

Sediment Remedial Activities Under the Great Lakes Legacy Act Program

WODCON XXI
Miami, FL
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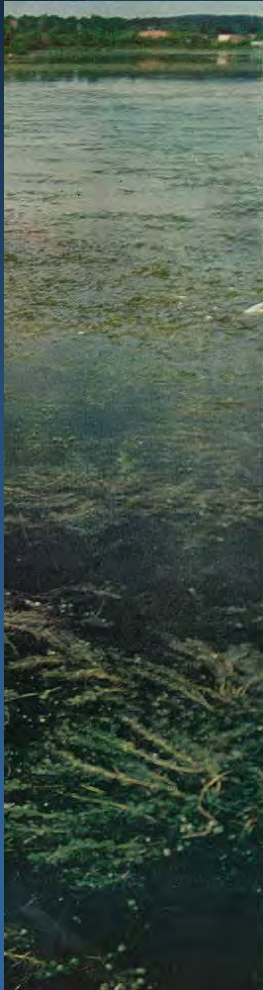
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≡ Outline

- ❖ Background on Great Lakes Legacy Act
- ❖ Methods
- ❖ Project highlights
- ❖ Summary statistics and observations

Setting the Stage...



Every lake has its own natural life cycle. The normal aging process, called eutrophication, begins with a cold, clean body of water. Then plant and animal life appear, organic matter accumulates and the water becomes shallower and warmer, until the basin is filled and becomes a marsh which will support only the lowest forms of marine life or no life at all. All this takes—or should take—thousands of years, but pollution can kill a lake in 500 years. Pollution feeds the plant life, particularly algae, which not only fills the basin but ruins the remaining water by removing the oxygen. Since the Great Lakes complex is the only practical disposal basin for 1,000 shoreline industries and communities, scientists agree that the remedy lies in removing the noxious elements from the waste before it enters the lakes.

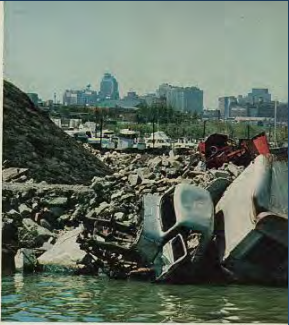


White Lake, a five-mile-long catch basin on Lake Michigan's eastern shore, is covered by sewage-fed weeds. They sprout all over the water, ruining it for boaters and swimmers and driving out fish. The picture at top left is a detail of this scene. The bottom picture shows an island in the lake formed by cattle hides discarded by a tannery. Above, at Green Bay, Wis., paper mill refuse helped turn the municipal beach into a marsh; there has been no swimming here for 25 years. Lake Erie's Sterling State Park (right) has been dangerously polluted by septic-tank wastes for eight years, but—despite warning signs—the state of Michigan still permits swimming.



Eyesores, scum and hardly any fish left

Erie's curse is the Cuyahoga, which snakes through Cleveland (below) carrying a load of detergents, sewage and chemicals to the Lake. Eyesores abound at river's edge (right), a junkheap in late, Ohio) and in the Cleveland port itself, where leftover litter is used to build unsightly breakwaters (center). The dig port has only one commercial fisherman left, and Fred Wittal, shown at far right cleaning a meager perch catch, is leaving too.



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Great Lakes Legacy Act

- ❖ **Objective:** Accelerate the pace of sediment remediation at Areas of Concern (AOCs)
- ❖ **Funding:** Use partnerships to help fund sediment remediation efforts
 - ▶ Minimum 35% Non-Federal match required
- ❖ **Mechanism:** EPA and Partner Contractors
 - ▶ Great Lakes Engineer and Architect Services (GLEAS)
 - ▶ Great Lakes National Program Office Construction Services (GLNPOCS)

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Great Lakes Legacy Act Success Stories

Legacy Act Projects Tackle Great Lakes Pollution

U.S. Areas of Concern
Great Lakes

May 2008

Federal funding

The Great Lakes Legacy Act authorizes \$270 million in funding over five years, beginning in fiscal year 2004.

Appropriations received to date have been:

FY2008 – \$34.5 million
FY2007 – \$30 million
FY2006 – \$29.3 million
FY2005 – \$22.3 million
FY2004 – \$9.9 million

For more information

EPA's Great Lakes National Program Office administers the Legacy Act for the federal government. For more information contact:

Marc Tuchman
312-353-1369
tuchman.marc@epa.gov

Web sites

Check out these Web pages for even more information:

About The Great Lakes Legacy Act
www.epa.gov/glla

About Areas of Concern
www.epa.gov/glnpo/aoc/

GLLA rules for identifying and evaluating proposed projects
www.epa.gov/glla/rule



EPA's research vessel Mudpuppy can enter shallow inlets on the Great Lakes to test for contaminated sediment.

The Great Lakes are among the largest and most complex freshwater ecosystems in the world, providing water, food and a home to millions of people, aquatic plants and animals. The Great Lakes Legacy Act of 2002 is part of a larger strategy to provide a healthy, natural Great Lakes environment for swimming and fishing as well as a source of clean water for drinking and industrial uses.

Although discharges of toxic chemicals to the Great Lakes have been reduced in the last 30 years, high concentrations of contaminants persist in the sediment of some rivers, harbors and bays as a "legacy" of North America's industrialization.

Harmful pollutants include polychlorinated biphenyls, better known as PCBs, as well as heavy metals like mercury, oil and grease, and polycyclic aromatic hydrocarbons, or PAHs. These substances accumulate in the sediment. They first affect the tiny organisms that fish eat. That contaminates the fish, and can be a health risk to people who eat the fish. The contaminants also affect the environment in other ways.

To help address the contaminated sediment problem, The Great Lakes Legacy Act of 2002 authorizes \$270 million in funding over five years, beginning in fiscal 2004, to specifically assist with the cleanup of



≡ Great Lakes Legacy Act Facts

- ❖ 27 remaining AOCs in United States
- ❖ 4 AOC sites delisted
- ❖ 20 projects completed
- ❖ 10 projects in active remediation
- ❖ Over 3.1 million cubic meters (m³) of sediment remediated
- ❖ Total cost to date is \$549.9 million
- ❖ 37 Industrial Partners contributed \$74 million
- ❖ \$221 million total in non-Federal match funding



Canadian and U.S. Areas of Concern in the Great Lakes Basin



≡ Methods

- ❖ Web search of publicly-available reports
 - ▶ GLNPO documents
 - ▶ Conference proceedings
- ❖ Personal communications
- ❖ Develop and refine spreadsheet database
- ❖ Meetings with GLNPO staff
- ❖ Prepare manuscript
- ❖ Review by GLNPO staff

GLLA Project Database example

Lake Basin	AOC	Project (Cost Match)	COCs ¹	Dredge or Excavation Type	Dewatering Method	Acres or Volume Capped	Disposal Volume ² (cy)	Sediment Volume ³ (cy)	Project Cost ⁴ (million USD)
Erie	Ashtabula River	Ashtabula River, OH (50/50)	PCBs	Hydraulic	Geotextile Tubes	2.3 acres (6-inch sand backfill)	497,383	497,383	60.0
		North Slip - "Jacks Marine", Ashtabula, OH (40/60)	PCBs, DRO,ORO	Hydraulic	Geotextile Tubes	--	11,976	11,976	1.5
	Maumee River	Ottawa River, OH (50/50)	PCBs, PAHs, metals	Hydraulic	Geotextile Tubes	--	241,672	241,672	47.2
	Detroit River	Black Lagoon - Trenton Channel, MI (40/60)	PCBs, Hg, Oil & Grease	Mechanical/ amphibious	Gravity drain in CDF	3.5 acre	115,671 (CDF)	115,671	8.7
	River Raisin	River Raisin, MI ⁶ (40/60)	PCBs	Mechanical and Hydraulic	Gravity drain and solidification/ Gravity drain in CDF	--	3,000 (landfill), 70,000 (CDF)	73,392	18.9

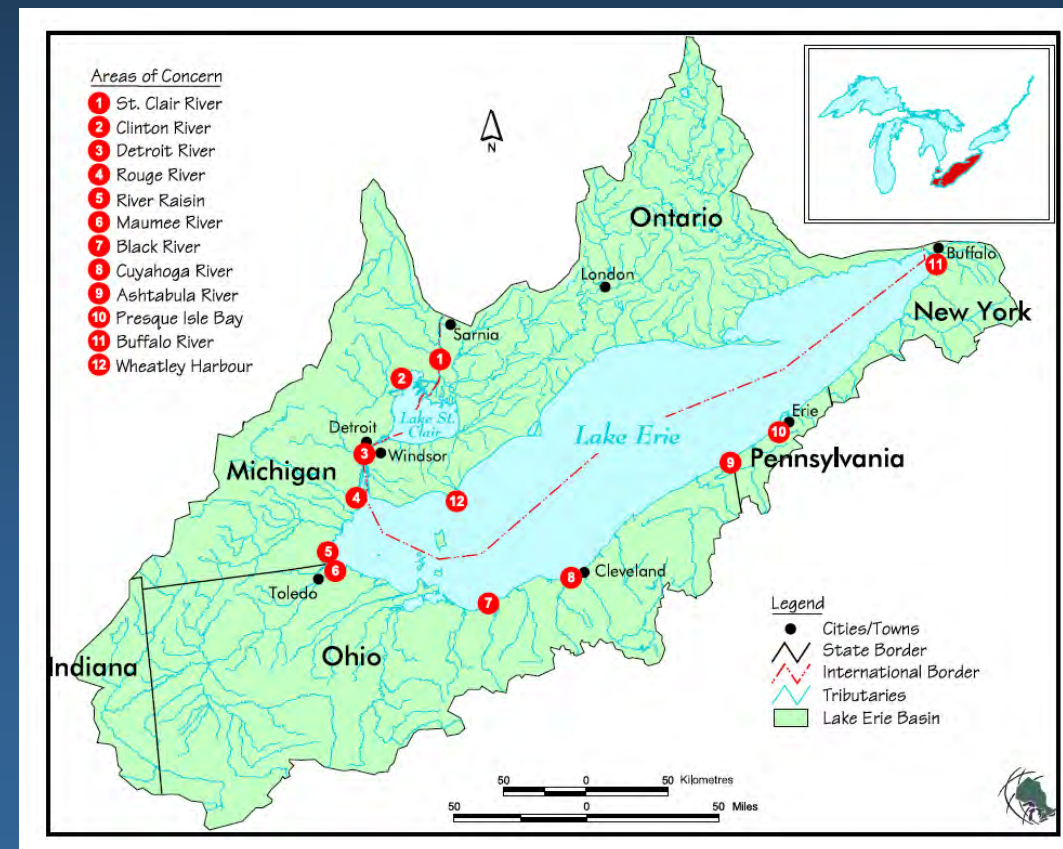
≡≡≡ Lake Ontario AOCs

- ❖ 4 AOCs
 - ▶ Eighteen Mile Creek
 - ▶ Niagara River
 - ▶ St. Lawrence River at Massena
 - ▶ Rochester Embayment
- ❖ 1 AOC Delisted- Oswego River
- ❖ 2 Legacy Sites- assessments
 - ▶ Niagara River AOC (Smokes Creek and Niagara River)



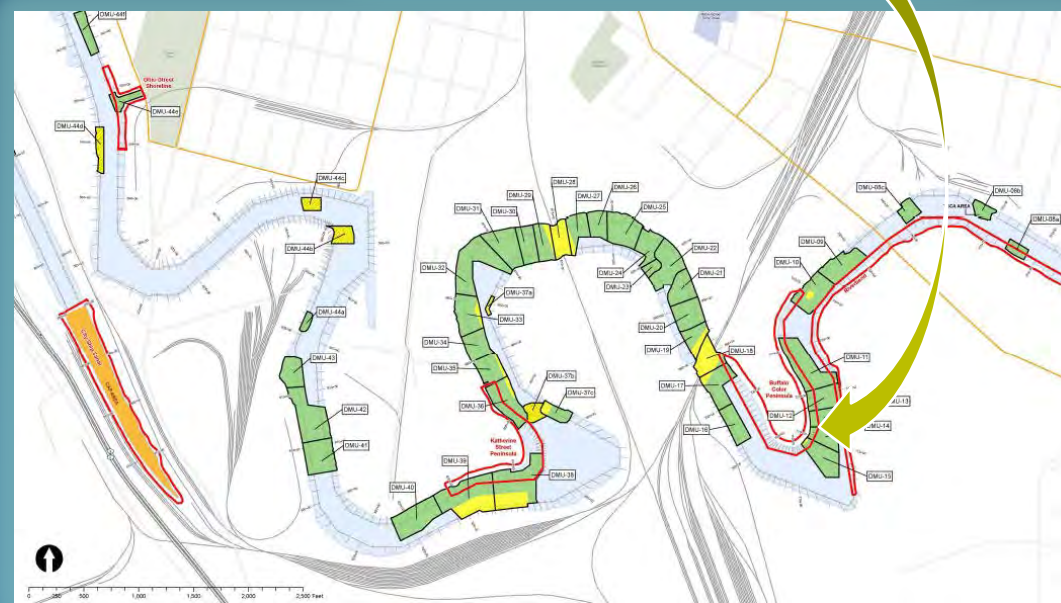
≡ Lake Erie AOCs

- ❖ Currently 10 AOCs
- ❖ 1 AOC delisted (Presque Isle Bay)
- ❖ 18 Legacy Sites
- ❖ 5.7 M m³ of contaminated sediment
- Current Phase of Remedial Activities
 - ◆ 10 Assessment
 - ◆ 1 Design
 - ◆ 2 Remediation
 - ◆ 4 Complete
 - ◆ 1 Unknown



Buffalo River AOC in NY

- ❖ Environmental dredging of 367,000 m³
- ❖ 4,200 m³ of TSCA removal
- ❖ Disposed in CDF
- ❖ **Over 765,000 m³ with USACE**
- ❖ In-situ capping of 3.6 hectares
- ❖ Restoring 3.1 hectares of aquatic habitat
- ❖ Estimated \$43.2 M clean up cost
- ❖ Partnering with Honeywell and Buffalo Riverkeepers



Ottawa River in Maumee AOC in OH

- ❖ 184,771 m³ of sediment removed from Ottawa River
- ❖ 7,316 m³ dredged from Sibley Creek
- ❖ 1,315 m³ /day
- ❖ 1.9 B L water treated
- ❖ \$49,000,000 (50/50 split)
- ❖ **City of Toledo and Ottawa River Group (8 industrial partners)**



Black Lagoon, Detroit River AOC in MI

- ❖ 88,688 m³ of contaminated sediment removed
- ❖ **Pt. Mouillee CDF Disposal**
- ❖ 22.5-cm sand and stone cap
- ❖ \$9.3 M cost
 - ▶ 65/35 - EPA/MDEQ
- ❖ Shoreline restoration/boat marina



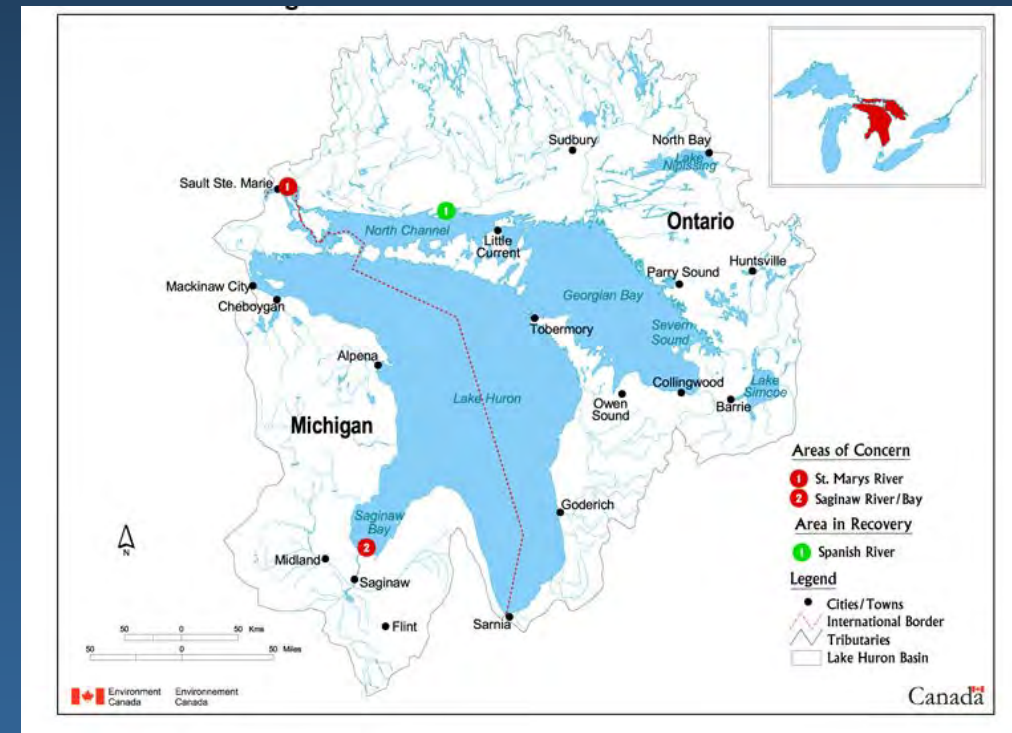
Ashtabula River Legacy Act Cleanup in OH

- ❖ 390,688 m³ of contaminated sediment from the Ashtabula River
- ❖ 8- and 12-inch swinging ladder hydraulic dredges
- ❖ Barge mounted booster pump
- ❖ Two marine plants
 - ▶ Debris removal using backhoes
- ❖ **15-cm sand cover over 1 hectare of dredged area**
 - ▶ **Broadcast spreading of sand**
- ❖ \$61.4 M remedial costs



≡ Lake Huron AOCs

- ❖ 2 AOCs
 - ▶ Saginaw River and Bay
 - ▶ St. Mary's River
- ❖ 3 Legacy Sites- all in St. Mary's River AOC
- ❖ 50,078 m³ of known contaminated sediments- 3 complete projects
- ❖ Remedial costs to date: \$16.5 M



St. Mary's AOC- Tannery Bay in MI

- ❖ 33,640 m³ contaminated sediment removed
 - ▶ **454,000 kg of chromium**
 - ▶ 32 kg of mercury
- ❖ \$8 M in remedial costs
- ❖ 60/40 GLLA/MDEQ and Phelps Dodge



≡ Lake Michigan AOCs

- ❖ 1 AOC Delisted- White Lake
- ❖ 20 Legacy Sites
- ❖ 2.1 M m³ of contaminated sediment (known)
 - ▶ Current Phase of Remedial Activities
 - ◆ 4 Assessment
 - ◆ 1 Design
 - ◆ 4 Remediation
 - ◆ 1 Feasibility Study
 - ◆ 9 complete
 - ◆ 1 unknown



≡≡≡ Kinnickinnic River, Milwaukee Estuary AOC

- ❖ Contaminated with PCBs and PAHs
- ❖ 12,681 m³ sediments removed
- ❖ **Mechanical dredging with air bubble curtain used to control TSS**
- ❖ Shoreline stabilization
- ❖ Construction of cell within Milwaukee CDF
- ❖ 35% or \$7.7 M came from the Governor's Growing Milwaukee Initiative



≡ White Lake AOC in MI

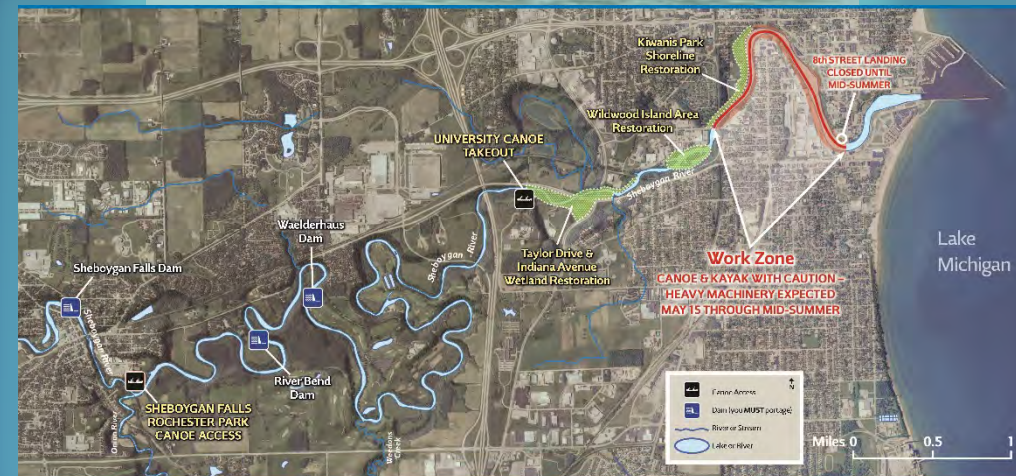
- ❖ Delisted in 2014
- ❖ Over 2,400 lineal meters of shoreline improved
- ❖ 74,162 m³ of contaminated sediment removed
- ❖ **Restored or created over 15.3 hectares wetland habitat**
- ❖ **Restored nearly 6.1 hectares of riparian and upland acres**
- ❖ Removed nearly 39,757 m³ of shoreline/submerged debris
- ❖ Removed 152 meters of sheet pile seawall

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Sheboygan River AOC in WI

- ❖ **233,189 m³ remediated under 2 Legacy Act projects**
- ❖ Mechanical/hydraulic dredging
 - ▶ TSCA and non-TSCA geotextile bags
 - ▶ Sand cover after dredging
- ❖ Disposal in licensed landfills
 - ▶ 2 TSCA- OK and MI
 - ▶ 1 Non-TSCA- WI
- ❖ 84,101 m³ under Superfund
- ❖ Total Cost of Project \$59 M
 - ▶ 60/40 EPA/Non-federal sponsors



≡≡≡ Ruddiman Creek in MI

- ❖ 68,711 m³ of contaminated sediment removed
- ❖ Mechanical dredging with long-arm and environmental bucket
- ❖ **Amphibious excavator**
- ❖ Solidification of sediment with Calciment
- ❖ 3,241 truckloads used for disposal to nearby Ottawa Farms Landfill
- ❖ **Floating interlocking HDPE road mats**
- ❖ Geotextile membrane, with sand and stone cap in dredged areas



West Branch of Grand Calumet River- Reaches 1 and 2 in IN

- ❖ 457,204 m³ remediated
 - ▶ 177,377 m³ hydraulic and mechanical dredging
 - ▶ **281,356 m³ sequestered through capping**
 - ◆ **15 cm reactive mixture of organoclay and fine fill sand (2%) covered by 30-cm sand and gravel mix**
- ❖ Geotextile tubes used for dewatering
- ❖ On-site pretreatment- discharge to POTW
- ❖ 177,377 m³ of dredged material sent to five landfills
- ❖ Approximately 10.1 hectares of marsh restored
- ❖ \$52M in project costs
 - ▶ GLLA \$33.8M / IDNR \$18.2M
- ❖ Project completed in 2012



West Branch of the Grand Calumet River (Reaches 3, 4 and 5) in IN

- ❖ 113,154 m³ sediment mechanically dredged
 - ▶ Reach 3- dry dredging of 38,228 m³
 - ▶ **2.9 hectare reactive carbon mat in channel**
 - ▶ 15,291 m³ sand cap (60 cm) on top of reactive cap material
- ❖ Steel sheet pile cofferdam to enclose a 1,524 m stretch of the river
- ❖ Installation of a 61 m steel sheet pile diversion barrier
- ❖ Project Cost \$33.9M



Lincoln Creek & Milwaukee River Channel Legacy Act Cleanup

- ❖ 107,038 m³ of contaminated sediment (2011 – 12) (Phase 1 - Lincoln Creek / West Oxbow)
- ❖ **Mechanical dry dredging**
- ❖ \$24.6 M in remediation costs
 - ▶ GLLA= \$16 M
 - ▶ WDNR= \$8.6 M
- ❖ 27,524 m³ Lincoln Park (Phase 2 - East Oxbow / Milwaukee River)
- ❖ \$15 M- \$20 M in project costs
- ❖ Recently completed



≡ Lake Superior AOCs

- ❖ 3 AOCs
- ❖ 1 AOC Delisted- Deer Lake
- ❖ 7 Legacy Sites
 - ▶ St. Louis River AOC- Minnesota and Wisconsin
- ❖ 160,557 m³ sediment remediated
- ❖ Current Phase of Remediation
 - ◆ 3 Assessment
 - ◆ 2 FS/Design
 - ◆ 2 Complete



Hog Island Inlet Remediation, St. Louis River AOC in MN

- ❖ Over 45,873 m³ of petroleum contaminated sediments removed
- ❖ **Dry excavation with disposal in local landfill**
- ❖ 8.1 hectares of wetlands restored
- ❖ Removed 227 kg PAHs
- ❖ Removed 318 kg lead
- ❖ \$6.3 M remediation cost
 - ▶ GLLA= \$4.1 M
 - ▶ NF sponsors= \$2.2 M



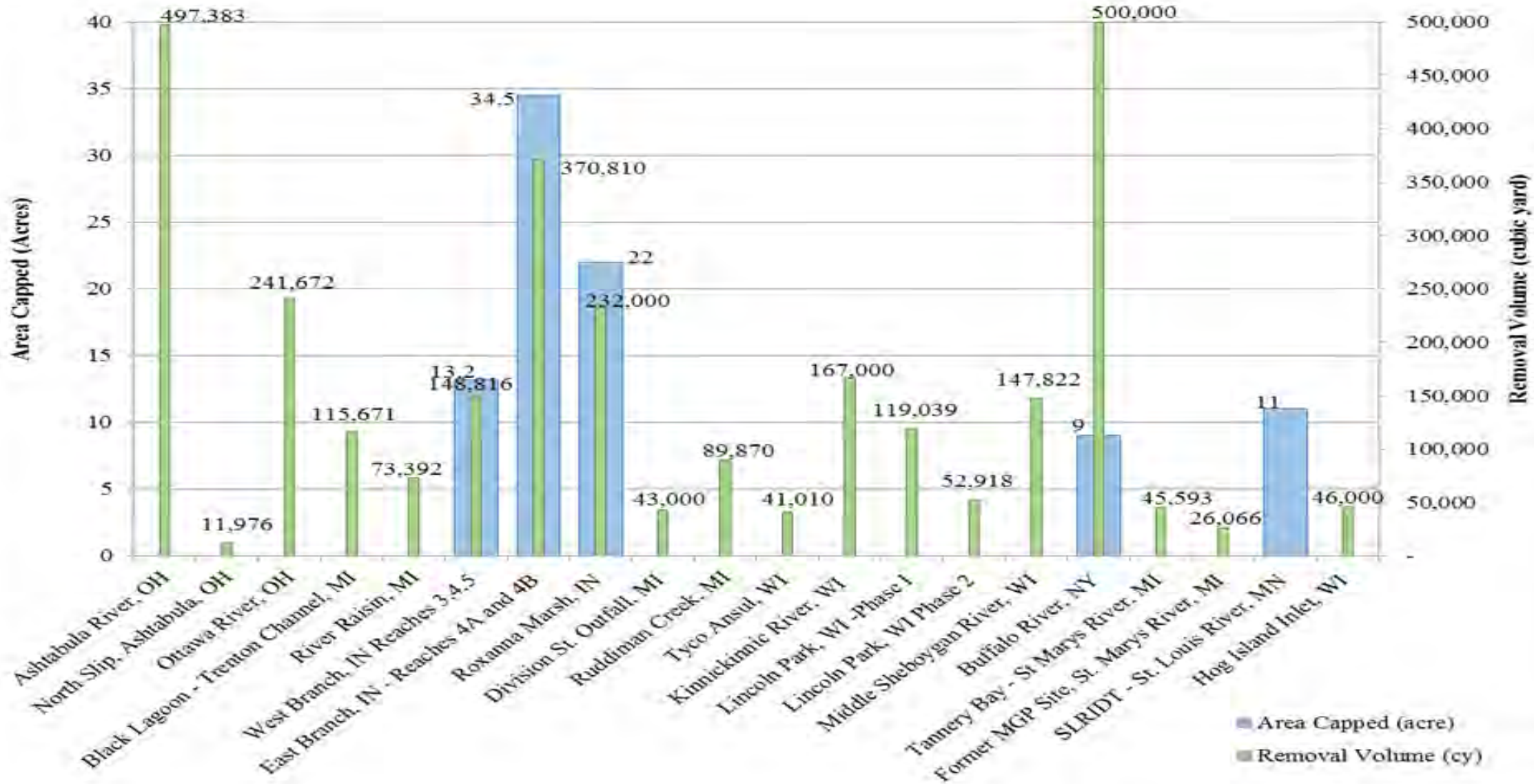
St. Louis River/Interlake/Duluth Tar Superfund Site - Carbon Mat (GLLA betterment) in MI

- ❖ 125,387 m³ of PAH contaminated sediments removed
- ❖ Mechanical dredging with hydraulic transport
- ❖ Capping with a spreader barge
- ❖ **Use of activated carbon mat in CAD cell**
- ❖ Construction of CAD in Slip 6
- ❖ Wetland and floodplain habitat restoration
- ❖ \$3 M in project costs

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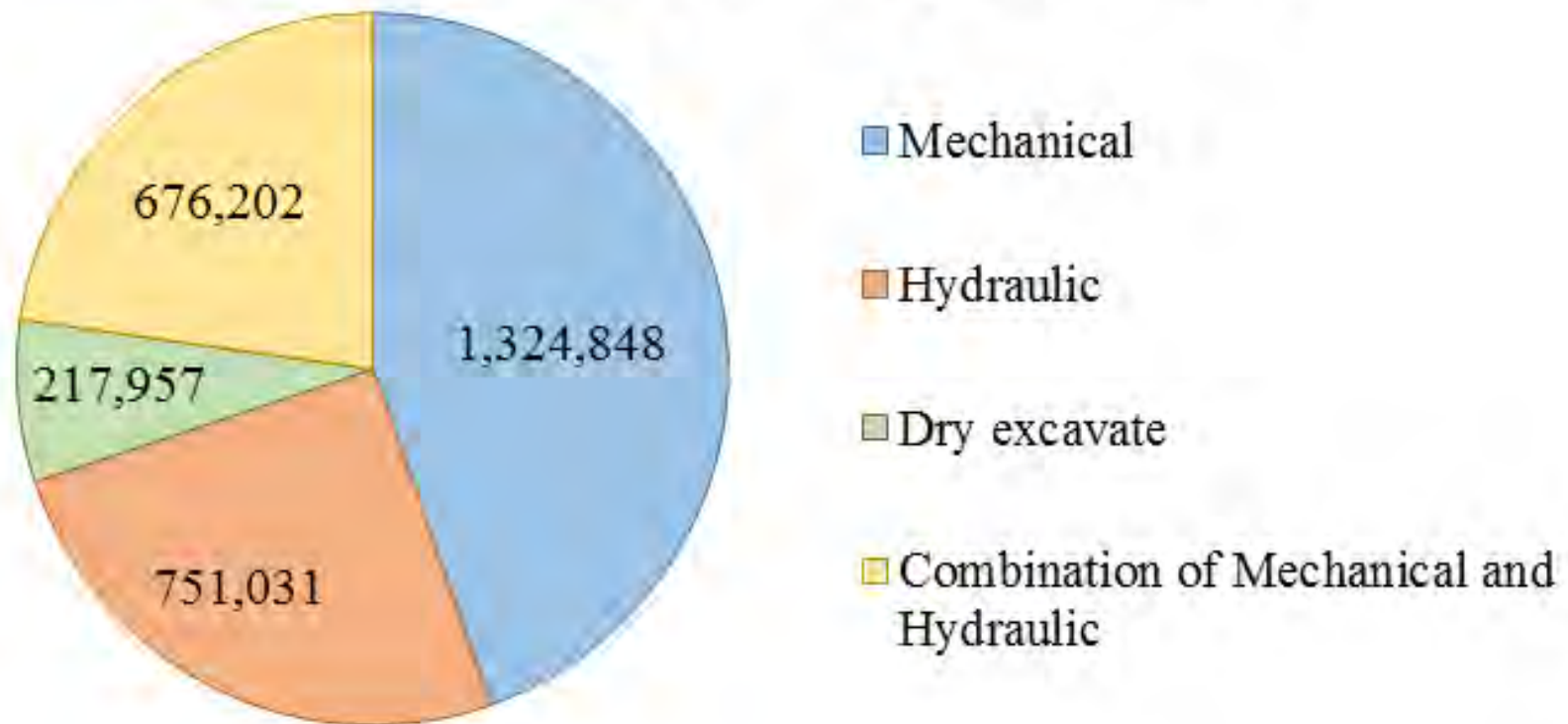


Great Lakes Legacy Act Facts

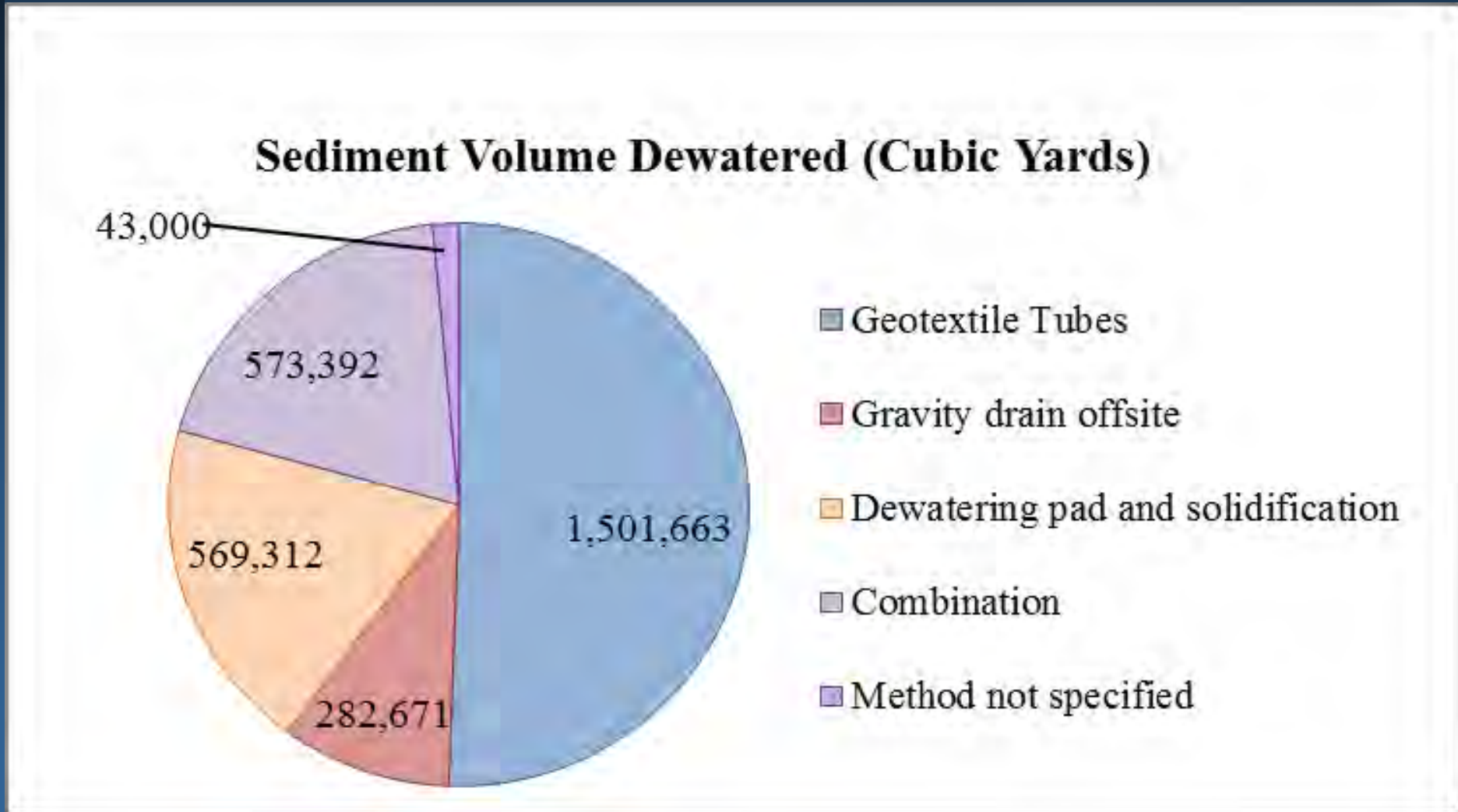


Great Lakes Legacy Act Facts

Sediment Volumes Removed (Cubic Yards)



Great Lakes Legacy Act Facts



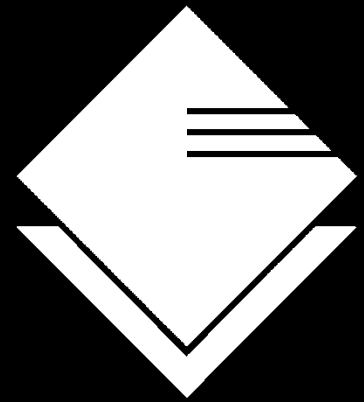
≡ In Conclusion....

- ❖ Another mechanism to achieve remediation goals at contaminated sediment sites
- ❖ Creating new partnerships in cleanups
- ❖ Getting risk reduction where funding is lacking
- ❖ Downside: annual funding depending on congressional appropriations



QUESTIONS?





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