



Remediating Contaminated Sediment

Overall Assessment

Trend: Increasing

Rationale: Between 1997 and 2010, U.S. EPA and its partners have remediated approximately 7 million cubic yards of contaminated sediment in Great Lakes AOCs. As of 2010, over 200,000 cubic meters of contaminated sediment have been managed in the Canadian Great Lakes AOCs.

Purpose

- To measure the volume [cubic yards (U.S.) / cubic metres (Canada)] or area [square yards (U.S.) / square metres (Canada)] of contaminated sediment managed in Areas of Concern (AOCs).
- Management of Contaminated Sediment in AOCs indicator is used in the Great Lakes indicator suite as a response indicator in the Restoration and Protection top level reporting category.

Ecosystem Objective

The ecosystem objective is to manage contaminated sediments in AOCs to reduce risks to the environment and to remove beneficial use impairments related to contaminated sediment.

Ecological Condition

Great Lakes AOCs are severely degraded geographic areas or “pollution hotspots” within the Great Lakes Basin. They are defined by the U.S.-Canada Great Lakes Water Quality Agreement (Annex 2 of the 1987 Protocol) as “geographic areas that fail to meet the general or specific objectives of the agreement where such failure has caused or is likely to cause impairment of beneficial use of the area's ability to support aquatic life.” The U.S. and Canadian governments have identified 43 such areas; 26 in U.S. waters, 12 in Canadian waters, and five shared between U.S. and Canada on connecting river systems. Four of these AOCs have been delisted (Collingwood, Severn Sound, and Wheatley Harbour, in Ontario, and Oswego in New York State) and two have been declared to be in a “recovery stage” (Spanish Harbour in Ontario and Presque Isle Bay in Pennsylvania). Contaminated sediments are the main cause of beneficial use impairments (BUIs) in the majority of the AOCs. Contaminants of concern include PCBs, PAHs, pesticides, metals, and oil and grease, etc.

Efforts to restore degraded conditions in the Great Lakes AOCs, including the remediation of the remaining estimated 40 million cubic yards of contaminated sediments, are underway using a variety of funding sources.

United States

GLNPO collects sediment remediation data from state and Federal project managers across the Great Lakes region. Several projects typically occur each year within the Great Lakes Basin to remediate contaminated sediments. Action has been taken at 20 of the remaining 30 U.S. and binational AOCs. While the annual volume can vary widely from year to year, the cumulative volume has been steadily increasing since 1997, when the U.S. first started tracking remediation information. As of 2010, approximately 7 million cubic yards of contaminated sediment have been remediated in U.S. AOCs.

Canada

The Great Lakes Sediment Remediation Program works with the Ontario Ministry of the Environment and local

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stakeholders to develop and implement sediment remediation plans for Great Lakes Areas of Concern. Action has taken place in 9 of the 17 Canadian AOCs. As of 2010 over 200,000 cubic meters of contaminated sediment have been managed in Great Lakes Areas of Concern. Over 1 million cubic metres of contaminated sediment are scheduled for management over the next 10 years in Canadian AOCs.

In Ontario, the *Canada-Ontario Decision-Making Framework for Assessment of Great Lakes Contaminated Sediment* provides step-by-step science based guidance for assessing risks posed by contaminated sediment. The framework is mainly concerned with risk to the environment but also considers human health concerns associated with biomagnifications of contaminants. As such, detailed risk assessment and/or human health risk assessment are conducted as appropriate. In addition, deeper sediments, and the risk of deeper sediments being exposed to biota, and associated risks are also assessed under the framework to assess the need for management action. In this assessment, sediment stability and sediment deposition rates are assessed. The framework identifies all possible sediment assessment outcomes based on four lines of evidence (sediment chemistry, toxicity, benthic community structure and the potential for biomagnifications), and provides specific direction on next steps in making sediment management decisions.

Linkages

The management of contaminated sediments in AOCs is expected to control a major source of sediment contamination to the Great Lakes, improve the water quality as measured by contamination in whole fish and waterbirds, and reduce restrictions on fish consumption.

Management Challenges/Opportunities

Secondary users of this information should be aware that there are several potential sources of error in the estimates. There are a number of different ways for contractors/project managers to determine the number of cubic yards/cubic metres remediated. U.S. Environmental Protection Agency and Environment Canada use best professional judgment in its oversight and review of the secondary data. To avoid introducing bias, the data are presented as reported by individual site Project Managers. While the information provided is quantitative, providing an estimate of error in the total volumes of contaminated sediments remediated is beyond the scale of this exercise. Thus, the numbers should not be viewed as exact totals. Data users are advised to take the process into account and recognize the unknown amount of error in these estimates. It is important to be realistic when applying these data quantitatively to scientific and policy questions.

Assessing Data Quality

Insert "x" under the statement that best corresponds with each data characteristic

Data Characteristics	Strongly Agree	Agree	Neutral or Unknown	Disagree	Strongly Disagree	Not Applicable
1. Data are documented, validated, or quality-assured by a recognized agency or organization		X				
2. Data are traceable to original sources	X					
3. The source of the data is a known, reliable and respected generator of data	X					
4. Geographic coverage and scale of data are appropriate to the Great Lakes basin	X					

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5. Data obtained from sources within the U.S. are comparable to those from Canada		X				
6. Uncertainty and variability in the data are documented and within acceptable limits for this indicator report			X			
Clarifying Notes: We are not able to quantify the uncertainty and variability in the data – see Management Challenges/Opportunities for more information.						

Acknowledgments

Authors:
 Mary Beth Giancarlo, U.S. EPA GLNPO, Chicago, IL
 Roger Santiago, Environment Canada, Toronto, Ontario

Information Sources

Pelletier, J-P. and R. Santiago (2002). *Contaminated Sediment Management and the Canadian Experience*. Environmental Protection, Environment Canada, Toronto, Ontario, Canada.

Giancarlo Ross, M.B. and C. McConaghy (2008). Quality Assurance Project Plan for “Great Lakes Sediment Remediation Project Summary Support.” Revision 1.0. U.S. EPA Great Lakes National Program Office, Chicago, Illinois, USA.

U.S. EPA and Environment Canada. “Sediments Challenge.” Great Lakes Binational Toxic Strategy Annual Progress Report (1998 – 2009).

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Source: Environment Canada

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Source: Environment Canada

Last Updated

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State of the Lakes Ecosystem Conference (SOLEC) 2011

Area of Concern	Cumulative Volume Sediments Remediated 1997 Through 2010 (cubic yards)	Ultimate Disposition
U.S. Sites		
Ashtabula River, OH - Great Lakes Legacy Act - Navigation Dredging	629,490 496,586 132,904	on-site TSCA landfill
Buffalo River, NY - Buffalo Color - Area D - Navigation Dredging	206,421 45,000 161,421	encapsulated on-site CDF
Detroit River, MI - Monguagon Creek - Black Lagoon - BASF Riverview	166,500 25,000 115,000 26,500	landfilled CDF encapsulated on site
Fox River, Green Bay, WI - Deposit 56/57 - Deposit N - Deposit O - OU 1 - Phase 1 - OU2, OU3, OU4	2,227,600 81,662 7,149 1,026 695,972 132,000 1,309,791	landfilled landfilled landfilled landfilled/capped landfilled landfilled/capped
Grand Calumet, IN - U.S. Steel/Gary Works - U.S.S. Lead - WBGCR Phase 1	945,197 840,200 25,370 79,627	on-site CAMU CAMU & TSCA facility landfilled
Kalamazoo River, MI - Bryant Mill Pond - Allied Paper/Portage Creek	274,000 150,000 124,000	landfilled off-site TSCA/landfill
Manistique River, MI	161,162	landfilled
Maumee River, OH - Fraleigh Creek (Unnamed Tributary) - Ottawa River/Sibley Creek	259,471 8,000 251,471	landfilled
Menominee River, MI/WI - Ansul Eighth Street Slip	13,000	landfilled/awaiting further management
Milwaukee Harbor, WI - North Ave. Dam - Moss American - Kinnickinnic River	196,960 8,000 21,960 167,000	landfilled landfilled CDF
Muskegon Lake, MI - Ruddiman Creek	90,000	landfilled
Niagara River, NY - Scajaquada Creek - Gill Creek - Cherry Farm/River Road - Niagara Transformer	77,850 17,500 6,850 42,000 11,500	landfilled
River Raisin, MI - Ford Monroe Outfall - Csl. Packaging Corp.	57,000 27,000 30,000	on-site TSCA facility TSCA landfill/landfilled

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Rouge River, MI - Evan's Product Ditch - Newburgh Lake	406,900 6,900 400,000	off-site TSCA facility and landfilled
Saginaw River/Bay, MI - NRDA - Lake Linton - Wickes Park - Navigation Dredging	510,213 342,433 17,000 780 150,000	off-shore CDF landfilled landfilled CDF
Sheboygan River & Harbor, WI	20,727	off-site TSCA facility and landfilled
St. Lawrence River, NY - Reynolds Metals/Alcoa E. - Alcoa Grasse River ROPS	112,000 86,000 26,000	landfilled/capped landfilled
St. Louis River/Bay, MN/WI - Newton Creek/Hog Island Inlet - Interlake/Duluth Tar	505,743 52,143 453,600	landfilled capped/on-site CAD
St. Marys River, MI - Cannelton - Tannery Bay - MGP	49,412 3,000 39,912 6,500	landfilled
White Lake, MI - Tannery Bay - Occidental Chemical Corp.	105,500 95,000 10,500	landfilled
TOTAL	7,015,146	

Abbreviations: CAD = confined aquatic disposal; CAMU = corrective action management unit; CDF = confined disposal facility; TSCA = Toxic Substances Control Act

Footnote: Information included in the matrix are quantitative estimates as reported by project managers. Data collection and reporting efforts are described in the "Great Lakes Sediment Remediation Project Summary Support" Quality Assurance Project Plan (GLNPO, June 2008). Detailed project information is available upon request from project managers.

Table 1. U.S. Cumulative Sediment Remediation Volume 1997-2010

Source: U.S. Environmental Protection Agency

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Year	AOC	Volume (cubic metres)			Removal Technology	Disposition Post
		Dredge	Cap	MNR		
1992/94	Collingwood	4,800			Hydraulic	CDF
1994	Severn Sound	375			Mechanical	Landfill
1995	Niagara River - Welland River	11,000			Hybrid	Landfill/Reuse
1997/98	Thunder Bay - NOWPARC	11,000			Mechanical	Thermal Treatment
1998	Thunder Bay - NOWPARC		21,000			Containment
1998	Thunder Bay - NOWPARC			28,000		Monitoring
2004	St. Clair River Zone #1	13,690			Mechanical	Landfill/Bioremediation
2005	St. Lawrence River			130,000		Monitoring
2006	St. Marys River - Algoma Slip	2,630			Mechanical	Landfill
2007	Niagara River - Lyons Creek East	300			Mechanical	Landfill
2008	Detroit River - Turkey Creek	975			Mechanical	Landfill
	Subtotal:	44,770	21,000	158,000		
	TOTAL:			223,770		

Hybrid - Combination mechanical and hydraulic

CDF - Confined Disposal Facility

MNR - Monitored Natural Recovery

Table 2. Canadian Sediment Remediation Volumes 1992-2011

Source: Environment Canada

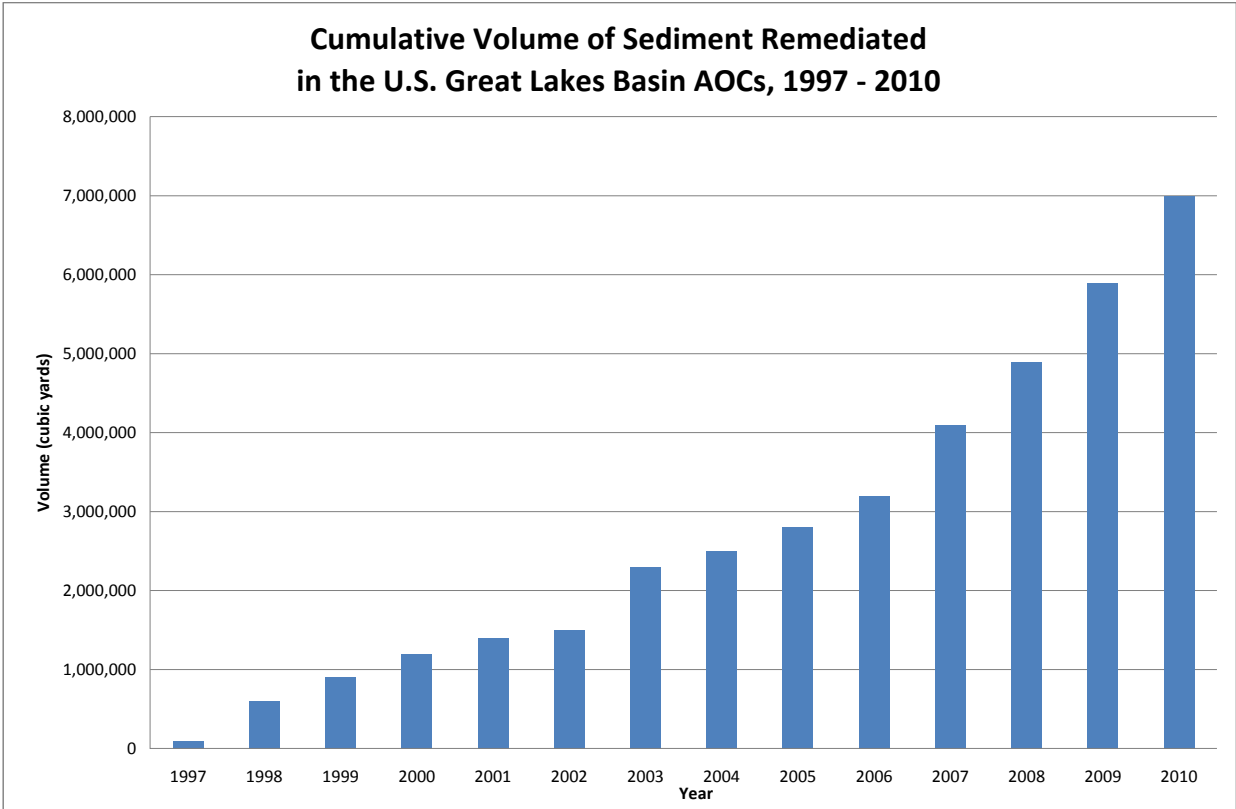


Figure 1. Cumulative Volume of Sediment Remediated in the U.S. Great Lakes Basin since 1997
Source: U.S. Environmental Protection Agency

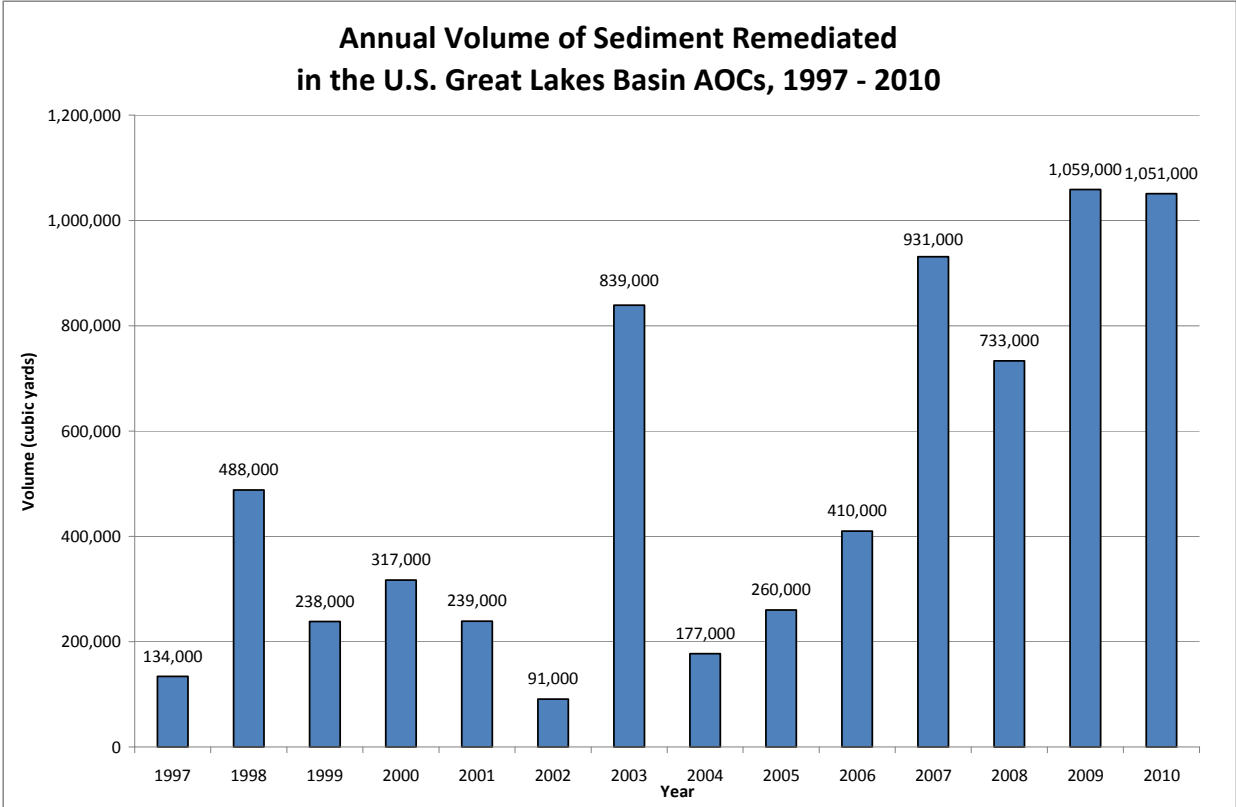


Figure 2. Annual Volume of Sediment Remediated in the U.S. Great Lakes Basin since 1997
Source: U.S. Environmental Protection Agency

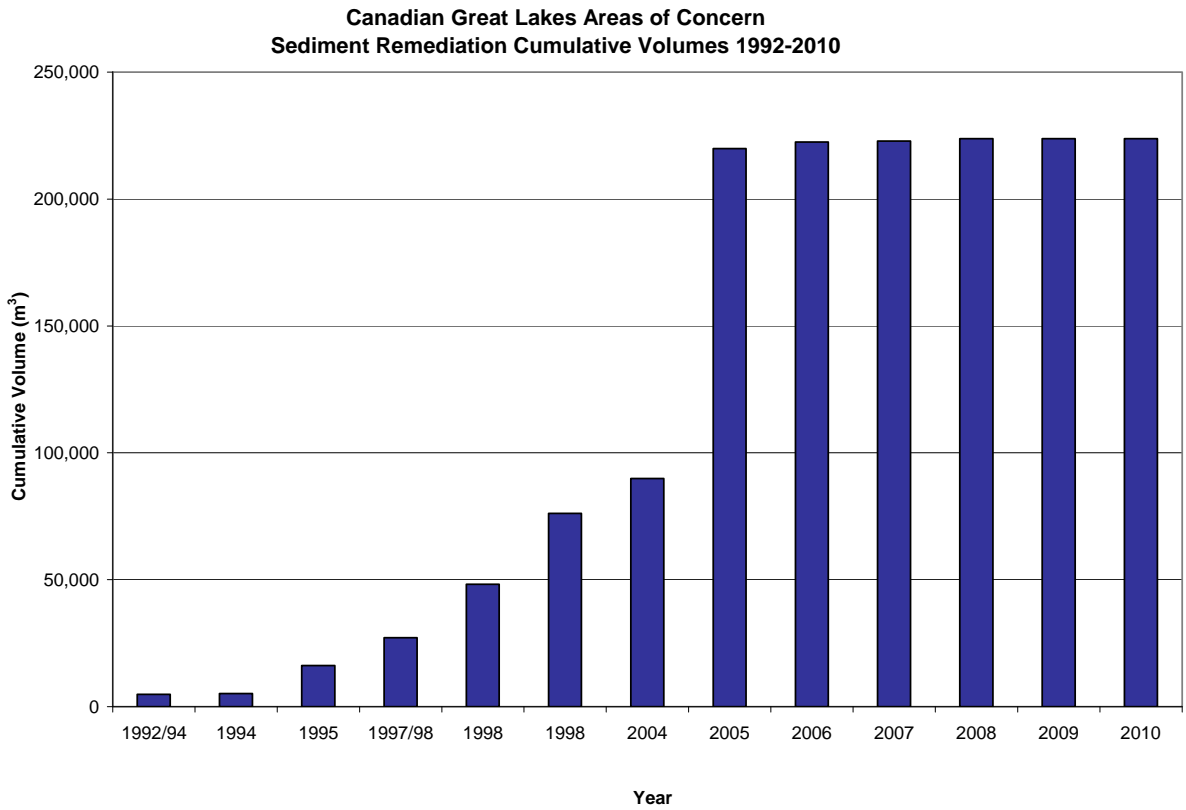


Figure 3. Canadian Great Lakes Areas of Concern Sediment Remediation Cumulative Volumes 1992-2010 (View 1).

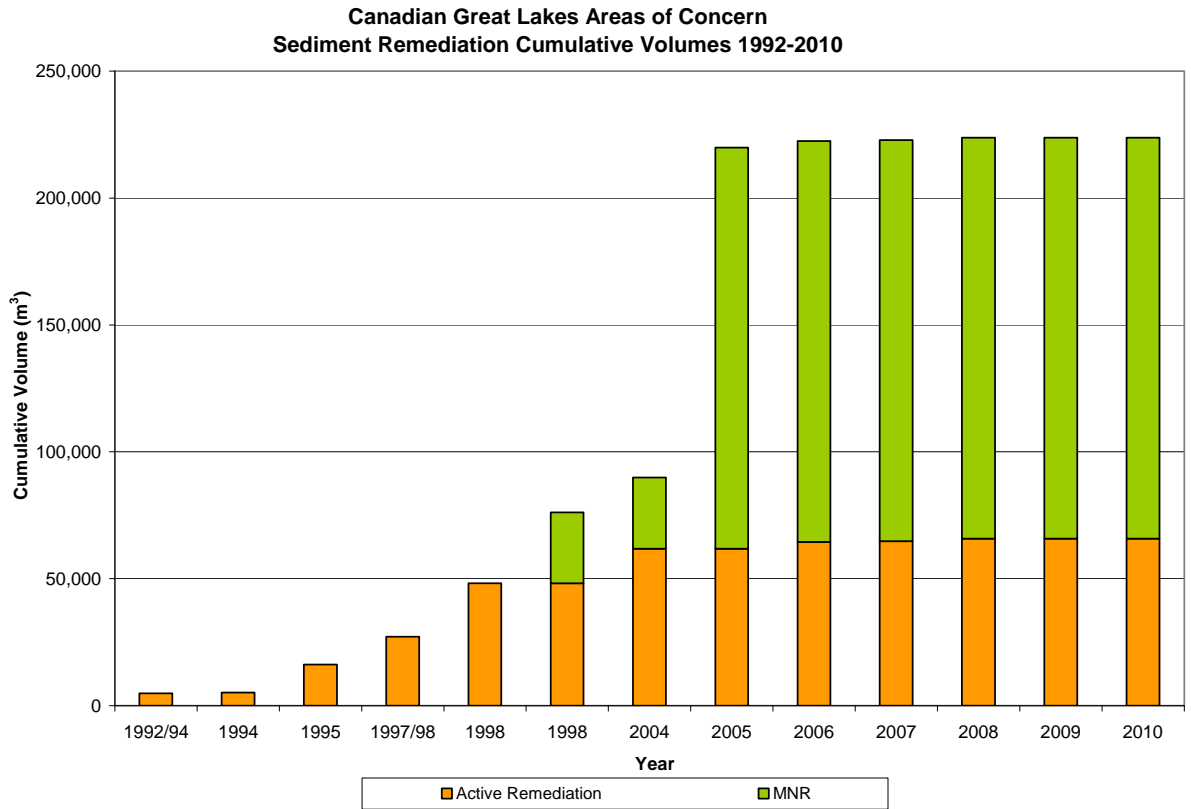


Figure 4. Canadian Great Lakes Areas of Concern Sediment Remediation Cumulative Volumes 1992-2010 (View 2).

Source: Environment Canada

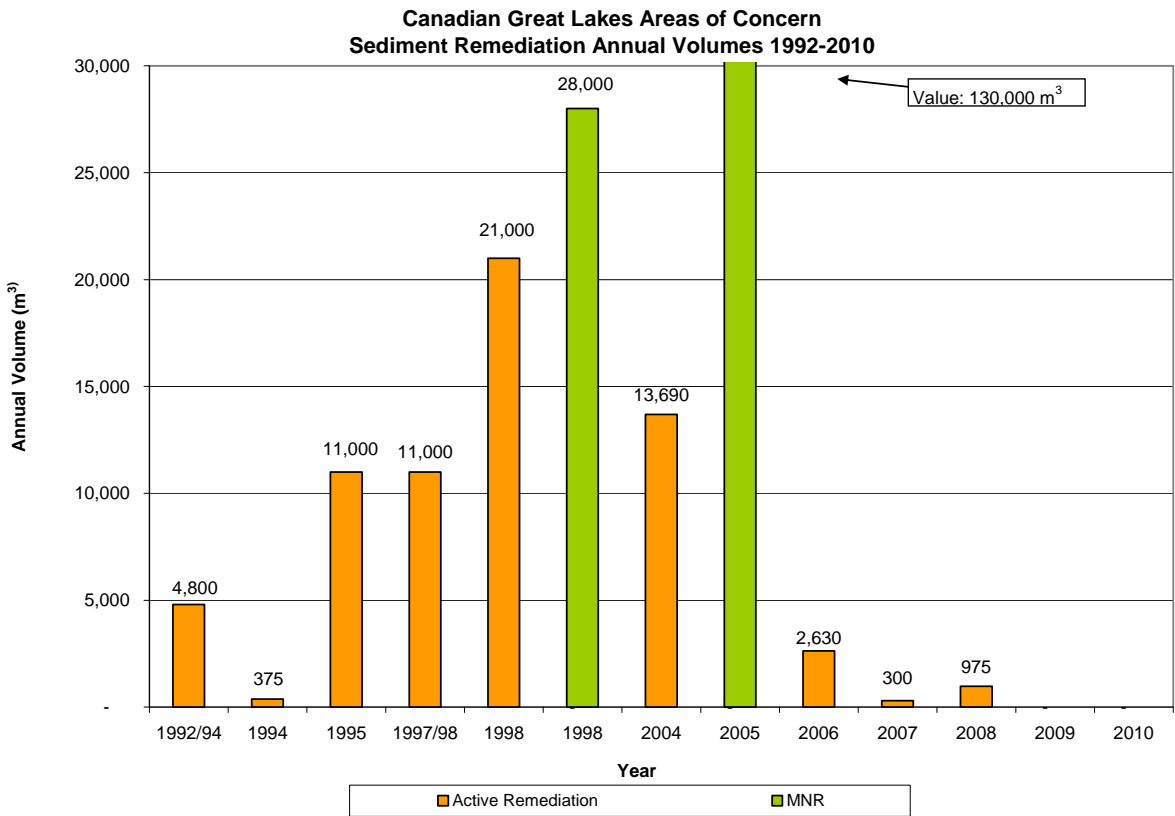


Figure 5. Canadian Great Lakes Areas of Concern Sediment Remediation Cumulative Volumes 1992-2010 (View 2).

Source: Environment Canada