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Great Lakes Navigation System

Economic Strength to the Nation

The Great Lakes Navigation System (GLNS) is a complex deep-water navigation system stretching 1,600 miles through all five Great Lakes and connecting channels from Duluth, Minnesota to Ogdensburg, New York. The U.S. Army Corps of Engineers' (USACE) mission to maintain the non-linear system comprised of interdependent locks, ports, harbors, navigation channels, dredged material disposal facilities, and navigation structures is essential to preserving the health and vitality of the region and the Nation in an environmentally sustainable manner.

The GLNS is a vital component of America's transportation system, containing 19 of the Nation's top 100 harbors by tonnage, with nearly 10 percent of all U.S. waterborne domestic traffic commodities moving through the system. Comprised of 60 commercial ports and harbors and 80 recreational harbors across the U.S. portion of the Great Lakes, the system is linked with Canada and ports worldwide. The Great Lakes ports are part of a system competing successfully against other transportation modes, unlike U.S. coastal ports, demonstrating tremendous efficiency and environmental sustainability in moving commodities. When maintained properly, the GLNS saves shippers approximately $3.9 billion per year over the next least costly transportation modes such as road or rail.

Between 2015-2019, the GLNS transported an average of 122 million tons of cargo, supporting 147,500 U.S. jobs (49,400 direct, 54,200 indirect, and 43,900 induced) and $20.3 billion in U.S. business revenue. The waterway network is critical to the region and the economic lifeblood of the Nation's heartland. By providing a safe, efficient, and environmentally sustainable transportation route for raw materials, agricultural commodities, and finished products, the GLNS is the economic strength to the Nation.

Creating Positive Economic Benefits

The Great Lakes Navigation System (GLNS) is vital to the Nation's economy. According to a 2018 study conducted by Martin Associates, annual tonnages handled by the Great Lakes-St. Lawrence Seaway's ports, harbors, and channels support 237,800 jobs (78,400 direct, 79,100 indirect, and 80,300 induced) and $28.1 billion in business revenue within the U.S. and Canada. This includes 147,500 jobs (49,400 direct, 54,200 indirect, and 43,900 induced), and $25.6 million in economic activity annually in the U.S. The GLNS serves as the least costly transportation mode of raw materials to manufacturing plants, allowing regional industries to be globally competitive. Greater expense in the transportation of domestic raw materials could have a detrimental impact on the U.S. economy. Manufacturers could pass costs onto the end-user, import foreign raw materials instead, or shift production overseas.

The GLNS also delivers a positive economic benefit to the U.S. economy as a jobs provider. The American Iron and Steel Institute reports the steel industry supports over 1.9 million jobs (386,800 direct, 715,500 indirect, and 877,700 induced). The Martin Associates 2018 study of the Great Lakes - St. Lawrence Seaway System determined the GLNS supports 78,400 total direct jobs, including 26,900 within the U.S. iron ore and steel industry, nearly 7 percent of that industry segment nationwide. The GLNS serves a vital role in the steel industry's continued viability, essential to the U.S. economy and a healthy and resilient national defense capability.

U.S. Steel mill in Portage, IN, as seen from Lake Michigan

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Transporting Essential Raw Materials

The GLNS is located within the core of the industrial and manufacturing heartland of North America, connecting the iron ore ranges in Minnesota and Michigan to the steel mills and factories on the lower Great Lakes. The prosperity of several critical sectors of the U.S. economy depends on the system, including iron and steel, cement production, energy production, and agricultural exports. These industries rely on the availability of reliable, low-cost water-borne transportation.

When maintained properly, the GLNS saves shippers approximately $3.9 billion per year over the next least costly transportation modes, such as road or rail. These savings lead to more competitive American steel, lower-cost energy, and ultimately more American jobs.

Great Lakes vessels transport iron ore from Minnesota and northern Michigan ports to the integrated steel mills and trans-shipment ports situated on southern Lake Michigan and Lake Erie as shown in Figure 1. This shipping route is a critical link in the U.S. steel industry's supply chain and the automobile and appliance industry. These industries rely on integrated steel for its lightweight, high-strength capabilities.

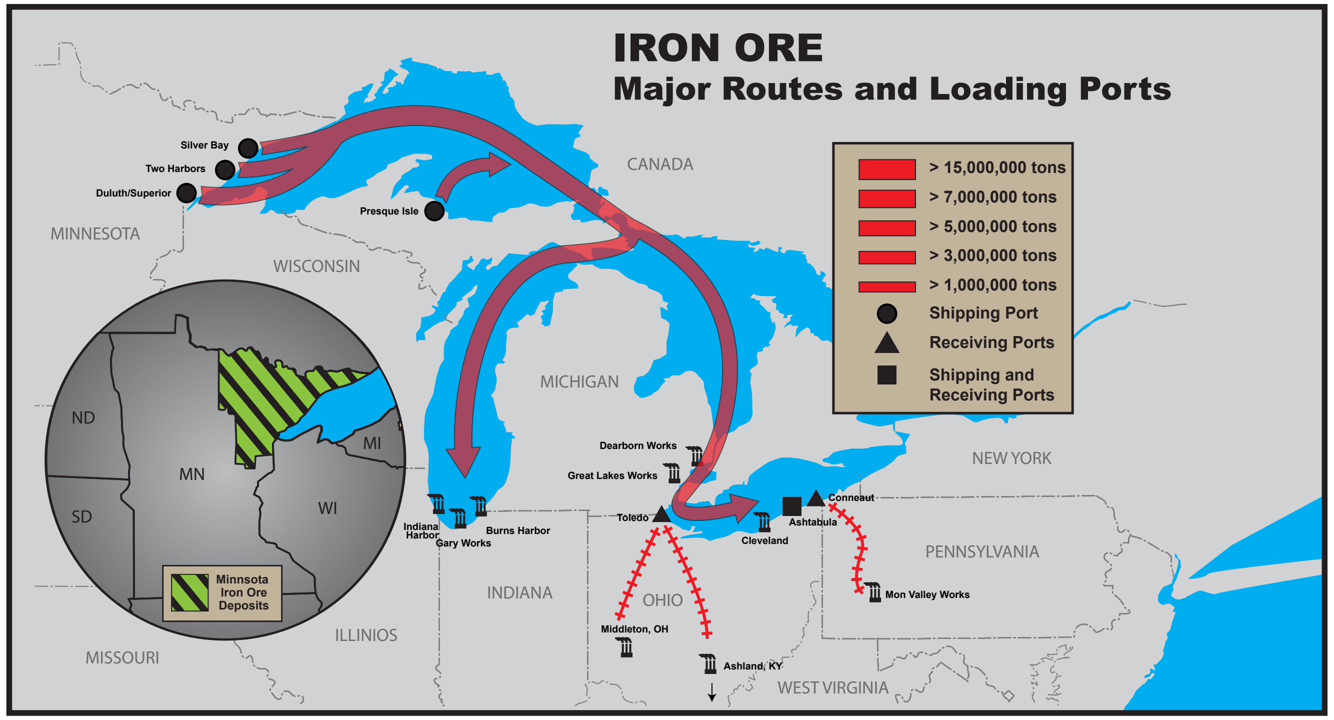
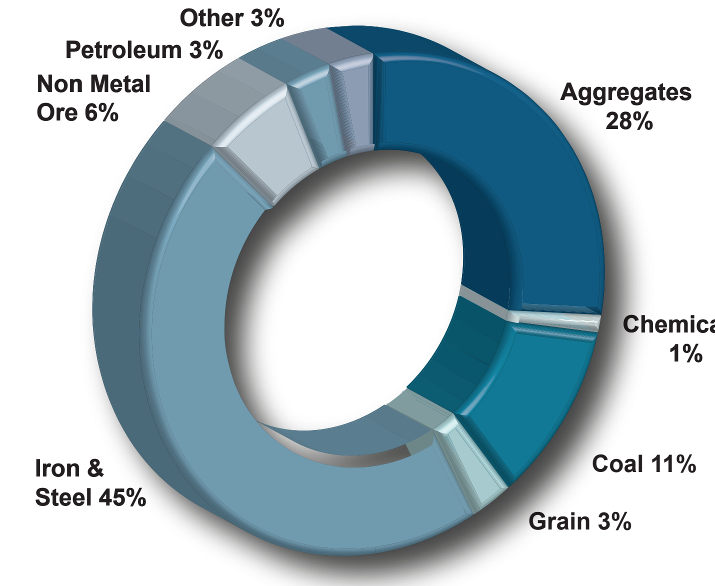


Figure 1. Iron Ore: Major Routes and Loading Ports

In 2019, 122 million tons transited the system, and the predominant commodity categories were iron ore and steel (45%), aggregates (28%), and coal (11%). Iron ore is the largest component of the iron and steel category (52.9 million tons) and is an essential input in the steel manufacturing process. Limestone is the largest component of the aggregates category (24.1 million tons), it is primarily used in the construction industry and is an important component in creating taconite pellets. In many Great Lakes metropolitan areas, coal is principally used for power generation. Other commodities like chemicals, petroleum products, grains, non-metallic ores, and various other goods also ship through the system. Transporting these raw materials is essential to maintaining our Nation's global competitiveness.



Great Lakes Tonnage by Commodity Group (2019)

Great Lakes Tonnage, by Commodity Type (2015-2019)

Commodity Type	Calendar Year				
	2015	2016	2017	2018	2019
Aggregates	33,109,200	31,511,000	33,707,300	32,379,200	34,414,000
Chemicals	892,800	752,200	737,500	748,900	717,100
Coal	21,081,200	16,710,300	17,886,500	14,647,400	13,938,700
Crude Petroleum	11,900	-	10,300	-	-
Grain*	9,084,300	10,037,300	8,519,400	8,768,000	9,220,000
Iron & Steel	51,747,900	53,013,100	58,704,300	59,719,000	55,294,600
Non Metal Ore	7,884,100	5,298,500	5,222,200	5,357,100	7,287,300
Petroleum	2,783,500	3,604,400	3,704,200	3,406,300	3,652,500
Other	3,235,400	3,243,200	3,075,600	3,048,300	3,628,300
Unspecified - Canadian*	3,024,400	3,262,800	3,049,000	3,175,600	3,252,400
TOTAL:	**132,854,700**	**127,432,800**	**134,616,300**	**131,249,800**	**131,404,900**

*Includes Downbound Canadian-Canadian and Canadian-Foreign Movements. Data Source: Soo Lock Performance Monitoring System (LPMS).

Providing an Efficient, Low-Cost, Low-Emission Mode of Transportation

The GLNS plays a crucial role in supporting fuel efficiency goals. The fuel economy of maritime transportation is significantly higher than any form of ground transportation. A Great Lakes carrier is 59% more fuel-efficient than rail and 773% more efficient than trucks, according to a 2018 Environmental and Social Impacts of Marine Transport in the Great Lakes-St. Lawrence Seaway Region.

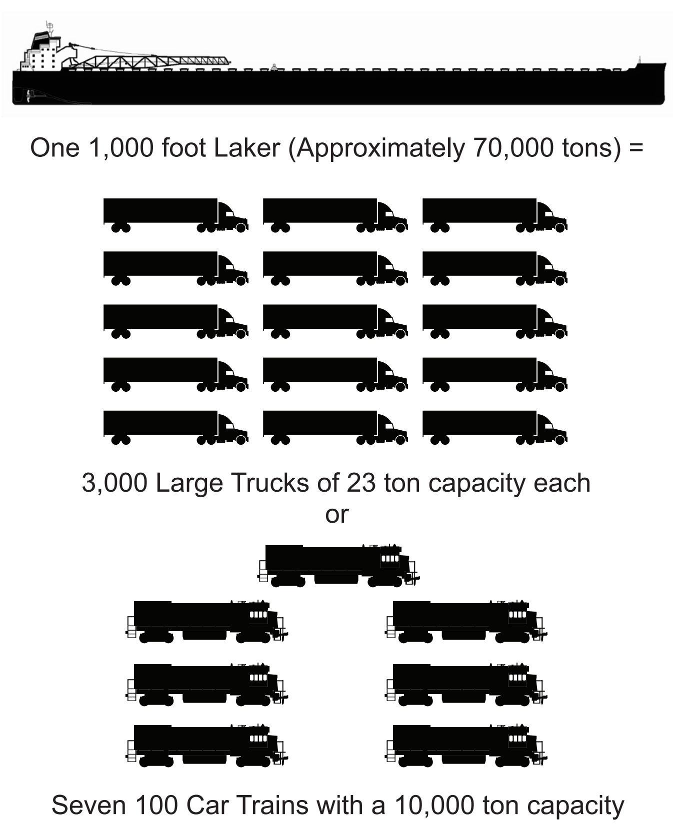


Figure 2. Freight Capacity Comparison

In one delivery, a 1,000-foot Great Lakes carrier contains 70,000 tons of cargo. It would require nearly 3,000 tractor-trailer loads or seven 100-car trains to carry the same shipment (as illustrated in Figure 2). Ground transportation is much less fuel-efficient, causing significant wear and tear on the country's infrastructure and increasing congestion on busy arteries. Maritime transport produces significantly fewer greenhouse gas emissions than ground transportation. Compared to marine transportation carrying one cargo ton for one kilometer, rail emits 19% more greenhouse gas and trucks 533% more greenhouse gas.

Investments into maintaining the GLNS ensures shippers will not have to employ alternative means of transport with higher costs and negative environmental impacts.

- 96% of cargo shipped out of Duluth-Superior is iron ore (64%), coal (27%) and wheat (5%).
- 92.5% of cargo received at Duluth-Superior is limestone (70%), salt (11%), coal (6.5%) and gravel (5%).
- The top domestic harbors that receive cargo from Duluth-Superior are St. Clair (6 million tons), Burns Waterway (5.8 million tons), and Indiana Harbor (4.2 million tons).
- 95% of coal shipments from Duluth-Superior go to St. Clair (75%), Monroe (14%), and Saginaw (6%)
- 87% of iron ore shipments from Duluth-Superior go to Burns Waterway (32%), Canadian Harbors (23%), Indiana Harbor (22%), and Gary (10%).
- The top domestic harbors that ship to Duluth-Superior are Calcite (1.4 million tons), Port Dolomite (.8 million tons) and Port Inland (.6 million tons).
- 87% of limestone receipts come from Calcite (41%), Port Dolomite (26%), and Port Inland (20%).
- 96% of salt receipts comes from Canadian harbors.
- 77% of wheat shipped from Duluth-Superior goes overseas and 19% goes to Buffalo.
- NOTE: The major docks at St. Clair, Silver Bay and Charlevoix are outside of the Federal channel.

Individual Pieces Working Interdependently to Form a System

The GLNS is a unique system consisting of 140 individually-authorized projects. The 60 individual commercial projects range from handling less than one million tons of cargo to over 34 million tons. These ports ship to and from each other in an intricate pattern of interdependency. The long-term viability of each port is dependent on the long-term viability of other ports in the system. This interdependency among GLNS ports and harbors is unique compared to most other U.S. ports that are either in a linear river system or major coastal ports that compete for foreign trade. Loss of outbound or inbound tonnage on the GLNS not only affects one port; it also represents a loss at each of its interconnected ports. Consequently, when smaller commercial ports and harbors are closed due to a lack of dredging funds, it affects all other interdependent harbors in the system.

Figure 3 depicts the interdependent system of one port on the Great Lakes system (Duluth-Superior Harbor). This figure represents the intricate interdependency pattern on a small subset of the 60 commercial ports on the Great Lakes system.

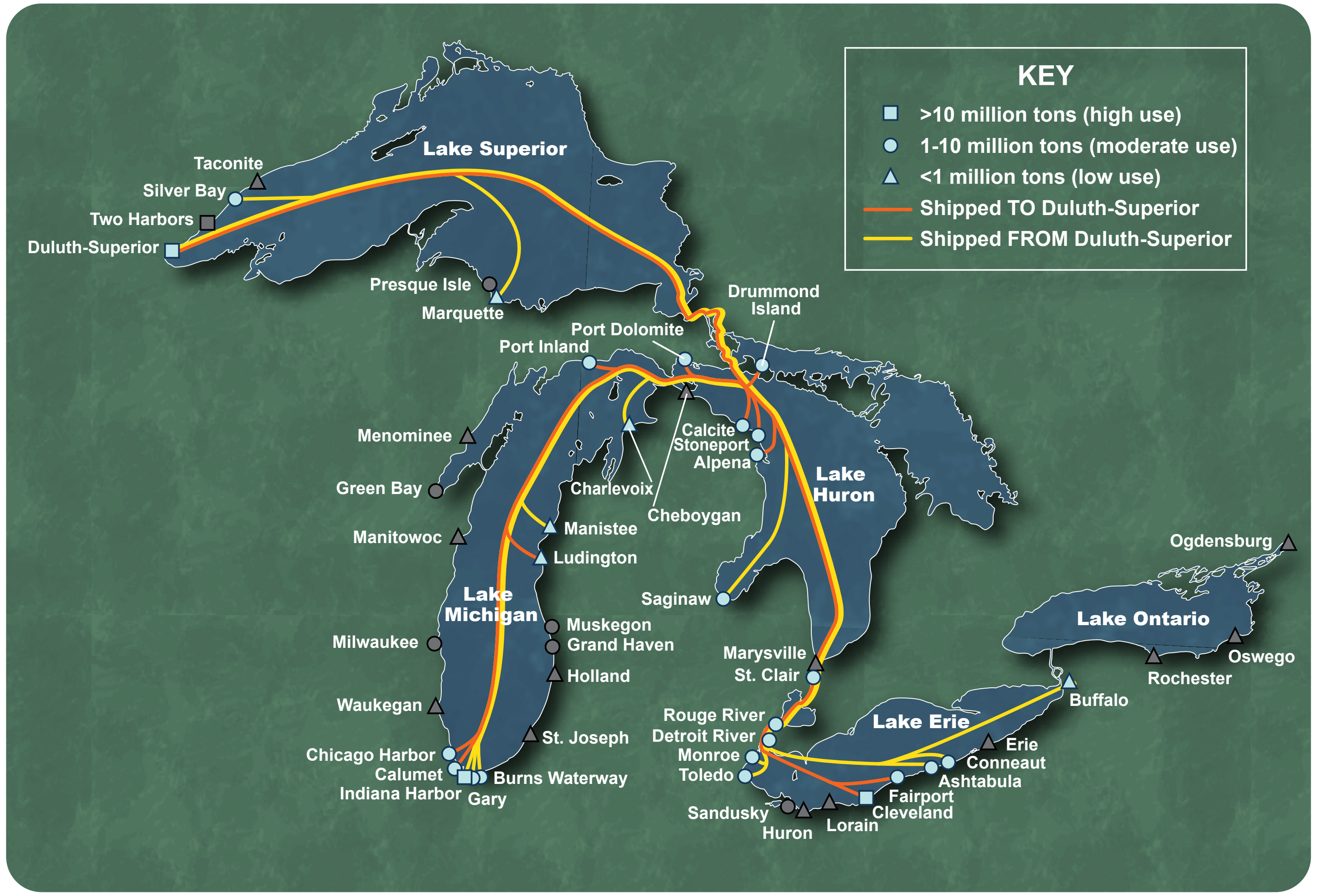


Figure 3. Great Lakes Navigation System: System Interdependency

Leveraging Mother Nature's Natural Shipping Lanes

The GLNS has a distinct advantage over other transportation modes like trucks and rail: 90% of the shipping lanes in the system use the waterway exactly as the glaciers left them. There is no need to maintain them because the waterways were gouged deep by the glaciers. The Nation has entrusted the maintenance of the remaining 10 percent of the GLNS shipping channels to USACE. The mission includes sediment removal from the connecting channels and harbors, lock operation and maintenance, and the repair of navigation structures to ensure safe and reliable service for all vessels employing the system. Maintaining 10 percent and getting 90 percent free is tremendous leverage unrivaled in other transportation modes.

A Bright Future for the Navigation System

Navigation is one of USACE's oldest missions; maintenance of the GLNS dates back to the 1820s. Unfortunately, the GLNS suffered from aging infrastructure and constrained budgets in the early 2000s. Backlog dredging of functional channels increased to 18 million cubic yards while locks and navigation structures showed significant signs of deterioration. Since 2014, GLNS funding has recovered and USACE has made significant progress in backlog maintenance reduction.

Additional funding appropriated in recent years has proven critical to address the large backlog of dredging and crucial maintenance of navigation infrastructure.

With the passage of the Water Resources Reform and Development Act 2014 (WRRDA 2014), the Nation began increasing the investments from the Harbor Maintenance Trust Fund (HMTF). The HMTF is generated through a tax on the value of cargo that is shipped to the Nation's coastal ports, including the Great Lakes. HMTF covers the cost for all navigation operations and maintenance of coastal projects as well as construction of confined disposal facilities. Funding dedicated to GLNS operations and maintenance increased every year from 2014 to 2021. With this increased funding, USACE decreased dredging backlog from 18 million cubic yards to 12.5 million cubic yards in functional channel dimensions. In addition, USACE made significant progress in reducing backlog maintenance at locks and navigation structures that had accumulated due to many years of leaner system maintenance investments.

With the passage of the Water Resource Development Act 2020 (WRDA 2020), Congress directed the use of the roughly $9.3 billion in taxes that had accumulated within the HMTF to fund USACE's operation and maintenance activities across the Nation's ports and harbors, including those on the Great Lakes. WRDA 2020 directed a gradually increasing investment from the HMTF surplus, from 2021 to 2030. WRDA 2020 also specified that GLNS would receive not less than 13% of the funds dedicated to USACE HMTF reimbursed projects on an annual basis. These changes are expected to significantly increase investments in GLNS operations and maintenance in the coming years.

Investments in the GLNS touch the lives of almost every American - it is a vital part of the national fabric and the future is bright for the system.

Bringing the Reliability of the GLNS Back to Life

Fifteen years ago, the story of the GLNS was one of aging infrastructure and constrained budgets. Aging infrastructure, persistent low water levels, and funding below levels needed to adequately maintain the system resulted in a condition where nearly half of the GLNS projects were in a state of failed or failing. They were not serving the purpose for which they were authorized. Although conditions have improved considerably across the GLNS, there are still significant maintenance needs throughout the system.

The USACE Great Lakes Navigation Team's assessment of the condition of GLNS projects in 2021 is illustrated in Figure 4. The assessment includes the dredging need, condition of structures and locks, and availability of dredged material placement sites. The plan served as a program implementation guide to engage stakeholders and focus resources on the system's most essential requirements to reduce risk and optimize reliability.

The plan focuses on four components:

1. **Lock Restoration**
2. **Removal of Dredging Backlog**
3. **Enabling Sustainable Dredged Material Management**
4. **Navigation Structure Repairs**

The following sections describe each of the Great Lakes system's specific needs in detail and highlights successes.

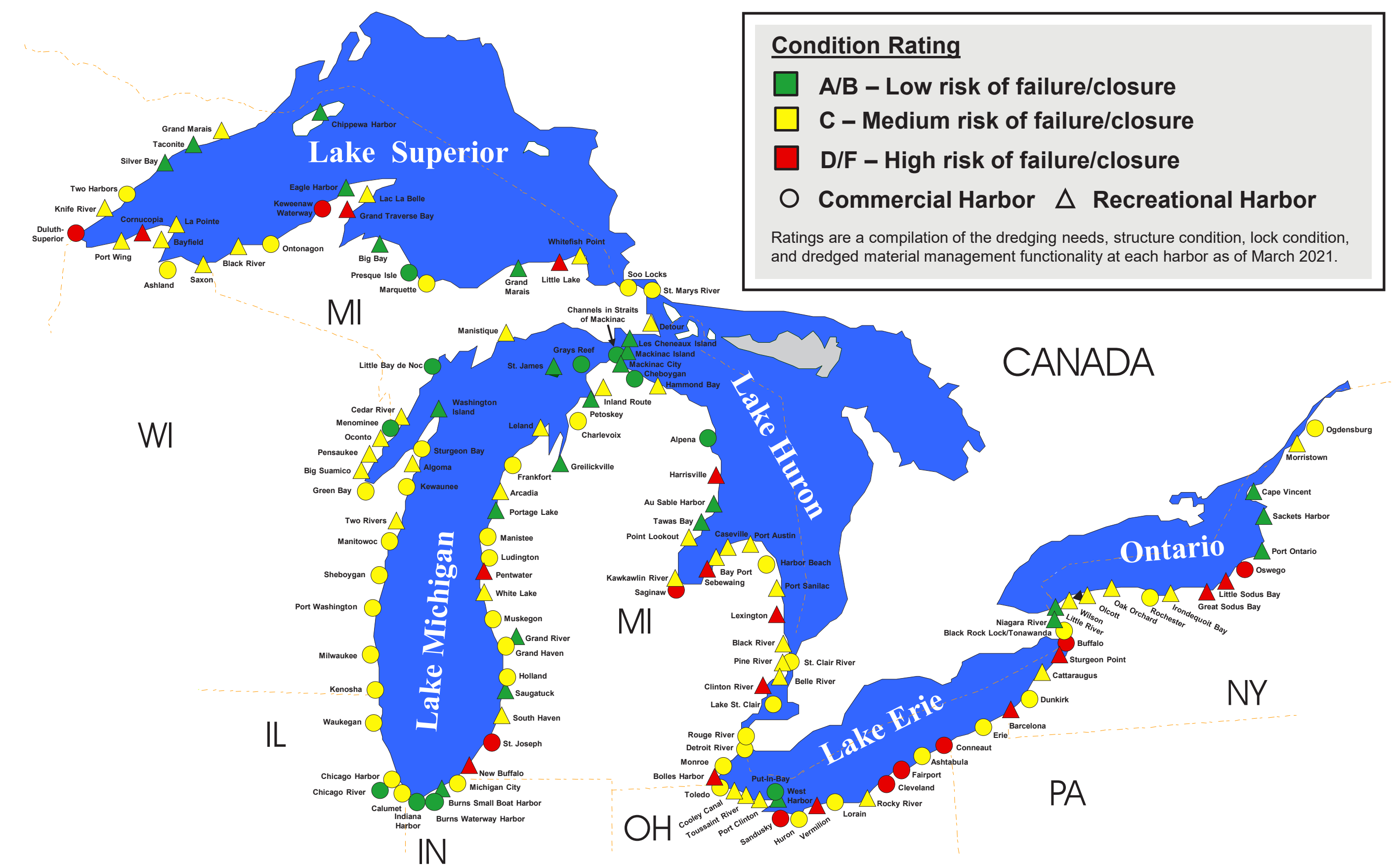


Figure 4. Condition of Federal Projects on the Great Lakes

Locks: Important Keys to the System

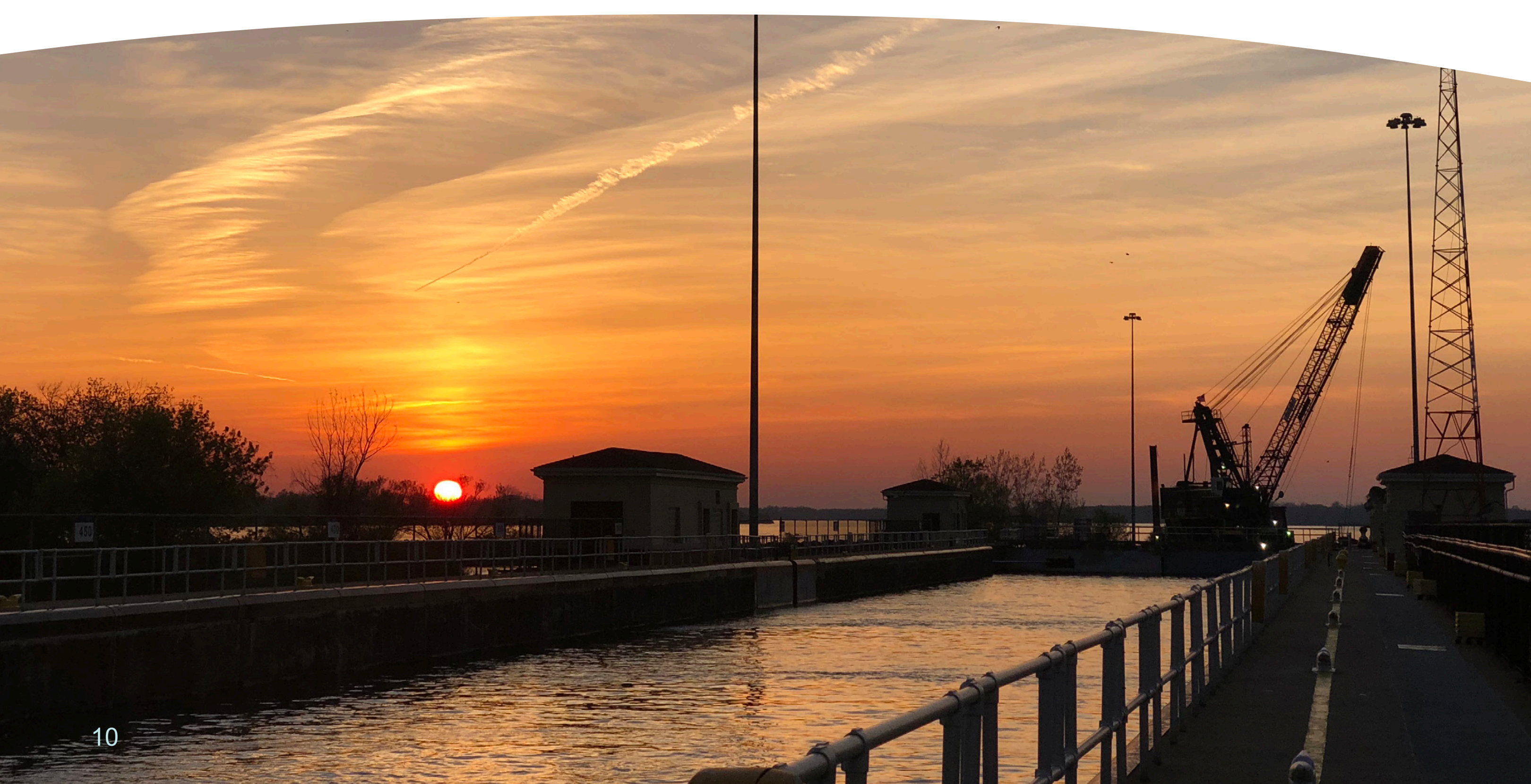
USACE operates and maintains three lock systems on the Great Lakes: The Black Rock Lock in Buffalo, New York; the Chicago Lock in Chicago, and the Soo Locks (Poe and MacArthur Locks) located in Sault Ste. Marie, Michigan.

Black Rock Lock, New York

The Black Rock Lock provides a safe passage for vessels along a two-mile stretch of the Niagara River, bypassing the swift and dangerous waters. With 1,364 lockages in 2019, the lock provided safe passage for 2,452 vessels (63 commercial, 30 non-commercial and 2,359 recreational), and processed 99,000 tons of freight, primarily petroleum products.

The lock provides the only means for deep-draft commercial vessels to reach delivery ports and harbors on the upper Niagara River, including fuel storage facilities and refineries.

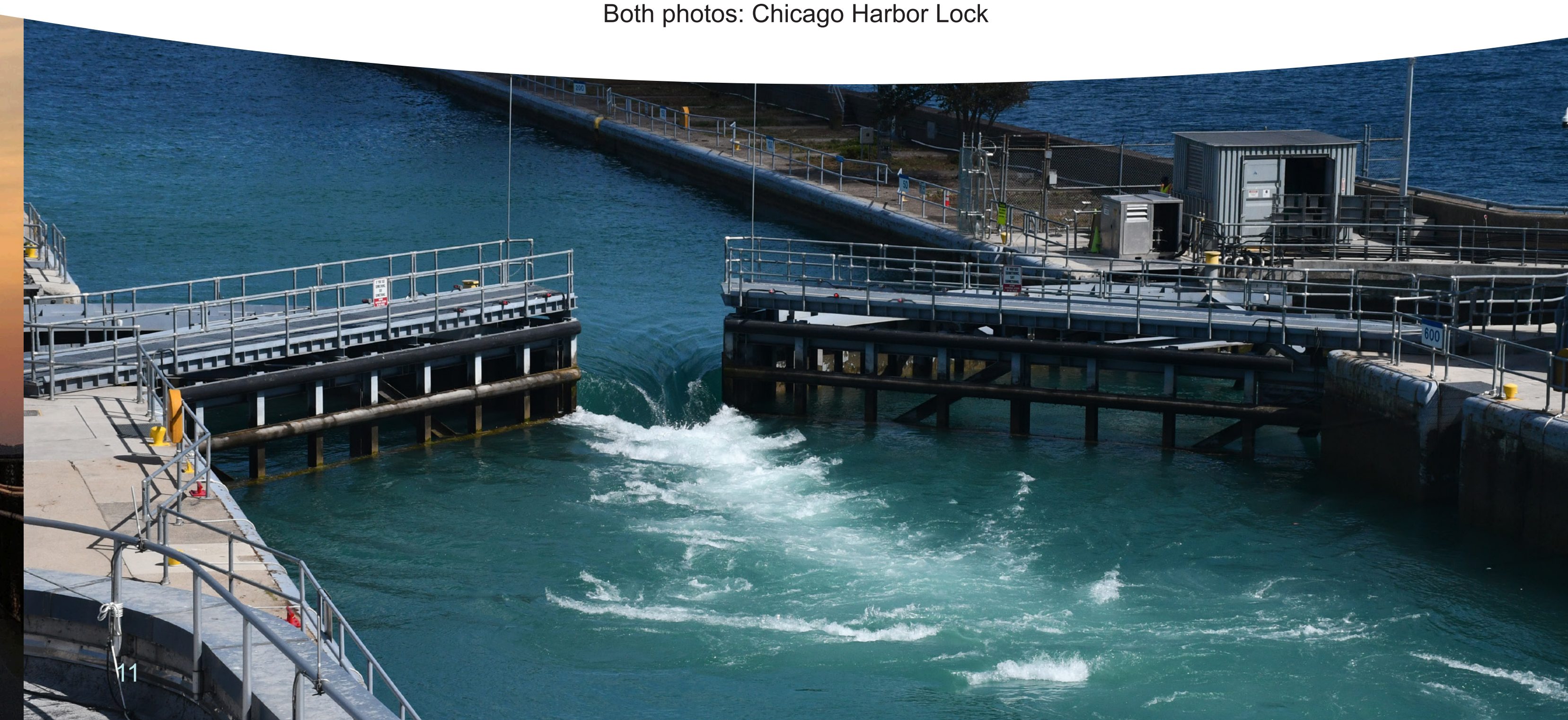
Investments totaling $10.4 million have been made, since 2016, to upgrade the structure ensuring the 100- year-old lock continues allowing vessels to bypass the swift and dangerous waters of a two-mile stretch of the Niagara River.



Chicago Harbor Lock

The Chicago Harbor Lock is often the busiest in the Nation. With 9,930 lockages in 2019, the lock provided safe passage for 36,685 vessels (12,101 commercial, 1,111 non-commercial, and 23,473 recreational), and passed 135,500 tons of freight, primarily chemicals and manufactured equipment. Originally constructed in 1938, the Chicago Lock allows safe passage of vessels navigating the three- to five-foot water level difference between Lake Michigan and the Chicago River. The Chicago Lock also serves as an essential flood risk management structure. Its sector gates must reliably open when needed during severe storms to prevent the Chicago River from flooding downtown Chicago. Despite making critical repairs in recent years, significant operational risks remain due to chamber floor erosion occurring during the Chicago River flood control (backflow) events, operating equipment reliability during high water conditions on Lake Michigan, and severe winter ice conditions.

Both photos: Chicago Harbor Lock



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Soo Locks Asset Renewal Plan: Improving Efficiency and Reducing Risks

The St. Marys River is a critical waterway that connects Lake Superior with Lake Huron. The Soo Locks facility is located on the St. Marys River at Sault Ste. Marie, Michigan, on the international border with Canada. It serves as a critical linchpin in the Great Lakes – St. Lawrence Seaway System by allowing ships to navigate the 21-foot drop between Lake Superior and the St. Marys River, making it the most crucial lock facility in the Great Lakes system. There are two locks at the facility: the MacArthur Lock, completed in 1943, and the Poe Lock, completed in 1968. Total tonnage through the Soo Locks in 2019 was 74 million tons, with 5,625 lockages providing safe passage to 6,926 vessels. Of these, 3,651 were commercial cargo vessels and 3,275 were non-cargo vessels including tour boats, tug boats, government vessels, and recreational vessels.

The Poe Lock is the only lock capable of passing most Great Lakes vessels due to its size. In 2019, over 88% of the Soo Locks tonnage was carried on vessels restricted by size to the Poe Lock. The Poe Lock is the linchpin of the GLNS and presently lacks functional redundancy. There is no existing rail and truck infrastructure to support the vast volume of commodities that would need to bypass the Poe Lock. This situation illustrates the tenuous condition that the Great Lakes shipping industry faces.

To reduce the risks of lock downtime and vessel delays, USACE created the Soo Locks Asset Renewal Plan in 2007, which outlines the operations and maintenance needs to rehabilitate and modernize the existing Soo Locks facility and infrastructure. Initially, the Asset Renewal Plan envisioned a 6-year plan maximizing reliability and reducing the risk of catastrophic failure. However, USACE has recognized that maintenance needs will continue to be identified on this aging facility. The Asset Renewal Plan will now use a moving five-year window to lay out the work necessary to prevent unscheduled closures and provide reliable infrastructure at the Soo Locks over the coming five years.

To date, projects in the Soo Locks Asset Renewal Plan have received $162 million; the total plan needs from FY22 – FY26 is $225 million. Key projects that have been completed include replacement of the Poe Lock hydraulic system, replacement of embedded gate anchorages on the Poe and MacArthur locks, and replacement of the compressed air and steam systems. Remaining needs in the next five years include fabrication of a replacement for Gate 1 on the Poe Lock, fill/empty valve rehabilitation, and electrical system rehabilitation. The plan will be continually updated as work is completed, and new condition assessments are done. USACE must continue asset renewal plans to reduce unscheduled closure risks. A new lock with the same dimensions as the Poe would significantly decrease unscheduled outage risks, which cause serious implications to the Nation's economy.

Lafarge Integrity in the MacArthur Lock and the Edgar Speer leaving the Poe Lock, Sault Ste. Marie, MI

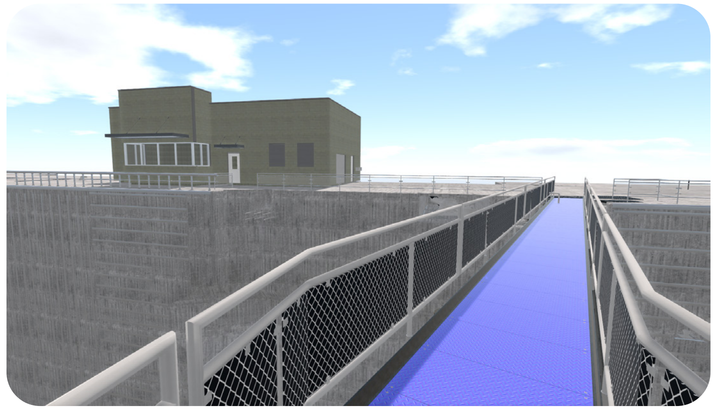
New Lock at the Soo: Providing Critical Redundancy

Great Lakes shipping industry executives indicate that a 30-day unplanned outage at the Poe Lock would be tremendously challenging to manage; the economic impact of a 30-day unscheduled outage is $160 million. A six-month outage would cause extreme economic impacts throughout the country. A 2015 Department of Homeland Security study estimated that a six-month closure of the Poe Lock would temporarily reduce the U.S. gross domestic product (GDP) by $1.1 trillion, resulting in the loss of 11 million jobs.

The Soo Locks are vital to the GLNS, supporting economically critical industries, including iron ore, steel, cement manufacturing, energy production, and agricultural exports. There are 12 North American integrated steel mills, 11 of which are supplied by iron ore transiting the Soo Locks. Eight of the eleven mills are located on the shores of GLNS, and three are supplied via rail from ore docks at Toledo and Conneaut, OH.

The 1986 WRDA authorized construction of a redundant Poe-sized lock, with the 2007 WRDA authorizing construction at full federal expense. The 2018 WRDA updated the authorized cost to $922 million with a Benefit Cost Ratio (BCR) of 2.32 at a 7.0% discount rate. Funding the new lock at the Soo facility demonstrates the federal government's commitment to ensuring GLNS resiliency. Following the 2018 reauthorization, the District began receiving construction funds in 2019. Although the project's full federal cost was authorized in 2007, the State of Michigan contributed $52 million to the project in 2019. USACE was able to immediately use $36.9 million of that contribution during fiscal year 2019. The use of these funds escalated the project by a year.

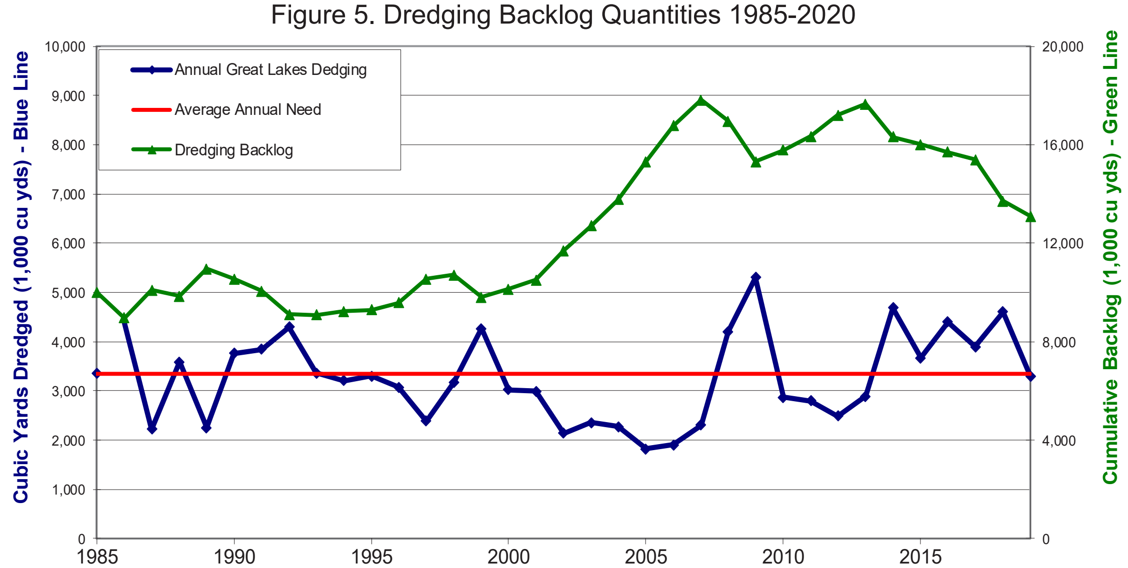
New lock construction eliminates the risk of the single point of failure to the system. Construction is underway, and the new lock chamber will be operational in seven to 10 years, dependent on receiving efficient funding. Achieving full operational redundancy at the Soo Locks offers many benefits to both the regional and national economy. The construction of the new lock also offers additional economic benefits through the construction period. During each year of construction (2020-2027) the project will support 1,238 jobs, $71 million in labor income, $202 million in business revenue, and $110 million in gross domestic product.



Renderings of the New Lock at the Soo

Dredging the GLNS

Figure 5. Dredging Backlog Quantities 1985-2020



Dredging operations have taken place on the Great Lakes for well over 100 years. Dredging and dredged material management are top priorities and challenges within the system. Sufficient funding has not always been available to maintain every channel segment to the full authorized width and depth. However, GLNS maintenance budgets and progress in reducing the sediment backlog have improved in recent years (as seen in Figure 5).

When sand or sediment accumulates within harbors and channels, transportation costs increase. Ships must carry lighter loads to avoid running aground and require more trips to move the same volume of commodities. The Lake Carriers' Association reports for every foot lost, a Great Lakes carrier forfeits more than 3,000 tons of cargo each trip. This equates to 16 million lost tons per year per foot of lost draft, which can have a large negative impact our national economy.

Approximately 3.3 million cubic yards of dredging is required annually to keep pace with the sediment inflow at Great Lakes' federal harbors and channels. Each year, $50 million is needed to keep up with the annual dredging requirement. When USACE dredges less than the 3.3 million cubic yards, the backlog of material grows. Conversely, when USACE dredges more than 3.3 million cubic yards, backlog decreases.

In the mid-2000s when dredging funds were scarce, the Great Lakes Navigation Team worked with stakeholders to identify functional channel dimensions (channel widths and lengths such that commercial navigation is not impeded under normal conditions). These dimensions are referred to as "functional dimensions." This allowed USACE to prioritize scarce funds on the most critical areas that were needed to support commercial shipping. The amount of backlog material in the functional channel dimensions peaked at 18 million cubic yards in 2013 but at the end of 2020 was reduced to 12.5 million cubic yards. By comparison, the amount of backlog sediment in fully authorized channel dimensions at the end of 2020 was 25 million cubic yards.

A total of $190 million would be required to remove the backlog in the functional channel dimensions and $375 million would be necessary to remove the dredging backlog within the authorized dimensions. USACE's ability to reduce the dredging backlog in the GLNS depends on receiving adequate funding and a suitable placement option for dredge materials.

Dredged Material Management

The Federal Standard is used at each harbor to ensure fair and equitable system resource distribution when determining dredged material placement is conducted in the least costly, technically feasible, environmentally suitable manner. Extensive sediment sampling and analysis as defined by the USEPA and USACE standards presented within the "Great Lakes Dredged Material Testing and Evaluation Manual" and the "Inland Testing Manual" determine sediment placement decisions on the dredging activity location.

For decades, confined disposal facilities (CDFs) held most sediment removed from federal channel areas. This approach was necessary to protect human health and the environment from contaminants in the dredged material. Dredged sediment from industrial ports contained contaminants that were the result of decades of industrial, residential, and/or municipal use of the waterway. Dredged sediment often included contaminants that had a negative impact on the aquatic environment. The intended design life of CDFs that were built in the 1970s and 1980s was most often 10 years. At that time, the expectation was 10 years of future dredging would sufficiently remove contaminated sediments to the degree that future sediments would be more suitable for open lake placement. However, the channel conditions did not initially improve as rapidly as expected and the need to confine contaminated sediment continued. Most CDFs have been expanded and used for over 40 years – four times the anticipated design life! Fortunately, channel sediment quality in many areas across the Great Lakes has improved with time, leading to alternative disposal options beyond CDFs in many areas.

Today, Great Lakes' sediments have 80% fewer PCBs than were present during the 1980s. That is a tremendous improvement and a sign of the improving health of our waterways. In many projects, improvements in the quality of channel sediment over time have led to a decrease in the amount of material that had to be placed in CDFs and allowed more material to be placed in the open lake or nearshore. This change reduces the cost of maintenance dredging and allows system funding to be used more efficiently on priority maintenance. In locations where sediment quality is suitable for open lake placement, the sediment is also suitable for beneficial use purposes, including a wide variety of land uses.

Sand dredged from nearby Burns Harbor, IN, is used to replenish a sand-starved beach at Indiana Dunes National Park

CDF 4 Buffalo, NY

An Emerging Market: Dredged Material

The beneficial use of dredged material is one of the keys to sustainable sediment management within the Great Lakes. The management strategy employs dredged material for some productive purposes such as beach/nearshore nourishment, habitat creation or restoration, landscaping, topsoil creation or enhancement, road construction, land creation or reclamation (e.g., strip mines, brownfields), or the manufacture of aggregates for marketable products like ceramics or asphalt. Implementation of a beneficial use strategy is often a significant component of a harbor's dredged material management strategy.

USACE recognizes the basin-wide interests in dredged material management across a variety of disciplines and agencies. The agency continually seeks to collaborate and identify cost-effective beneficial use options. However, funding availability often affects the timing of project execution.

Federal investments in dredged material management are based on the Federal Standard. Oftentimes, beneficial use concepts are more costly than open lake placement of clean sediment. If the cost to place material beneficially is greater than the least cost placement method, a non-federal cost share partner can pay for the difference.

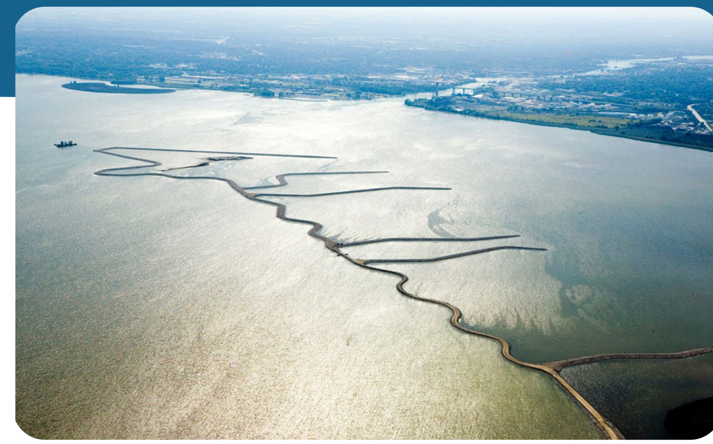
Many harbors across the Great Lakes have completed projects that beneficially employ materials removed from federal channel areas. A central element in all cases is the strong federal and nonfederal partnerships working together to develop innovative solutions to dredged material management.

Shallow water harbor placement in the Duluth-Superior Harbor, Duluth, MN

Waukegan, Illinois

Coastal communities of Evanston, Glencoe, Lake Bluff, and North Chicago in Illinois were recipients of a national pilot program and the only project selected on the Great Lakes. Established under the Water Resources Development Act of 2016, Section 1122, the program required USACE to identify and implement 10 beneficial use maintenance dredging projects nationwide. In each case, the federal government assumes the cost of the beneficial use portion of the maintenance dredging activity.

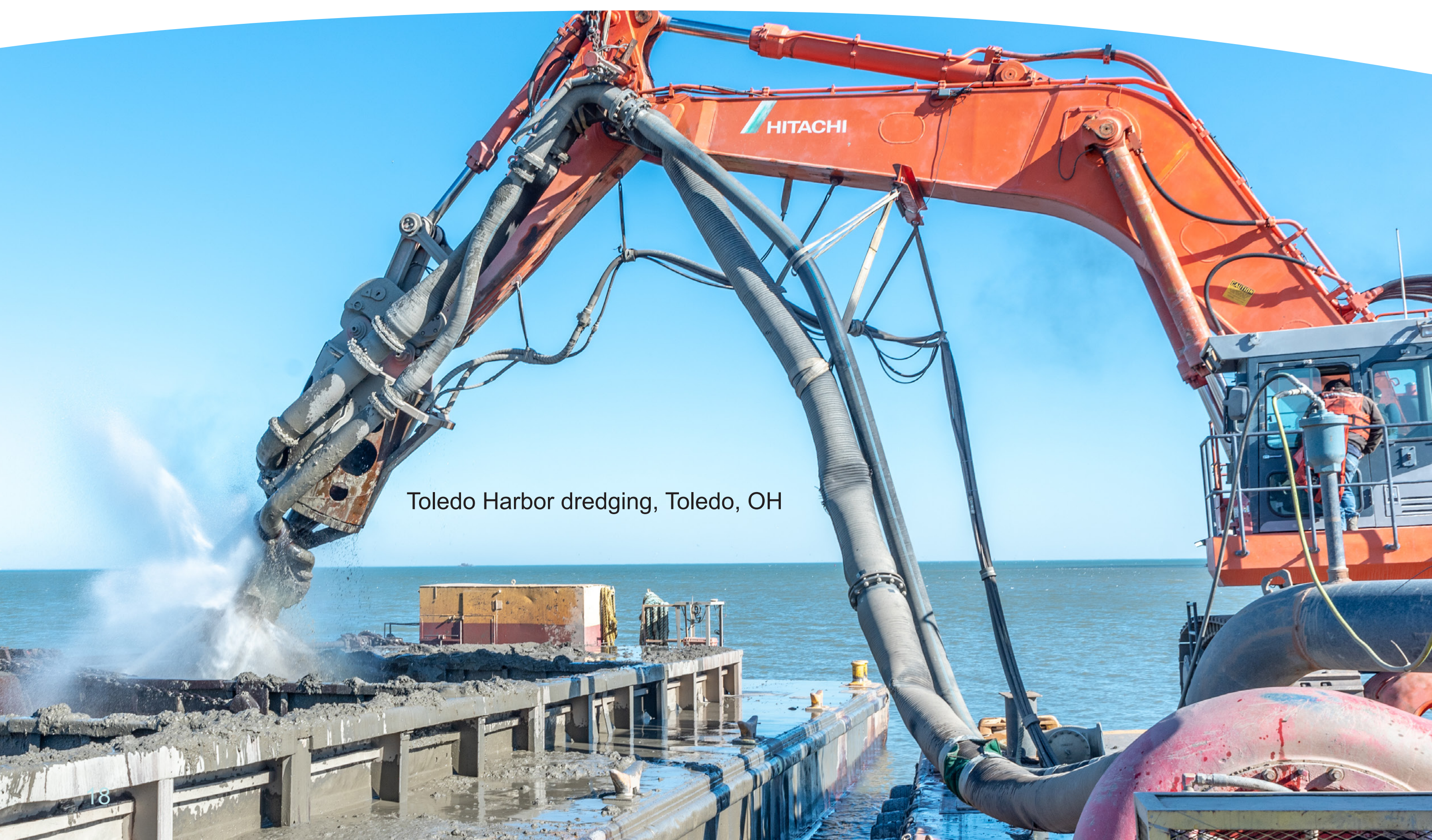
The Waukegan Harbor pilot project provides 54,560 yards of dredged material for shoreline protection at six sites: Sunset Park and Beach in Lake Bluff; Foss Park in North Chicago; Glencoe Beach in Glencoe; and Dog Beach, Greenwood Street Beach, and Lee Street Beach in Evanston - a positive step toward restoring public beaches and mitigating coastal erosion.



Cat Island, WI

Cat Island, Wisconsin

The Cat Island Dredged Material Disposal Facility provides an innovative solution to dredged material management through partnerships between USACE, EPA and local and state governments. The project provides both ecosystem restoration benefits and a very cost-effective manner of dredged material placement, which has reduced maintenance dredging costs in Green Bay, Wisconsin. Cat Island established 274 acres of habitat for wildlife, restored Pete's Marsh, Duck Creek, and the Delta Wetlands, delivering an additional 1,440 acres of wetland habitat.



Toledo Harbor dredging, Toledo, OH

Shallow Water Harbor Placement Duluth, Minnesota

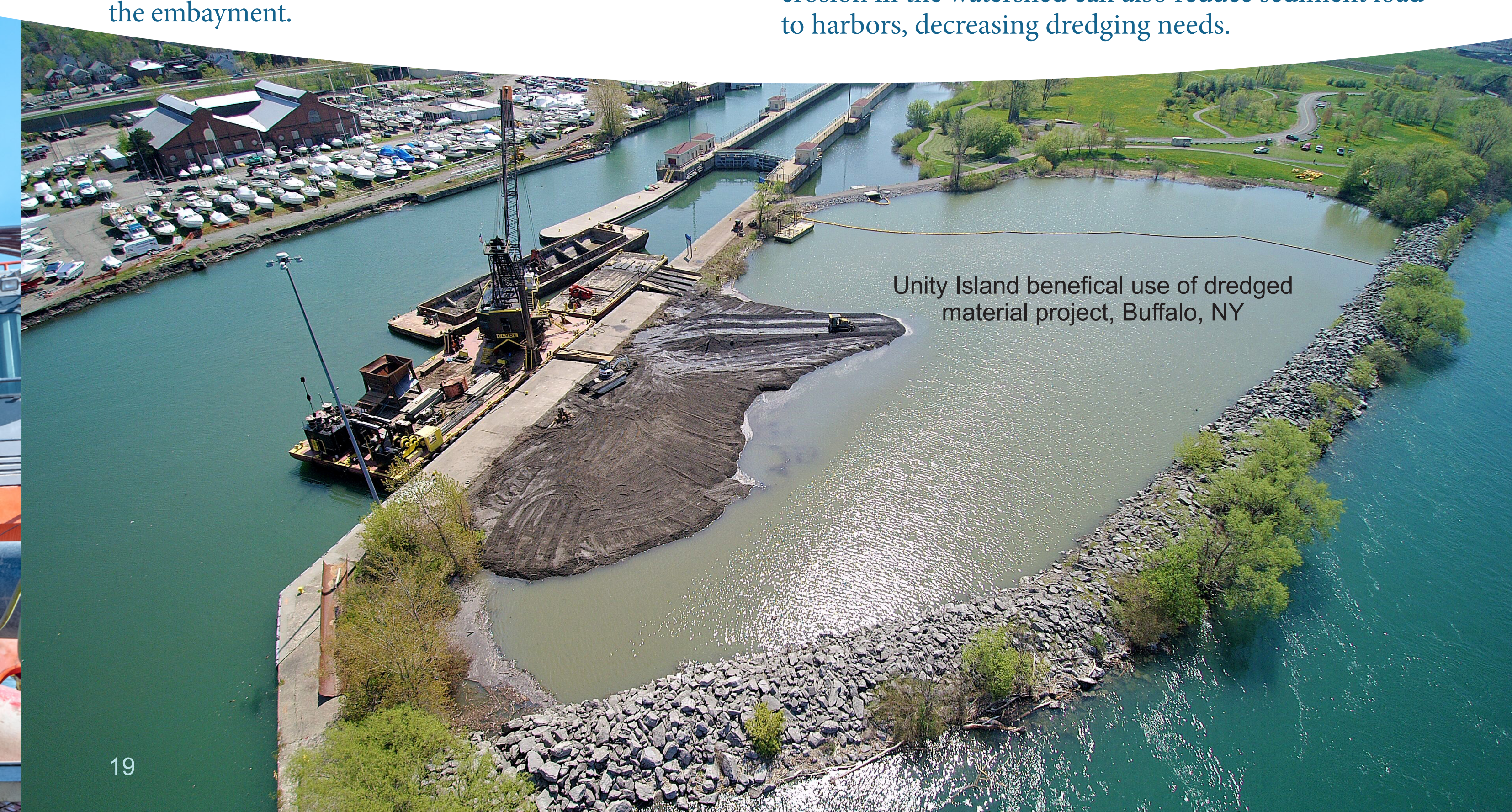
Piping Plover

Beginning in 2013, the USACE Detroit District, partnering with the Minnesota Pollution Control Agency (MPCA), the Minnesota Department of Natural Resources (MnDNR), Wisconsin DNR and the City of Duluth, placed dredged material into shallow embayments within Duluth-Superior Harbor, including 21st Avenue, 40th Avenue, and Interstate Island. These shallow water placement sites were designed to improve ecosystem benefits and help to delist the St. Louis River Area of Concern. Dredged material was also used to build a Piping Plover project at Wisconsin Point in Superior, Wisconsin. Over 1 million cubic yards has been placed beneficially since 2013. These projects are examples of beneficially using dredged sediment by placing the sediment at various depths below the embayment's water surface. In addition to providing a cost-effective method of dredged material placement, the project also has the added benefit of stimulating ecosystem restoration in the embayment.

Unity Island, New York

Completed in late 2020, the USACE Buffalo District successfully placed material dredged from the Buffalo River at Unity Island, Buffalo, New York, creating 10 acres of coastal wetland habitat along the Niagara River. Starting in 2008, using the EPA Great Lakes Restoration Initiative funding, USACE conducted environmental dredging of the Buffalo River, making 56,000 cubic yards of sediments suitable for beneficial use. Partnering with the City of Buffalo, who contributed funding, the project demonstrated USACE and its partners could evolve with the changing environment to find innovative solutions to protect and restore the Great Lakes.

Increased costs and environmental concerns make expanding the practice of beneficial use and reuse of dredged material essential. Removing material from CDFs for beneficial uses creates additional capacity and extends the life of the facility. Environmental projects are being coupled with dredging in mind. Using dredged material for habitat creation and other environmental needs before placing it in a CDF saves time, funds, and valuable space. Programs that prevent soil erosion in the watershed can also reduce sediment load to harbors, decreasing dredging needs.



Unity Island benefical use of dredged material project, Buffalo, NY

Navigation Structure Benefits

Federal harbors exist in over 100 cities and towns. In addition to navigation channels, harbors include coastal structures like breakwaters, piers, and jetties. Although authorized to safeguard navigation activities within the harbors from waves and ice, coastal navigation structures also provide critical flood and storm protection for buildings, roads, and other facilities developed alongshore in protected areas. In some cases, the development includes critical public infrastructure providing power generation, water supply, and wastewater treatment. Coastal structures also protect and support operations for the 43 U.S. Coast Guard stations on the Great Lakes.

More than 60% of the Great Lakes' coastal structures were built before World War I (1918), and 90% are older than their typical 50-year design life. Federal funding for project maintenance is prioritized based on economic benefits related to commercial navigation. Necessary funding for federal breakwaters at harbors with a low volume or no commercial navigation was a low priority for maintenance investments for years.

Due to the HMTF impact, since 2014 the Great Lakes have seen a dramatic increase in funding for navigation structure repairs over the past three years. For fiscal year 2019, $65 million was appropriated for structure repair. The increase in funding is a positive step in addressing the GLNS's infrastructure issues. From 2016-2020, USACE spent over $190 million toward structure repairs, with an estimated $320 million of critical repairs still needed on commercial harbors as of 2021. High water levels prominent from 2017 to 2021, compounded with lack of funding, have created a situation where nearly 40 percent of the Great Lakes' breakwaters are rated at failing or failed.

Chicago District Floating Plant

Most of these needs represent significant repairs or reconstruction of navigation structures. To effectively address this challenge, the three Great Lakes Districts employ a regional, multidisciplined breakwater assessment team conducting consistent condition assessments of the Great Lakes' navigation structures and developing maintenance priorities within the system. The team has inspected all of the Great Lakes structures and determined risk-based ratings for each coastal structure segment. The assessment team's work allows USACE to prioritize these maintenance needs on a regional level, ensuring the most urgent needs are given priority during the annual budget formulation process.

USACE marine floating plant assets perform preventive maintenance and repairs across the federal harbors, to address incremental repairs on critical degraded structures annually. The marine floating plant crews are versatile and intended to deploy quickly and respond to emergencies or failures involving harbor structures or CDF rapidly.

Buffalo District Floating Plant

Detroit District Floating Plant

Chicago District Floating Plant

Summary of Critical System Needs

Significant investments are being made to effectively and efficiently operate and maintain the GLNS, benefiting the Great Lakes region and the Nation. The system's combined needs amount to nearly $300 million each year for commercial projects alone, which does not include an estimated $15 million per year for dredging and structure repair at shallow-draft recreational harbors. System needs at the end of 2020 include $375 million for dredging backlog for authorized channels, $320 million for navigation structures repair, and $225 million for Soo Locks Asset Renewal, not including Construction General funds needed for the new Soo Lock.

SUMMARY:

Great Lakes Navigation System - Economically and Environmentally Crucial to the Nation

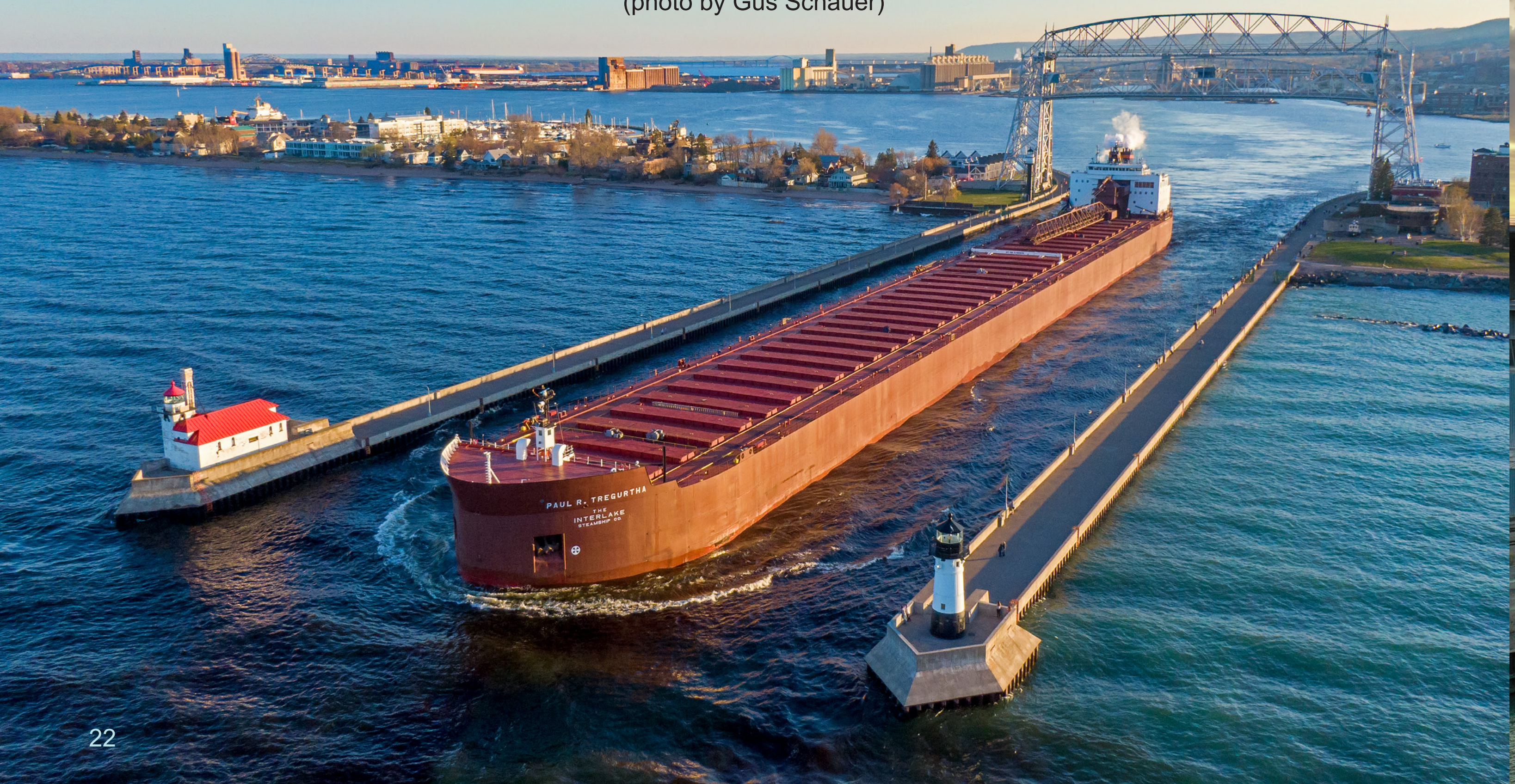
If the GLNS is to remain reliable, its assets must be maintained in good operating condition. The goal of maintaining the GLNS of interdependent locks, shipping channels, and ports is to keep commercial shipping in the region safe and reliable so that it can continue to provide a significant economic advantage to the country. Component failures at locks can cause major disruptions to commercial shipping. Navigation channels accumulate sediment both suddenly during storms and over time within a season and must be dredged regularly to maintain the authorized width and depth. The absence of adequate channel maintenance increases operating expenses to shippers and industry, limiting production capabilities and ultimately harming the national economy. Dredging, confined disposal facility capacity, and beneficial use are complimentary activities that must be planned accordingly. Failure to adequately maintain navigation structures hinders safe access to ports and reduces the efficacy of coastal storm damage protection provided to the critical infrastructure built up in urban areas adjacent to the harbors. Investments in the maintenance of GLNS assets provide significant economic benefits on a local, regional, and national level.

Between 2015-2019, the GLNS transported an annual average of 122.3 million tons, supporting 147,500 U.S. jobs (49,400 direct, 54,200 indirect, and 43,900 induced), and $25.6 million in U.S. economic activity annually. Marine shipping saves approximately $3.9 billion per year over the next least costly transportation mode, such as road or rail, translating directly into more competitive American steel, lower-cost energy, and ultimately more American jobs.

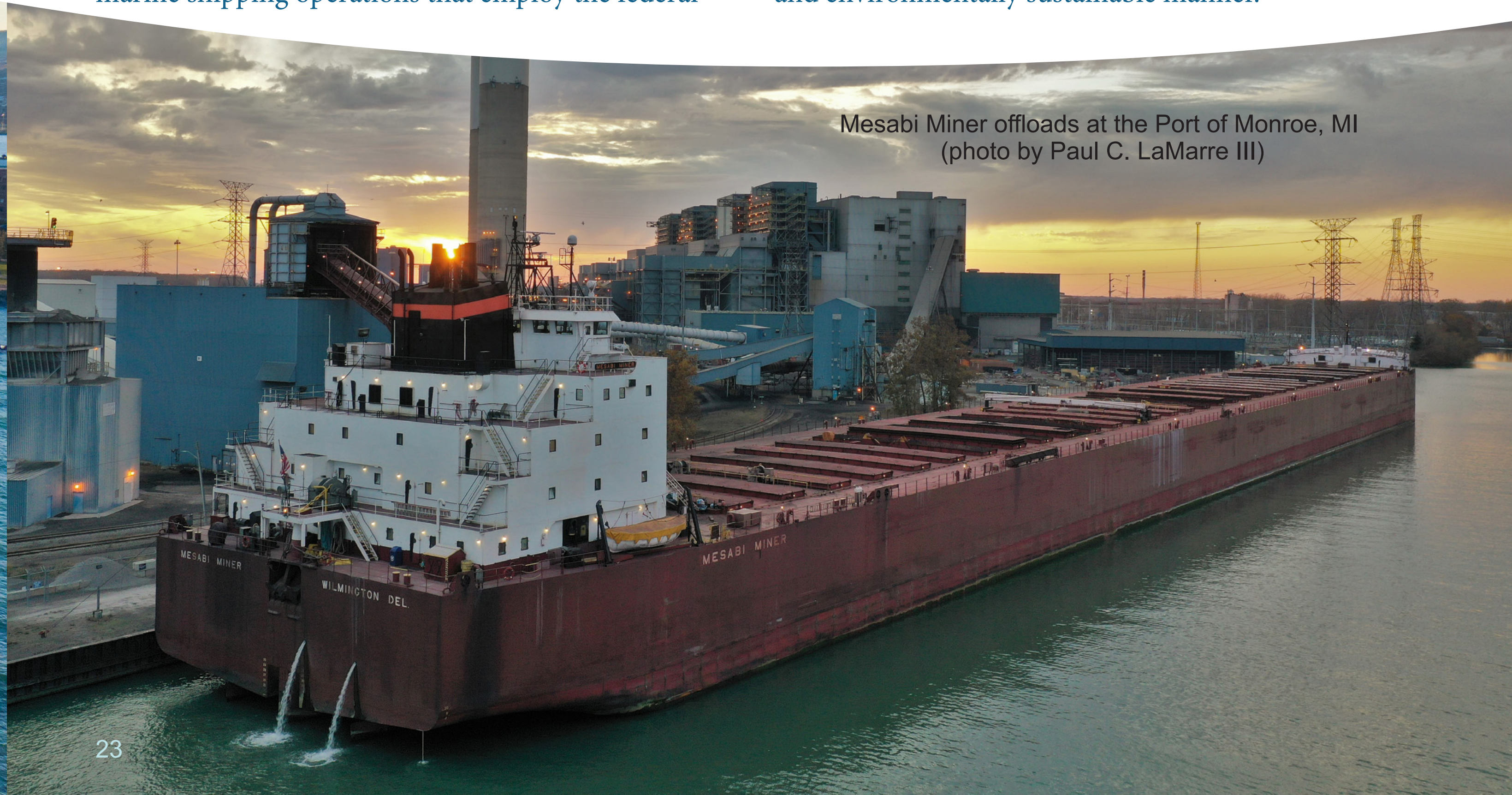
The GLNS offers an environmentally sustainable mode of transportation, providing significant fuel economy savings and much lower greenhouse gas emissions than rail and truck transportation. If all marine shipping operations that employ the federal navigation channels of the GLNS were unavailable, commodities would have to be transported by rail and truck. Were such a feat possible, this alternative would increase harmful emissions by over 995 million tons and generate concurrent losses of $223 million due to increased railroad-related accidents and $149 million due to increased trucking-related accidents.

The GLNS also has a distinct advantage over other modes of transportation such as truck and rail. Ninety percent of the shipping lanes within the GLNS are functional and efficient exactly as the glaciers left them. The Nation has entrusted the remaining 10% of maintenance to USACE. This is tremendous leverage and unrivaled in other transportation modes – by maintaining 10% of the system, the other 90% is obtained at no cost.

A reliable, cost-effective transportation network is one advantage that American businesses have in the global economy. The GLNS provides an economical and environmentally sustainable network. Maintaining Great Lakes navigation infrastructure as a reliable, efficient system is essential to preserving the health and vitality of both the region and the Nation in an economical and environmentally sustainable manner.



Paul R. Tregurtha leaving from Duluth Harbor, Duluth, MN
(photo by Gus Schauer)



Mesabi Miner offloads at the Port of Monroe, MI
(photo by Paul C. LaMarre III)

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