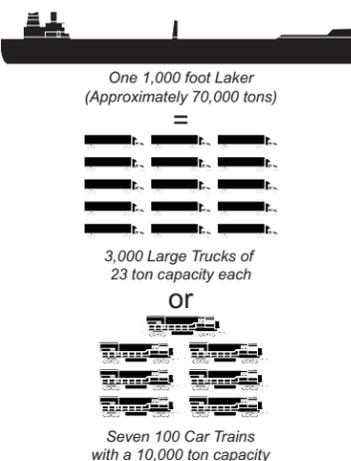


# THE GREAT LAKES NAVIGATION SYSTEM

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
  - Black Rock Lock: Buffalo, NY
  - Chicago Lock: Chicago, IL
  - Soo Locks: Sault Ste. Marie, MI
- 610 Miles of Federal Navigation Channel
- 20 Active Confined Disposal Facilities
- 104 Miles of Federal Navigation Structures (Breakwaters, Piers and Jetties).

### Value

- On average, 145 million tons of commodities are transported between and within U.S. ports located on the waterways of the Great Lakes system annually (2006-2010).
- Accounts for approximately 10% of all US waterborne domestic traffic
- Includes 22 of the nation's top 100 harbors by tonnage.
- Rate savings benefit of \$3.6 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 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

- Vital to the functionality of the GLNS.
- Failure to adequately dredge navigation channels reduces available channel dimensions and increases transportation costs to shippers and industry.
- When harbors and channels shoal in, ships have to light load, which increases the transportation cost because more trips are required. Over time, harbors can close completely due to severe shoaling.
- Approximately 3.3 million cubic yards of material is deposited annually in the federal harbors and channels of the Great Lakes.
- From the mid 1990s to the present constrained funding led to a growth of dredging backlog of over 18 million cubic yards.



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:

- Located in Sault Ste Marie, MI on the St. Marys River, the two operational locks (Poe and MacArthur) connect Lake Superior and Lake Huron.
- Only connection between Lake Superior and the Lower Great Lakes and St. Lawrence Seaway.
- The Soo Locks handle over 80 million tons of cargo annually and are a vital component of the Great Lakes Navigation System.
- Only the Poe lock has the necessary dimensions to pass the largest ships operating on the Great Lakes, including the 1000 foot lake carriers.

### 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.
- One of the busiest locks in the nation, with annual lockages of 12,000.



- Over 35,000 commercial and recreational boats, 680,000 passengers, and 125,000 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 1,402 lockages in 2012, the lock provided safe passage for 1,990 vessels (340 commercial and 1,650 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 has 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 and offshore breakwaters are typically constructed to provide safe entry into the harbors, especially during storm events.
- Over 50% of the navigation structures on the Great Lakes were built before World War I (1918) and over 80% 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 or by marine contractors.



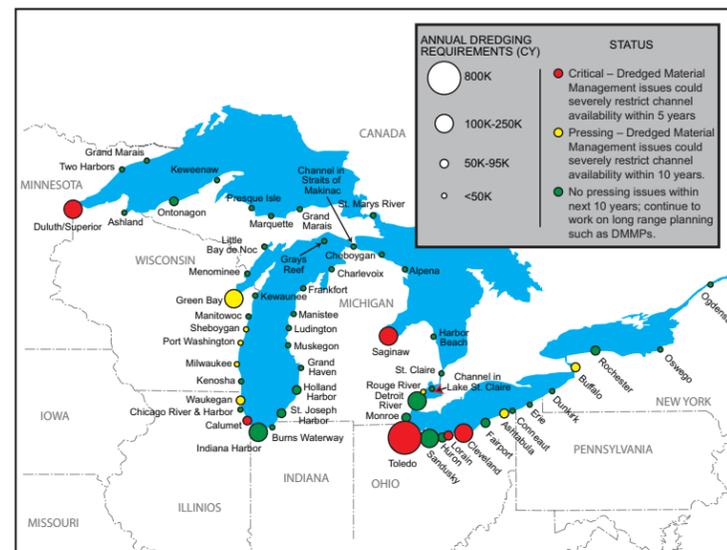
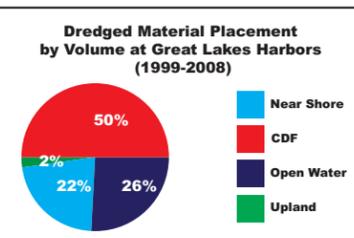
Cleveland East Breakwater

## 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.
- Duluth, Calumet, Saginaw, Lorain, Toledo and Cleveland 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 years.

- The Corps of Engineers has laid out a multi-faceted strategy to solve the dredged material management crisis



## ADDITIONAL INFORMATION

U.S. Army Corps of Engineers, Great Lakes Navigation:  
<http://www.lre.usace.army.mil/greatlakes/navigation>

## CONTACTS

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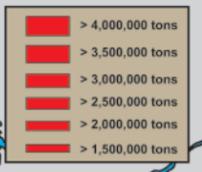
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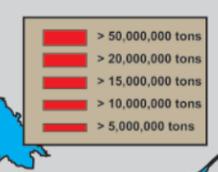
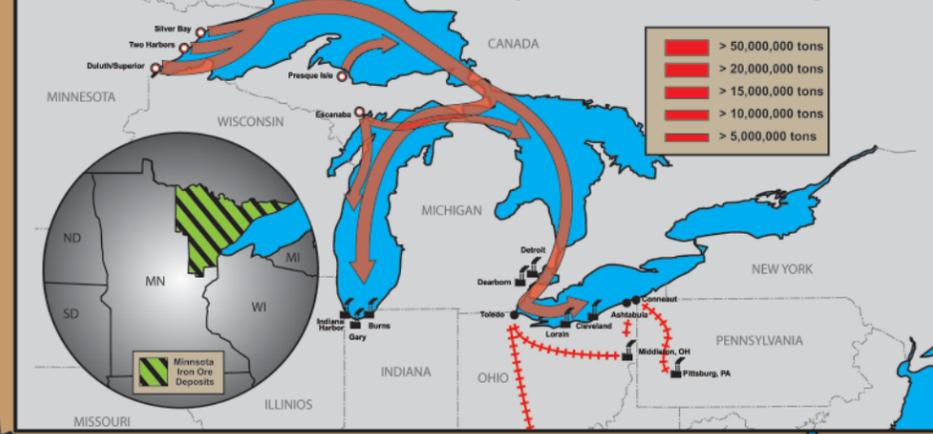


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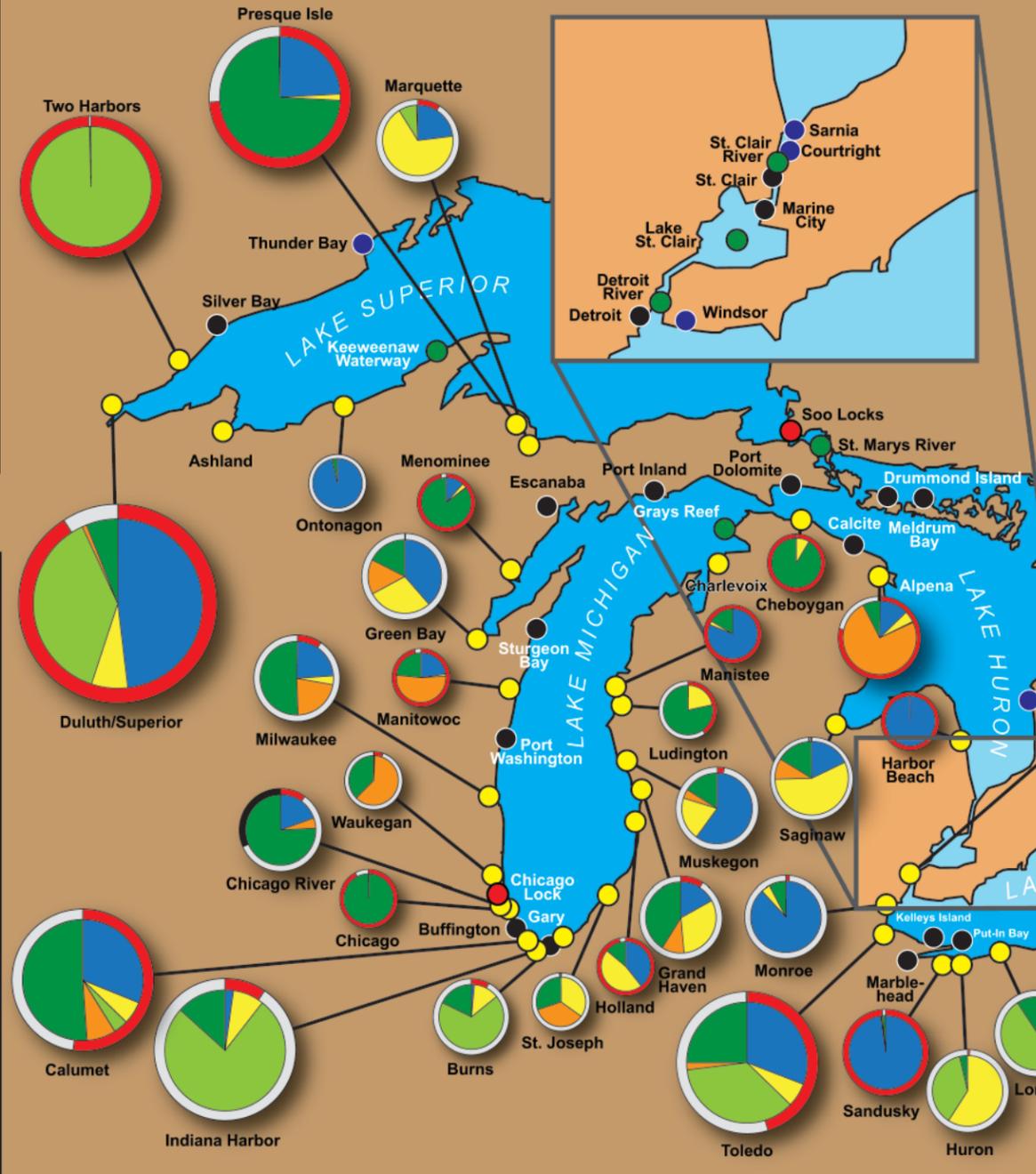
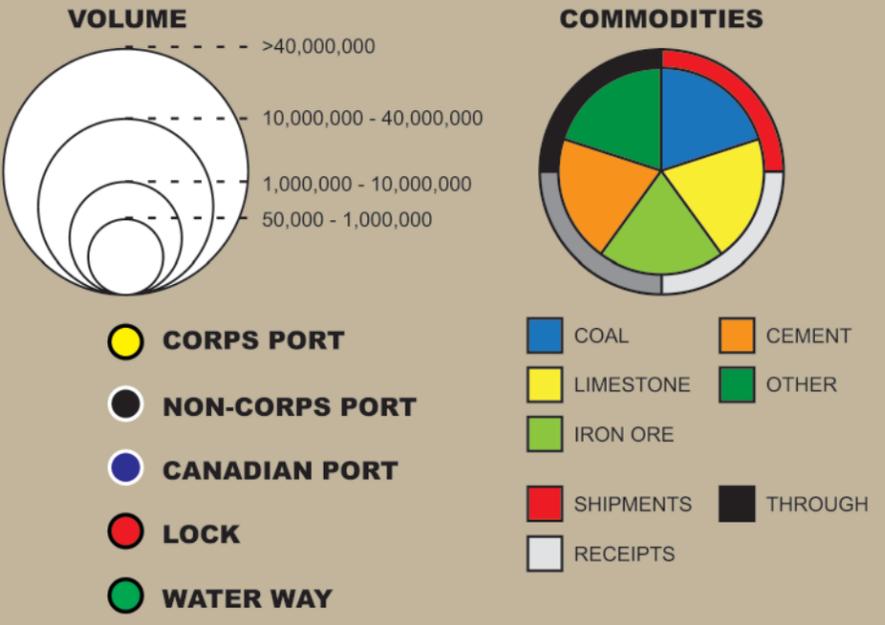
### EASTERN COAL Major Routes and Loading Ports



### IRON ORE Major Routes and Loading Ports



### AVERAGE CARGO VOLUME AND COMMODITIES BY PORT IN TONS, 2006-2010



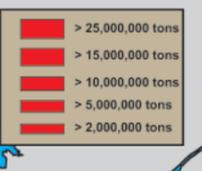
### AVERAGE TONNAGE FOR TOP GL FEDERAL WATER WAYS (2006 - 2010)

GL Rank	Port Name	Total
1	St. Marys River, MI	71,307,865
2	St. Clair River, MI	64,452,143
3	Detroit River, MI	59,326,319
4	Lake St. Clair	54,593,819
5	Grays Reef Passage, MI	9,748,204

### AVERAGE TONNAGE FOR TOP GL FEDERAL PORTS (2006 - 2010)

GL Rank	Port Name	Total	GL Rank	Port Name	Total
1	Duluth-Superior, MN and WI	41,127,518	18	Muskegon, MI	1,929,418
2	Chicago, IL (Port) <sup>1</sup>	22,122,075	19	Fairport, OH	1,787,302
3	Indiana, IN	12,985,939	20	Monroe, MI	1,468,377
4	Two Harbors, MN	12,299,384	21	Buffalo, NY (Port) <sup>2</sup>	1,459,414
5	Cleveland, OH	11,096,788	22	Marquette, MI	966,415
6	Toledo, OH	10,997,334	23	Grand Haven, MI	965,447
7	Presque Isle, MI	8,476,728	24	Erie, PA	849,425
8	Rouge River	7,817,147	25	Huron, OH	835,605
9	Burns Waterway Harbor, IN	6,362,764	26	Manistee, MI	502,295
10	Ashtabula, OH	5,820,575	27	Ludington, MI	464,385
11	Conneaut, OH	4,742,326	28	Oswego, NY	458,579
12	Saginaw River, MI	3,522,463	29	Waukegan, IL	451,897
13	Milwaukee, WI	3,416,594	30	St. Joseph, MI	449,871
14	Sandusky, OH	2,878,417	31	Holland, MI	360,071
15	Alpena, MI	2,850,605	32	Manitowoc, WI	326,542
16	Green Bay, WI	2,343,644	33	Menominee, MI & WI	325,085
17	Lorain, OH	2,046,387	34	Ontonagon, MI	150,638

### WESTERN COAL Major Routes and Loading Ports



### LIMESTONE Major Routes and Loading Ports



<sup>1</sup> Includes: Chicago Harbor, Chicago River, Chicago Sanitary and Ship Canal, Calumet-Sag Channel and Lake Calumet, IL, Calumet Harbor and River, IL and IN.  
<sup>2</sup> 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