

TMDL Analysis of East Fork Poplar Creek (EFPC), Oak Ridge, TN

This task in particular focused on (1) the development of a TMDL methodology for analysis of flow and load duration exceedance probabilities for key monitoring stations along Bear Creek and the EFPC from numerical simulations and observed data; and (2) the analysis of the relative contribution of point and non-point sources to mercury pollution in the watershed including the contributions from the floodplain of the two watershed creeks (EFPC and Bear Creek), the remobilization of stream sediments during stormwater events, the groundwater exchange with the creeks, and the transport within the creeks.

- Understand the relationship among impaired domains and evaluate the timing of impairment and potential source loading or other conditions contributing to impairment.
- Analyze relationships among multiple parameters or in-stream measures (e.g., contaminant concentration and flow, suspended sediments and contaminant concentration, hydraulic parameters such as Manning's number and contaminant concentration).
- Identify the nature of the impairments being addressed by the TMDL, perform TMDL analysis on EFPC and develop a TMDL methodology for analysis of flow and load duration exceedance probabilities for key monitoring stations along Bear Creek and the EFPC from numerical simulations and observed data.
- Provide analysis of the relative contribution of point and non-point sources to mercury pollution in the watershed including the contributions from the floodplain of the two watershed creeks (EFPC and Bear Creek), the remobilization of stream sediments during stormwater events, the groundwater exchange with the creeks, and the transport within the creeks.

- Modeling will support development of TMDLs to estimate source loading and evaluate loading capacities that will meet water quality standards. *(EFPC identified on Final 2008 303(d) List by TDEC as impaired waterbody not supporting designated uses due to contamination by mercury, PCBs, nitrates, and phosphates).*
- TMDL may be used to develop controls for reducing pollution from both point and nonpoint sources to restore and maintain the quality of water resources.

- Update of existing EFPC database with recent surface and groundwater level, water flow, temporal and spatial distribution of pollutant sources in soil, water, and sediments, and bioassessment data.
- Spatial and temporal analyses to identify spatial variations of Hg in EFPC water, shallow and deep soil layers, and stream bank and streambed sediments; and evaluate the timing of impairment, potential source loading or other conditions contributing to impairment. Effect of rainfall and runoff on Hg concentration in the creek was investigated.
- Comprehensive review of TMDL requirements for EFPC established by EPA and TDEC. Target Hg concentration for the EFPC was determined to be 51 ppt for recreational use based on TDEC regulations for surface waters, from which a "Loading Capacity" duration curve was developed.
- Development of a report including water quality criteria and TMDL target, water quality assessment and deviation from the TMDL target, water quality data analysis, and source identification. The report also includes information on the development of flow and load duration curves and load allocation analysis.
- Publication of scientific articles in peer-reviewed journals and conference proceedings based on the modeling results derived from this project work, including:
 - "Simulation of Flow and Mercury Transport in Upper East Fork Poplar Creek, Oak Ridge, Tennessee," Remediation Journal, Spring 2012.
 - Awarded Best Professional Poster, "Simulation of Flow and Mercury Transport in Upper East Fork Poplar Creek, Oak Ridge, TN", Waste Management Symposium 2011.
 - Awarded 1st place for poster "Groundwater Transport of Organic Compounds in Old Salvage Yard, Oak Ridge, TN" in Track 7 "Remediation", Waste Management Symposium 2012.