Ecological Study Update: June 2012 SRST Meeting

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Outline

- Ecological Study Timeline
- Introduce the objective of the Ecological Study Final report
- Describe the contents and major findings of the Ecological Study
- Present the conclusions of the Ecological Study

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Ecological Study Timeline

- June 2005:
  - Consent Decree between DuPont and NRDC
  - Presents framework for Ecological Study
- March 2006:
  - Field work begins
- December 2011:
  - Field work completed
- May 2012:
  - Draft Ecological Study report sent to NRDC
- July 2012:
  - Consultation with NRDC
- August 2012:
  - Final report submitted to NRDC
- August 2013:
  - Remediation proposal submitted

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Objective of the Ecological Study Final Report

- Answer four questions posed in the Consent Decree:
  1. Why has mercury remained higher than previously predicted in fish tissue in certain areas?
  2. How is bioavailable mercury getting to the river ecosystem?
  3. How is mercury getting into the tissue of fish and aquatic animals?
  4. Are there specific mercury pathways that significantly contribute to mercury levels in fish tissue?

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Ecological Study Report Contents

- Environmental Setting/Phase 1 Findings
- Chemistry
- Biology
- Data Integration
- Findings
- Uncertainties
- Conclusions

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Chemistry

- Mercury in surface water, sediment, and pore water increase between RRM 0 and RRM 10.
- The majority of mercury is loaded in the upstream reach (RRM 0 to RRM 10).
- Floodplain soil THg declines with distance downstream.
- River banks have high THg; some banks are eroding.
- THg in soil and sediment is bioavailable.
- Mercury methylation is widespread.

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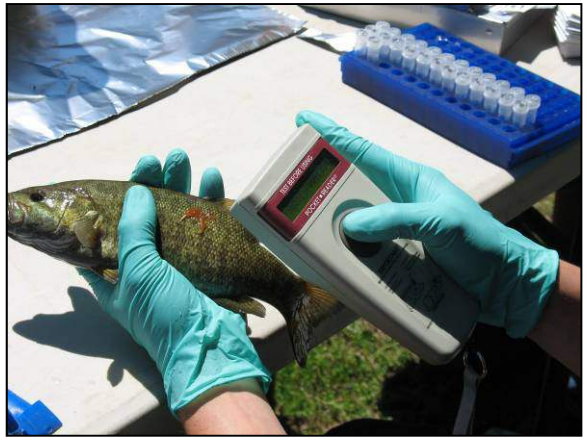
Biology

- MeHg concentrations in biota generally increase with distance downstream.
- Uptake rates of biota vary by trophic position and feeding behavior (i.e., aqueous vs. dietary exposure).
- Little or no evidence that mercury exposure affects benthic invertebrate or fish communities.



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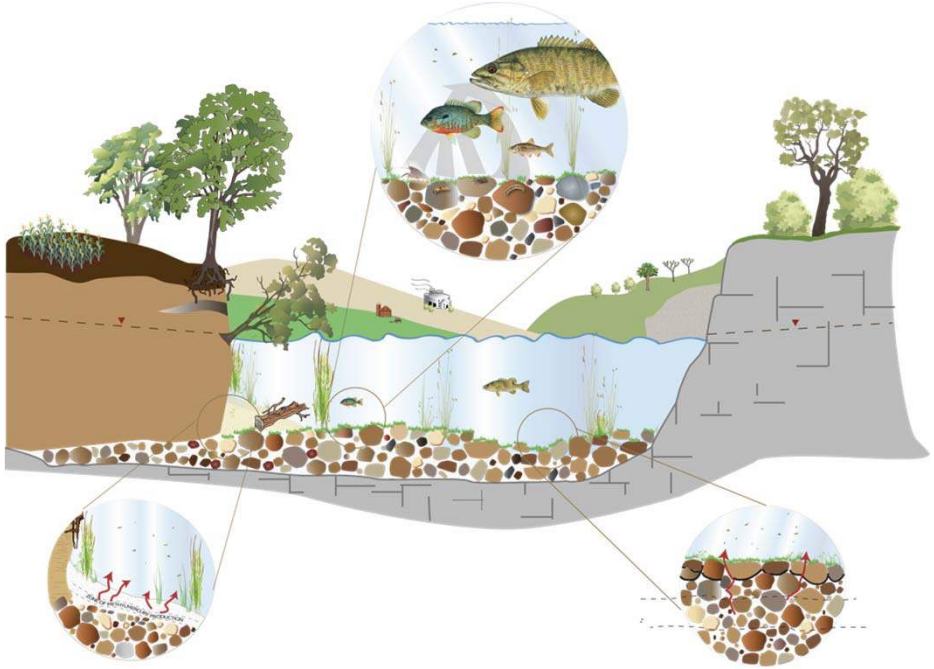
Data Integration

- Statistical Models
- Invertebrate and Fish Responses to Mercury
  - Sediment Quality Triad
  - Field (in situ) Microcosm Study
  - Integrated Assessment of Invertebrate and Fish Response to Mercury
- Conceptual System Model
- Relative Risk Model



Conceptual System Model Schematic

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Findings

1. Why has mercury remained higher than previously predicted in fish tissue in certain areas?
2. How is bioavailable mercury getting to the river ecosystem?
3. How is mercury getting into the tissue of fish and aquatic animals?
4. Are there specific mercury pathways that significantly contribute to mercury levels in fish tissue?

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1. Why has mercury remained higher than previously predicted in fish tissue in certain areas?

- Inputs of inorganic mercury have not been mitigated by natural attenuation:
  - Geomorphic constraints
  - Low sedimentation rates
- Original assessments may not have understood that small amounts of inorganic mercury in a system can support high concentrations of methylmercury in fish.

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2. How is bioavailable mercury getting to the river ecosystem?

- Erosion of bank soils
- Transport of mercury from particle-associated mercury stored in sediment

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3. How is mercury getting into the tissue of fish and aquatic animals?

- Input of inorganic mercury from soil
- Methylation of inorganic mercury:
  - Widespread
  - Diverse microbial community
- Biomagnification

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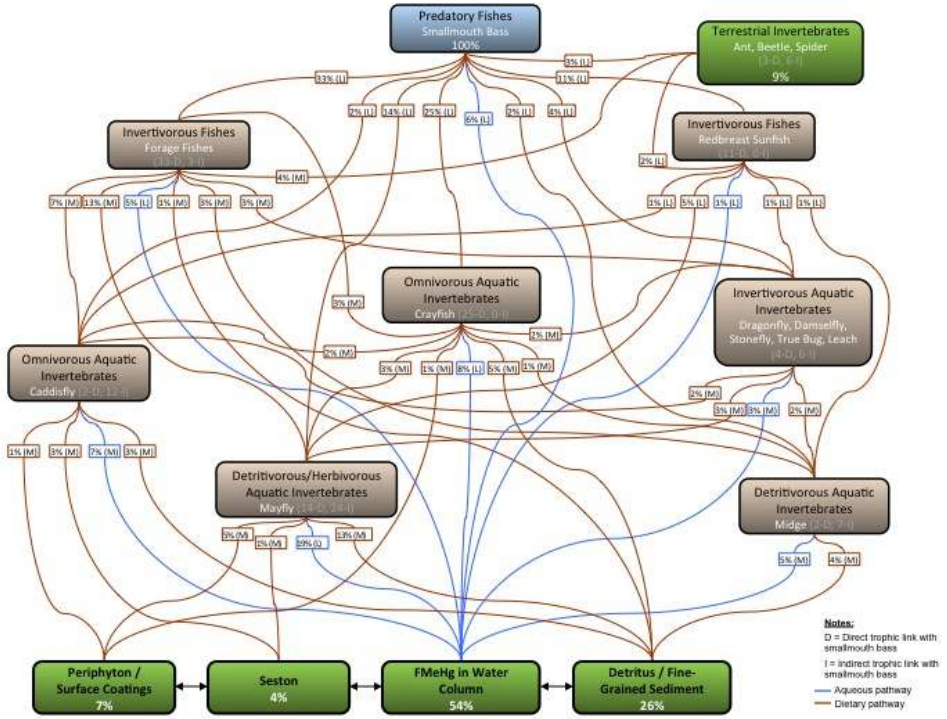
4. Are there specific mercury pathways that significantly contribute to mercury levels in fish tissue?

- Dietary uptake is important, particularly for high trophic level fish
- At the base of the food web, aqueous exposure and consumption of particles is important for methylmercury uptake



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Uncertainties

- Climate change
- Landscape alteration
- Regulatory changes
- Advances in science and technology

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Conclusions

- There may be remedial options that are safe, effective and reasonably necessary
- An adaptive management approach will be used to address contamination
  - Structured and iterative process
  - Combines moderate scale pilot studies with monitoring
  - Future actions based on results of pilot studies

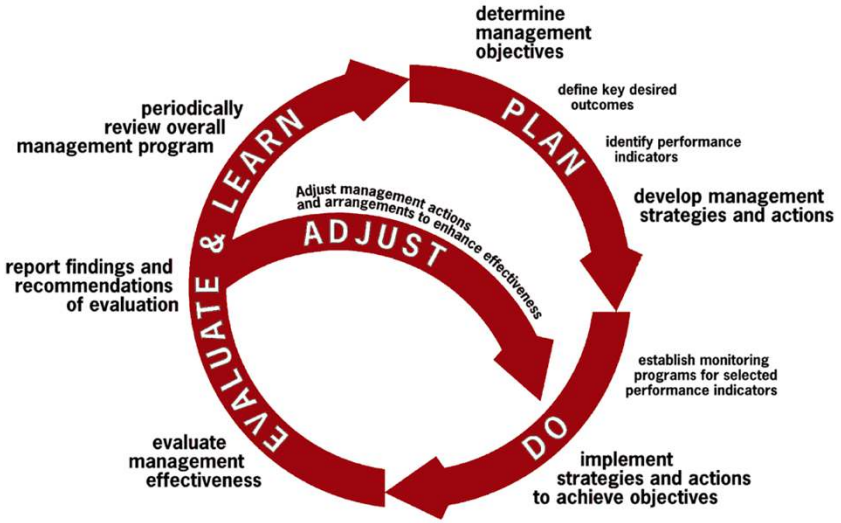

Image: http://www.cmar.csiro.au/

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