CAN WE EAT THE FISH?
Sediment Quality

The Issue: Great Lakes sediments are an ongoing source of chemical pollution that may result in fish consumption advisories.

- PCBs, DDT, and a myriad of other toxic contaminants were banned decades ago, but can still be found trapped in the sediments of the Great Lakes.
- Waves, bottom-dwelling organisms, or human activities may reintroduce these chemicals into the water column where they may be ingested, absorbed, and accumulated by Great Lakes fish species, triggering fish consumption advisories.
- Polluted sediments, particularly those found within several of the "Areas of Concern" (AOC) (Figure 1), are considered one of the largest sources of contaminants to the Great Lakes food chain.

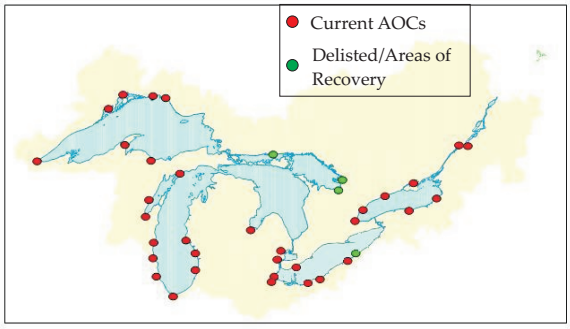

Figure 1. The Great Lakes AOCs.

The Indicator - SOGL 2003

This indicator assesses sediment using a Sediment Quality Index (SQI) developed by Environment Canada (based on the Canadian Water Quality Index). The Index was applied to analyze the concentration of sediment contaminants and determine an SQI score for each location with existing data. Progress in the basin toward virtual elimination of all contaminants in sediments was also evaluated by assessing the percent reduction of contaminants at open lake sites over time.

Contaminants bound to sediment can be re-suspended into the water column. Fish may then be exposed to these contaminants and store lipid (fat)-loving contaminants in their tissue. As these fish are ingested by other fish, the contaminants accumulate at increasingly higher concentrations. Large fish, the type most often desired for human consumption, are often those carrying the largest load of contaminants.

The Assessment

SQI evaluations are available on a lake-wide basis for Lake Erie and Lake Ontario based on data collected by Environment Canada's surveys initiated in 1997. In addition, SQIs have been tabulated for five of the AOCs designated in the Great Lakes with data collected from 1987 through 1989 (Table 1).

Lake and Basin	SQI Score
Erie	
Western	85
Central	86
Eastern	95
Ontario	
Niagara	67
Mississauga	66
Rochester	70
Kingston	87
AOC	**SQI Score**
Grand Calumet, IN	25
Saginaw River, MI	58
Buffalo River, NY	93
Sheboygan River, WI	29
Ashtabula River, OH	36

Table 1. SQIs calculated for Lake Erie, Lake Ontario and five of the AOCs.

The higher the SQI score, the better the quality of sediment at each respective site. Sediment quality assessments, based on the SQI, help us to identify the most troubling sites where cleanup should be prioritized to prevent extensive food web contamination.

In the future, the governments plan to perform additional sediment assessments depending on the availability of historical and current sediment quality data.

The assessment of the percent of contaminant reduction over time revealed that contamination has declined by approximately 40-50 percent (from 1971 to 1997) in most cases examined at Lake Ontario, Lake Erie, and Lake St. Clair (Table 2). This information illustrates the success of past controls on the various chemicals.

Chemical	Lake Ontario	Lake Erie (W. Basin)	Lake St. Clair
Mercury	73	37	N/A
Lead	30	40	N/A
PCBs	38	40	49
HCB	38	N/A	49
Dieldrin	19	+	+
Chlordane	20	N/A	-
DDT	60	42	78
Toxaphene	N/A	+	N/A
Dioxins	70	N/A	N/A
PAHs	N/A	38	N/A

Table 2. Percent reduction in concentrations of various contaminants in sediment from open lake index sites. The "+"/"-" symbols indicate a slight increase or decrease of contaminants at open lake sites, but the change could not be quantified due to insufficient information. "N/A" indicates data were not available.

Additional chemicals, such as polybrominated diphenyl ethers (PBDEs), polychlorinated naphthalenes (PCNs), polychlorinated alkanes (PCAs), endocrine disruptors, and in-use pesticides may be potential future stressors on the ecosystem.

The Outlook

Environmental agencies throughout the basin are focused on controlling contaminant input to the Lakes and determining a course of action for existing contamination. Many contaminants have been banned from use, thus their effect over time will steadily decline as they are either cleaned up or naturally broken down in the environment.

The Great Lakes Binational Toxics Strategy tracks the remaining sources of contamination and explores opportunities to accelerate their elimination. These efforts and others are helping to clean up the Lakes from our past and to protect the Great Lakes and the Great Lakes food web for our future.

For More Information...

Visit the web site, **www.binational.net**, to access the ***State of the Great Lakes 2003*** and other references reporting on the state of the Great Lakes.