

## **Saginaw River/Bay**

### **Site Description**

The Saginaw River/Bay is one of the 43 Great Lakes Areas of Concern (AOC). The AOC includes the 22-mile length of the Saginaw River and all of Saginaw Bay (1143 sq. miles) out to its interface with Lake Huron. The Pine River (Project ID 05-17) and the Shiawassee River (Project ID 05-15) are upstream tributaries of the Saginaw River. Five priority segments in a two-mile stretch of the lower Saginaw River, totaling about 53 acres, were targeted, initially, for remedial dredging.

Dredging of 342,433 cubic yards (cy) of PCB-containing sediment was completed on July 22, 2001. The cost of the dredging project was approximately \$9.7 million and was paid for with funds from the natural resource damage assessment (NRDA) settlement (USFWS, 2007a). The U.S. Fish and Wildlife Service (USFWS) and the Michigan Department of Environmental Quality (MDEQ) worked with the U.S. Army Corps of Engineers (USACE) to design the dredging project. The USACE managed the project, which was carried out by Luedtke Engineering Company (Luedtke) of Frankfort, Michigan. Luedtke used a Cable Arm environmental bucket. Cable Arm built a 15 cy bucket for the project so as to maximize the efficiency of broad, rather than deep, grabs of primarily unconsolidated material (silts and sands rather than clays) (Dredging News Online/Clarksons, 2007). Luedtke used the specially designed, gasketed clamshell dredge bucket to remove sediment from the parts of the river with the highest constituent concentrations. Resuspension of material during dredging was controlled with careful use of the gasketed bucket (or conventional bucket when harder materials were encountered) and by silt curtains which completely enclosed the area being dredged. The dredged material was transported by barge to a nearshore Confined Disposal Facility (CDF) which was designed to contain sediments dredged from the navigation channel in the Saginaw River. The Environmental Protection Agency (EPA) assisted the USFWS and MDEQ in periodic inspection of the dredging operation in addition to the constant monitoring conducted by the USACE (USFWS 2007).

### **Potential Responsible Parties (PRPs)**

General Motors Corporation is the responsible party for this site.

## Threats and Contaminants

The constituents of concern are PCBs, DDT, dioxins, furans, polycyclic aromatic hydrocarbon (PAHs) and heavy metals.

## Cleanup Approach Update Since 2004

### *Dredging Activities*

Navigational dredging of the Upper Saginaw River between Bay City and Saginaw was completed in fall 2006. The USACE oversaw the project; the work was performed by Great Lakes Docks and Materials. Approximately 100,000 cy of sediments were dredged from the navigational channel and part of the 6<sup>th</sup> St turning basin, barged, and transported down the river to an in-water island CDF in Saginaw Bay. This project was considered an emergency dredging for two reasons, the navigational channel was shallow and the sediments to be dredged could not be placed in the newly constructed CDF in the Upper Saginaw River due to high levels of dioxin (USACE, 2007).

In July 2007, the USACE awarded a contract to MCM Marine Inc. in the amount of \$1,296,663 to dredge approximately 350,000 cy of sediments from just north of the mouth of the Saginaw River to approximately 2 miles into Saginaw Bay. This project began in September 2007 to improve navigation for shipping traffic at the mouth of the river (USACE, 2007).

On August 30, 2007, the USACE opened bids for a dredging project in the Lower Saginaw River. This project will cover the dredging in two sections of the river; the Lower Saginaw and the Mouth (USACE, 2007). An approximate total of 50,000 cy will be dredged from the shipping channel of Lower Saginaw and the mouth of the river to improve navigation for shipping traffic. A contract was awarded to Luedtke on September 12, 2007 with a winning bid of \$632,250.

### *Monitoring Activities*

A caged fish study was conducted by the MDEQ of the lower Saginaw River in 2005, with a goal of improving the PCB uptake characterization. Cages were placed in Saginaw River and Saginaw Bay. Findings include the following;

- Lipid-normalized total PCB concentrations measured at the river sites near the mouth was an average of 79 ppb, higher than the average concentration of 43 ppb

measured at the upstream sites. The concentrations detected in 2005 were not statistically different than the concentrations measured in 1998 or 2002. The concentration of PCB in the water near the mouth of Saginaw has not changed over time from 1998 to 2005.

- Lipid-normalized total PCB concentration at the Gull Island site in Saginaw Bay was less than the average concentration of 79 ppb detected at the mouth of the river.
- Lipid-normalized PCB concentrations measured upstream of Middle Ground Island have fluctuated over time from 1998 to 2005, the highest concentrations were detected in 2005.
- Concentrations of PCBs from caged fish placed at or near the mouth of the Saginaw were higher than elsewhere, suggesting a PCB source downstream of the Detroit and Mackinac railroad bridge.

A Fish Consumption Survey completed in June 2007 by the Michigan Department of Community Health (MDCH) surveyed anglers from the Saginaw Bay Watershed to determine their awareness and use of fish consumption advisories. The survey determined that white males consuming only walleye fish or boat-based anglers have the highest level of awareness of the Michigan fish consumption advisory. Females, minorities, benthic fish eaters, land-based anglers, and individuals under the age of 30 were less aware of the Michigan fish consumption advisory. Only 50% of the individuals aware of the advisory attempted to use the fish consumption advisory. The most common sources cited for awareness were the Michigan Department of Natural Resources (MDNR) fishing guide, local television, and local newspapers. Fishing on the Saginaw River and Bay occur year round. The most common fish consumed based on this survey were walleye.

Post-removal sediment sampling was conducted in 2003. As part of the MDEQ Water Division's (WD's) environmental assessment program, staff of the Surface-Water Quality Assessment Section and the EPA Region 5 Great Lakes National Program Office (GLNPO) conducted a sediment sampling survey of the lower Saginaw River in Bay City. The goal of this sediment sampling was to measure PCB concentrations within the five areas that were remediated in 2000 and 2001. The following three summary points were provided in the report:

- PCB concentrations of all surficial (0 to 6 inches) sediments sampled within the dredged areas were below the PCB remediation target concentration of 1 ppm.
- Low levels of PCB Aroclor 1242 were detected (above the reporting limit) for all surficial river stations except Stations 31 and 34, which were below the reporting limit.
- Slightly elevated levels of PCB Aroclor 1242 and PCB Aroclor 1260 were reported in the deeper core sections in three locations within the dredge areas (i.e., Stations 25, 37 and 39) (MDEQ, 2003).

A post-remediation caged-fish study was conducted from June 18 to July 16, 2002 by the MDEQ-WD to determine whether sources of PCBs remain following sediment removal. Findings include the following:

- Total PCB concentrations were measured in caged fish from eight Saginaw River Watershed sites in 2002. PCBs were quantified in at least three samples from each test site and in one of the four, day-0 control samples.
- The mean PCB concentration in the day-0 control samples was essentially zero and the average concentrations in the test fish are presented as net uptake.
- Lipid-normalized PCB concentrations in samples from the mouth of the Tittabawassee River, Saginaw River at Zilwaukee and at the mouth of the Saginaw River were significantly greater than concentrations in the control samples. Concentrations in the samples from the other river sites were not significantly different from the control.
- The lipid-normalized PCB concentrations in samples from the Saginaw River mouth were higher and significantly different ( $p < 0.05$ ) than the other seven sites tested.
- The lipid-normalized PCB concentrations in samples from the mouth of the Tittabawassee River were significantly higher ( $p < 0.05$ ) than the concentrations at the Shiawassee, Flint and Cass River sites.
- The lipid-normalized PCB concentrations in samples from the Zilwaukee Bridge and Shiawassee River mouth sites were significantly lower in 2002 samples as compared to 1998.

- The difference between lipid-normalized total PCB concentrations at the Saginaw River mouth and the upstream sites did not change significantly between 1998 and 2002.
- Lipid-normalized total PCB concentrations at the mouth of the Saginaw River did not change between 1998 and 2002, but the concentrations have declined significantly since 1986.
- The 2002 caged-fish study has not provided evidence of the effectiveness of the sediment removal project and further study is recommended (MDEQ, 2002)

The MDEQ conducted intensive water quality monitoring at stations in the Pine, Au Sable, and the Saginaw Rivers from March to November 2004. Each station was sampled 12 times and analyzed for PCBs, trace metals and mercury, MTBE, BTEX, cyanide, and nutrients. The highest median concentration of PCBs was detected in the Saginaw River (12 ng/L); the Saginaw contributed the highest PCB loading rate of 37 kg/year to Lake Huron. The total PCB concentration measured at each monitoring station exceeded the PCB Rule 57 water quality value of 0.026 ng/L in all samples collected at all monitoring stations (MDEQ, 2004). The Saginaw River was sampled in 1998, and annually from 2001-2004. The MDEQ sampled different rivers during the 2005-2007 sampling season. The MDEQ does not plan to resample the Saginaw River for PCBs.

### Current and Recent Activities

MDEQ-WB conducts caged fish studies in the Saginaw River and Bay on a regular basis. The most recent study was conducted in 2005 and reported in the 2006 annual report. The 2005 study concentrated on the lower Saginaw River, and was the most intensive study of that river reach. The MDEQ analyzes the caged fish for a variety of bioaccumulative constituents, including PCBs, mercury, DDT and dioxins/ furans. The MDEQ does not anticipate repeating the full study, they may periodically monitor at the mouth of the river approximately every five years with the next event in 2009. That event would put the MDEQ Fish Contaminant Monitoring Program back in synch with the State of Michigan's 5 year watershed sampling plan (MDEQ. 2006).

The Partnership for the Saginaw Bay Watershed (the Partnership), in consultation with Public Sector Consultants, Inc. (PSC), has received funding from the EPA for a fish tainting survey in the AOC. Chemical odors and tastes associated with harvested fish were frequently reported from the 1940s through the 1970s in the Saginaw and

Tittabawassee Rivers, and in the Saginaw Bay. In the 1994 Remedial Action Plan Update, the MDNR reported that no off-flavor was detected in taste tests conducted on fish taken from these waters. Since taste and odor complaints related to edible fish taken from both Saginaw River and Bay have disappeared in recent years, this project will distribute a voluntary survey to 7,680 local residents and anglers to determine if taste and odor problems in fish fillets have abated to the extent that delisting of the beneficial use impairment may be recommended for the AOC (EPA, 2006).

The Partnership continues to organize and host monthly education forums on environmental and water quality issues in the Saginaw River/Bay AOC. Ten forums in 2005 focused on toxic contamination. Topics covered included the Saginaw River PCB cleanup, the Pine River St. Louis Reservoir cleanup, dioxin issues on the Tittabawassee River, and fish consumption advisories in the Saginaw River and Bay. The focus of 2006 forums included phosphorus and eutrophication issues.

Approximately \$10 million has been spent on the dredging and operations and maintenance activities to date (USFWS, 2007b)

## References

Clark. 2007. Dredging to clear Saginaw Bay Shipping Channel to Start. The Bay City Times September 15, 2007.  
<http://www.mlive.com/news/bctimes/index.ssf?/base/news-10/1189851302319180.xml&coll=4>

Dredging News Online. 2006. Saginaw clean-up about to begin. November 16, 1999.  
[http://www.sandandgravel.com/v\\_dno/print.asp](http://www.sandandgravel.com/v_dno/print.asp)

EPA. 2005. Agency Information Collection Activities: Proposed Collection; Comment Request; Delisting the Fish Tainting Beneficial Use Impairment in the Saginaw River/Bay Area of Concern, EPA ICR Number 2199.01.  
(<http://www.epa.gov/fedrgstr/EPA-WATER/2005/September/Day-20/w18721.htm>)

EPA. 2006. Saginaw River and Bay Area of Concern.  
(<http://www.epa.gov/glnpo/aoc/sagrivr.html>)

MDEQ. 2002. [A Post-Sediment Removal Caged Fish Study of the Saginaw River Watershed, June 18 - July 16, 2002](#), MDEQ Report MI/DEQ/WB-04-077.  
(<http://www.fws.gov/midwest/SaginawNRDA/documents/CagedFish04.pdf>)

MDEQ. 2003. [A Sediment Sampling Survey of the Saginaw River, Bay County, Michigan, September 2-3, 2003](http://www.fws.gov/midwest/SaginawNRDA/documents/SagRiverSediment.pdf), MDEQ Report MI/DEQ/WD-04-001. (<http://www.fws.gov/midwest/SaginawNRDA/documents/SagRiverSediment.pdf>)

MDEQ. 2004. Michigan Water Chemistry Monitoring Great Lakes Tributaries 2004 Report. (<http://www.deq.state.mi.us/documents/deq-wb-swas-04tribreport.pdf>)

MDEQ. 2006. Michigan Fish Contaminant Monitoring Program 2006 Annual Report MI/DEQ/WB-07/053. ([http://www.michigan.gov/documents/deq/wb-swas-fcmp-2006report\\_198916\\_7.pdf](http://www.michigan.gov/documents/deq/wb-swas-fcmp-2006report_198916_7.pdf))

MDEQ. 2007. August 16, 2007. Personal Communication with Joseph Bohr MDEQ Water Bureau regarding biota sampling.

MDCH. 2007. Fish Consumption Survey of People Fishing and Harvesting Fish from the Saginaw Bay Watershed June 14, 2007. ([http://www.michigan.gov/documents/mdch/FCS\\_Final\\_rpt\\_061407\\_199288\\_7.pdf](http://www.michigan.gov/documents/mdch/FCS_Final_rpt_061407_199288_7.pdf))

MDCH. 2007. *Michigan Family Fish Consumption Guide*. (<http://www.michigan.gov/mdch/0,1607,7-132-2942-13110--,00.html>)

USACE. 2007. FY 2007 Contract Dredging Program. (<http://www.iwr.usace.army.mil/ndc/dredge/pdf/dredgerpts/drgadvcu.pdf>)

USACE. 2007. Personal Communication with Angie Mundell of the Detroit District on August 30, 2007.

USFWS. 2007a. (<http://www.fws.gov/Midwest/SaginawNRDA/>)

USFWS. 2007b. July 2, 2007 conversation with Lisa Williams regarding remediation costs to date and scheduled site activities.

USFWS. 2007c. Saginaw River and Bay Natural Resource Damage Assessment. (<http://www.fws.gov/midwest/SaginawNRDA/dredge.html>)