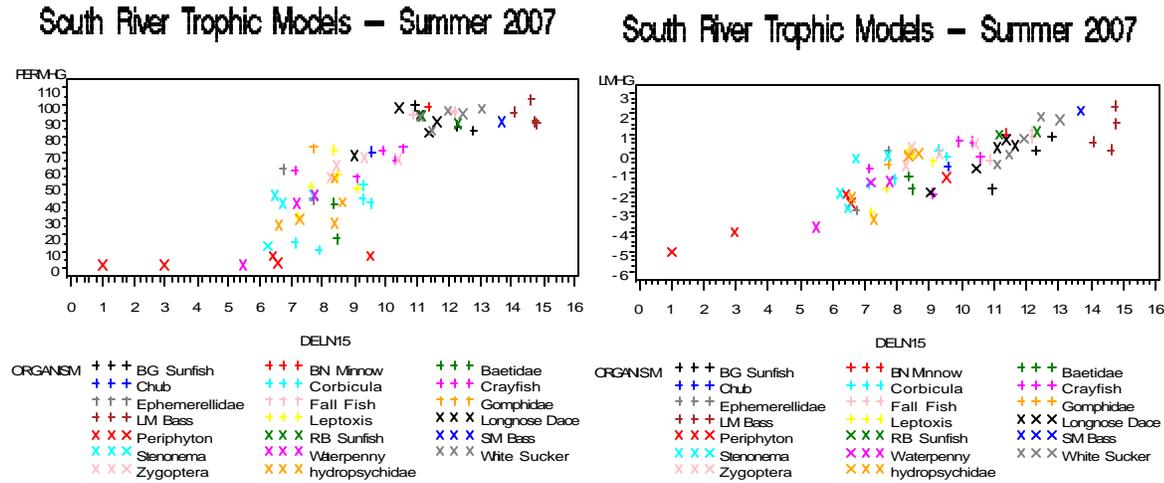


trophic position until reaching essentially 100% in fish species such as largemouth and smallmouth bass, and white suckers (left figure below). Statistical tests suggested that methylmercury biomagnifies but inorganic mercury (i.e., total mercury minus methylmercury) biodilutes. True to predictions by members of the science advisory panel last year, methylmercury concentrations resulted in quantitatively useful models as evidenced by the graph of the natural logarithm of methylmercury concentrations (:g/g dw) versus * 15N (below on right).



Predictive models based on methylmercury were produced and are recommended in river management activities. The best model included trophic position (* 15N) and location (river mile),

$$\text{Methylmercury}(ug / g \text{ dry weight}) = e^{0.265} e^{-5.252+0.450(d^{15}N+0.054(\text{River Mile}))}$$

The regression (0.78) and prediction (0.76) r² values were judged acceptable for the intended purposes of the model, that is, as a quantitative tool for exploring remediation scenarios (including natural attenuation). As one example of potential predictions, we estimated that procedurally-defined periphyton total mercury concentrations need to decrease to approximately 0.6 :g/g dw in order for the average largemouth bass total mercury concentration to decrease to 0.5 :g/g wet weight. (Based in the 2005/2006 survey, current periphyton concentrations above and below the past mercury source are approximately 0.057 and 7.85 :g/g dw (Grottoes Town Park), respectively.)

Summary of 2008 Sampling Progress

Samples of fine material settling in traps, sediment fines, periphyton from natural surfaces, and periphyton from artificial substrates were taken in triplicate during two time periods at six sites from Constitution Park to Grottoes City Park. Such materials were collected in riffle and pool microhabitats; however, funding might restrict analysis to only pool samples. Samples are processed and will be sent for isotope and mercury analyses shortly. The results will allow us to relate concentrations in sediment fines or settling solids to those in periphyton. Using the example prediction above, one could then predict the sediment fines or settling solids mercury concentrations corresponding with 0.6 :g/g dw in periphyton.

Summary of Tentative 2009 Plans

Initial plans are to extend trophic sampling and modeling onto the floodplain with emphasis on movement of mercury to screech owls and sharp-shinned hawks. The owl consumes significant numbers of small mammals and the hawk consumes primarily songbirds.

