THE IMPORTANCE OF CONCURRENT MONITORING AND MODELING FOR UNDERSTANDING MERCURY EXPOSURE IN THE ENVIRONMENT

Christopher D. Knightes, US EPA
960 College Station Road
Ecosystems Research Division
National Exposure Research Laboratory
Office of Research and Development
United States Environmental Protection Agency
Athens, Georgia 30605

ABSTRACT

Understanding the cycling processes governing mercury exposure in the environment requires sufficient process-based modeling and monitoring data. Monitoring provides ambient concentration data for specific sample times and locations. Modeling provides a tool for investigating the processes governing mercury exposure, providing insight into predictions of pasts and futures, and wildlife and human exposure risks. Both monitoring and modeling provide valuable information on their own, and one can be tempted to focus solely on one or the other. However, neither of these can be effectively used in isolation to address the mercury problem.

Mercury monitoring yields a temporal and spatial snapshot of mercury exposure, effectively informing investigators about concentrations at each location and time but cannot be easily extrapolated to how these concentrations change over time or throughout the area of interest. Mathematical modeling can provide time series and spatial distributions throughout the system, but currently no mercury model can be considered *a priori* predictive without monitoring data for calibration.

By designing sampling strategies for monitoring concurrently with developing a site-specific modeling structure, a more complete picture of mercury exposure can be drawn connecting data temporally and spatially and anchoring modeling results. The difficulty lies when monitoring is done first and then modeling is attempted after the fact. In this presentation the case is made for combining modeling with monitoring at the onset of an ecosystem investigation by demonstrating benefits associated with more tightly coupled monitoring and modeling programs.

KEYWORDS
Mercury, methylmercury, exposure, monitoring, process-based modeling