

# Sources of mercury in a contaminated stream—implications for the timescale of recovery

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DOE/Office of Environmental Management/Groundwater and Soil Remediation Program

## Objective

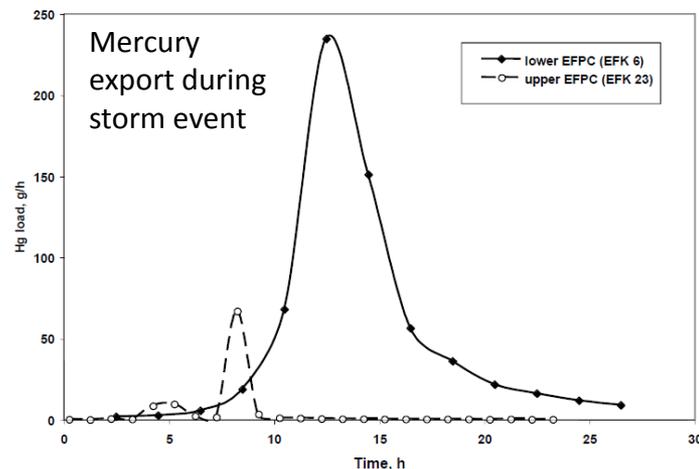
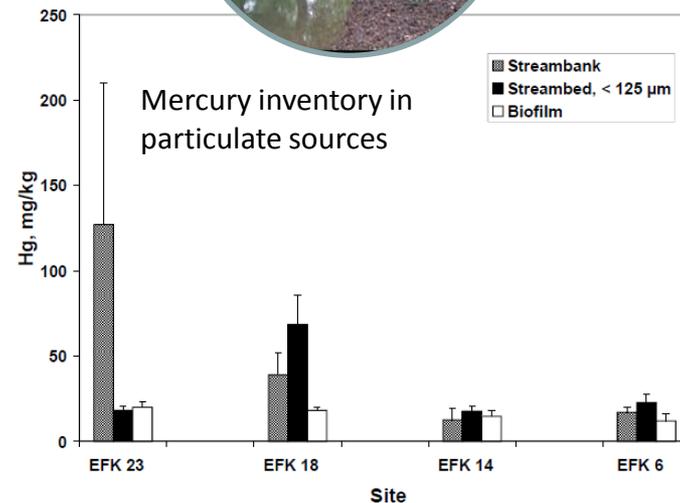
- Determine the relative importance of different mercury sources in sustaining elevated mercury flux in East Fork Poplar Creek during storm and base flow

## New Findings

- Soils and sediments account for >80% of the annual mercury export, with most export occurring during wet weather events
- Bank erosion and re-suspension of streambed particulates are the major sources maintaining high mercury export rates

## Significance

- Calculations suggest that the inventory of particle-associated mercury in the streambed can only sustain the estimated export rates for a few years in the absence of ongoing dissolved mercury inputs
- To prevent contamination from continuing for decades, remedial actions will have to control the headwater mercury source that sustains day-to-day base flow mercury concentrations and the riparian stream bank sources that generate most of the mercury export from the system.



Southworth, G, Mathews, T, Greeley, M, Peterson, M, Brooks S., Ketelle, D. 2013. "Sources of mercury in a contaminated stream—implications for the timescale of recovery" *Environmental Toxicology and Chemistry*. Vol. 32, pp: XX-XX (published online)

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## *Environmental Chemistry*

### SOURCES OF MERCURY IN A CONTAMINATED STREAM—IMPLICATIONS FOR THE TIMESCALE OF RECOVERY

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**Mercury contamination in East Fork Poplar Creek in Tennessee arises from dissolved mercury exiting a headwater industrial complex and residual mercury in the streambed and soil throughout the watershed downstream. The headwater inputs generate chronic base flow concentrations of total mercury of about 1000 ng/L, but most of the annual export of mercury from the system appears to originate farther downstream. Effective targeting of remedial efforts requires determining how long downstream sources might continue to contaminate the system following elimination of the headwater mercury inputs. Our calculations suggest that: 1) contaminated soils and sediments account for >80% of the annual mercury export from the entire watershed, with most export occurring during wet weather events; 2) bank erosion and re-suspension of streambed particulates are the major sources maintaining high annual export rates; and 3) the inventory of particle-associated mercury in the streambed was not large enough to sustain the estimated export rates for more than a few years. Our findings imply that in order to prevent waterborne mercury contamination in this system from continuing for decades, remedial actions will have to control the headwater mercury source that sustains day-to-day base flow mercury concentrations and the riparian stream bank sources that generate most of the mercury export from the system.**

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