

**South River Science Team  
Expert Panel Meeting  
October 5-6, 2010**

**Minutes**

**Meeting Format:**

The format of this meeting included sessions that explain where we are and where we are going. Session topics were guided by expert panel feedback from last year and designed to help answer the following questions for this year. Those questions were:

1. What critical gaps remain in our understanding of the South River aquatic environment that specifically impact remedial options selection and implementation?
2. What strengths and weaknesses do you see in our current programs for innovative watershed management & remedial technology options?
3. What critical gaps remain in our understanding of the fate & dynamics of Hg in the terrestrial environment adjacent to the South River?
4. What critical gaps remain in the identification and communication of potential human exposure?

**Day 1 – Tuesday, October 5, 2010**

**Welcome and Introductions:** *Don Kain, DEQ*

**Introduction of New Expert Panel Members:** *Mike Liberati/Ralph Stahl, DuPont*

- Two new panel members:
  - Will Clements, Colorado State University
  - Dave Hirschman, Center for Watershed Protection

**Questions to Guide Expert Panel Feedback & Meeting Format:** *Jim Dyer, DuPont*

- See slides
- **Path forward:**
  - *In the future, prepare and distribute briefing papers.*

**Review 2009 Expert Panel Feedback:** *Jim Dyer, DuPont*

- See slides

**Mercury in the Aquatic Environment:** *Greg Murphy, URS, Session Lead*

**Conceptual Pathway & Exposure Model:** *Reed Harris, RHE LTD.*

- See slides
- **Path forward:**
  - *Consider uncertainty analysis for the abiotic portion of the conceptual pathway and exposure diagram.*
  - *Consider impact of “availability of Hg for methylation” on IHg and MeHg flow through the abiotic diagram.*
  - *Consider nutrient spiraling methodologies to help understand MeHg and IHg cycling.*
  - *For conceptual exposure diagrams, document how numbers were derived, including assumptions.*

**2010 Ecological Study:** *Greg Murphy, URS*

- See slides
- Total of 40 fish species collected in South River. Fish and benthic taxa richness increased since 1970; however upper South River reference site remained stable.
- Stomach content analysis indicated bass mainly consumed fish and crayfish, while redbreast sunfish and forage fish mainly consumed aquatic insects.
- Total of 25 bass recaptured. One of the recaptures moved more than 10 miles, while another moved 3 miles between the spring and summer sampling events.
- *In situ* uptake experiment with crayfish indicated greater MeHg uptake via diet, while mayfly had greater MeHg uptake via water. Both taxa had greater THg uptake via diet.
- Sediment toxicity tests indicated no response in invertebrate growth or survival with increasing MeHg concentrations in sediment.
- **Path forward:**
  - *Evaluate summer data for fish populations/communities, stomach contents, and tissue*
  - *Assess summer data for in-situ uptake experiment*
  - *Evaluate benthic community data for sediment quality triad*
  - *Assess results of field microcosm study when received (results in December)*
  - *Simulate fish MeHg bioaccumulation dynamics using BASS model*

**Aquatic Trophic Model:** *Mike Newman, VIMS*

- See slides
- Any remediation would need to reduce bioavailable mercury in fine sediments or periphyton by 95% in order to get most bass below Hg of 0.3 to 0.5 ug/g.
- MeHg bioaccumulation occurs faster in floodplain than in river.

**Remedial Options and Watershed Management:** *Nancy Grosso, DuPont, Session Lead*

**Engineering Options Task Team:** *Nancy Grosso, DuPont*

- See slides
- Conceptually design and cost out an amendment pilot
- Conduct survey of eroding banks and sources of loading
- Explore opportunities to partner with DCR and DEQ to achieve sediment/bacteria TMDL while reducing bank Hg loading
- Support development of mesocosm test system for experimental manipulation at SR
- Develop a program to identify the significant Hg pools
- Bank Stabilization Pilot: Collect and evaluate data.

**Bank Stabilization Pilot Monitoring:** *Ceil Mancini, URS*

- See slides
- Findings are preliminary based on limited data collected year-1, post stabilization; additional monitoring is needed to confirm findings
- Post-stabilization sediment THg concentrations reflect the THg concentrations on particles transported by the river rather than bank soil.
- Porewater likely influenced by older soils.
- IHg on particles may continue to be available for methylation for several years or more.
- Porewater is heterogeneous spatially; movement of station location might be a factor.
- Transplanted clams in near-bank storage zone habitat had substantial decrease in MeHg uptake compared to pre-construction data from 2009, but was not statistically significant.
- Transplanted clams in transport habitat had higher MeHg uptake than 2009.
- Path Forward:

- *Continue monitoring to further assess efficacy of bank stabilization option.*

**Methylation Demethylation Task Team:** *Erin Mack, DuPont*

- See slides
- Created table of “turnable knobs” and literature references.
- Doing literature review of demethylation process.
- Created table on nutrient effects on fish Hg and monitoring decrease loading of phosphorus from Waynesboro STP.
- Developing testable hypothesis to explore factors controlling net MeHg production in the South River.
- **Path Forward:**
  - *Consider adding a terrestrial component to the methylation/demethylation remedial options task team.*

**Trophic Modification Task Team:** *Mike Liberati, DuPont*

- See slides
- Discussing two broad options:
  - Increase the recreational opportunity to catch more fish, larger fish, and /or safe to eat fish.
  - Manipulate the aquatic system to promote production of safe to eat fish.
- Working on BASS model predictions for stocked fish and river temperature survey to find areas favorable to trout stocking.

**Mercury in the Terrestrial Environment:** *Anne Condon, F&W, Session Lead*

**Terrestrial Trophic Model:** *Mike Newman, VIMS*

- See slides

**Toad Studies Overview:** *Bill Hopkins, VA Tech*

- See slides

**Bird Studies Overview:** *Dan Cristol, William & Mary*

- See slides
- Elevated Hg persists for hundreds of meters away from river
- Individuals vary in Hg accumulation even on identical diets (finches)
- Starlings had lower Hg than finches.

**Human Exposure and Outreach:** *Annette Guiseppi-Elie, DuPont, Session Lead*

**Exposure Pathways That Have Been Evaluated:**

*Annette Guiseppi-Elie, DuPont*

- See slides
- Fish, recreational use of river, potential drinking water, soil contact.

**Exposure Pathways Currently Being Evaluated and/or Proposed for Evaluation:**

*Betty Ann Quinn, U.S. EPA*

- See slides
- Deer: collected two deer, looking to get more hunter collected samples this fall. Also examining data collected on turtles, squirrels, muskrats and waterfowl.
- Livestock: Putting together workplan for beef and dairy.
- Additional floodplain work: revisiting areas over 23 ppm and floodplain ponds.

**Outreach Activities:** *Mike Liberati, DuPont*

- See slides
- Future work:
  - Increase efforts to raise fish consumption advisory awareness in minority communities
  - JMU-The Institute for Innovation in Health and Human Services
- Blue Ridge Area Health Education Center.

**Day 2 – Wednesday, October 6, 2010**

**Research Project and Field Study Updates**

**Geomorphology Update:** *Jim Pizzuto, Univ. of Delaware*

- See slides
- It will take about two decades to rework fine-grained sediments of the South River's hyporheic zone in areas of sand-cobble bed material.

**Univ. of Waterloo Research Program:** *Carol Ptacek, U. of Waterloo*

- See slides
- Not all biochar same.
- All types effective at Hg removal

**DGT Probe Investigations:** *Danny Reible, UT Austin*

- See slides
- DGT should respond to dissolved and fine colloidal Hg.
- Results much higher than expected for THg.
- Higher DGT THg values more consistent with observed fluxes to river.

**Exponent Sediment & Biochar Updates:** *Rich Landis & Bill Berti, DuPont*

- See slides
- Biochar is a stable, carbon-rich charcoal produced by thermal decomposition of organic material under low/no oxygen at relatively low temperatures. Investigating making biochar and using it to reduce bioavailability of Hg.
- Sediment is an activated charcoal which can also be used to reduce bioavailability
- Both will be investigated at Waterloo.

**Use of Experimental Stream Mesocosms to Assess Mercury Uptake in Biota:** *Robert Brent, JMU*

- See slides
- Mesocosm provided relatively inexpensive, useful tool for experimentation.
  - For periphyton Hg uptake, provided reasonable surrogate to the river.
- Water born Hg played a much larger role in biological uptake than sediment derived Hg.
- Advective flow through contaminated sediment didn't increase biological uptake.

**Otter & Mink Update:** *Cecil Mancini, URS*

- See slides
- Two mink and no otter observed on South River during the spring survey. One otter observed on S.F. Shenandoah River.
- No mink or otter were filmed on trail cameras deployed where mink were sited.
- Piscivorous mammals are present in the watershed, but owing to the noncontinuous distribution of suitable habitat, sightings are patchy, and most information is anecdotal.
- VDGIF indicated South River and associated flood plain is not optimal habitat for piscivorous mammals

since the river lacks sufficient subsurface structure, and continuous pools and well developed riparian edges where mammals can hunt and rest.

- **Path Forward:**

- *Cameras will continue to be monitored*
- *Final piscivorous mammal survey will be performed in the Fall*

**Wren Study Update:** *Anne Condon, U.S. Fish & Wildlife Service*

- See slides
- Preliminary results show clutch size slightly larger in contaminated area, however brood and fledging size smaller.

**Watershed Management Model:** *Wayne Landis, Western Washington U.*

- See slides

**Panel Feedback and Discussion**

- Experts will be giving feedback in written statements in near future.

**Feedback on Meeting Format**

- January 11, 2011 (Tuesday)
- webmeeting