

South River Science Team Activities

August 28, 2006 Data Review



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Food Web and South River Biota Studies

South River Earthworm Survey

- Dr. Dean Cocking, James Madison University

Periphyton of the South River Watershed, Virginia: Mercury Accumulation, Bioavailability and Transformation

- Dr. Michael C. Newman, VIMS College of William and Mary

Mercury Biomagnification Models of South River : Aquatic and Floodplain

- Dr. Michael C. Newman, VIMS College of William and Mary

Fate and effects of mercury on South River avian populations

- Dr. Daniel A. Cristol, College of William and Mary

South River Earthworm Survey

Objectives:

- Contribute to an understanding of potential food web interactions in the floodplain
- Understand extent to which floodplain mercury bioaccumulates in earthworms
- Evaluate the relationship between total Hg and MeHg concentrations in earthworms and paired soil samples

Progress:

- Criteria for selection of 10 study sites
 - Previously sampled locations
 - Include site upstream of historical mercury source
 - vegetated plots with minimum recent disturbance
- Test of Earthworm Collection and Depuration Procedure (April, 2006)

Path Forward:

- Finalize selection of sites and lay out grids for sampling
- Collect earthworm and soil samples
- Evaluate Data



Periphyton of the South River Watershed, Virginia: Mercury Accumulation, Bioavailability and Transformation

Objectives:

- Describe periphyton and define and quantify Hg and MeHg in periphyton in the South River
- Develop baseline information on $\delta^{15}\text{N}$ isotope signature

Progress:

- Intensive survey of periphyton (40 locations; June, 2005)
 - Define the spatial distribution of mercury in periphyton
 - Assess the correlations between these mercury concentrations and covariates
 - Determine $\delta^{15}\text{N}$ isotope signature
- Focused survey at to examine MeHg in periphyton (5 locations; July, 2005)
 - Define spatial distribution of MeHg in Periphyton

Results:

- River mile (distance from historical source) was the dominant factor in determining Hg and MeHg concentrations in periphyton
- Strong $\delta^{15}\text{N}$ isotope signature associated with waste water treatment plant

Mercury Biomagnification Models of South River: Aquatic and Floodplain

Objectives:

- Development of quantitative models of mercury biomagnification based on trophic position ($\delta^{15}\text{N}$)

Progress:

- Collection of tissue samples for $\delta^{15}\text{N}$ analysis
 - Aquatic biota from ecostudy
 - Insects from ecostudy and avian study
 - Avian tissue samples

Path Forward:

- Continue tissue collection and analysis for model development

Fate and Effects of Mercury on South River Avian Populations

Objectives:

- Determine effects of mercury in South River avian populations
 - Reproductive success
 - Physical Health
 - Community effects (species richness)
 - Quantify mercury availability to avian populations

Progress:

- First Year:
 - Reproductive and health data on tree swallows and kingfishers
 - Tissue samples from additional species
 - Population Surveys
- Second Year (current)
 - Survival and reproductive success on tree swallows and kingfishers
 - Diet studies on tree swallows, kingfishers, wrens, bluebirds and mallards
 - Tissue samples from additional species (including mallards)
 - Post-fledging study on blood and feather Hg of bluebirds
 - Collection of dietary and tissue samples to support development of $\delta^{15}\text{N}$ trophic models



Fate and Effects of Mercury on South River Avian Populations (cont.)

Path Forward:

- Complete 2006 field season
- Data Analysis to determine if long-term health and reproductive effects exist
- Integration of dietary study with $\delta^{15}\text{N}$ trophic models

Conceptual System Model Review - HydroQual, Inc.

Objectives:

- Refine the South River CSM by:
 - Identifying potential sources of Hg to the aquatic system
 - Identifying potentially important processes for migration and exposure pathways to the aquatic system
- Identify data needed to better define sources or pathways to the aquatic system
- Recommend improved or new methodologies for collecting data

Conceptual System Model Review

Scope

- Project Kick-off meeting
- Task 1: Data Review and Analysis of reports and database contents
- Task 2: Hypothesize Potential Source and Exposure Pathways
- Task 3: Evaluate Potential Source and Exposure Pathways
- Task 4: Identify Data Gaps and Recommendations
- Draft Report for Review
- Final Report

Schedule

August 4
Weeks 1 to 16

Weeks 15 through 18

Weeks 17 through 23

Weeks 23 through 26

Week 28

Week 34