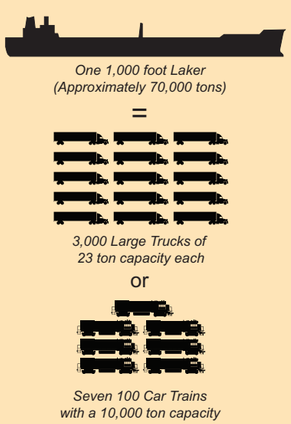
THE GREAT LAKES NAVIGATION SYSTEM

The Great Lakes Navigation System (GLNS) is a complex deepwater navigation system stretching 2,400 miles through all five Great Lakes and connecting channels from Duluth, Minnesota to Ogdensburg, New York. It is a non-linear system of interdependent locks, ports, harbors, navigational channels, dredged material disposal facilities, and navigation structures. Maintaining Great Lakes navigation infrastructure as a viable, functional system 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. Federal commercial ports on the Great Lakes are linked in trade with each other, with Canadian ports, and with ports throughout the rest of the world. Unlike ports along the eastern and western U.S. coasts that compete against each other for trade business, Great Lakes ports are part of an overall system that competes against other modes of transportation that are less economically viable and far less environmentally sustainable.

FREIGHT CAPACITY COMPARISON



Navigation System

Features

- 60 Commercial Navigation Projects
- 80 Recreational Navigation Projects
- 3 Navigation Lock Facilities
- 610 Miles of Federal Navigation Channel
- 20 Active Confined Disposal Facilities
- 104 Miles of Federal Navigation Structures (Breakwaters, Piers and Jetties).

Value

- On average, 126 million tons of commodities are transported between and within U.S. ports located on the waterways of the Great Lakes system annually (2013-2017).
- Accounts for approximately 5.5% of all US waterborne domestic traffic
- 1% of US waterborne tonnage on the Great Lakes is either shipped to, or received from an internal waterway system. Additionally, 17% of tonnage is shipped to Canadian or overseas ports and 12% is received from Canadian or overseas ports.
- Includes 21 of the nation's top 150 harbors by tonnage.
- Rate savings benefit of $3.9 billion per year in transportation and handling charges when vessel costs are compared to the next-best, all-land transportation alternative.
- Over $33.5B in business revenue annually generated as a result of maritime activity on GLNS.
- A cargo of 1,000 tons transported by a Great Lakes carrier produce 90% less carbon dioxide as compared to the same cargo transported by truck and 70% less than the same cargo transported by rail.

Channels

Dredging

- Failure to adequately dredge navigation channels reduces available channel dimensions and increases transportation costs to shippers and industry because when harbors and channels shoal in, ships have to light load, which increases the transportation cost because more trips are required.
- Approximately 3.3 million cubic yards of material is deposited annually in the federal harbors and channels of the Great Lakes.
- 15-25 projects are dredged annually, removing 3-6M CY of material. There is a current dredging backlog of 12.5M CY of material system wide.

Dredging on the St. Marys River

Strike Removal

- The four connecting channels: the St. Marys River, St. Clair River, Channels in Lake St. Clair and Detroit River require continuous strike removal (sounding for, locating, and removing boulders and other obstructions from the federal channel) to maintain a safe and functional channels.
- Strike removal is performed in-house by U.S. Army Corps of Engineers floating plant.

Locks

Great Lakes lock facilities include: the Soo Locks (Poe and MacArthur), the Chicago Lock, and Black Rock Lock.

Soo Locks:

- The Soo Locks are nationally critical infrastructure; their reliability is essential to U.S. manufacturing and National Security.
- A failure of the Poe Lock in Sault Ste. Marie, Michigan would have significant impacts to the U.S. economy, especially the domestic steel and auto industries.
- The Soo Locks handle nearly 80 million tons of cargo annually and are a vital component of the GLNS. Only the Poe lock has the necessary dimensions to pass the largest ships operating on the Great Lakes; currently over 86% of tonnage traversing the Soo Locks is restricted by vessel size to the Poe Lock.
- A Major Rehabilitation project is underway on the Soo Locks to rehab four critical lock components: Davis and Poe Pump Well, Poe Ship Arrestors Poe Bulkhead, Poe Bulkhead, MacArthur Tainter Valve Machinery.
- Construction of the New Soo Lock is expected to begin in 2010 and could be complete, with efficient funding, within seven to ten years of the construction kickoff with total work estimated to cost approximately $1 billion.

Chicago Harbor Lock:

- Located in Chicago, Il on the Chicago River, the lock connects Chicago Harbor and the Great Lakes to the Illinois River and ultimately the Mississippi River.
- Over 65,000 commercial and recreational boats, 800,000 passengers, and 100,000 tons of freight pass through the lock annually.
- The Lock also serves as a flood damage reduction structure to prevent flooding of downtown Chicago from Chicago River overbank flooding.

Black Rock Lock:

- Located in Buffalo, NY, the lock connects Buffalo Harbor, on Lake Erie to Tonawanda Harbor and delivery destinations on the upper Niagara River.
- 3.5 mile Black Rock Channel connects the Buffalo Harbor and Black Rock Lock and a 2.0 mile pier separates the channel from the Niagara River.
- With 1,781 lockages in 2016, the lock provided passage for 2,653 vessels (328 commercial and 2,325 recreational).

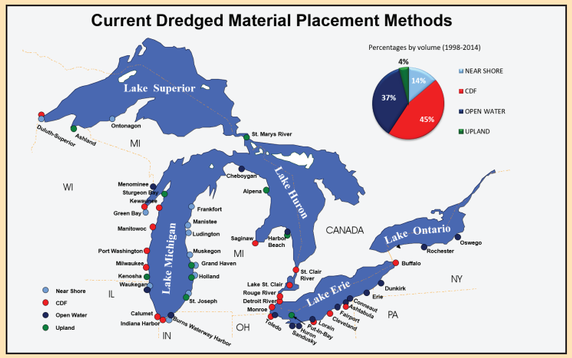
Navigation Structures

- 135 coastal cities and towns on the Great Lakes with federal navigation projects that include breakwaters; 60 of these projects currently support commercial navigation.
- Built to safeguard navigation activities in the federal harbors, these structures also provide critical flood and storm damage protection for buildings, roads, facilities and municipal infrastructure that have developed along the waterfront.
- Navigation structures provide protection from powerful natural forces such as storm surges, large waves, and ice.
- Piers and jetties are typically constructed perpendicular to the shore to help keep channels open for navigation by reducing shoaling in the federal channel and reducing the wave climate and offshore breakwaters are typically constructed to provide safe entry into the harbors, especially during storm events.
- Over 60% of the navigation structures on the Great Lakes were built before World War I (1918) and over 90% are older than the typical 50-year design life.
- Repairs to navigation structures are completed by in-house U.S. Army Corps of Engineers floating plant and by marine contractors.

Cleveland East Breakwater

Dredged Material Management

- Dredged material placement methods on the Great Lakes include beach nourishment, open water placement, upland placement and placement in confined disposal facilities (CDFs).
- The Corps of Engineers is striving to prolong CDF service life by emphasizing dredged material recycling (beneficial use) and fill management activities and are committed to maximizing the beneficial use of dredged material, consistent with Corps policies..
- Cleveland Calumet, Duluth, Iindiana, Saginaw, Lorain, and Toledo harbors are facing critical dredged material management issues that could limit the ability of the Corps of Engineers to maintain federal navigation channels and therefore restrict channel availability within five yvears. n addition, all harbors in Ohio will present challenges in finding acceptable placement methods with a new state law effective July 2020, which prohibits the use of open water placement in Lake Erie.
- The Corps of Engineers is working closely with state agencies and partners to find the most cost effective, engineeringly feasible, and environmentally acceptable placement method for dredged material at our harbors. We have had several success stories recently, notably Cat Island in Green Bay, and 21st and 40th Ave in water placement in Duluth-Superior harbor.



Additional Information

U.S. Army Corps of Engineers, Great Lakes Navigation:

http://www.lre.usace.army.mil/greatlakes/navigation

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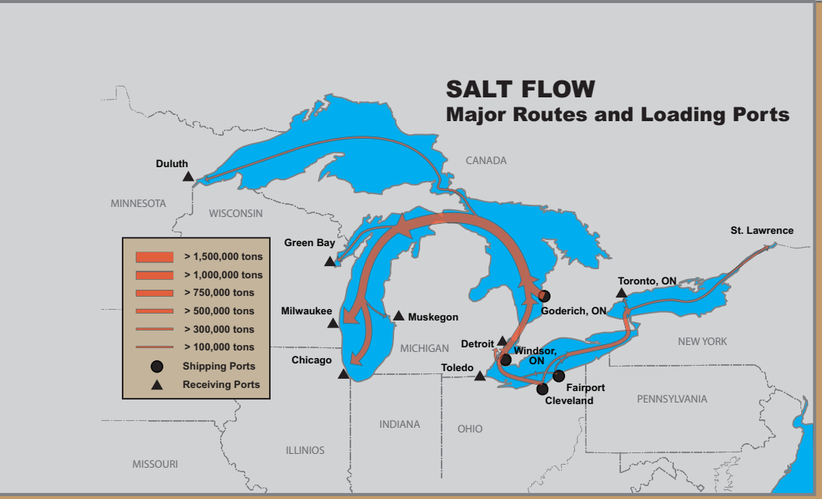
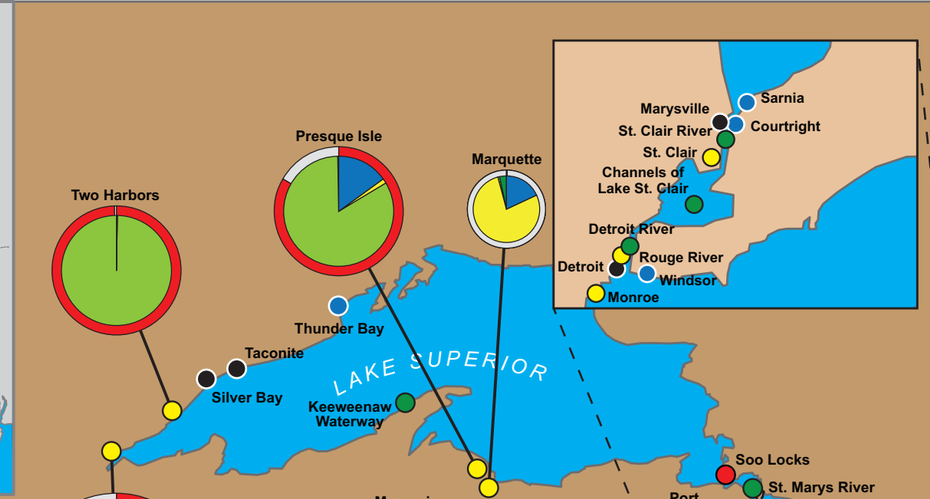
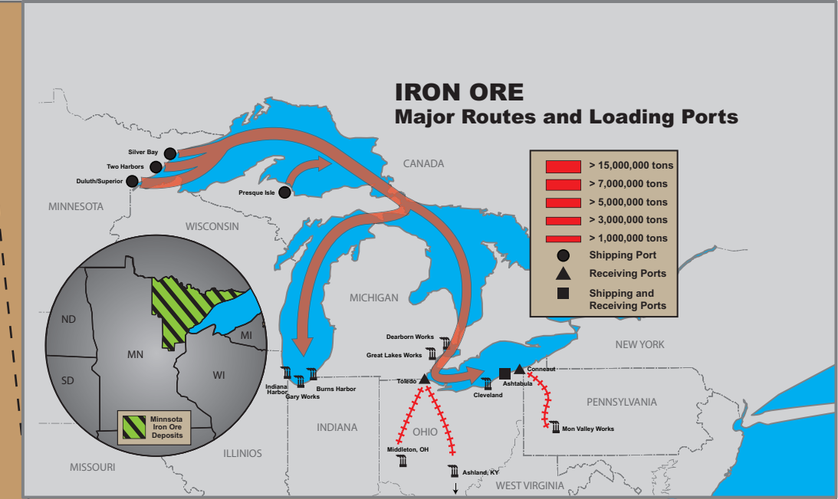
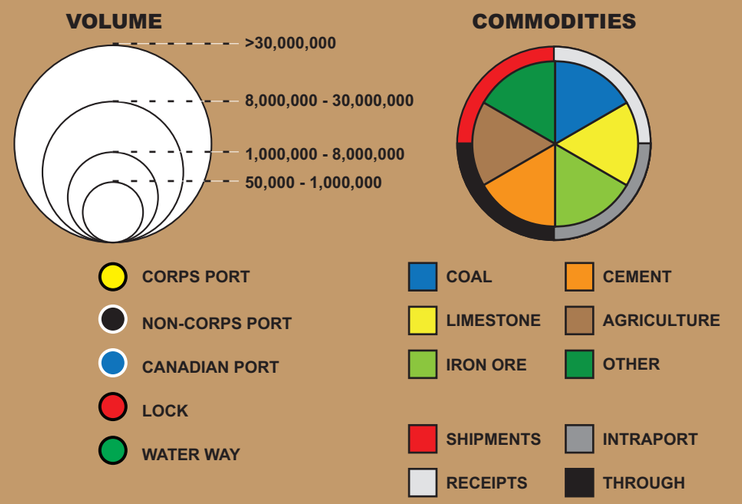
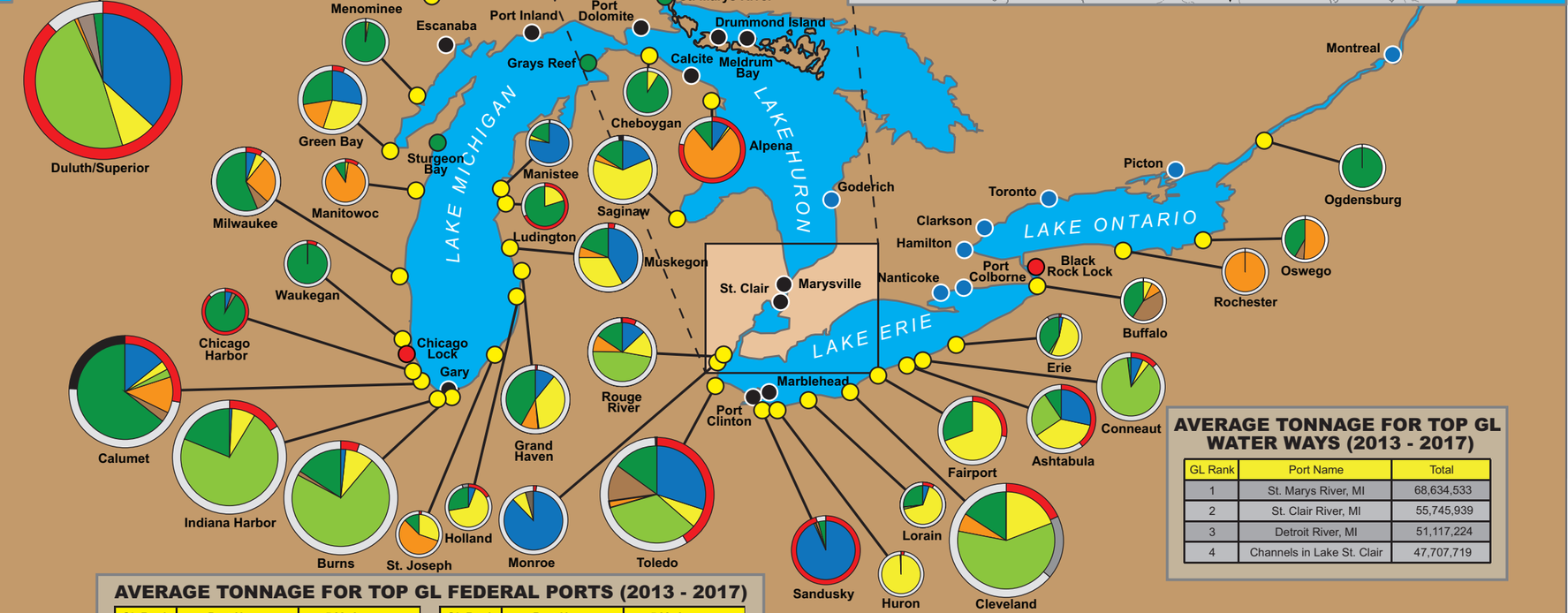






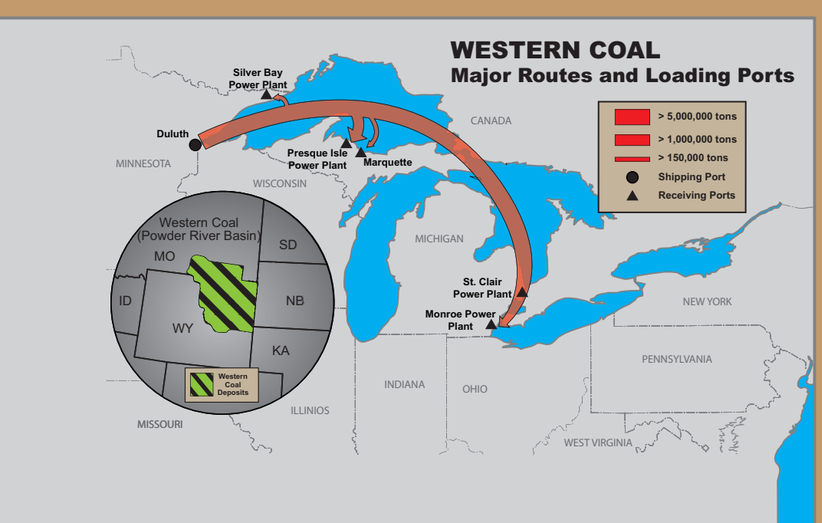
AVERAGE CARGO VOLUME AND COMMODITIES BY PORT IN TONS, 2013-2017





AVERAGE TONNAGE FOR TOP GL WATER WAYS (2013 - 2017)

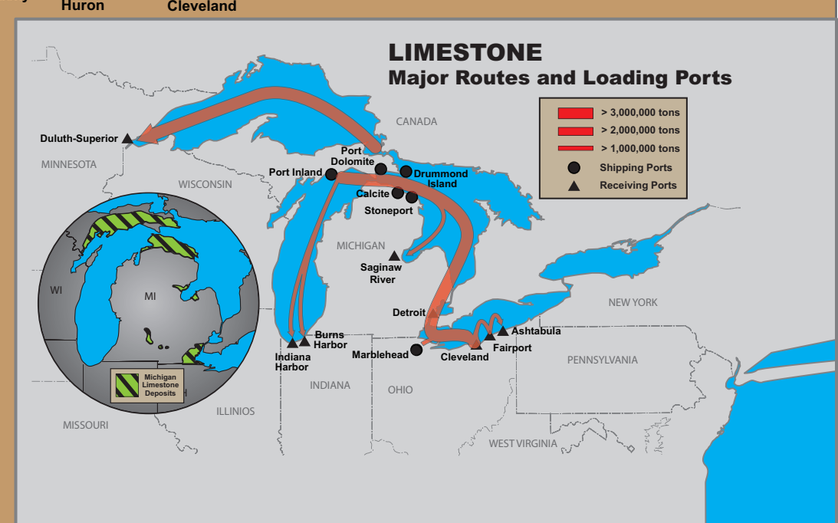
GL Rank	Port Name	Total
1	St. Marys River, MI	68,634,533
2	St. Clair River, MI	55,745,939
3	Detroit River, MI	51,117,224
4	Channels in Lake St. Clair	47,707,719



AVERAGE TONNAGE FOR TOP GL FEDERAL PORTS (2013 - 2017)

GL Rank	Port Name	5-Yr Average	GL Rank	Port Name	5-Yr Average
1	Duluth-Superior, MN	34,451,029	16	Alpena, MI	2,269,251
2	Chicago, IL[1]	16,695,562	17	Green Bay, WI	2,105,749
3	Two Harbors, MN	15,932,866	18	Fairport, OH	1,599,360
4	Detroit, MI[2]	13,526,777	19	Muskegon Harbor, MI	1,311,289
5	Cleveland, OH	12,777,414	20	Marquette, MI	1,066,608
6	Indiana Harbor, IN	12,263,759	21	Grand Haven Harbor, MI	1,053,467
7	Toledo, OH	9,289,400	22	Lorain, OH	867,229
8	Burns Harbor, IN	8,758,890	23	Buffalo, NY[3]	732,497
9	Presque Isle, MI	8,274,294	24	Erie, PA	655,339
10	Conneaut, OH	4,499,394	25	Ludington , MI	448,961
11	Ashtabula, OH	4,133,141	26	Oswego, NY	405,842
12	Milwaukee, WI	2,764,618	27	Huron, OH	396,847
13	Sandusky, OH	2,573,801	28	Manistee, Mi	366,112
14	Monroe, MI	2,553,685	29	St. Joseph, MI	306,645
15	Saginaw River, MI	2,450,820	30	Trenton, MI	303,753

[1] Includes: Chicago Harbor, Chicago River, Chicago Sanitary and Ship Canal, Calumet-Sag Channel and Lake Calumet, IL, Calumet Harbor and River, IL and IN.

[2] Includes: Detroit Harbor, Rouge River, Ecorse, Wyandotte, Riverview and Trenton

[3] Includes: Outer harbor, Lackawanna Canal, Union Canal, Buffalo River from mouth to Conrail RY Bridge 5.5 miles, Buffalo Ship Canal, BlackRock Canal, Black Rock Lock, Black Rock Channel, Niagara River, and Tonawanda to and including Buffalo Oil Terminal, Inc. Dock, located about 2,000 feet north of turning basin, Tonawanda inner Harbor, and Tonawanda Creek Channel from mouth to Main Street Bridge