

GREAT LAKES NAVIGATION DREDGED MATERIAL MANAGEMENT AND EMERGING CHALLENGES

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U.S. ARMY



US Army Corps
of Engineers



GREAT LAKES DREDGING

Annual Dredging Need: 3.3 M cubic yds in the Great Lakes' federal harbors and channels

Typical Dredging Program: 20-30 projects annually, 3-5 M cubic yds

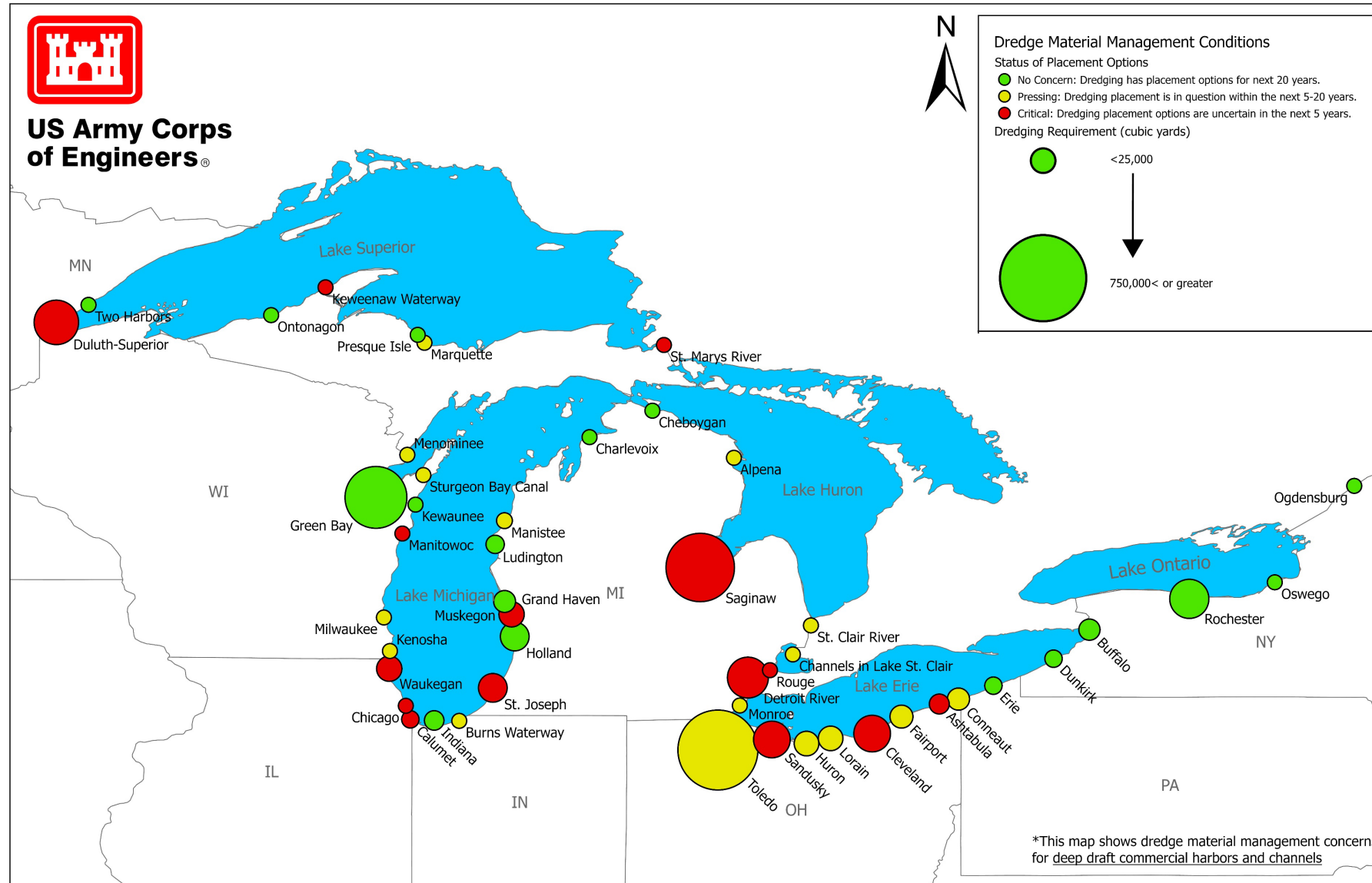
Dredging Costs vary from \$7/cu yd - \$70/cu yd. Factors that influence cost include:

- Environmental requirements (dredging windows, limitations on open-lake placement, state 401 environmental certificates)
- Many small quantity harbors in system (vs more cost-effective large quantity harbors)
- Contractor mobilization costs
- Short dredging season and weather delays in outer harbors during dredging season (equipment is smaller and thus cannot handle rough conditions as much as oceanic coastal equipment)
- Material placement – especially where double handling is required

Key stakeholders for engagement: Lake Carriers' Assoc; GL Ports Association; Port directors; harbor committees; state agencies, local cities/communities; industries in the port/harbor



CURRENT DREDGED MATERIAL MANAGEMENT CONDITIONS AT COMMERCIAL PROJECTS



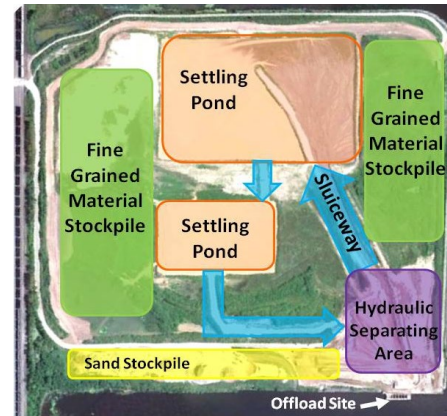


DREDGED MATERIAL MANAGEMENT – STRATEGIES

- Extend CDF life through fill management – maximize the use of fill management and facility adaptation
- Aggressively pursue opportunities for beneficial use of dredged material
- Foster strategic partnerships with state agencies and stakeholders to develop innovative long-term solutions to dredged material management (DMM) challenges
- Leverage research and development to explore technologies for DMM and further beneficial use
- Optimize funding Programs to Advance DMM Solutions – continued partnership with USEPA with Great Lakes Legacy Act and Great Lakes Restoration Initiative



*Unity Island beneficial use of dredged material project
Buffalo, NY*



*Duluth Erie Pier CDF converted
to Placement and Reuse Facility*



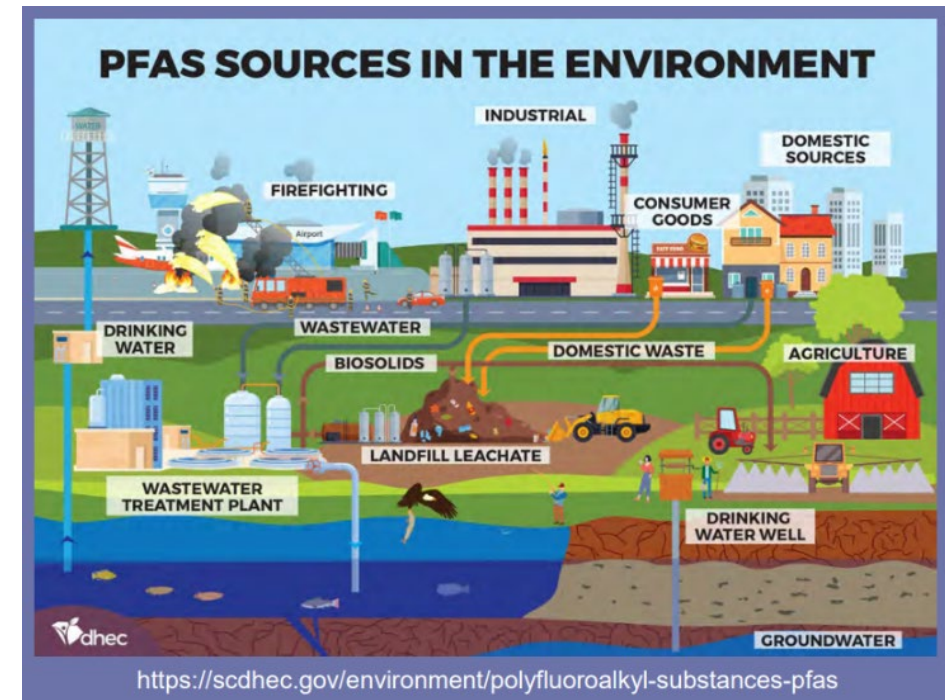
*Shallow water placement for habitat
restoration using dredged material
Superior, WI*



EMERGING CHALLENGES FOR DMM - PFAS

What We Know

- PFAS (Per- and poly-fluoroalkyl) are human-made substances composed of fluorinated carbon chains and are found across all environmental media including soil, water, and biota.
- Current research indicates the compounds may not be acutely toxic to many benthic macroinvertebrates, with **bioaccumulation impacts and human health risks often driving concerns from aquatic exposures**. Research is ongoing to understand toxicity, bioavailability, uptake, and transfer through aquatic food webs (especially from sediments).
- For some PFAS, EPA has national drinking water standards, recommended ambient surface water quality criteria, and risk-based screening levels for soil, but **no guidelines for sediments**.
- The Great Lakes States differ in their approach to PFAS in the environment, with varying regulations and guidelines for drinking water, surface water, air, and/or soil, along with consumption advisory levels for fish and/or wildlife existing in some states. **No state guidelines for sediment exist**.



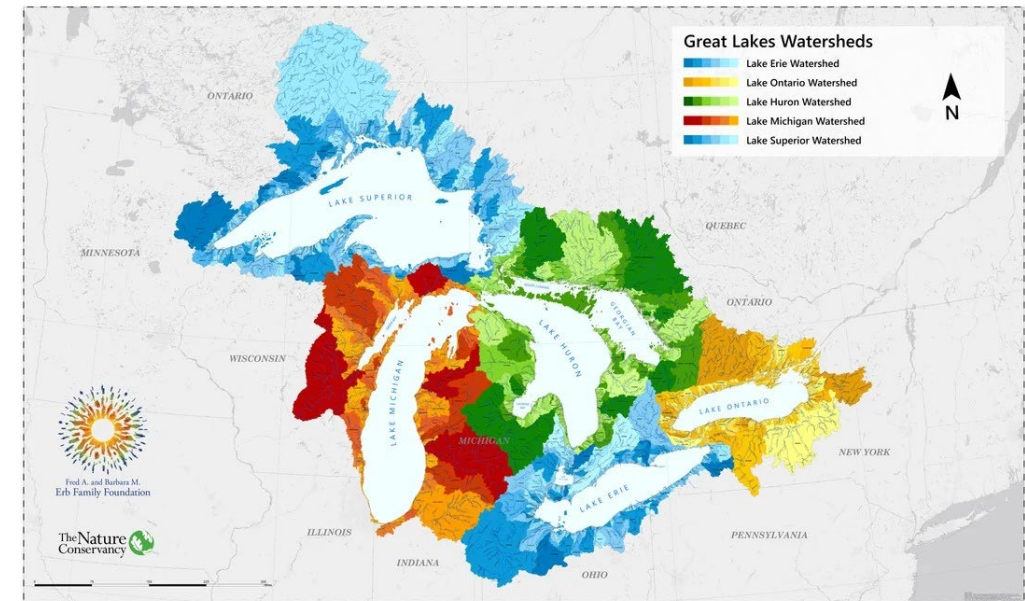
PFAS appear to be present in nearly all water, soil, and sediment – often at very low concentrations. They can be airborne, transported far from sources, and deposited in remote areas.



EMERGING CHALLENGES FOR DMM - PFAS

What Are We Doing

- Consistency is key when it comes to USACE's actions related to PFAS. To accomplish this, we have a **USACE-wide policy that requires any PFAS-related work be approved by USACE Headquarters.**
- To date only **one navigation project in the Great Lakes** has been approved to test for PFAS (Menominee Harbor Deepening Study)
- Understanding of PFAS and the risks that certain PFAS may pose is rapidly evolving and USACE is researching the presence of PFAS in dredged material. **Current knowledge gaps preclude us from fully interpreting PFAS levels in sediment (ERDC Research).**
- **Regulations are still evolving which could impact placement of dredged material**, liability of hazardous material placed upland could fall on USACE with increased costs (sampling, dredging, transportation, placement)



Great Lakes Watershed Map

Source: Fred A. and Barbara M. Erb Family Foundation and the Nature Conservancy
<https://www.erbff.org/blog/great-lakes-watersheds-map/>



CASE STUDY: MENOMINEE NAVIGATION STUDY

Project Activity	Initial Project Budget	Project Costs including PFAS Associated cost increases	Cost Increase
<ul style="list-style-type: none"> • Planning <ul style="list-style-type: none"> • Sediment Sampling • Environmental • Planning Section • Project Management • Engineering 	<ul style="list-style-type: none"> • \$203,000 • \$115,000 • \$308,000 • \$100,000 • \$382,000 	<ul style="list-style-type: none"> • \$1,321,000 • \$168,000 • \$382,000 • \$203,000 • \$665,000 	<ul style="list-style-type: none"> • \$1,119,000 • \$53,000 • \$74,000 • \$103,000 • \$283,000
• Total Project Costs: Planning	• \$1,107,000	• \$2,739,000	• \$1,632,000
<ul style="list-style-type: none"> • Design & Construction <ul style="list-style-type: none"> • Design & Con. Mgmt • Construction 	<ul style="list-style-type: none"> • \$7,379,000 • \$29,517,000 	<ul style="list-style-type: none"> • \$36,887,000 • \$147,549,000 	<ul style="list-style-type: none"> • \$29,508,000 • \$118,032,000
• Total Project Costs: Construction	• \$36,896,000	• \$184,436,000	• \$147,540,000
• Total Project Costs	• \$38,003,000	• \$187,176,000	• \$149,172,000



RISKS TO DREDGING COSTS FROM PFAS

Project Activity	Risk Increasing Cost/Time	Est. of PFAS Related Cost Increases to Menominee Nav Study*	Extrapolated Cost Incurred by Navigation Program due to PFAS
Project Planning	<ul style="list-style-type: none"> Increased uncertainty Increased/varied alternatives Increase coordination efforts Delays to schedule milestones Revoked/delayed 401 Water Quality Certification for projects where concerns about PFAS exist New/amended Environmental Assessments 	<ul style="list-style-type: none"> \$1 increase per cubic yard (cyd) of material dredged 3 - 10 year schedule delay if a new Dredge Material Management Plan is required 	<ul style="list-style-type: none"> \$3.3M increase for 3.3M cyds of dredge material needed to maintain the navigation channels
Sediment/ CDF Discharge Sampling	<ul style="list-style-type: none"> Additional testing requirements Re-testing harbors and placement sites where PFAS testing was not conducted 	<ul style="list-style-type: none"> 60¢-80¢ increase per cyd of material dredged 	<ul style="list-style-type: none"> \$1.98M – \$2.64M increase over 3.3 million cyds of dredge material needed for maintenance
Construction & Design	<ul style="list-style-type: none"> Alternate placement site creation/identification: upland confined, new CDF, Tipping Fees, etc. Additional precautions & potential water treatment 	<ul style="list-style-type: none"> \$133-\$231 increase per cyd of material dredged 	<ul style="list-style-type: none"> \$439M – \$762M increase over 3.3 million cyds dredged
Economic & System Impacts	<ul style="list-style-type: none"> Reduced capacity (time and money) to complete projects causing significant delays to dredging Reduced local economies from harbor closures or significantly reduced navigability Unachievable Chief's goal of 70% Beneficial Use 	<ul style="list-style-type: none"> \$30M annually in lost revenue \$5.3M annually in increased shipping costs 	<ul style="list-style-type: none"> FY25 Dredging Budget: \$71M Future FYs: \$488M - \$793M annually 24 harbors dredged in FY25 3-5 harbors dredged in future FYs at current \$71M budget level

*See Slide 7 for Menominee Navigation case study project and detailed breakdown of budget impacts.

DULUTH-SUPERIOR HARBOR

Commercial Connections with Other U.S. Harbors

HYPOTHETICAL Connectivity Map

KEY - 2021 DATA

- ★ >1,000,000 tons
- 200,000 - 1,000,000 tons
- △ 50,000 - 200,000 tons
- <50,000 tons
- Shipment TO Duluth-Superior Harbor
- - - Shipment FROM Duluth-Superior Harbor
- Italic Harbor Text = Non-Federal Harbor*

Map highlights domestic movements only. Tonnages in Fast Facts table may include Canadian or other foreign movements.

Ton = 2,000 lbs.

*Movements do not transit federal channel.

FAST FACTS

2021 Highlights

Harbor Ranking Great Lakes (1st)
..... National (18th)
Total Tonnage 33 Million

5-Year Averages (2017-2021)

Total Tonnage 32 Million
Shipments..... 28 Million *-100 to 250k*
Receipts 4.1 Million *-100 to 400k*
Thru 0
Intraport* 0.038 Million

Top Three Commodities Handled

Coal & Lignite (24%)
Iron Ore (58%)
Limestone (10%)

Primary Commodity Shipped

Iron Ore (67%)

Primary Commodity Received

Limestone (75%)



Tonnages are rounded to two significant figures. 5-Year Averages may not precisely sum to 5-Year Total Tonnage.

† Intraport: Movement of freight within the confines of a port whether the port has one or several arms or channels included in the port definition.

Updated: 3/4/2024