority	Ports and Waterway
		Ron Dvorak*	Marketing Director	Lake Superior Warehousing Co., Inc.	
		Kathryn Sarnecki	VP of Redevelopment and Harbor Management	St. Paul Port Authority	
		Lee Nelson	President	Upper Rail Services, LLC	
Missouri	0				
Ohio	2	Joe Cappel	Chair	Toledo-Lucas County Port Authority	Port
		Eric Thomas		Ohio River Association	Ports
Wisconsin	2	Andrew Barnes	Assistant Chief, Programs and Project Management	US Army Corps of Engineers	Maritime - Federal
		Dean Haen	President	WI Commercial Ports Association	Ports & Harbors

Effective Engagement Strategies

In addition to the role of the FAC, additional federal, state, and local stakeholders must be included in the maritime planning process. The Transportation Research Board explains the roles of the owners and operators of marine transportation.

Even more than other parts of the Nation's transportation system, marine transportation is a joint private-and public-sector enterprise. The private sector owns and operates the vessels and most of the terminals—it is responsible for the commerce that flows through the system. The public sector provides much of the infrastructure at ports and on the

waterways—it is responsible for keeping the system functioning in support of commerce, and for doing so in a safe, secure, and environmentally sound manner [12].

As a common practice at the state level, federal agencies such as USACE, MARAD, USCG, USDOT, USDA, and the EPA are included in planning and stakeholder activities. Within state agencies, it is common to include natural resource agencies, economic development agencies, and various appointed commissions in the planning process. At the local level, community representatives, along with the representatives of industry sectors, are typically included in the outreach.

The outreach activities for this array of stakeholders generally include public meetings and sessions that provide project and policy information and collect feedback from a wide range of stakeholders. One-on-one interviews are also common. Opportunities to meet face-to-face with industry and agency personnel are considered best practices. “Boots on the ground” is an essential component to developing the relationships necessary for equitable, innovative, and successful marine and port planning.

The Importance of Funding and Programs

Consistent and adequate funding through stable programs provides at least three benefits to the maritime sector. First, it provides the investment needed for improved infrastructure and growth; second, the programs can spur additional state port initiatives; and third, the process provides for networking across the industry.

Wisconsin offers one example of good program and planning integration practice. Through its Harbor Assistance Program, ports and terminal operators are incentivized to plan for port and waterway development, due to requirements that program applicants include a three-year plan. This requirement supports the use of solid data and planning practices and provides for a strategic, multi-year approach to port investment for the state.

While competitive grants are becoming more available, especially through competitive state freight programs, dedicated funding programs for ports and waterways are considered the better option due to consistent and predictable investment levels. A more detailed discussion of multimodal freight programs across the MAASTO States can be found in the report *MAASTO Regional Freight Alignment: Assets for Freight Movement and Economic Development Section 3.11.1*.

Marine Freight System Needs and Issues

The IJA requires identification of significant freight system needs and issues in the state's freight plans. In addition to highway bottlenecks, this includes marine and waterway issues.

Based on a review of the recent state freight and marine/port plans, the common issues facing all the MAFC states are:

1. Multi-modal connections: Poor accessibility to the ports or marine hubs hinders supply chain fluidly.
2. Aging infrastructure: Most waterway infrastructures (i.e., locks and dams) are aging and require significant rehabilitation or replacement.
3. Dredging: Maintaining navigation requires timely and adequate dredging to ensure efficient and reliable waterborne freight movement.
4. Funding issues: lack of funds to support marine freight-related activities.

Additional challenges include:

5. Environmental sustainability
6. Resiliency
7. Financing for port development
8. Disconnected oversight due to multiple agencies

Table 11 summarizes the challenges and issues MAFC states identified in each state freight plan. Current MAASTO state freight plans can be found at:

<https://wwwtest.midamericafreight.org/index.php/resources/freight-planning/>.

Table 11: Challenges and Issues Identified in MAFC State Freight Plans

State	Freight Plan	Dedicated Marine Transportation System Plan	Challenges and Issues						
			Multi-modal Connection	Aging Infrastructure	Dredging	Funding Issues	Environmental Sustainability & Resiliency	Emerging Port Development	Disconnected Oversight
Illinois	2017	2021	x	x	x	x		x	x
Indiana	2018	N/A	x	x	x	x			x
Iowa	2018	N/A	x	x	x	x			
Kansas	2017	N/A	x	x	x	x			
Kentucky	2017	N/A	x	x	x	x	x		
Michigan	2022	N/A	x	x	x	x			x
Minnesota	2018	2014	x	x	x	x			
Missouri	2017	N/A	x	x	x	x	x	x	
Ohio	2019	2018	x	x	x	x	x	x	
Wisconsin	2018	N/A	x	x	x	x			

The MAFC states are pursuing funding, programs, and partnerships to resolve these persistent state-by-state issues and are simultaneously presented with a unique opportunity to transform these distinct pieces of a system into a cohesive multistate marine freight corridor.

By focusing on existing Marine Highway corridors in the region, states can work together to present these waterway connections as freight corridors that should be funded, managed, and operated similarly to Interstate Highway freight corridors across the country. This collaborative approach has worked on highway corridors and should be replicated for Marine Highway corridors. This corridor approach addresses the limitations listed in individual freight plans. A coalition of states provides a larger base for regional advocacy and a larger voice for increased funding and infrastructure. Further, supporting and developing marine freight service supports decarbonization, as well as community and economic development.

State agencies' use of performance measures can also support a corridor approach by including system-wide performance management and measures, in addition to state measures. System-wide reporting provides a more comprehensive approach by focusing on freight corridors rather than individual states or ports.

As partners with state DOTs, federal agencies should support the harmonization of regulations and policies. Those agencies should further support the development of waterways as functioning, connected corridors rather than as individual ports and segments.

All MAASTO states address marine and port freight movement in their freight plans. Seven of the ten states are pursuing the development of a complete multimodal system plan that includes waterways. The political and legislative histories of highway investment, and/or limited access to commercial waterways, have limited the potential for greater emphasis on maritime efforts in the remaining states.

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4. STATE MARITIME AND PORT PLANNING: ORGANIZATION, PROGRAMS, AND INTEGRATION

Chapter 4 draws from interviews with freight and marine planners and topical experts to examine the organizational settings, planning efforts, marine and port programs, and stakeholder involvement in each of the ten MAASTO states.

To better understand the planning context for marine and port development within state DOTs, interviews were conducted with marine and freight planners across all ten MAASTO states. In addition, representatives of associations and federal agencies were also interviewed. MAFC conducted interviews with representatives of MARAD, UMRBA, Great Lakes-St. Lawrence Governors & Premiers, and an MPO (OKI) actively involved in marine and freight planning.

Following the interviews, a teleconference and a working session were completed with the MAFC technical representatives, UMRBA, and MARAD. This working session presented the project results and reviewed the identified best practices and opportunities for the states to accelerate marine development. Attendees provided comments and revisions to the findings to best reflect the MAASTO state perspectives and practices.

Organization and Integration

All ten MAASTO states have access to an inland river and/or the Great Lakes for waterborne freight movements. Yet there is a range of state investment – in both programs and in the organization – for marine freight systems across the region. This is in part due to the general lack of marine-specific funding within state DOTs, and due to the ownership and operation characteristics along the rivers and lakes. Kansas, for example, reports marine freight movement in its freight plan but does not have programs to support infrastructure or policy development. The Indiana DOT reports little activity other than in their freight plan and does not have marine funding programs. However, the Ports of Indiana, a state-wide port authority that was established in 1961 to support economic development, acts as the state's marine champion.

In 2022 the Michigan state legislature passed a bill to create a Maritime and Port Assistance Office within MDOT. The bill was signed by the Governor and is now a Public Act. However, appropriations have not yet been provided to create the office and execute its duties as

prescribed in the law. Until appropriations are provided, there will be no immediate change to the marine duties at MDOT.

Given the broad functions of waterways, these different levels of focus and investment across the states reflect historic marine development patterns, legislative and institutional relations, and to a minor degree, limited access to waterways.

Table 12 identifies the planning efforts and organizational integration within the agency through the proxy measures of marine plan type, and the number of Full-Time Equivalents (FTEs) devoted to marine and port planning and programs in each agency. The cost of the plans are included for comparison and to track the extent of these planning investments.

Table 12: MAASTO State Plan Type and Year, Cost, and FTE(s) responsible for Marine Freight/Ports

State	Plan Type	Cost	FTE
Illinois	2021 Marine Transportation System Plan and Economic Impact Analysis Study - WSP, CPS, EBP	\$597,691	1.5 FTE
Indiana	Included in 2018 Freight Plan	-	Only freight plan
Iowa	2019 Alt Funding Study - HDR	\$400,000	1 FTE across 4 people
Kansas	Included in 2017 Freight Plan	-	Only freight plan
Kentucky	2022 Economic Study, IHS, Metro Analytics, Razor Communications	\$1,000,000	.7 FTE across three people
Michigan	Included in 2022 Freight Plan	~\$100,000	1 FTE across 3 people
Minnesota	2014 Maritime Plan - AECOM, CPCS	~\$95,000	1 FTE plus agency support
Missouri	2018 Econ/ROI Study - Cambridge, Hanson	~\$345,000	1.5 FTE
Ohio	2018 Maritime Strategy - CPCS	\$665,000	1 FTE
Wisconsin	2014 Commercial Ports Economic Study	-	1 FTE

Source: Data Provided by MAFC States

In summary of states' marine and port planning status, all states provide marine freight reporting in their freight plans. Some have conducted funding and economic studies, and others have produced distinct marine and port plans. The level and investment in marine or port planning can be summarized as follows:

- In addition to their freight plans, Ohio, Minnesota, and Illinois have completed maritime and/port plans.
- In addition to their freight plans, Iowa, Kentucky, Missouri, and Wisconsin have completed port economic studies or funding studies.
- The remaining 3 states, Kansas, Indiana, and Michigan, have maritime planning integrated within their freight plans. Of note, Indiana's port operational structure is unique in the region, removing maritime efforts from direct state DOT oversight.
- Seven of the 10 MAASTO states are actively engaged in advancing port and marine freight activities based on their planning efforts and investments.

The costs column in Table 12 represents the cost of the marine or port study or the estimated portion of their freight plan attributed to marine and port planning. The costs for post-2018 marine or port studies range from approximately \$345,000 to \$1 million.

The FTE column represents the approximate agency effort devoted to marine and port planning. Wisconsin, for example, has a dedicated full-time position for harbors and ports and responded that their agency has one FTE. Iowa reported one FTE shared across four positions. Michigan reports approximately one FTE per year spread across three positions. Recent Michigan legislation created a marine and port position within MDOT, but the position has yet to be funded.

Another proxy measure of the agency's investment in marine freight systems is the level of marine representation on the state's FAC. Summarizing Table 10, Maritime Industry Representation on MAASTO State Freight Advisory Committees, Table 13 shows the number of marine sector representatives on each state's FAC.

Table 13: Summary of Marine Representation on State Freight Advisory Committee (as of late 2022)

State	IL	IN	IA	KS	KY	MI	MN	MO	OH	WI
Marine FAC members	3	1	1	0	1	1*	4	0**	2	2

*Michigan government has a state-appointed Port Authority Advisory Committee.

**Missouri does not use an FAC but instead uses industry representation based on the project specifics and mode.

Funding Programs

Two additional measures of the maturity and investment levels of MAASTO DOTs in their marine freight systems are the presence of and funding levels for marine programs. While all MAASTO states generally have prohibitions against road user funding for non-road investment, several of the states have established programs with consistent funding. Historically, marine and port funding has been legislatively appropriated to agencies, with the frequency and amounts varying depending on yearly legislative priorities and budget conditions. With recent federal transportation legislation, states can now allocate up to 30 percent of the federal allocation towards multimodal freight investments. The following examples demonstrate how the MAASTO states are expanding their role and investment in marine freight systems.

Illinois

Illinois has enacted the Rebuild Illinois Capital Plan. Over a six-year period, it dedicates \$150 million for port improvements as part of a \$33.2 billion investment in transportation infrastructure. The state has also allocated 30 percent of the State Freight Planning Funds to port and rail projects. Illinois has utilized Statewide Planning & Research (SPR) funds to support planning and research activities, to develop Port Master Plans, and other port planning efforts. The funds are used to establish a cooperative, continuous, and comprehensive framework for making multimodal transportation investment decisions. They have also created a port and marine planning position in the agency.

Indiana

Indiana DOT has minor port responsibilities. The Ports of Indiana, the self-funded statewide port authority established in 1961, is dedicated to economic development and is the voice and management for the ports. There are cost-share opportunities and flexible funds available for alternate modes in state programs, but there has been little interest in marine funding.

Iowa

Iowa does not have any capital port funding programs. Marine projects have used flexible funding from IIJA, and Iowa manages the Linking Iowa's Freight Transportation Systems (LIFTS) program. Iowa allocates approximately \$1.7 - \$1.8 million per year between both programs for ports and waterways.

Kansas

Kansas does not have port capital programs for marine and port development. There are cost share and flexible funds available to alternate modes, but there has been little interest in developing marine funding programs.

Kentucky

Kentucky was able to fund its 2021 Port Economic Study with funds remaining from a previous federal waterfront improvement grant. This was a one-time opportunity. While the KYTC planning budget is \$12-14 million annually, ports are a very small portion of these funds. KYTC also manages a \$500,000 River Port Improvement Program that was identified in their economic study.

Michigan

Michigan currently does not have port and marine capital improvement programs. The Detroit-Wayne County Port Authority receives legislative funding, and ports are eligible for freight flexible funding. The agency has created a yet-to-be-filled waterways position.

Minnesota

Minnesota's port program (Minnesota Port Development Assistance Program (PDAP)) started in 1994 and is funded with bonding through the legislature. Funding has increased every bonding round since 2012, totaling over \$70 million over the program's history. Minnesota has an active port infrastructure funding program.

Missouri

Missouri's port program was a legislatively driven program until recently. MoDOT now operates with port capital funding of approximately \$11.7 million annually, an additional \$600,000 for port administration, and \$200,000 to support port improvement preliminary engineering. The State also allocates \$3.25 million to the freight enhancement program, of which one-half is applied to marine and rail access.

Ohio

In 2019 Ohio established its Maritime Assistance Program, driven by the state's public port authorities working through the state legislature. Appropriations of \$11 million in 2019 and \$12 million in 2020 were requested by public port authorities. In 2021 and 2022, the program received comparable amounts, also at the request of industry. For 2023, public port authorities again secured funding, but at a reduced \$5 million per year. These funds are legislatively allocated from state general revenue funding in the biennial Operating Budget, and are administered by Ohio DOT in accordance with eligibility and administrative requirements cited in Ohio Revised Code 5501.91.

Wisconsin

Wisconsin is well known for its Harbor Assistance Program (HAP). HAP has demonstrated long-term success in supporting port and marine development. While the funding is available for both recreational and harbor-related activities, it is primarily used for cargo-related investments. This legislatively authorized program, created in 1979, has invested more than \$204 million between 1980 and 2021. Importantly, the HAP, along with the Wisconsin Commercial Ports Association, provides the drive for marine planning, industry networking, peer-to-peer support, and sharing of strategies and accomplishments. The program provides more than critical funding; it also provides the social and business network needed to continuously improve marine and port development.

In summary of the states' programs and initiatives, port and marine funding opportunities range widely across the region and have expanded with the flexible freight opportunities from IJIA and state-based legislative appropriations. States and localities are increasingly realizing the economic importance of freight facilities and operations, and are seeking funding to support these efforts. The investment, management, and operation of waterway corridors stands in contrast to the consistency and harmonized approach for funding and operating Interstate Highways. Other than the project prioritization efforts of USACE, there are no uniform, consistent, and geographically equitable planning and funding systems for these major freight corridors.

In a 2020 University of Michigan report, *The Tools to Complete: State Level Assistance Programs for Great Lakes Ports, Comparing State-Level Assistance Programs*, state activity in marine and port development is classified as active or passive. The report also provided an assessment of the tools and programs used in the Great Lakes states and other comparable

states. Table 14, based on the 2020 Michigan study, shows that six MAASTO states vary greatly in the strength of their programs in support of marine freight development [13].

Table 14: Marine Program Tool Assessment

State	Dedicated State-Level Grant Program for Ports	Economic Development Department Grants	Loan Programs	Technical Assistance	Tax & Bond Authority
Illinois	Moderate	Weak	Strong	Strong	Moderate
Indiana	Weak	Weak	Weak	Weak	Moderate
Michigan	Weak	Moderate	Weak	Weak	Moderate
Minnesota	Strong	Moderate	Moderate	Strong	Strong
Ohio	Strong	Moderate	Moderate	Strong	Strong
Wisconsin	Strong	Moderate	Strong	Moderate	Strong
Florida	Strong	Moderate	Strong	Strong	Moderate
Virginia	Weak	Moderate	Strong	Strong	Strong

Source: The Tools to Complete State-Level Assistance Programs for Great Lakes Ports, Comparing State-Level Assistance Programs.

The results of this effort are included as key takeaways in the report and presented in Figure 7.

- *The number of funding tools available to a port matters for the range of feasible investment. Ports in states with many funding programs are able to plan farther into the future, balance multiple projects at a time, draw federal dollars into the local economy and spur private investment.*
- *The level of a state’s investment into its ports varies widely among this group of states; some states contribute through many programs, while others do almost nothing.*
- *There is a heavy reliance on competitive federal grants for port infrastructure investments, even in states with robust grant programs. Ports are able to compete for federal grants easier with access to matching funds at the state and local level.*
- *The main focus of state transportation funding is on other modes, namely surface transit. However, coastal states’ investment into ports still outpaces that of the Great Lakes States.*

Figure 7: Key Takeaways

Source: The Tools to Complete State-Level Assistance Programs for Great Lakes Ports, Comparing State-Level Assistance Programs.

Interestingly, the maritime freight corridors that historically led to the development of many of the major cities in the U.S. and around the globe have not developed as rapidly as land-based

freight. This includes a lack of coordinated freight planning, consistent and uniform funding, and comprehensive and multistate management of freight corridors.

Stakeholder Involvement in Marine Planning and Studies

MAASTO states do an excellent job of soliciting stakeholder input in all areas and modes of transportation. State freight plans and Long-range Transportation Plans rely on extensive communication and input with all stakeholders, including the marine freight industry. Increasingly, these states are also working to ensure equity in the availability and participation in public input processes.

General Stakeholder Representation

Stakeholder representation in recent marine and port planning and economic development studies varies, as some of the outreach was impacted by COVID-19 social distancing. Fortunately, virtual meetings have been well accepted by the public and across state and federal agencies, allowing much of the planning and stakeholder involvement to continue. The port and marine freight outreach activities of Illinois, Kentucky, Missouri, and Ohio are outlined and discussed below.

Illinois

Illinois completed its IMTS Plan in March 2021. Participants included 41 stakeholders reflecting public, private, and industry organizations with a vested interest in Illinois' waterway system. A peer-to-peer exchange with neighboring states was conducted to identify best practices in marine and port planning. The IMTS Plan provides the State of Illinois a foundational understanding of the marine transportation system and how it contributes to the state's economy. This plan is only the first step in better integrating the state's waterways into the state's multimodal transportation network. The programmatic recommendations created as part of the IMTS Plan provide IDOT and other state agencies important information on how to move forward towards integration of the marine mode as part of Illinois' multimodal transportation network.

Kentucky

Kentucky faced the COVID-19 social distancing challenges to successfully complete its 2020 economic study. The study was guided by a steering committee of 18-19 individuals representing multiple state and federal agencies, including USACE, MARAD, FHWA, the Kentucky Transportation Cabinet, the University of Kentucky Transportation Center, economic

development agencies, and public ports. The KYTC conducted three public summits as the study progressed to share information and gather additional feedback. Even with COVID-19 protocols in place, over 150 people participated in one of the virtual sessions.

The summits also allowed industry stakeholders to see the details of freight movements through their ports and provided insights into potential markets and commodities. While the outreach is considered a success, KYTC recommends “more boots on the ground” when it comes to understanding and working with the ports. This face-to-face outreach was limited during the study period due to COVID-19 restrictions.

KYTC also conducted peer-state interviews to understand the issues others faced and to identify potential best practices for implementation.

Missouri

Missouri conducted an economic study in 2018 to better understand the impact and potential of the state’s public ports. Traditional stakeholder public outreach was conducted through a consultant. In terms of study guidance and implementation, MoDOT, as well as the Department of Agriculture (MOAG), Natural Resources (MODNR), and Economic Development (MODED), played key roles. This is based on the organization of management of the Missouri River and Missouri state government.

MOAG supports waterway freight movement to ensure sufficient marine freight capacity to move agricultural outputs. The MODNR has traditionally been responsible for river-related activities related to natural resources. With MoDOT focusing on navigation and freight movement through the ports and its related economic development potential, MODED is included to support the inherent economic development related to marine freight and logistics.

Ohio

For Ohio’s maritime strategy, public and private stakeholder interaction was driven by a steering committee consisting of representatives of the Governor’s Office, Lt. Governor’s Office, JobsOhio, Development Services Agency (DSA), ODOT, and The Ohio Rail Development Commission (ORDC).

Based on the steering committee experience, Ohio recommended, similar to KYTC, that marine freight planning outreach include direct interaction with port officials and boards to enhance the grounded perspective of the industry.

Public and Private Ports and Terminals

A recurring suggestion by state practitioners and industry leaders is to involve ports more directly and inclusively in stakeholder participation. Most frequently, this call specifically focuses on including private terminals and ports in addition to public ports. Often in state-level port and marine planning, the focus has been on public ports. With the additional voices of the many private terminals and facilities as stakeholders, influence and potential political support are broadened.

KYTC and Ohio experienced how powerful grassroots, private-sector support can be for marine planning, program development, and funding. The marine industry drove Ohio's marine program funding; in fact, the industry submitted its funding request through the legislature during the previous two funding cycles. Similarly, grassroots support in Kentucky and Ohio reached the Governor's office with high-level state support to capture the economic development potential of this industry and modes.

Increasing the stakeholder base is a solid strategy for any planning process or study; however, as identified in several interviews, more effort should be extended to capture private ports and terminals in the outreach process.

Regional Marine Freight Corridors

With a desire to work regionally on these major marine freight corridors on the Great Lakes and Inland River System, how can stakeholder input that has traditionally been focused on the growth and expansion of individual businesses and ports be directed to support an entire corridor? Interstate Highway and multistate coalitions, such as the I-10 Corridor Coalition and the I-75 Central Corridor Coalition, have successfully promoted a corridor focus rather than an project-by-project focus.

Port planning could also be regionalized. Drawing from the MARAD Marine Highways designations, states could move forward collaboratively to focus their resources on improving the system. This provides a coordinated focus on the strategic development of individual components of the larger system in a harmonized, collaborative manner.

The Marine Highways in the MAASTO region could act as a catalyst for forming regional groups to support strategic corridor planning. State FACs could also be involved to provide greater industry, agency, and decision-maker awareness and support.

A Marine and Highway Freight Corridor Perspective

Several respondents also compared the uniformity, investment, and operation of marine corridors to that of highway freight corridors. Highway freight corridors are most efficient when planned and operated as a larger system with uniformly designed, appropriately sized, and safe infrastructure. In contrast, the nation's marine freight corridors are limited by state commitments and agency authorities that are fragmented and vary from state to state. Infrastructure is often outdated and inefficient, and funding tends to be less consistent and varies each funding cycle.

Outdated infrastructure also contributes to extensive delays and costs incurred. Moes reported [14] that approximately 9,700 tows with 55,000 barges were delayed by an average of 12.23 hours across the entire inland navigation system in 2020. The delays resulted in an estimated cost of nearly \$84 million to the economy. Barring extreme urban traffic, nowhere in the U.S. would a truck driver experience such delays and antiquated infrastructure on a comparable highway facility. Yet marine freight infrastructure system delays are an everyday, multiple-hour experiences for tows.

According to UMRBA, the majority of locks and dams on the Mississippi River were constructed in the 1930s. Additionally, the original 600-foot lock channel is insufficient for today's multi-barge tows. If this system were ranked similarly to bridges, these structures would be considered structurally deficient and functionally obsolete. In contrast, if adequate funding were available uniformly across the corridors for improvements, the corridor could be reconceptualized not as individual locks, ports, and states but as a corridor best served with strategic investments and planned development.

Summary

While all MAASTO states have access to the major marine and port systems through the Great Lakes and Inland River System, there is a great deal of variability across the MAASTO states in the level of engagement with marine freight systems.

Marine and port planning efforts range from minimal additions to state freight plans, to studies of alternate funding and economic benefits, to dedicated maritime strategies and planning. This pattern generally reflects the freight development history in the individual state. Examples of the rationale and changes in maritime responsibilities process across the states are described below. Kansas has traditionally been a rail-focused state, based on the need for large grain

moves and limited marine access. Wisconsin's historical focus on waterways is ingrained in the state's history and led to the successful Harbor Assistance Program. With the significance of the Chicago port area and Mississippi River system, Illinois DOT recently took over the role as maritime freight champion in the state. With planning, programs and funding, Illinois is making tremendous strides in revitalizing Illinois marine freight. Indiana's success is based on the work of the Ports of Indiana with a minor role for the DOT.

Personnel devoted in each agency to marine and port planning is nominal and mostly static, with one FTE being the most common response. However, that one FTE might be divided across three or four job positions in the agency. Those states with funding programs are more likely to have a single FTE in a marine-devoted position.

In terms of stakeholder integration into the planning process, respondents relied heavily on steering committees, peer states, and smaller groups of professionals for guidance regarding the scope of marine and port studies, and best practices in marine and port development. Of those completing port/marine studies or plans, direct stakeholder contact was cited as extremely important and key to fully understanding the needs of the industry. In addition, several respondents pointed out that most agencies focus on public ports while potentially missing input from numerous private terminals and businesses along the waterfront.

Finally, as a multimodal transportation system, marine corridors and the related planning pale compared to the organized, uniform approach to planning, development, investment, and operations for our nation's Interstate Highway freight system. Greater maritime freight investment is necessary for infrastructure, planning, and innovation to push marine freight past antiquated infrastructure and lack of coordinated corridor-wide planning and policy development. The MAASTO states are in a prime position to improve maritime freight planning and operational efficiency. The region's history of collaboration, increasing state involvement in marine freight, and participation in groups such as the GLSGP and UMRBA, and other marine related associations supports further development.

5. SUMMARY OF FINDINGS AND OPPORTUNITIES

Discussions with state planners and marine professionals included best practices, marine development opportunities, and regional approaches to marine freight corridor development. These best practices and strategies are attributed to five areas of planning practice and outcomes:

- Organization, staffing, programs, and funding
- Stakeholders and stakeholder involvement
- Marine freight corridor development and regional development
- Awareness and marketing
- Environment and economy

Best practices and their rationales are listed below in each of these five areas. There is often dual utility for the practices or ideas across these categories, so some practices are listed more than once. In general, when a best practice influences two or more categories, it should be considered for implementation.

Organization, Staffing, Programs, and Funding

The following practices and opportunities address organization, integration, and operations of the state DOTs to support marine freight development.

Given the diversity across the state agendas regarding marine development, not all these recommended practices will be suitable for each agency. Each of them can elevate awareness, provide an institutional home for marine freight, and move towards developing regional marine corridors that are managed and funded like other major freight corridors.

Table 15: Agency Practices to Support Marine Freight Development

Practice	Rationale
Create Marine and Port Office with dedicated staff.	Include marine freight in multimodal development, increase ability to work with industry, increase awareness and focus.
Create stable and consistent funding stream for ports and corridor infrastructure.	Increased funding is imperative. In addition to infrastructure, state programs should serve to support organizational activities by the maritime industry and its partners.
Support corridor navigation specialist positions through regional group such as UMRBA.	Provides a focus to the freight and navigation considerations of marine corridors, supports collective action and drives development of an agenda and funding stream.
Include marine and port industry representatives in FAC.	Ensure marine sector representation and input on agency marine and freight development activities.
Feature a 'Ports and Waterways' day in an FAC meeting.	Increase awareness of waterway capabilities, value, and integration with multimodal system.
Create a state 'Ports Day' at the legislature.	Opportunity for marine industry to have face-to-face time with legislators, and increase recognition of the importance of ports and marine corridors.
Consider other uses of waterways – recreational, cruise ships, environmental protection.	Are there opportunities to partner with other interest groups to advance infrastructure and policy in support of navigation? These groups also represent potential new stakeholders to advocate for waterways.
Utilize MAASTO and its leadership to disseminate information about the value and importance of waterways freight movement.	MAASTO has a strong policy voice and is a leader in transportation. This can be used to advance freight specific policy, programs and funding.
Work with other states, commodity associations, and waterway groups to increase awareness of maritime industry and advocate for policy and programs.	Waterways serve a diverse audience, so advocating with a larger base and including private sector voices has proven to be effective for several states in securing program or development funding.
Include workforce evaluation and development in freight planning. Support apprenticeship programs.	Similar to all freight transportation sectors, the marine sector anticipates a large deficit in qualified employees. This is considered a resiliency issue. Apprenticeship programs can create the talent pipeline necessary for succession and anticipated growth.

Stakeholders and Stakeholder Involvement

The practices and opportunities address expanded stakeholder involvement. There are two functions of the process. First, the stakeholders provide input on needs, system performance, and future trends to be addressed. Secondly, the stakeholders act as partners in the development and advocacy of the system.

Table 16: Marine Stakeholder Recommendations

Practice	Rationale
Work with other states, commodity associations, and waterway groups to increase awareness of the industry and advocate for policy and programs.	Waterways serve a diverse audience, so advocating with a larger voice and including the private sector has been very effective for several states in securing program or development funding.
Include private terminals, ports, and ancillary industries as stakeholders in advocacy, planning, development, and operations; go beyond the public, commercial ports for input and support.	Increasing the stakeholder base and voice is critical to advancing marine freight corridors. States have benefited from private sector modal support to drive funding in state legislatures.
Support a corridor navigation specialist through regional group such as UMRBA.	Provides a focus to the marine corridor, supports collective action, and drives development of an agenda and funding stream. Provides direct contact to navigation stakeholders.
Include marine and port industry representatives on Freight Advisory Committees (FACs).	Ensure marine sector representation and input on agency marine and freight development activities. Private sector advocacy is effective in securing funding.
Create a state 'Ports Day' at the legislature.	Opportunity for marine industry to have face-to-face time with legislators, and increase recognition of the importance of ports and marine corridors.
Consider other uses of waterways – recreational, cruise ships, environmental protection.	Are there opportunities to partner with other interest groups to advance infrastructure and policy in support of navigation? These groups also represent potential new stakeholders to advocate for waterways.
Create MAASTO-based river and lakes corridor development groups to advance the system in parallel to the development and concept of the Interstate Highway System with its uniformity, efficiency, and reliability.	To increase efficiency of marine freight corridors, they should be conceived, designed, and implemented with uniform standards for operation, reliability, and adequate funding to modernize the system.
Boots on the ground! Freight planners should get firsthand exposure to activities and people in the industry.	For planning or for programs, practitioners should go to the field to meet industry professionals. If a study is contracted, practitioners should attend project interviews and events with contractor to gain exposure and real-world awareness.

State departments of transportation in the MAASTO region have increased stakeholder outreach, working to include all populations in their public input, planning, and communications. Much of what the agencies have learned and practiced over the last 25 years is applicable to marine and port development. However, there are some key practices and approaches worth noting. Capturing the input and support of private terminal operators, expanding partnerships, and extending stakeholder outreach can support regional marine corridor development.

This stakeholder outreach serves two purposes. It first serves to gather input on services and facilities from system users. Second, it aligns these stakeholders as advocates and partners in developing the marine freight corridors.

Marine Freight Corridor Development and Regional Development

The practices and opportunities in Table 17 address the development of the waterways as freight corridors at the state and regional levels.

Table 17: Marine Freight Corridor Recommendations

Practice	Rationale
Use the defined Marine Highway corridors in the MAASTO region as launching points for regional, public, and private corridor coalitions to advocate for the development of specific corridors. The corridors should provide uniformity, efficiency, and reliability across all marine freight corridors.	Marine corridors should provide uniform service, quality, efficiency, and reliability in all cases. Consistent, adequate, and equitable maritime funding should also mirror the intentions of Federal highway programs. This process would replicate the successful Interstate Highway System development and provide a degree of development equity across the modes.
Support corridor navigation specialist positions through regional group such as UMRBA	Provides a focus to the marine corridor, supports collective action and drives development of an agenda and funding stream. Provides direct contact to navigation stakeholders.
Devote a specific focus towards marine freight corridors in competitive freight programs.	Provide increased funding and a focus on marine freight corridor development.
Consider other uses of waterways – recreational, cruise ships, environmental protection.	Are there opportunities to partner with other interest groups to advance infrastructure and policy in support of navigation? These groups also represent potential new stakeholders to advocate for waterways.
As a regional freight corridor coalition, pursue flexible funds and MARAD grants for development of multistate marine freight corridors.	With defined funding for coalitions, and MARAD’s grant support for Marine Highways, MAASTO states should pursue marine corridor funding.

Conceiving of and working to develop greater efficiency, uniformity, and reliability on waterway freight corridors supports the development of other segments of the industry as well as ancillary support industries and businesses. Similar to development along highway freight corridors, the growth simply would not happen without the facility. It is the same way with marine freight corridors; these corridors must be further developed to provide the reliability and efficiency expected with modern transportation systems. Given the environmental, economic, and potential freight efficiency of waterborne freight, these corridors could assume and capture additional bulk commodities through containerization, as well as service containerized goods normally moved on highways.

Awareness and Marketing

The practices and opportunities addressed in Table 18 are focused on increasing awareness of the marine industry.

Table 18: Marine Industry Awareness and Marketing Recommendations

Practice	Rationale
Include public and private ports and terminals in reporting, planning, and advocacy.	Expands base of stakeholders and advocates. More fully represents the needs, activities, and scope of the system.
Work with port and waterway associations and user group associations such as the soybean association, corn growers, and cruise lines.	Expand advocacy, and support development of markets for waterways corridors.
Work directly with private ports and terminals that have capacity to expand.	Private terminals are critical to the system and economy and frequently have the capacity to capture more business if investment dollars were available.
Work with industry to create a 'Ports and Waterways Day' during the legislative session.	Keep marine freight in front of legislators, make them aware of economic, employment, and community benefits of this industry.
As corridor coalitions develop, use the groups to advocate policy changes such as expanding the Marine Highways program and the concept of containerization to all commodities and goods, including bulk imports and exports.	Containerization allows for uniformity, efficiency, and better integration and transfer with other modes which rely on containers. Containerization can eliminate additional handling for some goods and allows a more seamless transfer between modes.
Develop or advocate for program to incentivize Container on Barge (COB)	Containerization allows for uniformity, efficiency, and better integration and transfer with other modes which rely on containers. Containerization can eliminate additional handling for some goods and allows a more seamless transfer between modes.
Identify the costs of congestion, environmental impacts, and community impacts of different modes and use as a factor in program funding and marketing.	Increase awareness of benefits of marine freight. Provide avenues for decarbonization efforts in project programming.
Support development of barge-load cooperatives to combine loads for sufficient quantities to support service.	A cooperative approach makes a direct market available to more producers.
Fund research on marine market development, include private terminals as a case study. Examine if conditions and conclusions are consistent across the public and private sectors.	With an open door to additional commodities and goods, what are the possible markets to attract, and can the private sector support market growth through their expertise?

Marketing and other efforts to increase awareness of waterborne freight are necessary components to tout the benefits of investment in the waterways system. Reaching across the broad array of marine and waterway stakeholders provides a broader base for advocacy. In the

interviews with states, efforts to increase the stakeholder base through contact with various associations, agencies, and industry sectors were cited in every case.

Environment and Economy

These practices and opportunities address in Table 19 identify the economic and environmental dimensions of marine freight. Given the efficiencies of the waterway movements, increasing marine freight activity generally provides both economic and environmental benefits.

Table 19: Marine Freight Environmental and Economic Recommendations

Practice	Rationale
Identify cost of congestion and air quality impacts across all modes.	Provide incentives to those modes offering low-carbon or no-carbon freight solutions. Promotes decarbonization with a better understanding of impacts.
Work with port and waterway associations and user group associations such as the soybean association, corn growers, and cruise lines.	Expand advocacy, and support development of markets for waterways corridors.
Work with industry to create a 'Ports and Waterways Day' during legislative session.	Keep marine freight in front of legislators, make them aware of environmental, economic, employment, and community benefits of this industry.
Use MAASTO and AASHTO to advocate for program to incentivize Container on Barge.	Containerization allows for uniformity, efficiency, and better integration and transfer with other modes which rely on containers. Containerization can eliminate additional handling for some goods and allows a seamless transfer between modes.
Develop resiliency plans to address issues such as drought, flooding, workforce issues, and infrastructure failure.	Planning efforts help agencies recognize the potential threats. It can also provide alternate routing for emergencies, and solutions for anticipated changes in water levels
Continue to support innovative reuse of dredged materials.	Channels, ports, and harbors must be dredged and material quality, safety, disposal, and reuse are critical issues.
Develop communications materials to demonstrate environmental benefits of waterway movements.	Marine freight provides for more tons moved per mile per gallon, fewer emissions per tons moved, and is the safest of the modes.
Support decarbonization of the system.	Innovations in engine technologies, shore power, and port solar installations should be explored and funded.

In Figure 8 and 9, comparisons of freight transportation modes show how waterway freight is clearly the cleanest and most efficient mode, mainly due to the massive carrying capacity of barges and ships. The graphics demonstrate the dramatic benefits of marine freight. For each of

the three dominant modes, one ton of goods can be carried per gallon of fuel, 59 miles by truck, 202 miles by rail, and 514 miles by barge [15].



Figure 8: Inland Waterways Advantages

Source: National Waterways Foundation

And for the Great Lakes, the Great Lakes Seaway Partnership states [16]:

Big is better. The largest Great Lakes freighters are enormous and can carry more than 70,000 tons of cargo in a single voyage. Stood on end, these ships would be as tall as a 100-story building. Because of their size, ships offer the most efficient means of transporting large quantities of cargo. For example, the largest Great Lakes vessels can transport the same amount of cargo as 700 railcars or 2,800 trucks.

These efficiencies benefit the environment. On average, Great Lakes-Seaway shipping is 14 percent more fuel efficient than rail and nearly 600 percent more fuel efficient than trucking. These fuel savings result in fewer emissions and a cleaner environment.

Information about marine freight’s economic and environmental advantages can be used to support broader decarbonization strategies and attract commodities and new markets. The advantages can play a role in the decarbonization of the transportation system through modal shifts in some commodities, and directing appropriate loads to the waterways. This can also increase business with clients aware of the consumer marketability of low-impact products, packages, and transport.

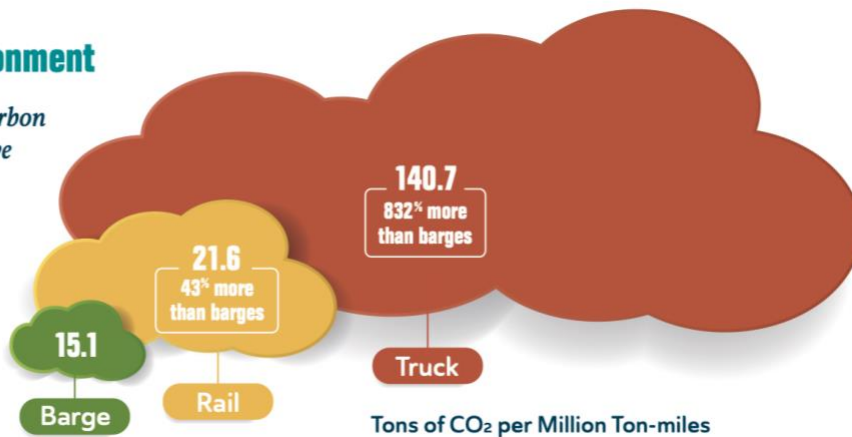
Lowest Carbon Footprint

Least Community Impact Moving cargo on the inland waterways is the best bet for reducing carbon footprint because barges generate far fewer emissions than trucks or rail. Barge transport also results in fewer spills, which are more than double by truck and nearly three times by rail.

Better For the Environment

Barges have the smallest carbon footprint among competitive transportation modes.

To move an identical amount of cargo by rail generates 43% more carbon dioxide than by barge, and trucks generate over 800% more emissions.



Protecting Our Communities

Inland waterways transport moves hazardous materials more safely.

All transport modes continuously work hard to prevent accidents, human errors, and other causes of spills. Statistics for 2001-2019 show trucks have 239% and rail cars have 287% more incidents than barges.

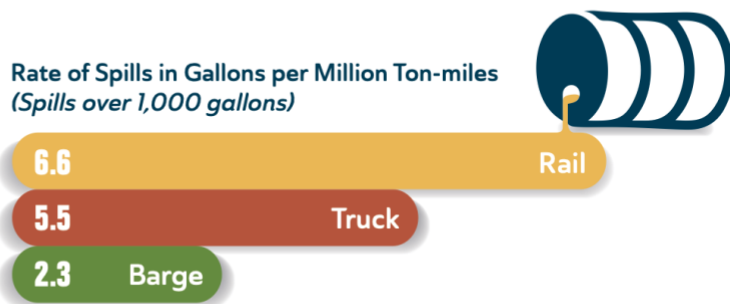


Figure 9: Environmental Advantages of Inland Waterways Freight

Source: <https://www.irpt.net/environmental-advantages/>

Summary

This review of maritime opportunities for the MASTO states has included best practices, ideas for innovation, and areas needing further investigation. The organizational setting and authority for marine infrastructure management and construction have historical roots in each State's geographical, political and economic history. As a result, developing a ports and waterways office with dedicated staff may only be relevant for states with adequate marine access and active industries. For states with less access to waterways or minor maritime responsibilities, increasing the breadth of stakeholder participation from the marine industry may be a more direct and appropriate solution to address planning and programming needs.

Corridor coalitions offer a potential point of entry to understanding and operating Marine Highways with similarities in uniformity, efficiency, and reliability to highway freight corridors. Marine freight corridors should be conceived, operated, and managed like highway freight corridors. Given that natural factors such as flooding and seasonality of the waterways rule out full reliability, gains could still be made through system investment and management that reflect the importance of freight movement on these waterways.

The message from the MAFC states was clear regarding stakeholders. As the marine industry is very broad across a range of areas, there are stakeholders from every aspect of the industry that should be included in both marine freight corridor planning and advocacy. First, both public ports and private terminals should be included as stakeholders. Further, while it is common for planning studies to be conducted by consultants, state planners should get their "boots on the ground," as one respondent stated, meaning planners should meet and understand the stakeholders. This provides for familiarity and network development that can result in trusted long-term industry-to-agency relationships.

Where possible, consistent program funding should be made available for waterway freight needs. This allows for consistent infrastructure investment and can act as a tool to encourage port program applicants to plan for growth and resiliency in their funding requests. For example, Wisconsin's HAP program requires applicants to complete a three-year port plan to remain eligible for funding.

States and the industry should also promote the containerization of bulk commodities, where economically viable. The uniformity and ease of transfer of containers changed global shipping and should be introduced to the Inland Rivers and Great Lakes. More efficient container

exchanges support the industry and the environment, and provide integration with markets relying on containers.

Another advantage to advancing maritime freight is the lessened environmental impacts of waterway movements. The industry and agencies should increase awareness of these benefits and aggressively fund infrastructure for transportation modes that are environmentally more benign.

Lastly, research should be pursued to support the development of multistate marine freight corridors based on MARAD's established Marine Highways. This effort supports modernization of the maritime freight system and increased efficiency on multistate maritime freight corridors.

6. SUMMARY AND INNOVATIONS

The MAASTO states are home to most of the nation's inland waterway freight system. The Great Lakes, the Ohio, Mississippi, Missouri, and Illinois Rivers provide interstate trade and are ports of entry with direct connections to the coasts.

Still, there is tremendous diversity across the MAASTO states in their maritime development histories and abilities to invest and support the development of waterway freight. Waterway resources and navigation management have not been traditional roles for state DOTs. However, there has been an intensified momentum towards multimodal freight systems, and increasing state-level interest and investment in port and waterway development.

This project was based on the experiences of state freight planning personnel in developing freight plans, developing freight staffing, and collaborative work on interstate freight corridors. Like freight highway corridors, planning personnel wanted to explore working collaboratively as states to support the development of these marine freight resources, when historically, ports along the river or lake were often considered competitors. This project examined the marine planning processes in the MAASTO states to identify best practices, innovative approaches, and potential ways to work collaboratively on these major waterway routes.

Critical Elements for Marine Planning and Development

Based on interviews with planning and marine professionals, existing guidance, and state experiences, multimodal freight planning principles serve marine freight planning well. Advances in stakeholder inclusion, program development and funding, and collaborative corridor development are discussed as additions to traditional freight and marine planning processes.

The critical elements include:

- Investing in a distinct marine freight plan increases awareness, allows for longer-term development strategies, and has led to stakeholder- and evidence-driven funding for marine programs.
- Investing in a marine or waterway office can provide direct service to the industry and can act as the social and business network for the ports in the state.

- The development of dedicated state-level marine freight funding programs that are reliably and adequately funded will support development. This is not, “build it, and they will come”, but instead, develop and operate the corridor with the same efficiency as Interstate Highway corridors. If the system is efficient and well maintained, it can play more of a role in bulk as well as containerized goods.
- The marine freight industry is diverse and includes private and public sector actors. Stakeholder outreach should be inclusive of private terminals and ports as well as public ports.
- The federal and public focus on the environment, decarbonization, sustainability, and reliability should be leveraged by highlighting the related benefits of marine freight transportation.
- Innovations in environmental improvement should be pursued, such as green docking, shore power, and cleaner and alternate fuel ship engines.

Additional innovative ideas were identified through the interviews and one project working session. These projects or activities are intended to leverage MAASTO’s collaborative working context and accelerate the development of marine freight corridors.

Innovative Ideas: Creating the Marine Highway Corridor

The following actions serve as a roadmap for the region.

- MAASTO states should develop a multistate Marine Highway Corridor development team. There is potential to capitalize on Marine Highway designations and manage and operate these marine corridors like interstate highway corridors.
- States should secure support from MARAD, EPA, USACE, and USDOT to develop a case study corridor. The project would include performance tracking, environmental and efficiency evaluations, and pre-and post-economic studies for the corridor area.
- States should create and fund a navigation specialist position that works to market, plan, and operationalize multistate efforts to develop marine freight markets and corridors within existing organizations such as the Upper Mississippi River Basin Association (UMRBA).

- States and the industry should market and increase awareness of marine transportation, especially the environmental and decarbonization benefits of marine freight.
- States should conduct a region-wide port and corridor-based market study that assesses potential markets for marine corridors. In addition to data and GIS analysis, the project should include multistate stakeholders and state FACs to create momentum for marine freight development.
- States should conduct a region-wide port and corridor-based economic analysis to provide a uniform and consistent analysis across ports, states, and regions.
- MAASTO states and Industry associations in coordination with the USACE, should examine unfunded marine projects on previous USACE budgets. These projects should be re-examined for funding.

There is an opportunity for the MAASTO states to further develop and improve marine freight transportation and reduce freight transportation's impacts on society and the environment. Moving to a safer, more fuel-efficient, and less polluting mode benefits the industry and the public and provides for additional economic development.

MAASTO states can collaborate to develop and operationalize the concept of marine corridors as Interstate freight corridors. Marine freight corridors should be similar in service, quality, uniformity, efficiency, and funding. The Marine Highway Corridor concept is the best approach for states to work together for marine corridor freight development. This approach steps beyond port-to-port competition and provides local, regional, and national economic and environmental benefits.

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