

Phase II 2011 Ecological Study

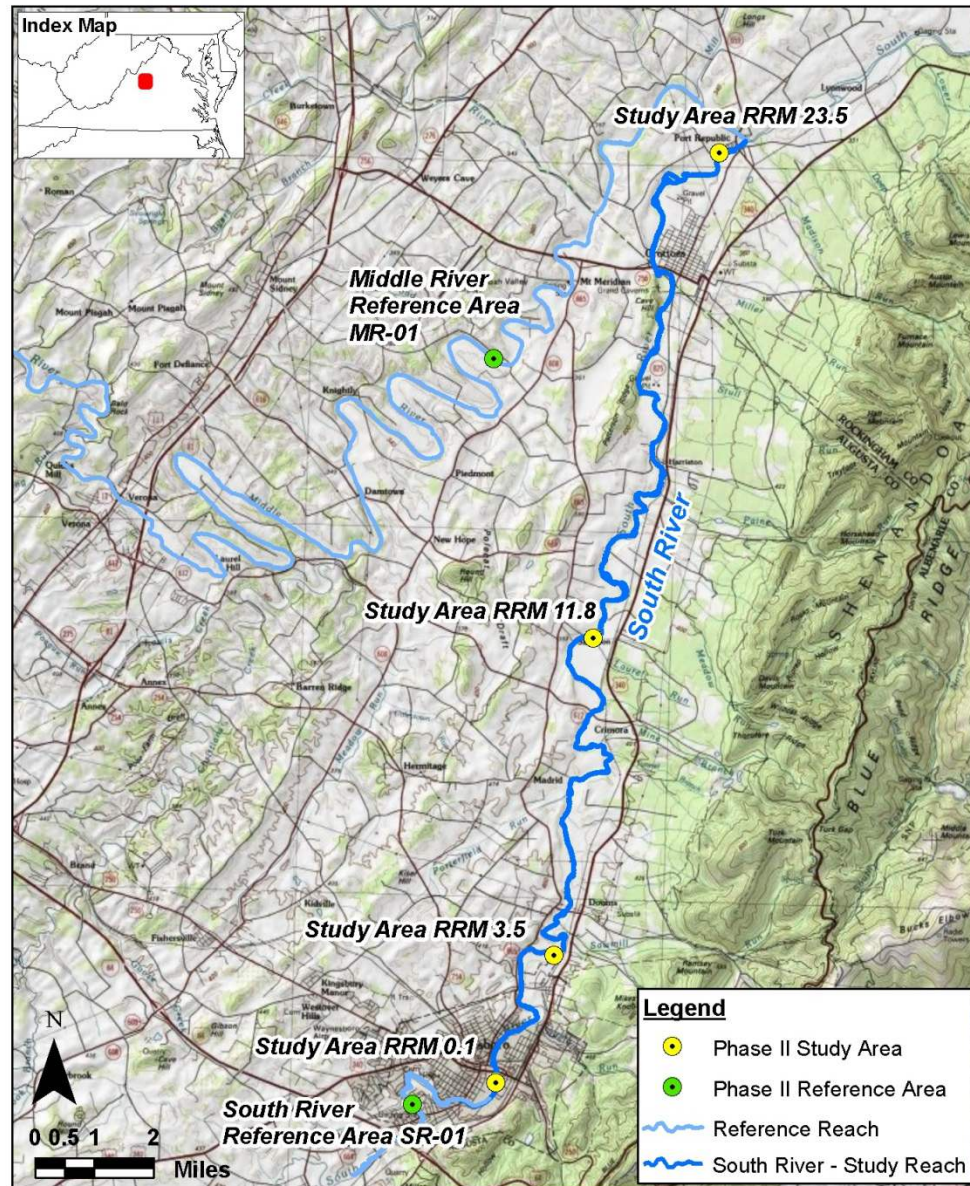


South River Aquatic Environment
2011 Expert Panel Meeting
October 12-13, 2010

Phase II 2011 Study Objectives

1. Further develop baseline physical and biological monitoring data sets for potential future remedial options testing
 - Surface water
 - Fish tissue
2. Further assess potential impacts to benthic macroinvertebrate communities
 - Benthic Colonization Study
3. Compile and evaluate all available data into Final Phase II Ecological Report

Phase II 2011 Study Locations

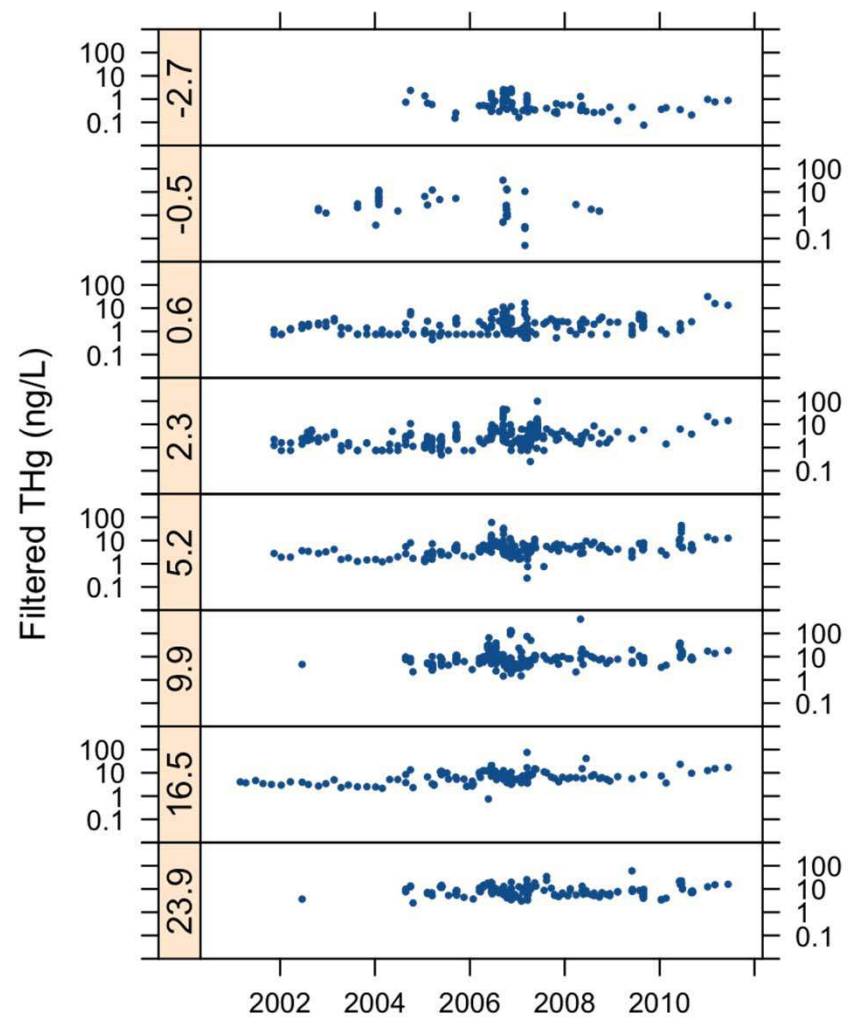
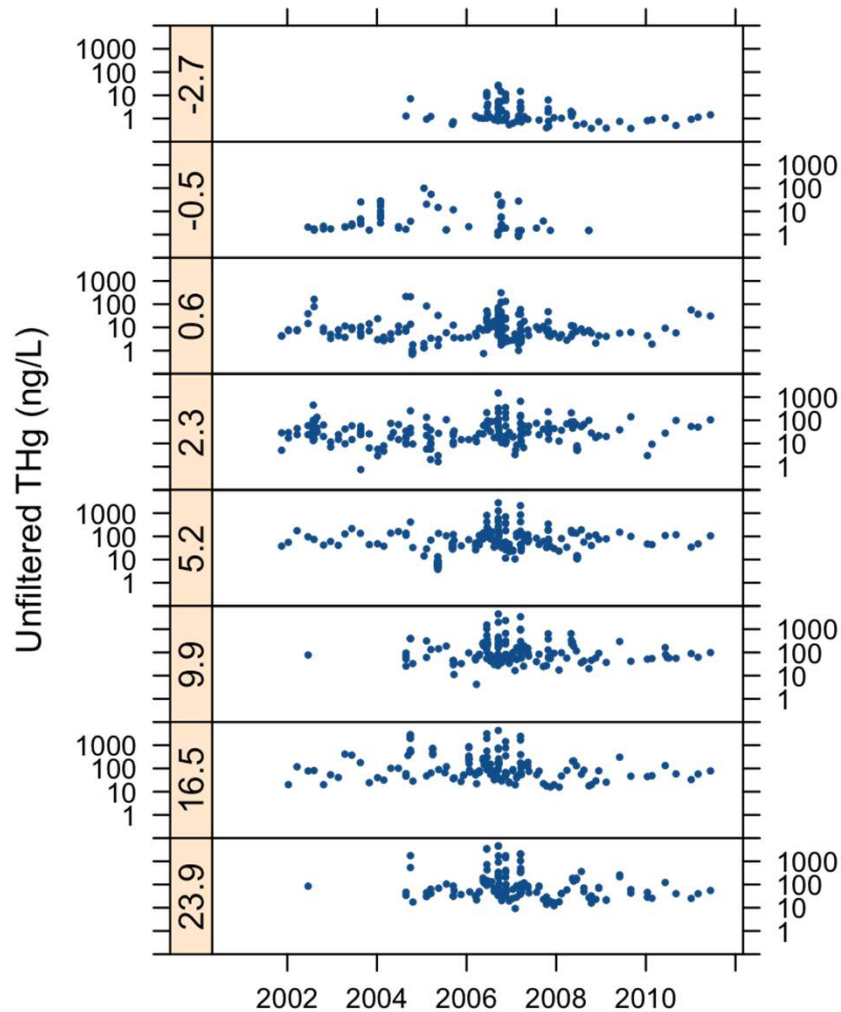


Baseline Surface Water Monitoring

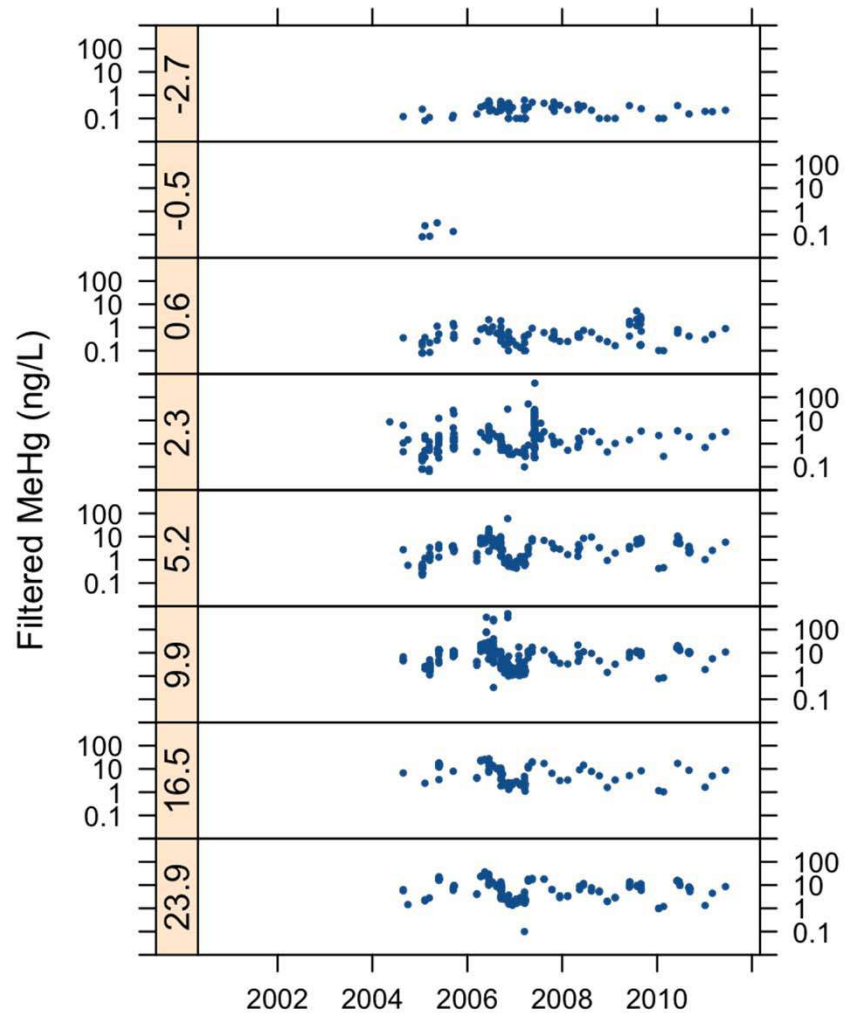
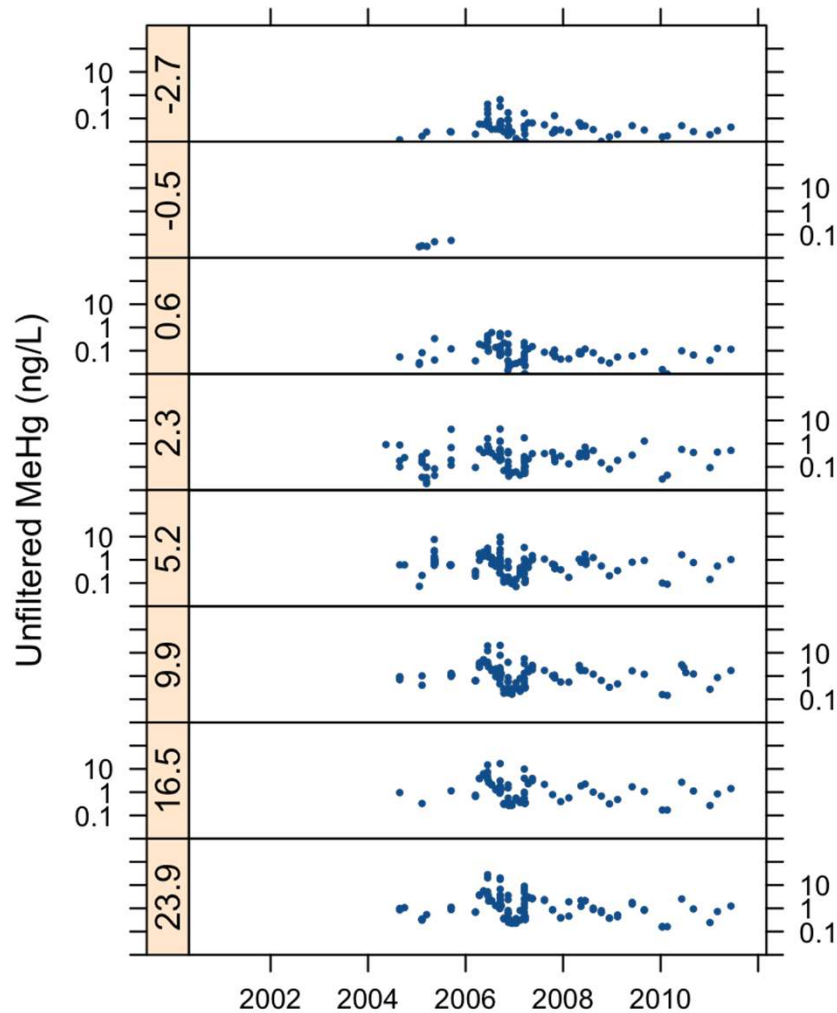
- Coordinate with VDEQ efforts
- Sample quarterly at 7 bridge locations
- Parameters include TOC, DOC, TSS, cations and anions, nitrogen, phosphorous, FTHg, FMeHg, THg, and MeHg



Total Hg in Surface Water

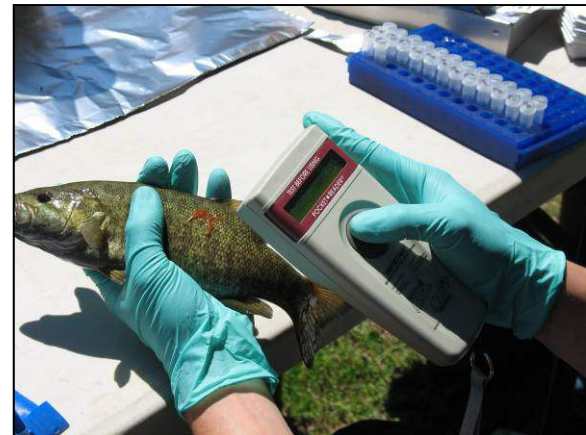


Methylmercury in Surface Water

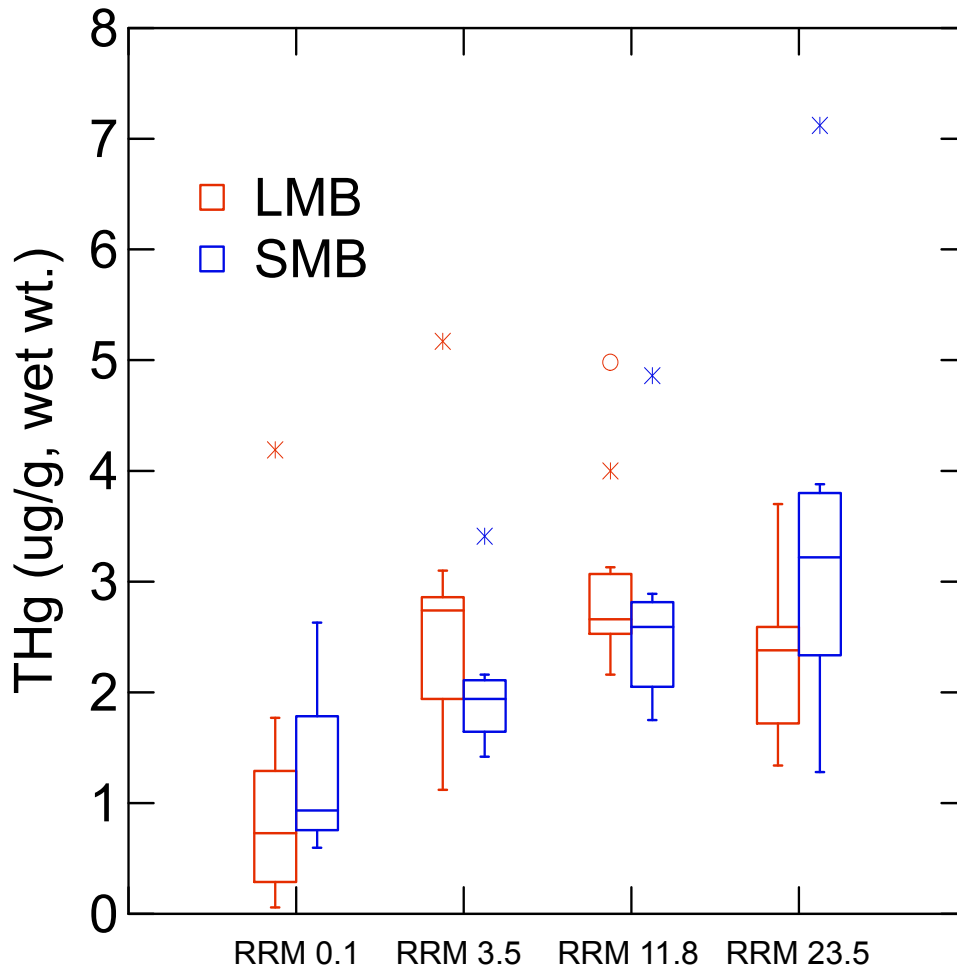


Fish Tissue Monitoring

- Spring 2011
- Sampled broad reaches around previous sampling locations:RRM 0.1, 3.5, 11.8, and 23.5
- Dorsal muscle plugs from three size classes of bass
 - 130 – 174 mm
 - 175 – 250 mm
 - > 250 mm
- Bass tagged with unique ID



2011 Fish Tissue Results



Notes:

1. SMB = Smallmouth bass, LMB = Largemouth bass
2. Data from spring 2011

2011 Recapture Summary

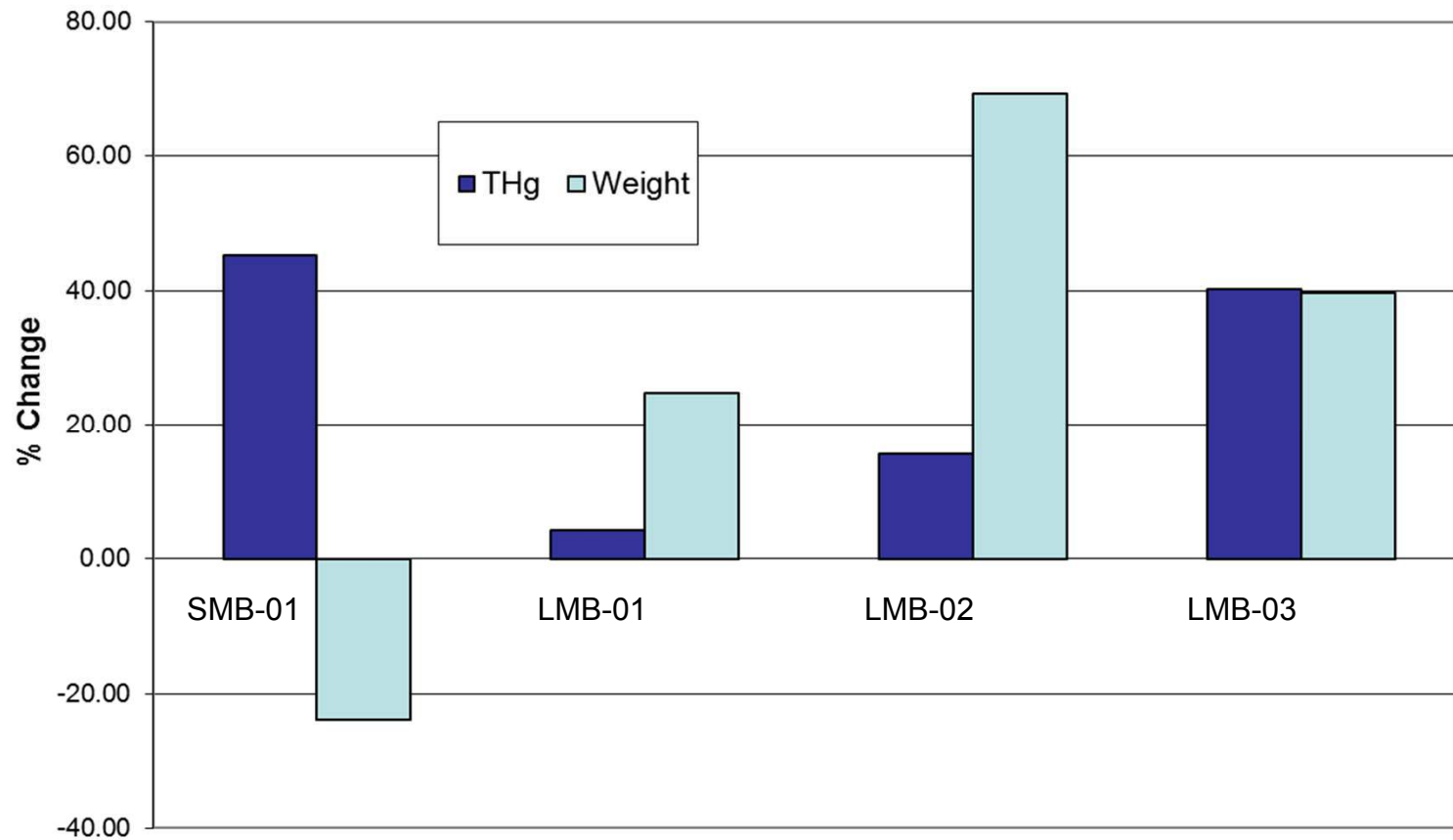
Sample	Deployment		Recapture		Days at Large	Growth TL (mm)	Growth Weight (g)	THg Change (ug/g)
	RRM	Date	RRM	Date				
SMB-01	0.1	May 2010	0.1	May 2011	371	-6	-17.3	0.46
LMB-01*	3.5	May 2010	0.1	May 2011	368	24	74.8	0.06
LMB-02	23.5	May 2010	3.5	May 2011	364	85	342.0	0.43
LMB-03	11.8	Sep 2009	11.8	May 2011	623	58	221.0	1.61

- LMB-01 recaptured in September 2010 and May 2010
- Relocated from RRM 3.5 to RRM 0.1
- LMB-02 relocated from RRM 23.5 to RRM 3.5
- LMB-03 ~ 2 years at large

Notes:

1. SMB = Smallmouth bass, LMB = Largemouth bass
2. *LMB-01 recaptured multiple times (i.e., Sep 2010 and May 2011)

2011 Recapture Summary (continued)

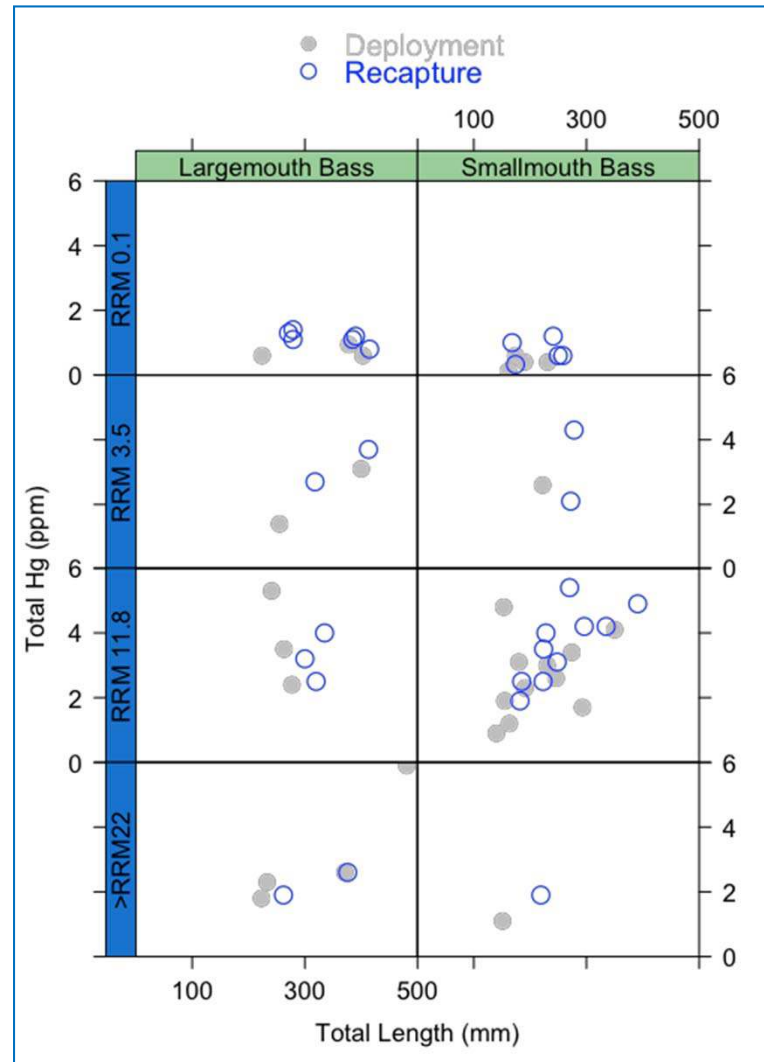


Notes:

1. SMB = Smallmouth bass, LMB = Largemouth bass
2. Data from spring 2011

2009-2011 Recapture Summary

- 33 total recaptures to date
- Three fish have moved between sites; all upstream
- Five fish have been recaptured multiple times
- THg increases with length and days at large



Benthic Colonization Study

Objective:

Assess benthic macroinvertebrate community structure and colonization dynamics along mercury gradient in the South River

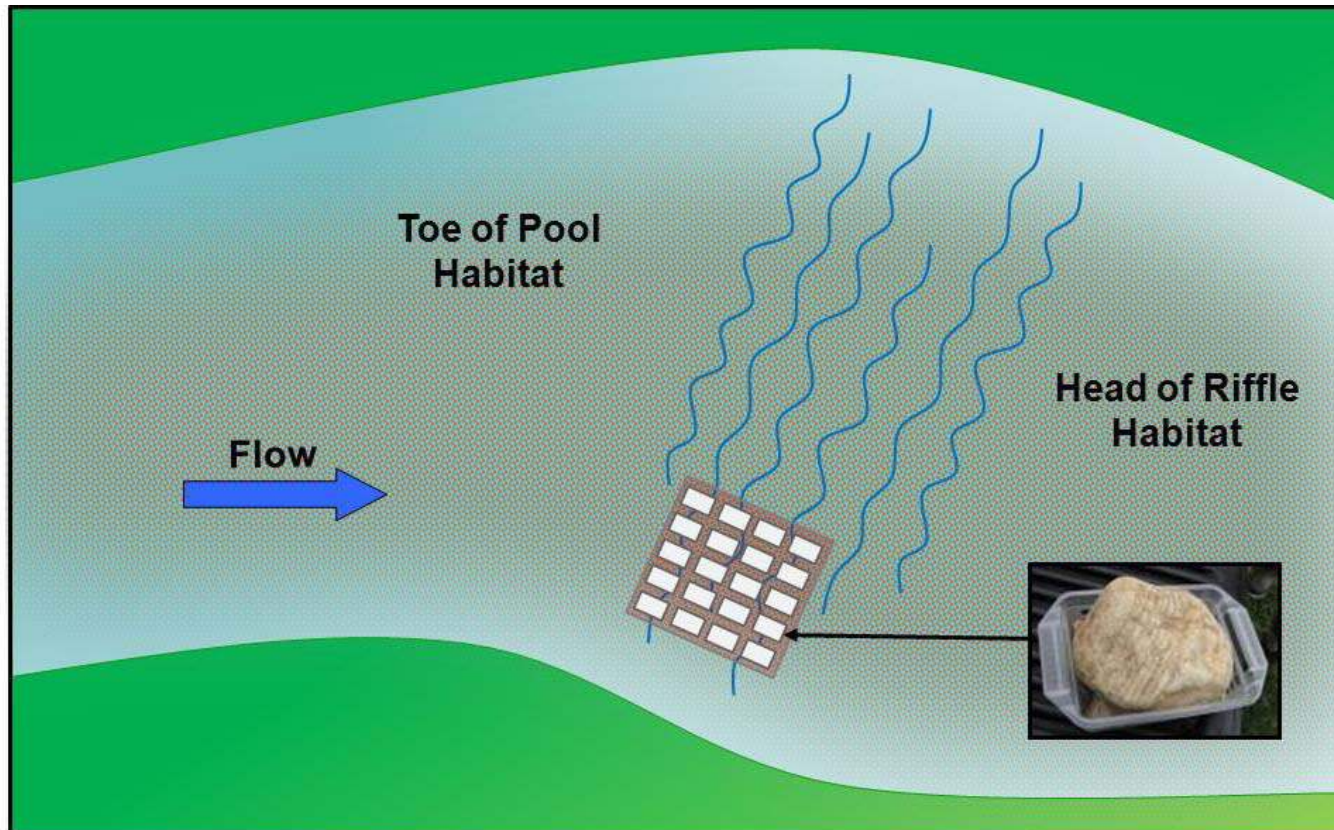


Study Design

- Spring / Summer 2011
- RRM 0.1, 3.5, 11.8, 23.5, SR-01, and MR-01
- Six-week exposure period
- RRM 23.5 trays lost due to high flow event
- Six trays collected per site at weeks 2, 4, and 6
- Co-located resident benthic communities, interstitial sediment (Hg), and colonization tray grain size analysis at week 6



Conceptual Design



LEGEND:

-  Benthic colonization tray sampling location
-  Co-located sampling area for fine-grained interstitial sediments and resident benthic community
-  Cobble / pebble / gravel substrate

Notes:

To the extent practical, all benthic colonization study sampling will take place at approximately one-quarter of the total stream width from the nearest stream bank.

Week Six Substrate Trays

SR 01



RRM 0.1



RRM 3.5



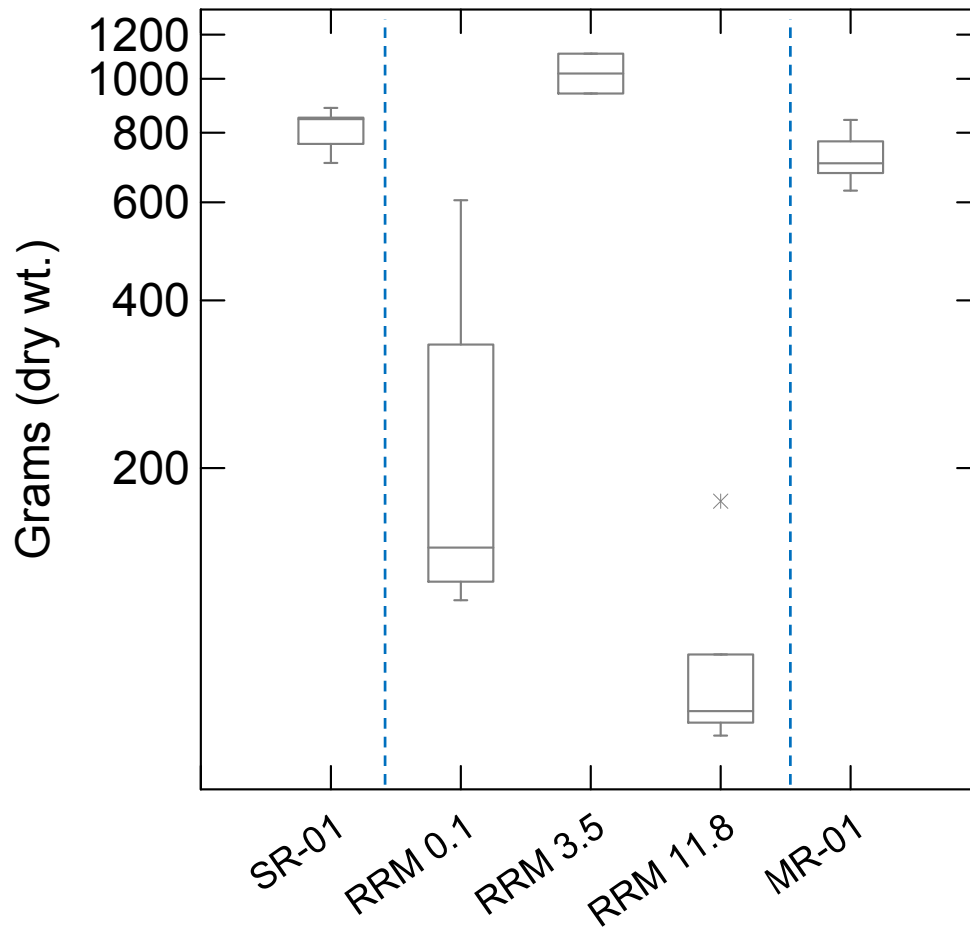
RRM 11.8



MR 01



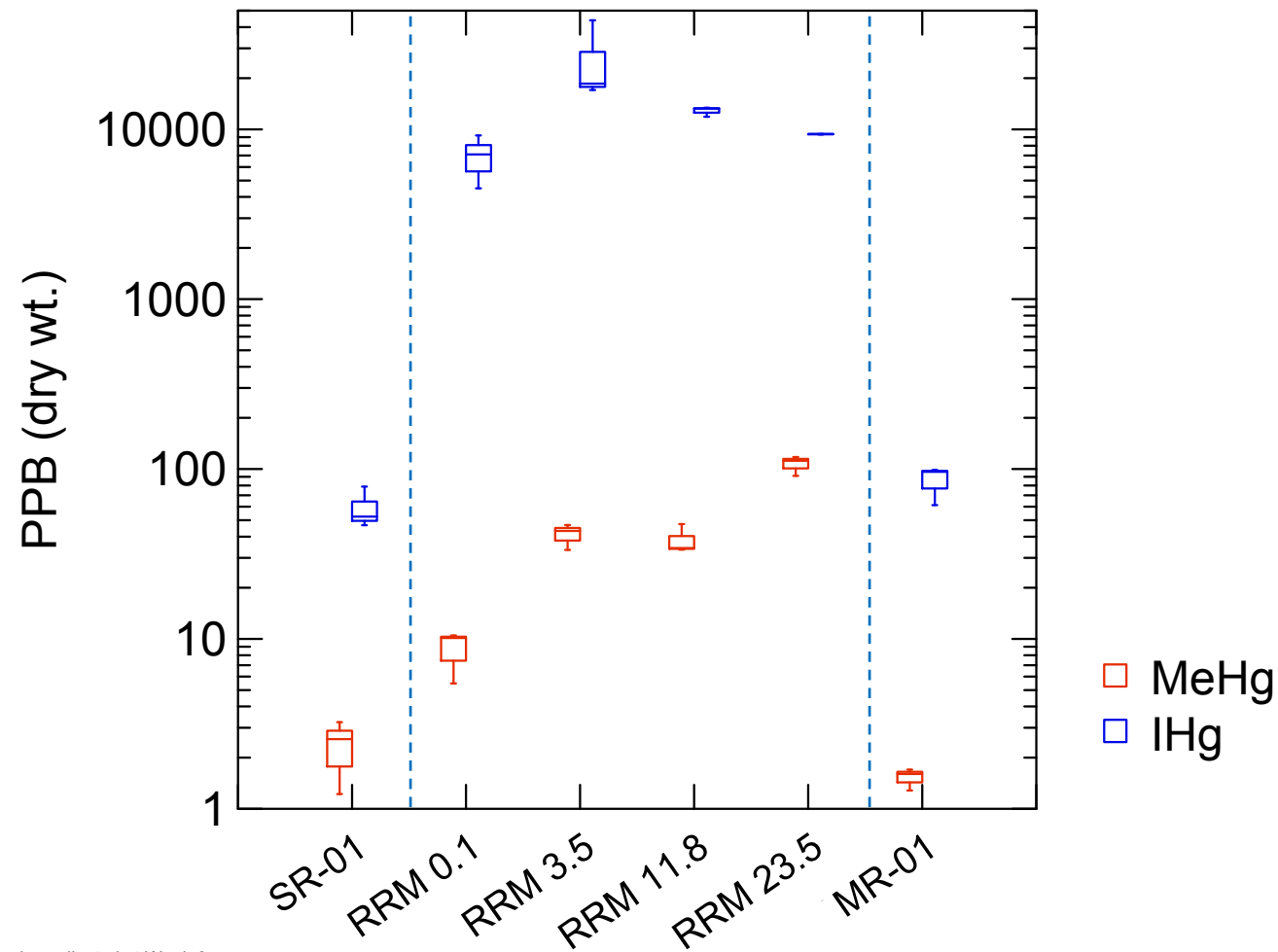
Colonization Tray Embeddedness



Notes:

1. Grain size analysis (ASTM D422) conducted on remaining colonization trays at Week 6.
2. Figure represents total dry weight mass passing for all grain size $\leq 19\text{mm}$ (i.e., material that migrated into the tray during the 6-week exposure period).

Interstitial Sediment Mercury (Hg)



Notes:

1. Interstitial sediment samples collected at Week 6.
2. IHg= THg-MeHg

Taxonomic results anticipated in October 2011

- 500-organism sub-counts; ID to lowest taxa practical
- Univariate and multivariate statistical analyses



Next Steps

- Surface water monitoring in October and November
- Data evaluations
- Final Ecological Study Report

