# Predicting contaminant transfer following re-establishment of controlled connectivity in the Boardman River

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by:

**Brandon Gerig[1] and Gord Paterson[2]**

[1]105H Anheuser Busch
University of Missouri
Columbia, MO 65211

[2]112 Great Lakes Research Center
Department of Biological Sciences
Michigan Technological University
Houghton, MI 49855

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**ABSTRACT:**

Anthropogenic alteration of the environment began as soon as people settled the Great Lakes (GL) region with hydrologic alteration (dams) and discharges of man-made chemicals into the air and water as populations and industry expanded. Consequently, the GL became a reservoir for anthropogenic contaminants including polychlorinated biphenyls (PCBs), dichloro-diphenyl-trichloroethylene (DDT), organochloride compounds, and mercury (Hg). Migratory fish accumulate and magnify contaminants within their tissues and transport them across ecosystem boundaries. Re-established connectivity in the form of dam removal has the potential to allow contaminant laden migrants access to ecosystems previously inaccessible. For this project, we assessed the contaminant burden of a subset of GL migrants and stream resident trout in the Boardman River, MI. GL migrants had similar or greater concentrations of persistent organic pollutants (POPs) in their eggs versus whole body samples. There was a marked difference in Hg with eggs having far lower Hg levels than whole body samples. These differences reflect differing bioaccumulation pathways between tissue types and contaminant type. Hg, POPs, and PCB congener patterns were compared between open and closed reaches with different patterns present in trout from each reach type, suggesting

that POPs were higher in open but Hg was higher in closed reaches. Congener patterns of open trout closely resembled the congener pattern of GL migrant eggs indicating these are a dominant source of POP contamination in stream residents. Semi-permeable membrane devices (SPMDs) deployed at multiple locations along a 25-mile stretch of the Boardman River in Traverse City Michigan suggest concentrations of POP compounds were in low and below regulatory guidelines considered to pose chronic risks to aquatic health. As a result, changes in legacy pollution from spawning fish are likely detectable given the low concentrations measured in this study. Ultimately our study suggests that migration size, contaminant concentration, and egg mass strongly influence contaminant deposition in spawning streams with introduced Pacific salmon representing a greater risk than native suckers.