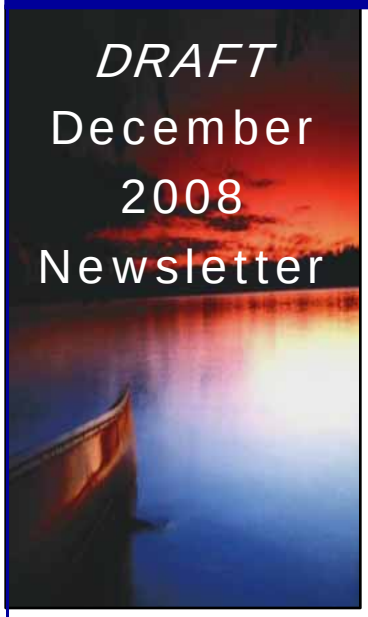
THE GREAT LAKES BINATIONAL TOXICS STRATEGY



Introduction

Signed in 1997 by Environment Canada (EC) and the United States Environmental Protection Agency (US EPA), the Great Lakes Binational Toxics Strategy (GLBTS, or Strategy) established challenge goals for Canada and the U.S. for 12 Level 1 persistent toxic substances, and targeted a list of Level 2 substances for pollution prevention measures. Over the past 10 years, the governments of Canada and the U.S., along with stakeholders from industry, academia, state/provincial and local governments, Tribes, First Nations, and environmental and community groups have worked together toward the achievement of the Strategy's challenge goals for the Level 1 substances. Thirteen of the original 17 challenge goals have been achieved, and significant progress has been made toward the remaining four. Under the Strategy, EC and US EPA also agreed to consider additional substances that may present threats to the Great Lakes ecosystem. The challenge of identifying potential new threats to the Great Lakes Basin has become a new focus of the GLBTS.

The Level 1 substances consist of: mercury, polychlorinated biphenyls (PCBs), dioxins and furans, hexachlorobenzene (HCB), benzo(a)pyrene (B(a)P), octachlorostyrene (OCS), alkyl-lead, and five pesticides: chlordane, aldrin/dieldrin, DDT, mirex, and toxaphene.

A Changing GLBTS

In 2008, EC and US EPA recognized the achievement of positive efforts to reduce and eliminate the Level 1 substances. At the same time, a variety of substances of emerging concern have been detected and reported in the Great Lakes Basin and have increasingly become the focus of the GLBTS. Given these changing priorities, the GLBTS Integration Workgroup decided to reduce the frequency of face-to-face Level 1 workgroup meetings and to make greater use of electronic means of communication, such as teleconferences and webinars. Specifically, the HCB/B(a)P and PCB Workgroups will reduce the number of face-to-face meetings from two to one per year, and increase other means of communication throughout the year. The Mercury Workgroup no longer requires semi-annual meetings and instead will periodically sponsor larger gatherings in collaboration with broader mercury efforts. The Integration Workgroup will reduce its schedule of quarterly face-to-face meetings to semi-annual meetings, and a Stakeholder Forum will be convened annually in conjunction with an Integration Workgroup meeting.

The GLBTS has a history as a voluntary forum where a variety of stakeholders are invited to collaborate in information-sharing discussions and management opportunities to reduce the Level 1 substances. For over 10 years, these collaborations have been a key aspect of workgroup efforts to reduce the Level 1 substances in the Great Lakes environment. As the GLBTS moves forward to address substances of emerging concern, EC and US EPA seek to retain the key attributes that have contributed to the success of the GLBTS: an open and transparent process, continued multi-stakeholder engagement, and the systematic sharing of information to empower both voluntary and regulatory activities.

GLBTS Annual Reports

As the GLBTS transitions from a focus on the Level 1 substances to substances of emerging concern, EC and US EPA have decided to change the reporting mechanisms for the GLBTS. To lessen the burden of publishing the traditional GLBTS progress report annually, the governments will prepare a formal progress report once every two years, with a 2008-2009 edition of the GLBTS Biennial Progress Report available in 2010 (even years), and a less formal GLBTS newsletter will be published in the interim (odd years). Instituting this change is the present December 2008 GLBTS Newsletter, which takes the place of the 2008 annual progress report.

Substance/Sector Group

In September 2007, EC and US EPA initiated the Substance and Sector Groups under the GLBTS. The two groups were subsequently combined as one group to more effectively achieve their mission to explore substances of emerging concern, which may present threats to the Great Lakes ecosystem, and the potential value the GLBTS might add in addressing these substances.

Rationale

Under the Strategy, EC and US EPA agreed to consider substances of emerging concern that may pose threats to the Great Lakes ecosystem, and to explore the potential for risk mitigation strategies. The Strategy challenges the Parties to consider "whether new substances which present threats to the Great Lakes ecosystem should be considered for inclusion on the Level I or II lists." In addition, the objective of the Substance/Sector Group to work to prevent the release of toxic substances into the Great Lakes, in order to protect and ensure the health and integrity of the Great Lakes ecosystem, is consistent with the Great Lakes Water Quality Agreement (GLWQA).

Activities

The Substance/Sector Group has developed a surveillance program to identify potential toxic substances that may pose a threat to the Great Lakes Basin. Terms of reference for the group have been outlined in a draft *Guide to the Substance and Sector Groups.* The group has developed a framework for identifying substances to be considered for potential management opportunities under the GLBTS. Several substance profiles are being developed using this framework, in consultation with stakeholders.

The following Substance/Sector Group meetings were held in the past year:

- November 30, 2007 teleconference
- June 2-3, 2008 meeting
- August 7, 2008 teleconference
- September 25, 2008 meeting
- December 2-3, 2008 meeting

In addition, the Substance/Sector Group reported its progress and discussed future directions at GLBTS Integration Workgroup Meetings.

Next Steps

The Substance/Sector Group will continue to meet quarterly to achieve its objectives. In conjunction with Canadian and U.S. national programs, the group plans to identify candidate substances using the framework diagram and, in consultation with stakeholders, consider potential management options for selected substances. In June 2009, the group will convene a workshop to discuss potential management opportunities to address substances that present a threat to the Great Lakes ecosystem. By December 2009, the group hopes to reach agreement on management actions that can be undertaken within the GLBTS governance model.

Waterfall on the Cypress River, Ontario. Photo courtesy of Tim Leblanc, Ontario Ministry of Natural Resources

Future efforts of the Substance/Sector Group are expected to align with work being undertaken by other existing Great Lakes programs, such as ongoing monitoring and surveillance efforts, and the GLWQA, which is currently under review with possible renegotiation on the horizon. The Substance/Sector Group's work will also help inform a renewed 2010 *Canada–Ontario Agreement Respecting the Great Lakes Basin Ecosystem* (COA).

Status of the Level 1 Substances

Substance	Challenge Goals	Challenge Goal Met?	Workgroup Status	Future Activities
Alkyl-lead	Canada: By 2000, reduce by 90% the use, generation, or release of alkyl-lead.	Goal met: Over 98% reduction in sources, uses, and releases from 1988 to 1997 in Ontario.	Inactive	No plans to reconvene the workgroup.
	U.S.: Confirm by 1998 that there is no longer use of alkyl-lead in automotive gasoline.	Goal met: In 2000, EPA confirmed no use of alkyl-lead in automotive gasoline. NASCAR has agreed to phase-out the use of alkyl-lead in high octane fuel by 2008.		
Dioxins and Furans	Canadian releases: By 2000, reduce releases in the Great Lakes Basin by 90%.	Goal met: 89% reduction (228 grams) in total releases in the Great Lakes Basin since 1988.	Inactive	Continue to track sources and releases. Burn Barrel Subgroup reports to HCB/B(a)P Workgroup.
	U.S. releases: By 2006, reduce releases (to air nationwide and to waters of the Great Lakes) by 75%.	Goal met: 89% reduction achieved since 1987.		
HCB and B(a)P	Canadian releases: By 2000, reduce releases to the Great Lakes Basin by 90%.	B(a)P: 52% reduction in Ontario since 1988. HCB: 74% reduction in Ontario since 1988.	Active	Continue activities to achieve Canada's 90% reduction goal and to further reduce U.S. releases. Hold annual face-to-face meetings with interim tele-conferences, as needed.
	U.S. releases: By 2006, reduce releases to the Great Lakes Basin.	Goal met: 77% reduction in B(a)P releases in Great Lakes states, 1996 to 2001. HCB emissions reduced from 8,519 lbs (3,872 kg) in 1990 to 2,911 lbs (1,323 kg) in 1999.* Additional 28% reduction from 1999 to 2002.		
Level 1 Pesticides	Canada: Report by 1997 that there is no longer use, generation, or release of the five Level 1 pesticides.	Goals met: EPA and EC confirmed that all uses of the Level 1 pesticides have been cancelled, and production facilities have been closed.	Inactive	No plans to reconvene the workgroup.
	U.S.: Confirm by 1998 that there is no longer use or release of the five Level 1 pesticides in the Great Lakes Basin.			
Mercury	Canadian releases: By 2000, reduce releases by 90% in the Great Lakes Basin.	Goal met: 90% reduction between 1988 and 2006.	Less active information-sharing group	Share information and meet periodically, in collaboration with other mercury-related efforts.
	U.S. releases: By 2006, reduce releases (to air nationwide and to Great Lakes waters) by 50%.	Goal met: Estimated reduction of more than 50% since 1990.		
	U.S. use: By 2006, reduce by 50%.	Goal met: Estimated reduction of more than 50% between 1995 and 2003.		
OCS	Canada: Report by 1997 that there is no longer use, generation, or release of OCS.	Goal met: In 2000, EC concluded that there were no documented releases in Ontario in 2000.	Inactive	No plans to reconvene the workgroup.
	U.S.: Confirm by 1998 that there is no longer use or release of OCS in the Great Lakes Basin.	Goal met: EPA has concluded that the challenge goal has been met.		
PCBs	Canada: By 2000, reduce by 90% high-level PCBs (>1% PCBs) that were once, or are currently, in service. Accelerate destruction of stored high-level PCB wastes.	Goal met: Achieved 90% reduction of high-level PCBs in storage by, compared to 1993. Not met: Estimated 70% reduction in high-level PCBs in service in Ontario since 1989.	Active	Continue activities to achieve Canada's goal of reducing high-level PCBs in service by 90%. Hold annual face-to-face meetings with interim teleconferences, as needed.
	U.S.: By 2006, reduce by 90% nationally high-level PCBs (>500 ppm PCBs) used in electrical equipment.	Goal met for high-level PCBs in transformers, but it is uncertain whether the goal has been met for capacitors due to a lack of data.		

* Reductions cannot be used to establish a specific reduction in HCB emissions since 1990 due to inconsistencies in the 1990 and the 1999 emission inventories and source categories.

Progress of the Level 1 Workgroups

Progress toward the Level 1 challenge goals is presented in the table above. Additional activities undertaken by the Level 1 workgroups in the past year are described below.

Mercury Workgroup

The Mercury Workgroup contributed to the development of a *Great Lakes Mercury in Products Phase-Down Strategy* sponsored by the Great Lakes Regional Collaboration (GLRC). Implementation of the strategy has begun in the Great Lakes states (http://www.glrc.us/documents/MercuryPhaseDownStrategy06-19-2008.pdf). Another GLRC-sponsored strategy has been initiated, the *Great Lakes Mercury Emission Reduction Strategy*, and input will be solicited from stakeholders on an ongoing basis through the Mercury Workgroup. Mercury Workgroup efforts have decreased in the past year, as both Canada and the U.S have met their challenge goals. The workgroup has served as a means of sharing information on efforts related to reducing mercury releases and tracking mercury levels in the environment. The workgroup will continue to serve this function but will meet less frequently and will focus increasing attention on global mercury releases.

Mercury Collection Programs

In Canada, the Clean Air Foundation operates two voluntary mercury collection programs: Switch Out and Switch the 'Stat. Since 2001, as a result of participation by more than 600 automotive recyclers across Canada, the Switch Out program has collected more than 200,000 mercury-containing switches from end-of-life vehicles (~170 kg of mercury). The Switch Out program recovered approximately 31 kg of mercury from more than 36,500 switches in the past year. The Switch the 'Stat program has collected more than 17,100 mercury-containing switches from thermostats since its launch in April 2006, 72% of which were recovered in the past year (~31 kg of mercury).

In the U.S., Bowling Green State University (BGSU) in Ohio has operated an Elemental Mercury Collection and Reclamation Program since 1998. The free program collects and recycles uncontaminated elemental mercury that is present in a variety of devices, including thermometers, thermostats, and mercury switches, as well as bulk mercury. To date, the program has collected over 23,000 lbs of elemental mercury for recycling.

PCB Workgroup

In September 2008, EC published new PCB regulations that are expected to help Canada meet its challenge goal of a 90% reduction of high-level PCBs in service. The regulation requires equipment containing high-level PCBs and equipment containing low-level PCBs in sensitive locations to be phased out by December 2009; equipment containing low-level PCBs in all other locations must be phased out by December 2025. The rule also limits the storage of PCBs by generators to 1 year, and at disposal facilities to 2 years.

US EPA is re-evaluating regulations for PCBs in use and distribution in commerce, with a target date of May 2009 for publication of an advanced notice of proposed rulemaking. The PCB Workgroup will continue to seek commitments to reduce PCBs through PCB reduction commitment letters and other PCB phase-out efforts, and to publicize voluntary achievements in PCB reduction. The workgroup has developed a software tool to assist companies in evaluating the costs and benefits of PCB use, storage, phase-out and elimination programs. The tool is expected to be freely available to the public.

To prioritize remaining opportunities for PCB source reductions, the PCB Workgroup has begun to collect and assess information on sources of PCBs other than PCB-containing transformers and capacitors. The workgroup is also investigating the status of facilities that purchased PCBs from Monsanto in the 1970s, in an effort to determine the fate of the PCBs and to identify sites that may warrant investigation or may be in need of clean-up (e.g., abandoned sites with PCB contamination or equipment).

Dioxin/Furan Workgroup

In December 2007, the Dioxin/Furan Workgroup decided to move to inactive status. Both Canada and the U.S. have met their goals for dioxins/furans, reducing releases by approximately 90% to 28 g TEQ in Ontario and 1,422 g TEQ nationwide in the U.S. Through a Decision Tree exercise, the workgroup identified 10 of the top 12 sources as low priorities for the GLBTS to address. Most sources are being managed by existing programs. Recognizing that historical sources of dioxins/furans remain in the environment and that dioxin/furans can continue to be released from small sources, the Dioxin/Furan Workgroup co-chairs will continue to track sources of dioxin through release inventories and environmental monitoring data. The co-chairs may reactivate the workgroup if warranted as new issues arise. The co-chairs will also investigate potential opportunities to reduce agricultural waste burning and other poorly characterized sources of dioxins/furans. The largest source of quantified dioxin releases remaining in both countries is household garbage burning. The Burn Barrel Subgroup continues to address the use of burn barrels and other open burning issues but now reports to the HCB/B(a)P Workgroup.

HCB/B(a)P Workgroup

US EPA and Environment Canada support several programs that help reduce releases of HCB and B(a)P from diesel engines, residential wood stoves and fireplaces, scrap tire piles, steel mills, and other sources. The workgroup has investigated the use of coal tar sealants as a source of B(a)P in the U.S., and will begin to investigate the use of coal tar sealants in Ontario. The workgroup has also updated release inventories for sources of HCB and B(a)P. The most recent inventory of HCB sources in Ontario totals 13 kg (29 lbs) of releases, a relatively low level of release, but another 8 kg (18 lbs) must be reduced to meet Canada's HCB challenge goal. Major sources of B(a)P in Ontario include residential wood combustion, use of creosote-treated railway ties, and cokemaking in the steel manufacturing sector (although release estimates for this sector are under review). The workgroup will continue its efforts to improve the accuracy of the U.S. and Canadian HCB and B(a)P emission inventories to ensure that all significant emission sources have been identified and included, including a study of emissions from certified wood stoves and new studies to measure the impacts of wood smoke and other air pollutants. The workgroup will continue to pursue emission reduction activities from significant B(a)P source sectors. The workgroup will also continue to support actions that impact HCB releases to the Great Lakes Basin, such as full life-cycle management of PCP-treated wood products, modeling of HCB to the Great Lakes from North American sources, solicitation of voluntary HCB reductions from chemical companies, and the efforts of the Burn Barrel Subgroup.

Burn Barrel Subgroup

The Burn Barrel Subgroup continued efforts to reduce emissions from open garbage burning. Consultation with Great Lakes states, tribes, and Province of Ontario indicated that there was value in continuing to address the burn barrel issue and to consider broadening the scope of the subgroup's efforts to include other pollutants and related uncontrolled combustion issues. The subgroup held three teleconferences during 2008 and developed a scoping document that identifies objectives and activities to implement under the expanded scope of the subgroup. The subgroup will continue to hold regular conference calls to share information and identify issues for further action.

Photo courtesy of Patrick Atagi

Progress Toward the Long-Range Transport Challenge

Under the Strategy, EC and US EPA committed to assess atmospheric inputs of Strategy substances to the Great Lakes by evaluating and reporting on the contribution and significance of long-range transport of Strategy substances from worldwide sources. An example of research efforts conducted in support of this challenge is EC's *Emission Inventory and Multiple Pathways Modeling of HCB to the Great Lakes from North American Sources*. The major findings of this study are summarized below.

(1) Given that HCB strongly persists in the environment, and that North American industrial emissions reported by US EPA and EC and in the literature accounted for a lower HCB level in the atmosphere than measured air concentrations throughout the 2000s, the main source of HCB emissions in North America can be attributed to the past use of HCB as a fungicide in agriculture.
(2) Given the very long half life of HCB in air and the long period that has elapsed since its ban for agricultural use, air concentrations of HCB across North America have become fairly uniform and stable, and may be a significant source of HCB currently in the Great Lakes environment.
(3) On an annual basis, northeast U.S./Ontario sources made the largest contribution to HCB levels in the air and to depositions to all lakes (or basinwide deposition). Sources in the northwest U.S. were the second major source of HCB over the Great Lakes, followed by sources in the Canadian Prairies and the southwest U.S.
(4) Computation of the HCB soil/air fugacity ratio indicated that strong volatilization took place from the spring to autumn in most regions of the U.S., whereas Canada (except for southern Ontario) remained a receptor of HCB deposition.
(5) In 2000, Lake Michigan received the largest dry deposition of HCB, followed by Lakes Superior, Huron, Erie, and Ontario. For the same year, Lake Michigan also received the greatest wet deposition, followed by Lakes Erie, Huron, Superior, and Ontario (Figure 1). Both dry and wet depositions to the lakes in 2001 were considerably lower than those in 2000 but followed almost the same sequence of lakes as those in 2000.
(6) The highest HCB loading due to the net gas (water/air) exchange in 2000 was found over Lake Superior, followed by Lakes Erie, Michigan, Huron, and Ontario. For 2001, the largest gas exchange flux was found in Lake Erie (Figure 2). Overall, the results clearly indicate that the Great Lakes had become sources of HCB in the 2000s, where volatilization dominates the net gas exchange.

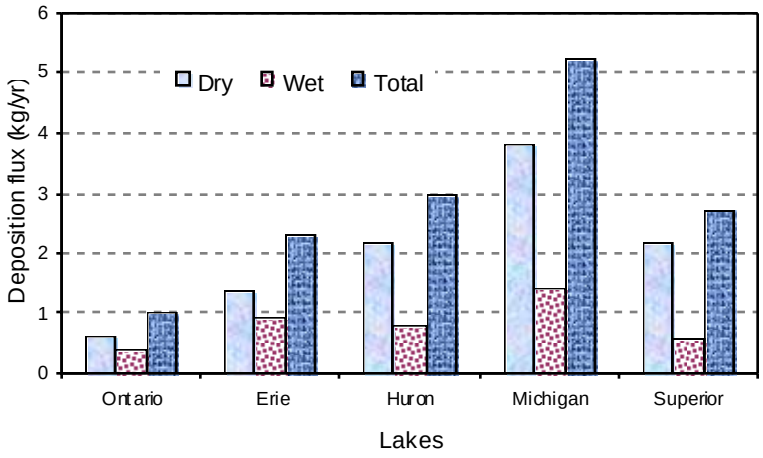


Figure 1. Modeled annual HCB loadings (kg yr^{-1}) to the Great Lakes in 2000 due to dry, wet, and total (dry + wet) deposition.

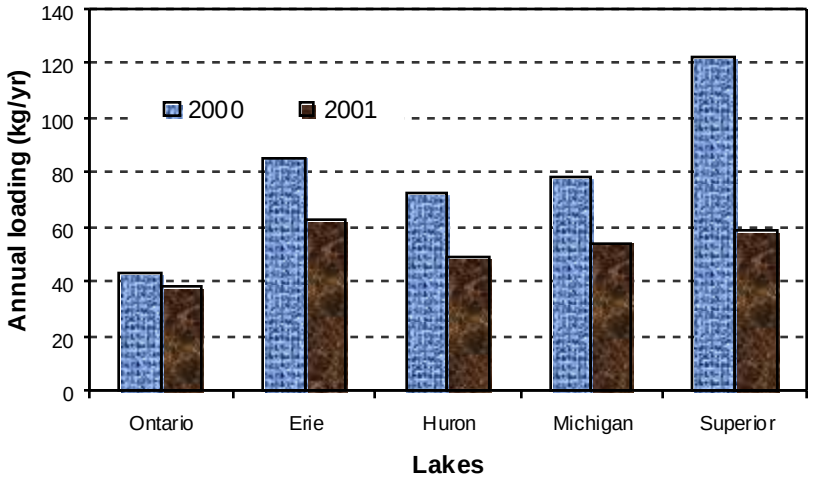


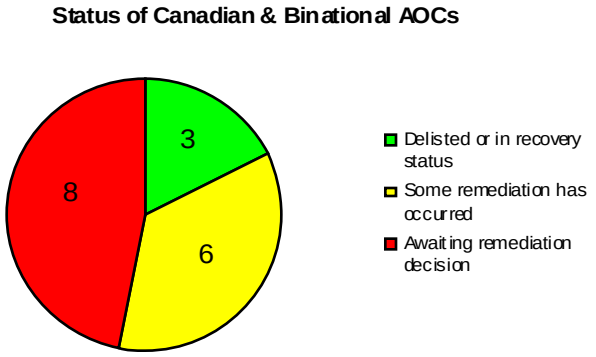
Figure 2. Annual total net gas exchange fluxes (kg yr^{-1}) of HCB in the five lakes.

Progress in Remediating Contaminated Sediment

In 2007, [1] approximately 960,000 yd^3 of contaminated sediment were remediated from eleven U.S. sites and one Canadian site in the Great Lakes Basin. Remedial action was initiated for the first time in 2007 at three US sites and one Canadian site. Five U.S. sites completed their remedial actions in 2007. Three U.S. sites, each under a different cleanup authority, continued to make progress on their remedial actions. Highlights of sediment assessment and remediation activities undertaken in the Canadian and U.S. Great Lakes Basin are presented below.

Canadian Update

- **Bay of Quinte (Trent River)** – As part of the ongoing monitoring work to assess sediment quality, elevated levels of dioxins and furans were found in sediment at the mouth of the Trent River in 2001. An Ecological Risk Assessment completed in 2007 predicted that there is negligible risk to piscivorous wildlife and fish exposed to the contaminated sediment. As such, monitored natural recovery was chosen as the preferred management option for this site. Source track down is continuing in the area.



- **Wheatley Harbour** – An Ecological Risk Assessment undertaken in 2007 concluded that there is negligible risk of PCB effects to piscivorous wildlife in the Muddy Creek wetland. Therefore, the Wheatley Harbour Implementation Team recommended that no further action is required prior to delisting this Area of Concern.
- **Niagara River (Lyons Creek, East & West)** – Arsenic-contaminated sediment from Lyons Creek West was excavated (500 cubic metres) in the summer of 2007 and placed in a secure landfill facility. Management options are being developed in consultation with various stakeholders to address PCB-contaminated sediments in Lyons Creek East and Lyons Creek West (the watercourse is bisected by the Welland Canal).

U.S. Update

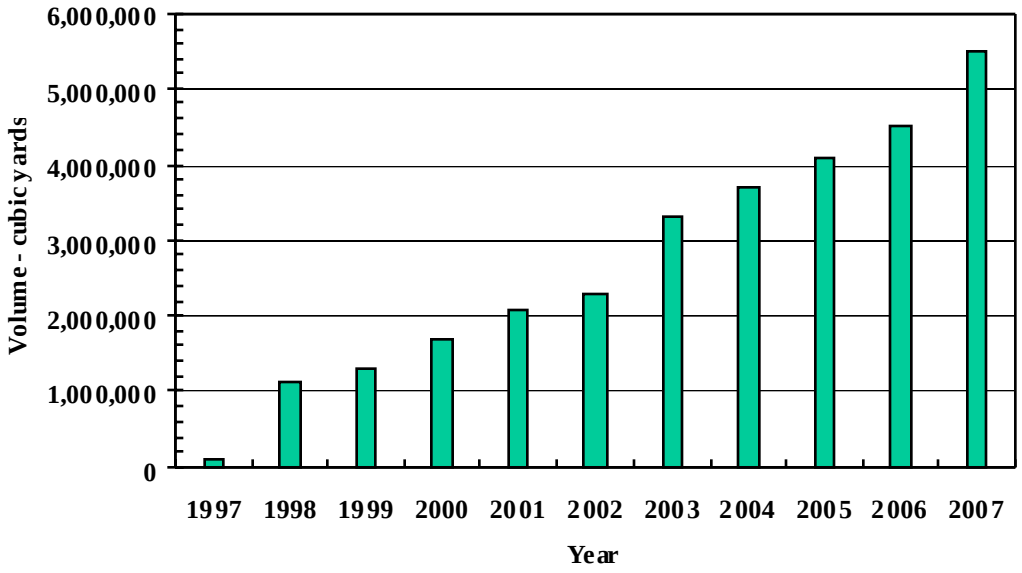
- In 2008, the US EPA's Research Vessel *Mudpuppy* assisted in the assessment of ten contaminated sediment sites in the Great Lakes Basin.
- **Allied Paper, Inc./Portage Creek/Kalamazoo River, Kalamazoo, Michigan** – A Time Critical Removal Action (TCRA) was implemented in April 2007 by Georgia-Pacific and Millennium Holdings contractors as a result of agreements negotiated by the two companies along with US EPA Superfund, Michigan Department of Environmental Quality, and Natural Resource Trustees. Approximately 132,000 yd^3 of PCB-contaminated sediment were dredged from the Kalamazoo River in a 1.2 mile area near Plainwell, MI. PCB-contaminated sediments were sent to a TSCA permitted disposal facility and solid waste landfills in Michigan.
- **Ashtabula River, Ashtabula, Ohio** – The Ashtabula River Great Lakes Legacy Act project was a collaborative effort between the US EPA and the Ashtabula River Partnership (represented by the Ashtabula City Port Authority). In 2007, over 435,000 yd^3 of PCB-contaminated sediment were dredged utilizing a 12-inch hydraulic cutterhead dredge. Production dredging was followed by cleanup dredging utilizing an 8-inch hydraulic dredge outfitted with the Vic Vac® suction system. Dewatered sediments remained in geotextile tubes and were covered and capped within the TSCA permitted landfill facility constructed as part of the remediation project.

[1] Sediment remediation data for 2007 are presented because data lag a year behind in reporting (i.e., 2008 data will become available in 2009).

- **Tittabawassee River, Reach D & Reach O, Midland, Michigan** – In July 2007, the US EPA and the Dow Chemical Company signed two consent orders to address elevated levels of dioxin-contaminated sediment within the Tittabawassee River. Approximately 12,000 yd^3 of soft bottom deposits were removed from Reach D using a GPS-guided hydraulic dredge system. Sediment was pumped via pipeline to a containment facility for dewatering. Reach O was segregated into five removal management units separated by sheet piling. Over 16,000 yd^3 of sediment were dry-excavated from Reach O. All sediments were disposed of at Dow's Salzburg Landfill.

The chart below presents the cumulative volume of sediment remediated in the U.S. since 1997. US EPA and its partners have now remediated more than 10% of the estimated volume of sediments requiring remediation in the U.S. Great Lakes Basin. The Great Lakes Legacy Act was reauthorized by Congress and signed into law on October 8, 2008, thereby extending funding for two years at a level of $54 million per year.

Cumulative Volume of Sediment Remediated in the U.S. Great Lakes Basin



*Volumes in bar graph are quantitative estimates as reported by project managers, summed, and then rounded to the nearest one hundred thousand cubic yards. 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. Source: US EPA – Great Lakes National Program Office.