Factsheet - Re-designation of the Degradation of Benthos BUI Report Concepts & Methods



The purpose of this fact sheet is to provide a brief description of the methods and concepts used in the Detroit River Area of Concern's Degradation of Benthos beneficial use impairment (BUI) assessment report.

WHAT IS A CONTAMINANT OF POTENTIAL CONCERN?

A contaminant of potential concern (COPC) is a contaminant which may result in ecosystem detriment or the impairment of a beneficial use. Generally, within the Detroit River, the list of COPC includes metals such as mercury, cadmium and lead; organic contaminants such as PCBs and PAHs; and hydrocarbons such as bunker fuel or other heavy oils. Due to the potential harm to the environment that COPCs can cause, the discharge of COPCs into the environment is highly restricted in both Canada and the United States.

WHAT IS THE HAZARD SCORE APPROACH?

Hazard scores combine measured sediment COPC levels and Ontario sediment quality guidelines to create an overall hazard score. The score provides insight into the contamination and toxicity of sediments, with low hazard scores indicating lower sediment contamination in comparison to higher hazard scores.

WHAT ARE SEDIMENT EXCEEDANCE LEVELS (SELs)?

Ontario has established provincial sediment exceedance levels, where if the concentration of a COPC in sediment exceeds the established threshold, detrimental effects are found in sediment-dwelling organisms. Soils with COPC levels that exceed thresholds are considered highly contaminated.

WHAT IS BIOACCUMULATION?

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Benthos live in sediments and often consume nutrients along the riverbed including algae and detritus (organic litter). These food sources, if found near sediments with high contaminant concentrations, may also contain small amounts of pollutants. These contaminants may be ingested by benthos. Some contaminants such as mercury and PCBs are not easily metabolized, and they build up in the tissue of benthos. Over time, this ingestion of contaminants can accumulate, in a process called bioaccumulation.



Conceptual diagram of bioaccumulation Source: https://blog.nus.edu.sg/agritated/2016/10/13/bioaccumulationandbiomagnification/

WHAT IS A BIOASSAY?

The purpose of a bioassay is to determine the effect of contaminants on living organisms. For this study, bioassays were used to determine the effect of Detroit River sediment contamination on benthos. To conduct a bioassay, Detroit River sediment was collected and the ability of a given benthos species to survive, grow, and reproduce within the sediment was measured. If the benthos were shown to have inhibited growth or died quickly, the sediment exhibited a toxic response. If the bioassay showed no death or inhibition of growth, then the sediment was considered to not have exhibited a toxic response.

WHAT IS COMMUNITY COMPOSITION?

Benthos community composition is the type of benthos species and their populations that reside in an ecosystem. Community composition depends on environmental factors including sediment composition, water quality and quantity, and hydrology.

The Detroit River Canadian Cleanup implements the Remedial Action Plan on behalf of a communitybased partnership working together to protect, restore and enhance the Detroit River ecosystem.

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