Contaminated Sediments Assessment in an Urban Great Lake Strait: Sediment Characterization of the U.S. Detroit River Shoreline under the Great Lakes Legacy Act

Rose Ellison (U.S. EPA Great Lakes National Program Office)
Sam Noffke (Michigan Department of Environmental Quality)
Kevin Kowalk and Ryan Darnton (EA Engineering, Science, and Technology, Inc., PBC)

Background/Objectives. The Detroit River is a large and dynamic bi-national waterway. The shoreline along most of the U.S. side has been developed and highly industrialized for over a century. From numerous industrial and municipal sources, both active and historic, legacy contaminants remain in sediments throughout the river's 32 miles, despite an average flow rate of 180,000 cubic feet/sec.

The level of contaminants in sediments continue to degrade the river's beneficial uses. In order to address impairments in the Detroit River caused by contaminated sediments the US Environmental Protection Agency Great Lake National Program Office (US EPA GLNPO), Michigan Department of Environmental Quality (MDEQ), and Detroit River Area of Concern Public Advisory Committee led a multi-year effort under the Great Lakes Legacy Act to characterize sediment contamination and identify target sites driving use impairments.

Approach/Activities. Between 2012-2016, US EPA GLNPO and MDEQ characterized sediment along 20 miles of the U.S. shoreline. Starting in the lower river and moving upstream the assessment was conducted in five segments, resulting in the collection of over 200 sediment cores and 700 sediment samples. Contaminants varied between segments but typically included polychlorinated biphenyls, polycyclic aromatic hydrocarbons, and heavy metals. Statistical analyses of the combined data from these assessments and comparisons with consensus based sediment quality guidelines (MacDonald et al., 2000) were used to identify locations with the highest contaminants. The data was then compared with known historical uses and discharges along the Detroit River shoreline to identify six target sites for potential remediation. The analysis also included consideration of how prevailing flow regimes could potentially have transported contamination from in-place historical activities to locations of contaminant deposits identified by these sediment assessments. The results of this effort were both expected and surprising.

Results/Lessons Learned. This presentation details the multi-level and international partnership, historic research, modeling, and database analysis that made it possible to identify zones of contamination throughout the river and will provide insights into how the assessment findings related to anticipated historical inputs while also yielding unanticipated results for areas that require further analysis and investigation. The culmination of this effort provides for a consensus driven strategic approach to addressing sediment contamination in a large bi-national urban waterway.