Status of benthic macroinvertebrate communities and toxicity of sediments in the Eighteenmile Creek Area of Concern, New York

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Background: The NYSDEC proposes a collaborative investigation with the USGS to evaluate the current condition of benthic macroinvertebrate communities and toxicity of bed sediments in the Eighteenmile Creek Area of Concern (AOC). Benthic-community data provided by the NYSDEC and sediment-toxicity data provided by the USGS from inside the AOC will be compared to similar data from non-AOC sites in Eighteenmile Creek or nearby reference streams (of comparable drainage areas) to determine if the benthos-BUI designation is appropriate or if the BUI could be removed in Eighteenmile Creek.

Approach: The general approach for the NYSDEC benthos BUI assessment of Eighteenmile Creek will be consistent with the approaches taken in previous benthos BUI assessments conducted by the NYSDEC. Test sites (AOC) will be compared to control sites (non AOC) to assess differences in community structures along with impacts to the NYSDEC multimetric index (Biological Assessment Profile (BAP)) and component metrics (NYSDEC SOP #208-12). Standard toxicity bioassays using *Chironomus dilutus* will be conducted by USGS to assess relative toxicity of bed sediments between AOC and control sites.

The field surveys will be done during the summer of 2014 and will consist of collecting benthic-community and sediment samples once from as many as 10 sites in Eighteenmile Creek and a nearby reference (control) stream. The sampling design will enable us to define the current conditions in depositional areas with statistically defensible metrics; i.e., with known levels of variability. At each site, a Petite Ponar sampler will be used to collect 5 replicate macroinvertebrate-community samples (NYSDEC SOP #208-12), and to collect a single composite sediment sample for toxicity testing. Bed-sediment size and organic content will be quantified by a NYSDEC subcontract laboratory using a split from the composite sediment-toxicity sample.

Acute (survival) and chronic (growth) toxicity tests will be conducted using *C. dilutus* follow standard USEPA-approved methods (ASTM, 2010; USEPA, 1994, 2000). Graphical and statistical analyses, including multivariate ordination methods, will be used to summarize current (baseline) sediment toxicity levels in the Eighteenmile Creek AOC. Results will also be used to quantify variability and to evaluate the suitability of the current benthos-BUI designation.

One report or peer-reviewed journal manuscript (paper) will be prepared during the spring/summer/fall of 2015 in collaboration with USGS staff. This report will summarize baseline sediment-toxicity levels and the condition of macroinvertebrate communities. These findings will be used to determine if the benthos-BUI designation is appropriate or if the BUI could be removed in the Eighteenmile Creek AOC. The draft report/paper will undergo USGS technical and editorial reviews and revision prior to submission for publication internally or via a peer-reviewed journal.

Provisional Budget: The NYSDEC analytical budget below is provisional and subject to internal review and approval before final consideration. Estimated cost is for the NYSDEC contribution only

Sampling Locations	Replicates/Location	Total Invertebrate Samples	Cost/ Invert Sample	Cost/TOC-Grain Size	Estimated Project Cost
10	5	50	$120	$225	
		Component Cost	$6,000	$2,250	**$8,250**

References:

ASTM. 2007. Standard Test Method for Particle-Size Analysis of Soils. . ASTM International, West Conshohocken, PA.

ASTM, 2010. Standard E1706 - 05, 2010, Standard Test Method for Measuring the Toxicity of Sediment-Associated Contaminants with Freshwater Invertebrates. ASTM International, West Conshohocken, PA.

Kahn, L. 1988. Determination of total organic carbon in sediment. United States Environmental Protection Agency, Region II, Edison, NJ.

SOP #208-12. Smith, A.J., D.L. Heitzman, J.L. Lojpersberger, B.T. Duffy, and M.A. Novak. 2012. Standard Operating Procedure: Biological Monitoring of Surface Waters in New York State. New York State Department of Environmental Conservation Albany, NY. 163.

USEPA, 1994. Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates. First Edition. US Environmental Protection Agency, Office of Research and Development, Duluth, MN.

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