

South River Science Team Meeting - January 2009

Expert Panel Feedback and Discussion

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Background

Eight questions were submitted to the 4 expert panel members (Turner, Mason, Newman & Bigham) as well as Reed Harris for their consideration and thoughtful responses.

Replies were received from Turner and Harris



Ralph Turner
Comments Oct 08 Mtg



Reed Harris
Comments Oct 08 Mtg

Questions to Expert Panel



Microsoft
Word Document

1. BFC and/or close-interval sampling to help close mass balance?
2. Greatest missing component of SRST effort?
3. Overlooked significant source Hg to water column?
4. Ways to reduce measurement & modeling errors w.r.t. loading estimates?
5. How best to synthesize information to keep uncertainty in foreground?
6. Probability that 99% reduction in THg is achievable and would result in lifting of fish consumption ban?
7. How should resources be allocated (TMDL vs. elegant solution vs. ecological/human health)?
8. Can bank stabilization pilot help answer critical questions regarding Hg fate, transport, and uptake?

Closing the Mass Balance

- BFCs not seen as solution to closing Hg mass balance
 - methodological and technical limitations requiring solution
 - better used for manipulative research where relative comparisons are made vs. absolute flux rates
 - proceed with caution (cost-benefit analysis)
- Close-interval sampling by itself not solution either
 - call for improved discharge measurements (area-velocity) to reduce uncertainty in reach-wide Hg load
 - mass balance should be expanded to include total, filtered, and particulate Hg

Where Should Team's Efforts be Directed?

- No obvious gaps in scope of activities; strong team in place
- Better balance needed
 - More focus on physical-chemical; less on ecological and biological
- Much effort has focused on sources of THg & MeHg to water column
 - increased focus on delivery of THg to sites of methylation, and what can be done to block this conversion
 - better understanding of transfer of MeHg from sediments to the lower food web. Sediment source of MeHg or water column?
- Increased project coordination
 - essential studies/no redundancies/no gaps
 - integrate results into consensus interpretation

Overlooked Hg Source to Water Column?

- Bedrock GW entering stream bottom needs to be ruled in or out as a significant source of Hg to water column
 - origin
 - Hg concentration
 - flow distribution entering river

Ways to Reduce Measurement & Modeling Errors w.r.t. Loading

- Error propagation on order of 30% just due to analytical and discharge measurement uncertainties
 - limit loading calculations and mass balance estimates to periods of extended stable river discharge
 - consider tracer studies over limited reach lengths of 100-1000 m
 - more intensive velocity profiling
- Annual sampling of young prey fish recommended to establish spatial and temporal trends
 - difficult to infer statistically valid temporal trends when sampling large fish every few years

How Best to Synthesize Information to Keep Uncertainty in Foreground?

- Mass balance approach as good as any for Hg loading
 - potential flaw in ignoring partitioning to TSS and sediments
 - field measurement + first principles modeling good combo
- Good point in program to pause and revisit conceptual model for Hg cycling and methylation
 - document overall characterization; identify key insights and hypotheses
 - summary graphs and tables with confidence intervals for sources and sinks for both water column and sediment
 - utilize Monte Carlo simulations, where appropriate

Probability That 99% Reduction in Total Hg Inputs Will Result in 0.3 ppm Fish Tissue?

- Very unlikely (< 10%) absent elegant solution
- No precedent for optimism
- Unknown impacts of nutrient and sediment TMDLs on methylation
- Need careful evaluation of link between THg reductions, MeHg in fish tissue, and proposed remedial actions
 - are there trophic pathways that deliver MeHg through lower food web to fish via sediments, bypassing the water column?
 - will bank stabilization shut down these pathways?

Current Balance of Resources ok?

- More resources directed toward elegant solution(s)
 - doubts expressed about impact of reducing THg particulate load on MeHg in fish
 - not currently on a trajectory for success in eliminating fish consumption advisory
 - more resources directed to reducing methylation efficiency in system

Bank Stabilization Pilot

- Consider mesocosm experiment to change dietary MeHg exposure to fish
- Is pilot in the right spot and at the right scale?
- Design pilot for temporary bank stabilization to reduce cost or expand scale
 - sprayed cement or physical binding?