

AOC 4 Long-term Monitoring Program Assessment

Former DuPont Waynesboro Site, Virginia
Area of Concern (AOC) 4



January 24, 2018



Agenda

- Background
- Objective
- Approach
- Program Assessment
- Path Forward



Background of the LTM Program

- Established baseline conditions consistent with historical investigations and as outlined in Remediation Proposal to NRDC
- Current program exceeds typical RCRA requirements
- Adaptive management framework



Objectives

- Optimize LTM Program
- Focus on sentinel/indicator media to monitor response to remediation under RCRA



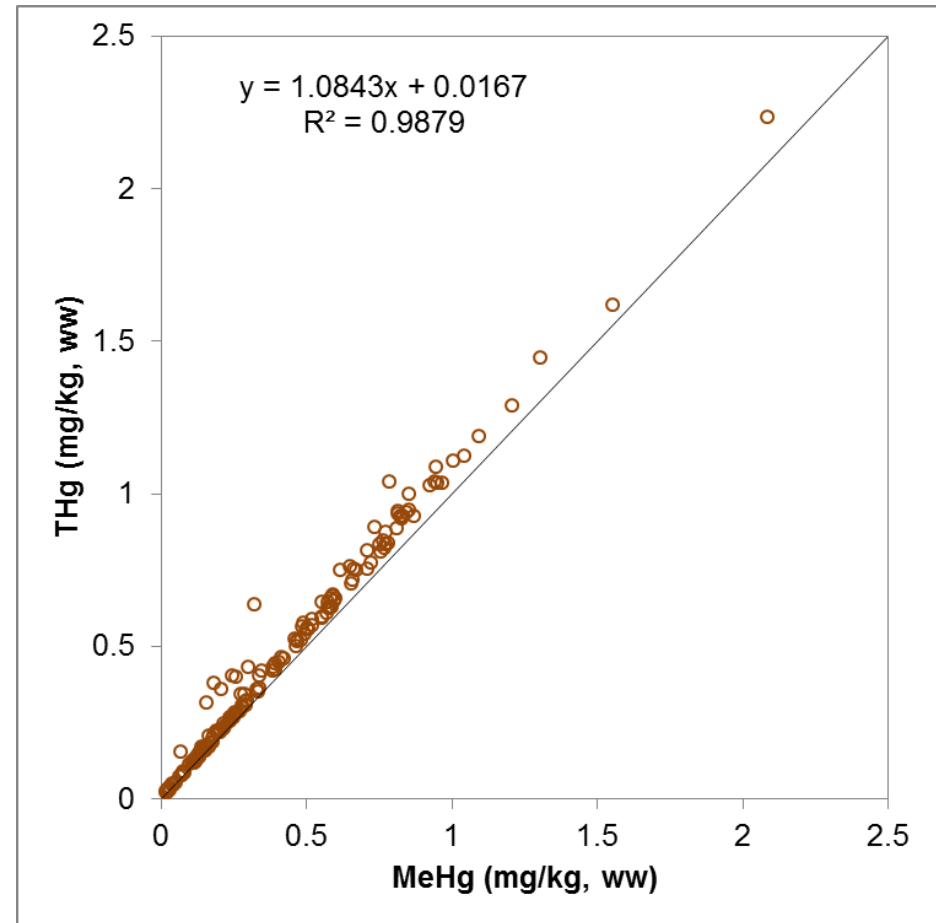
Approach

- Assess all LTM data to identify redundancies or monitoring media that do not satisfy LTM Program data quality objectives
 - THg/MeHg regressions
 - Relationships between media
 - Duplicative data
- Identify potential program modifications

THg-MeHg Relationships

- Predictive THg-MeHg relationships
 - Mayfly ($R^2 = 0.75$)
 - YOY SMB ($R^2 = 0.99$)
 - Wolf spider ($R^2 = 0.96$)
 - Snapping turtle ($R^2 = 0.95$)
- Recommend reducing analytes to THg only
- Similar approach has been implemented for Adult Bass

Example: YOY Smallmouth Bass



Adult Bass

Approach

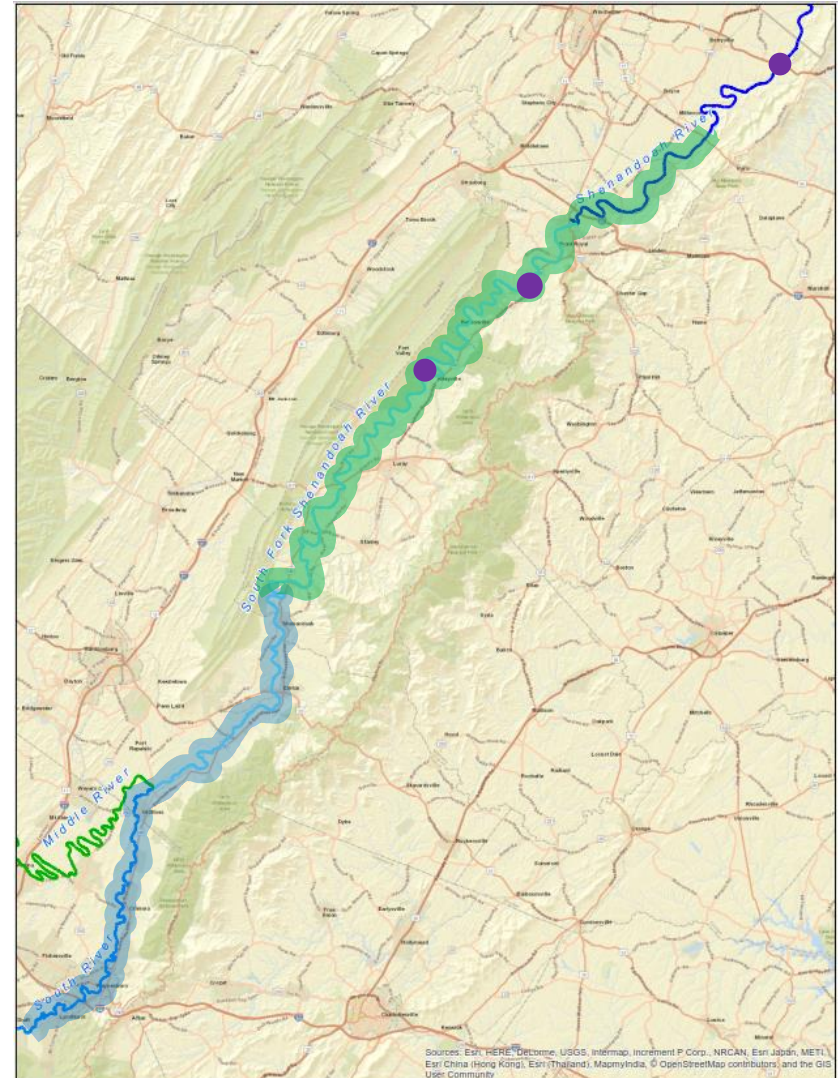
- Evaluated data for spatial and temporal differences using ANOVA/ANCOVA

Findings

- Limited seasonal differences
- Spatial patterns in THg data (i.e., SR > SFS > SH)

Recommendations

- Limit collections to **annual** and **5-year** intervals
- **Synchronize with VDEQ100-Year Monitoring Program**



Snapping Turtle

Approach

- Compared turtle and adult bass concentrations using linear regression

Findings

- THg: Significant relationship with adult bass ($p < 0.05$)
- Likely to display a slower response to interim measures

Recommendations

- Reduce sampling frequency to 5 years, co-located w/ modified fish sampling reaches (potential to eliminate)



www.moziru.com

Carolina Wren



www.aardvarkmcleod.com

($p < 0.05$)



prepperswill.com

($p < 0.05$)



www.audubon.org

Findings

- Strong relationship from aquatic to terrestrial food web
- THg in Mayfly → Wolf spider → Carolina wren

Recommendations

- Wolf spider – annual collections on SR; every three years for SFS
- Reduce Carolina wren monitoring to every three years

Mayflies

Findings

- IHg: No significant differences between seasons/years
- MeHg: Significant seasonal/annual differences

Recommendations

- Reduce monitoring to spring only



Benthic Community

Findings

- Natural variability
- Likely slow to respond to remediation

Recommendations

- Reduce monitoring frequency to every 3 years
- Utilize multi-metric indices (e.g. IBI approach)



Epilithic Periphyton

Findings

- IHg: Redundant with sediment data (IHg, $R^2=0.84$)
- MeHg: Highly responsive to seasonal conditions

Recommendations

- Eliminate from the LTM Program



Earthworm and Soil

- Representative of terrestrial exposure, though not likely to respond to current Interim Measures
- Recommend elimination from the LTM Program



Mallard Ducks

Approach

- Compared mallard data to adult bass and turtle THg concentrations

Findings

- THg: No significant correlation
- Data highly variable
- Life history introduces uncertainty
- Not likely to respond to Interim Measures

Recommendations

- Eliminate from LTM Program



Surface Water

- Opportunity to harmonize VDEQ 100-year surface water monitoring with LTM program
 - Reduce constituents
 - Add MeHg
 - Add monitoring in April



Summary of Recommended Modifications

Media	Reduction			Elimination
	Analyte (THg only)	Frequency	Locations	
Mayfly	✓	✓		
YOY SMB	✓			
Wolf Spider	✓			
Carolina Wren		✓		
Adult Bass		✓	✓	
Snapping Turtle	✓	✓	✓	
Benthic Community		✓		
Pebble Count		✓		
Epilithic Periphyton				✓
Earthworm				✓
Floodplain Soil				✓
Mallard Duck				✓

Note: Modifications as outlined above will result in an annual cost reduction of ~ \$300,000

Summary of Rationale to Eliminate Media from LTM

— Epilithic Periphyton

- IHg: Redundant with sediment data ($R^2 = 0.88$)
- MeHg: Highly responsive to seasonal conditions

— Floodplain Soil & Earthworms

- Not likely to respond to Interim Measures

— Mallard Duck

- Poor correlation with other media
- Variability in data; migratory
- Not likely to respond to IRM

Path Forward

Task	Date
Memo of Recommendations	February 2018
Revise LTM Plan	April 2018
Implement Revised LTM Program	2018 Monitoring





Thank You

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