Sediment Contamination in Lake Erie: A Spatial and Temporal Overview of Banned, Current-Use and Emerging-Issue Compounds

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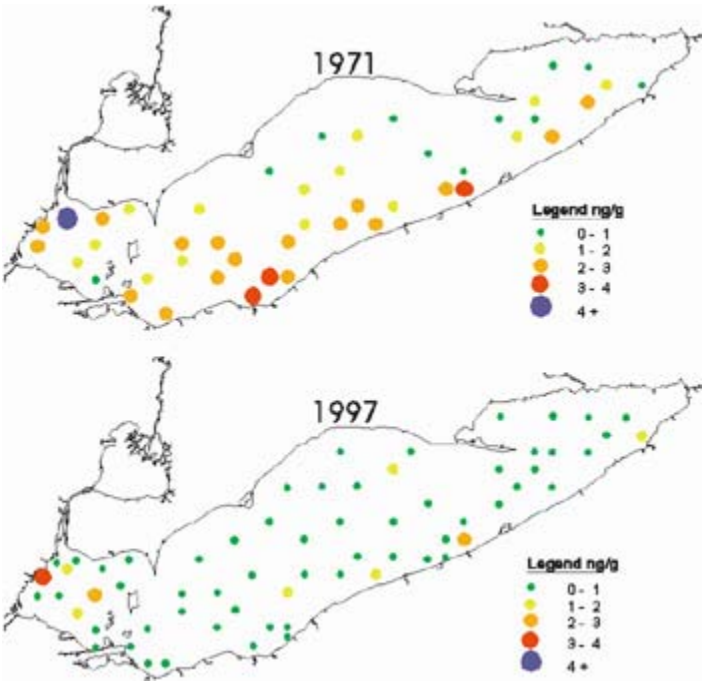
Environment Canada conducted Lake Erie sediment surveys in 1995, 1997 and 1998 to characterize spatial and temporal trends in contamination and for comparison with historical levels to assess the degree of improvement in environmental quality since the advent of measures to reduce sources. These surveys were also designed to assist in identification of possible sources of contamination and areas where contaminant levels exceeded Canadian sediment quality guidelines for the protection of aquatic biota. Lake-wide concentrations of contaminants including metals, polychlorinated biphenyls (PCBs), HCHs (Figure 1), hexachlorobenzene and DDT metabolites were found to have significantly decreased from levels determined in samples collected in 1971 in previous surveys. This trend was also evidenced by contaminant profiles of core samples from the three major lake basins. There was a lake-wide spatial trend in increasing sediment contamination from the eastern basin to the western basin, and from the north-central basin to the south-central basin.

Data from the 1997 and 1998 surveys also included current-use pesticides such as endosulphan, and contaminants requiring more specialized analytical methods and instrumentation, including polychlorinated dibenzo-p-dioxins and dibenzofurans and toxaphene. Sediment distributions and core profiles exhibited trends similar to those of other contaminants. Sediments in many areas of Lake Erie exceeded Canadian Federal and Provincial guidelines. However, exceedances of guidelines describing contaminated environments in 1997 and 1998 were largely restricted to the western basin and the southern portion of the central basin. Exceedances of Canadian Sediment Quality probable effects guidelines were most numerous for dioxins and furans followed by mercury. The Canadian threshold effects guideline for PCBs and the Provincial lowest effect guideline were exceeded at 50% and 21% of the sites, respectively. Mercury, PCBs and polychlorinated dibenzo-p-dioxins and dibenzofurans are responsible for fish consumption advisories in Lake Erie.


1971
Legend ng/g
0 - 1
1 - 2
2 - 3
3 - 4
4 +

1997
Legend ng/g
0 - 1
1 - 2
2 - 3
3 - 4
4 +