



Lake Michigan Mass Balance Project: PCBs Results

Large Lakes Research Station
(U.S. EPA/ORD/NHEERL/MED)
with
U.S. EPA Great Lakes National Program Office

Goals

Provide the modeled PCB mass balance for Lake Michigan

Forecast concentrations of PCBs in Lake Michigan lake trout under various loading scenarios

Assess the potential for unlimited consumption of age 5.5 lake trout using model forecasts

Major Findings

Forecasted PCB concentrations in lake trout may permit unlimited consumption as early as 2039 at Sturgeon Bay and 2044 at Saugatuck

PCB trends indicate that concentrations are declining in all media

Atmospheric deposition is the major source of PCBs to the lake

Chicago urban area is a substantial atmospheric source of PCBs to Lake Michigan

There is a dynamic interaction among water, sediments, and the atmosphere where large masses of PCBs cycle into and out of the lake *via* the atmosphere as vapor phase

PCB Properties

Total PCBs are composed of 209 different compounds called congeners

Very insoluble in water

Strongly attach to particles

Easily volatilize and are transported as vapor

Very persistent in the environment

Lake Michigan PCB Background

1948 PCBs first purchased for use within the Lake Michigan basin

1954-1972 PCBs discharged to the Lake Michigan basin

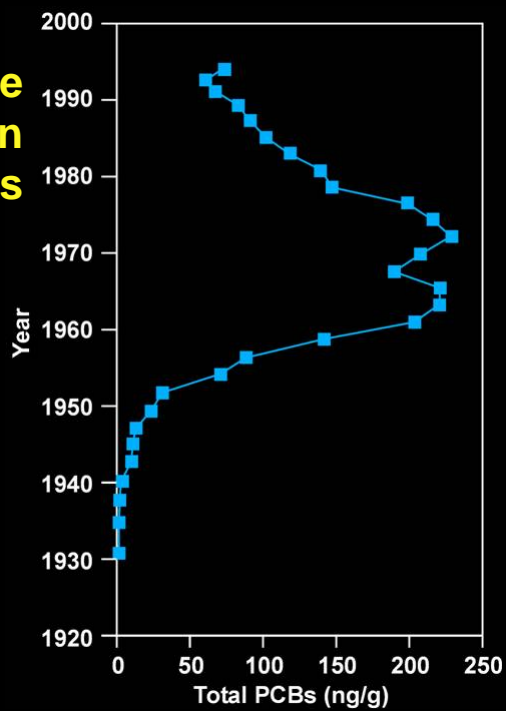
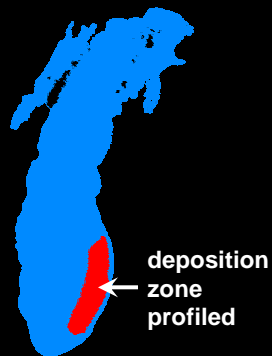
1977 PCB production banned; use continued

1989 remediation of PCB contaminated sites began

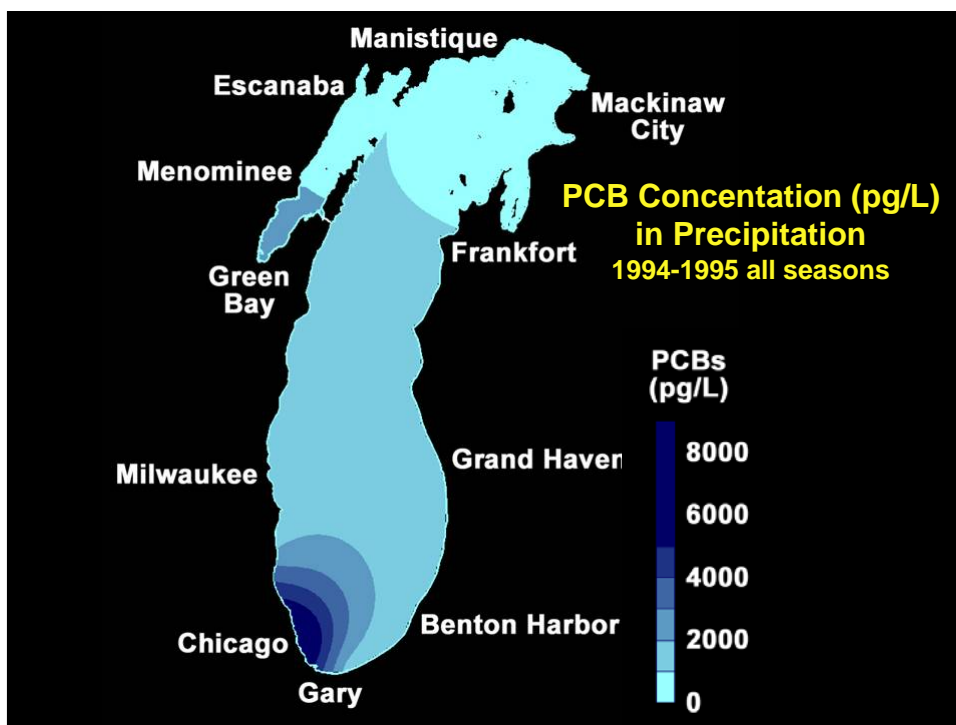
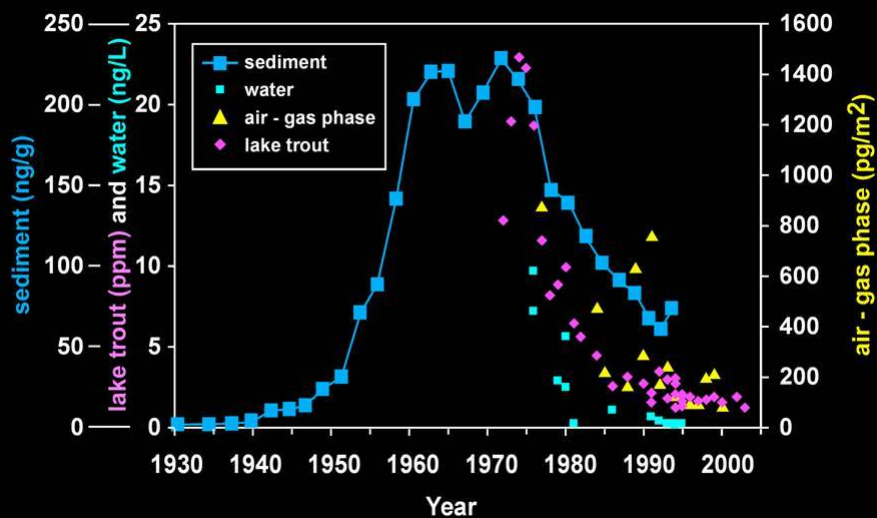
1991 PCBs identified as possible carcinogen

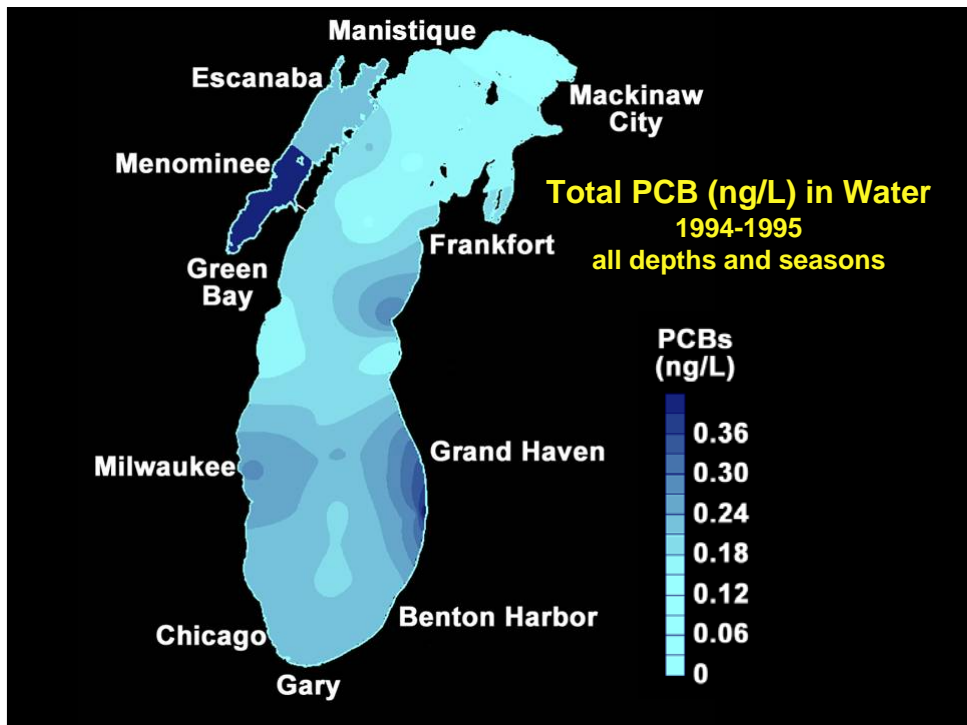
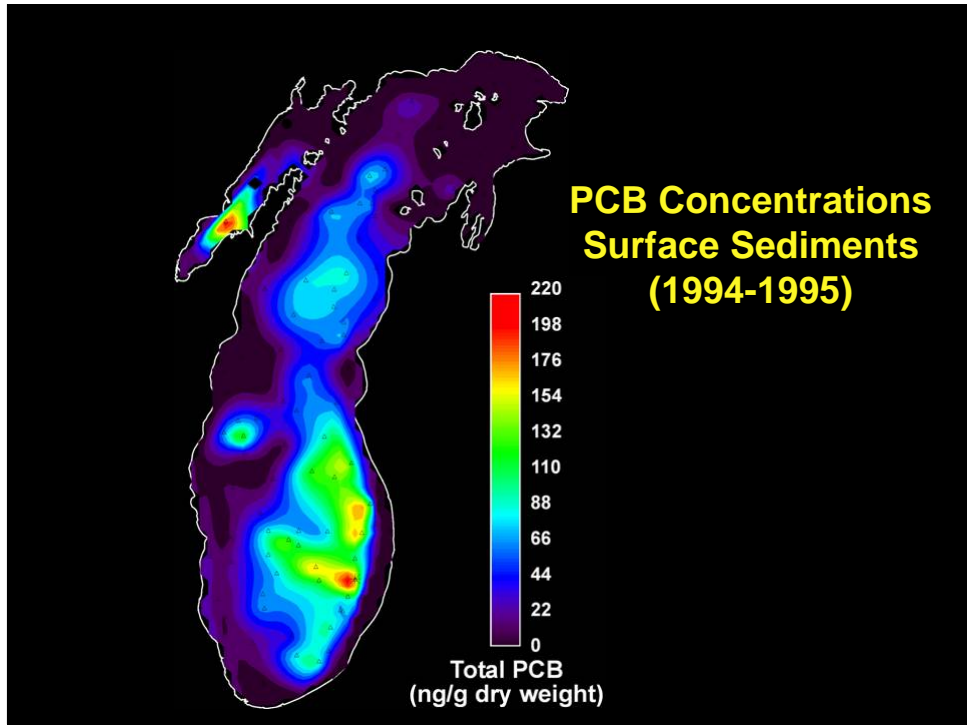
1998 Great Lakes States developed the "Great Lakes Protocol for Fish Consumption Advisories," setting regional standard at 0.05 ppm PCBs for fillets for unlimited consumption

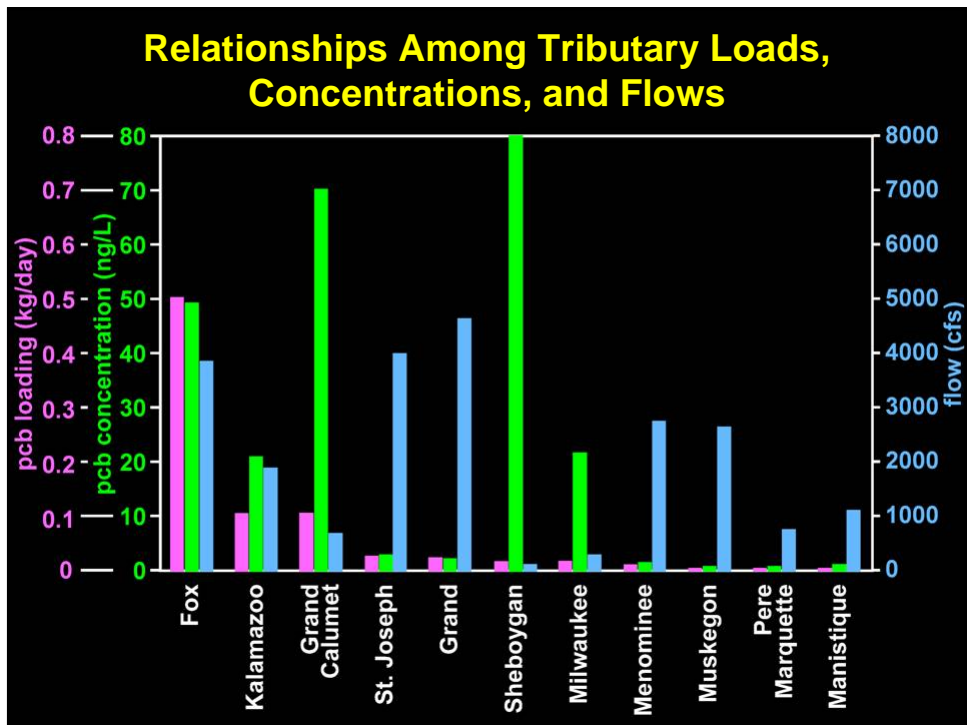
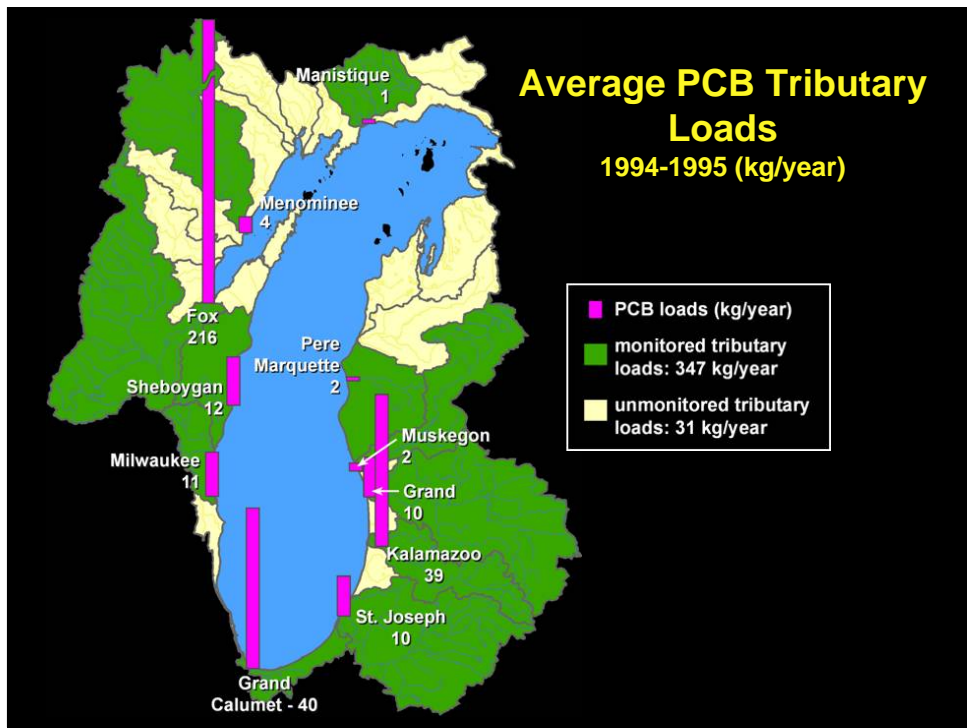
Sediment Profile of Lake Michigan PCBs

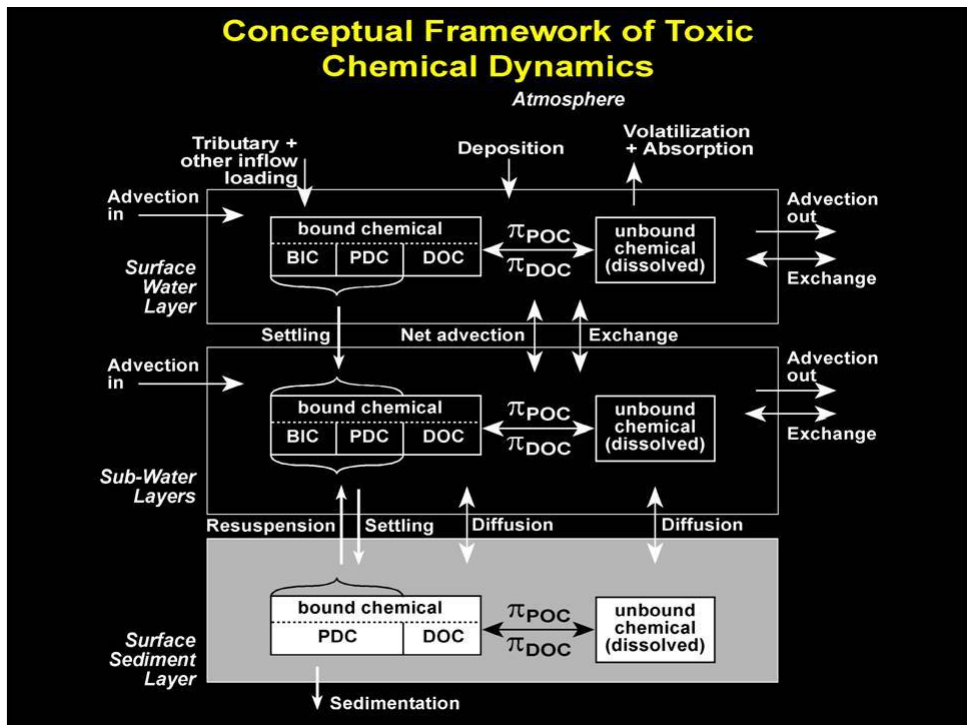
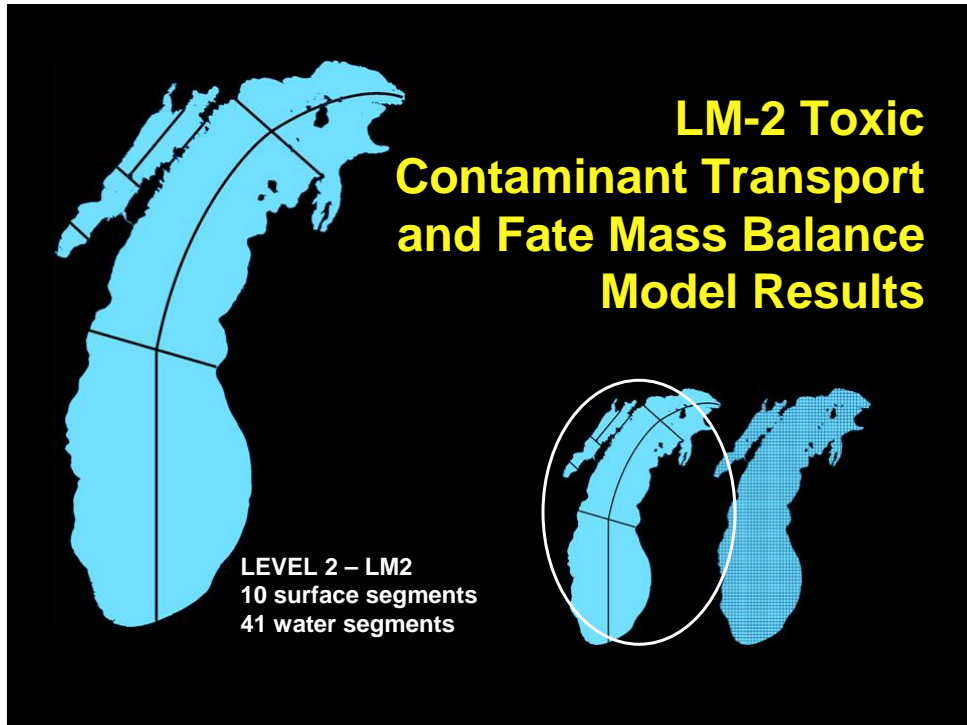


Total PCB trends in Lake Michigan Media

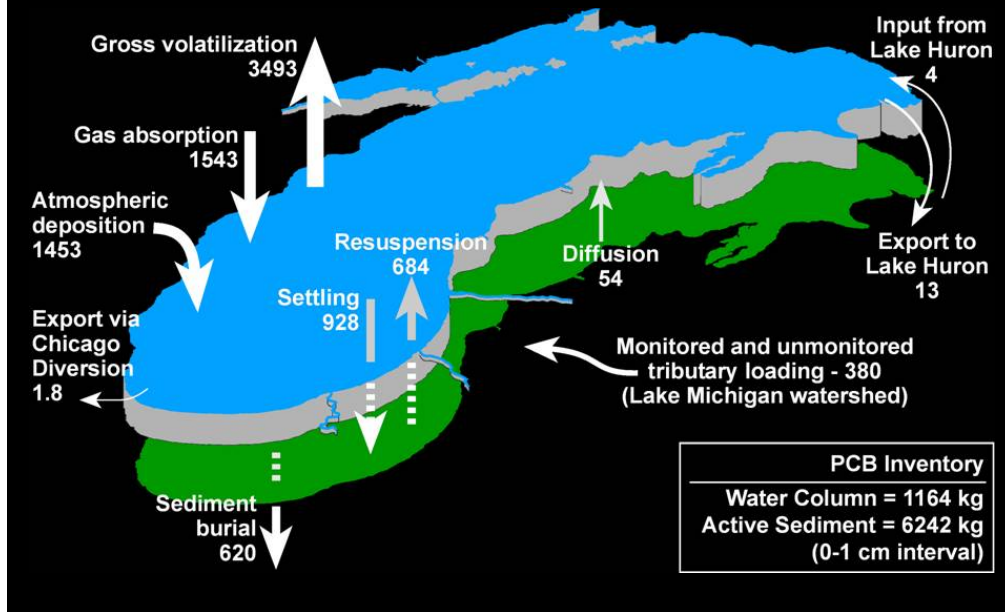








PCB Mass Balance (kg/yr) for 1994-1995

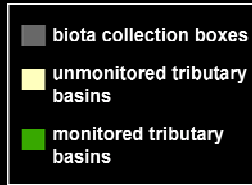


This graphic contains provisional information and data which are subject to further evaluation and revision.

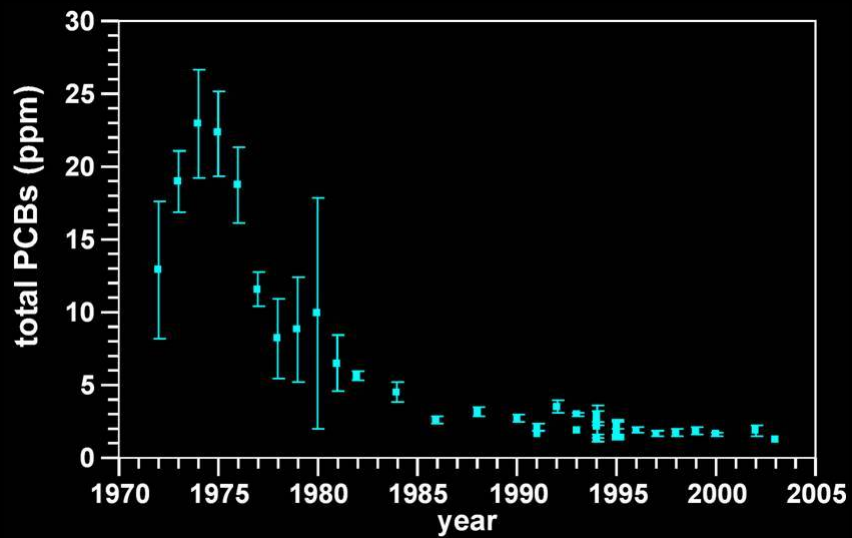
LM Food Chain Bioaccumulation Model Results



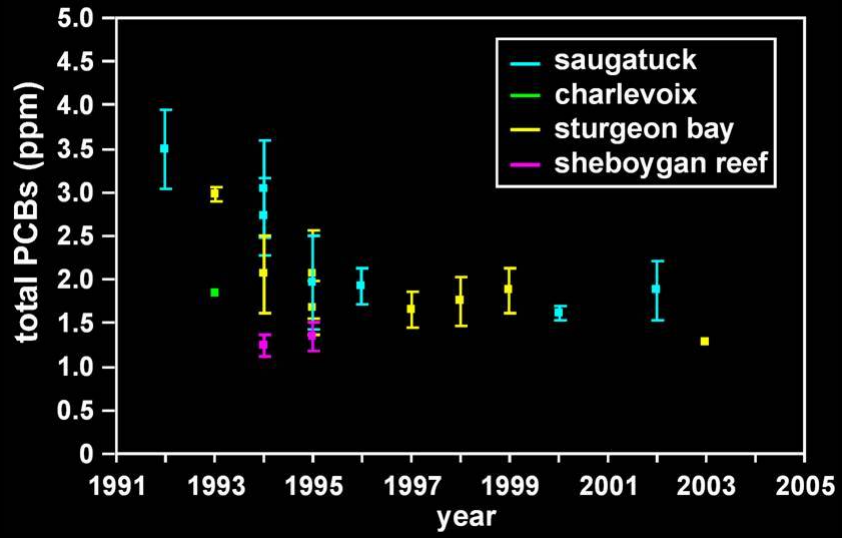
1994-1995 PCB Biota Stations



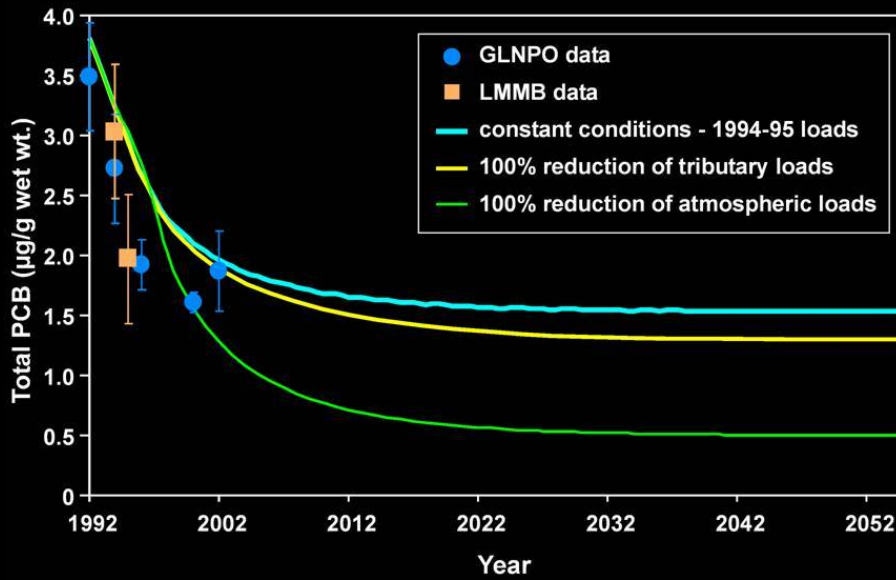
Total PCBs in Age 5.5 Lake Michigan Lake Trout from Multiple Locations



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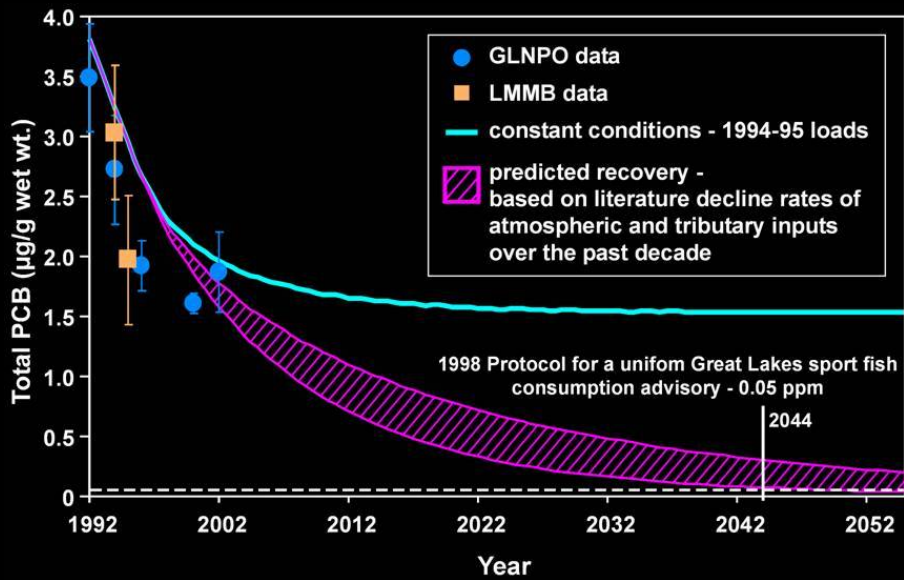


Predicted PCB Concentrations in Age 5.5 Lake Michigan Lake Trout at Saugatuck



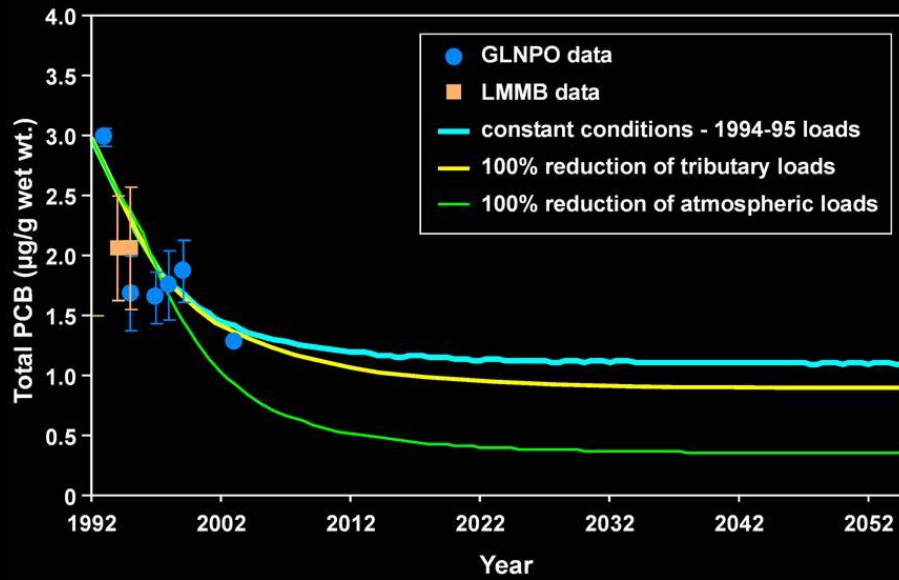
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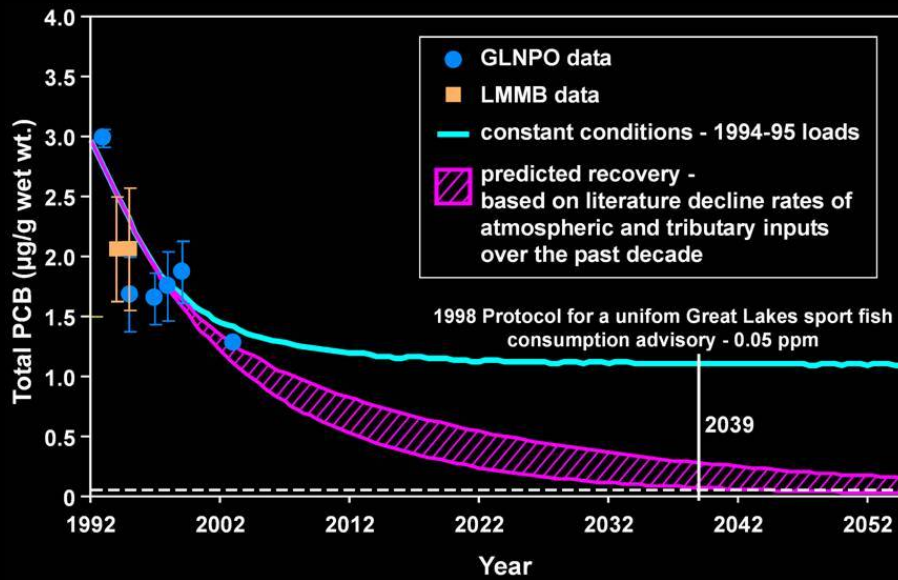
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Predicted PCB Concentrations in Age 5.5 Lake Michigan Lake Trout at Sturgeon Bay



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Summary

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Next Steps

Journal publications and EPA reports

Additional forecasts?

State visits

Post-audit with 2005 sampling results

Pursue the highest resolution models for PCBs