Biological Monitoring and Application of Food Web Bioaccumulation Models in the Detroit River.

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A biological monitoring program for organic contaminants and mercury was established in the Detroit River and at a reference site in the western basin of Lake Erie. Four sites were selected for study of contaminant trophodynamics along the Canadian side of the river to establish spatial trends in contaminant trophodynamics during the 2000 field season and to permit comparisons of organochlorine and mercury residues with historical datasets. The sites included an upstream reference site (Peche Island, at the head of the Detroit River), two sites located at mid points along the river length and at Middle Sister Island, western basin Lake Erie. Representative organisms were sampled at each site from the following trophic categories: benthos (pooled samples), benthic feeding fish, forage fish, pelagic fish and large piscivorous fish. The patterns of chemical bioaccumulation were consistent at each site, being related to physico-chemical properties of the contaminant, trophic status and body mass of the animal sampled. The dataset was used to validate a steady state food web bioaccumulation model previously developed and applied in Lake Erie and to contrast model predictions with observed residues along sites which vary among water and sediment chemical residues. The data indicate that the steady state food web bioaccumulation model, developed for Lake Erie, can be used as a generalized hazard assessment tool to predict contaminant residues in Detroit River biota. Model improvements require an ability to integrate the spatial range of chemical exposures of large fish which exhibit movements along the river length and between Lake St. Clair and Lake Erie.