

## Ecosystem Management and Restoration Research Program (EMRRP) Technical Report

**Title:** Incorporating trace element signatures across a large riverscape to assess fish movement patterns

**Presenter:** Dr. Todd Slack

### **Abstract:**

Utilizing trace element or stable isotope analysis has proven to be an effective means to characterize early life history and large-scale movement patterns in fishes. Target species are assessed for analyte concentrations occurring in calcified hard structures and compared to signatures noted from associated watersheds. However, this approach assumes analyte absorption occurs in proportion to their availability, and success relies heavily on the ability to identify unique water chemistry signatures between neighboring watersheds within a defined study area. Our objective was to establish a trace element signature profile for major tributaries occurring within the Mississippi River Valley (MRV). Water samples were obtained from 49 stations and evaluated for the presence and relative concentration of Barium, Strontium, Calcium, Iron and Lithium. Analyte concentrations (mg/L) varied across the sampled stations although Lithium occurred at only four stations, primarily in the upper reaches of the MRV, and provided little discriminatory use. Concentrations of Iron and Calcium depicted an inverse relationship with Calcium having higher concentrations in the upper 1/3 of the MRV while Iron typically had higher concentrations in the lower 1/3. Ratios of Ba/Ca and Sr/Ca (mmol/mol) exhibited the greatest utility for delineating river-specific or reach-specific signatures.