South River Site Conceptual Model

South River Science Team Expert's Meeting
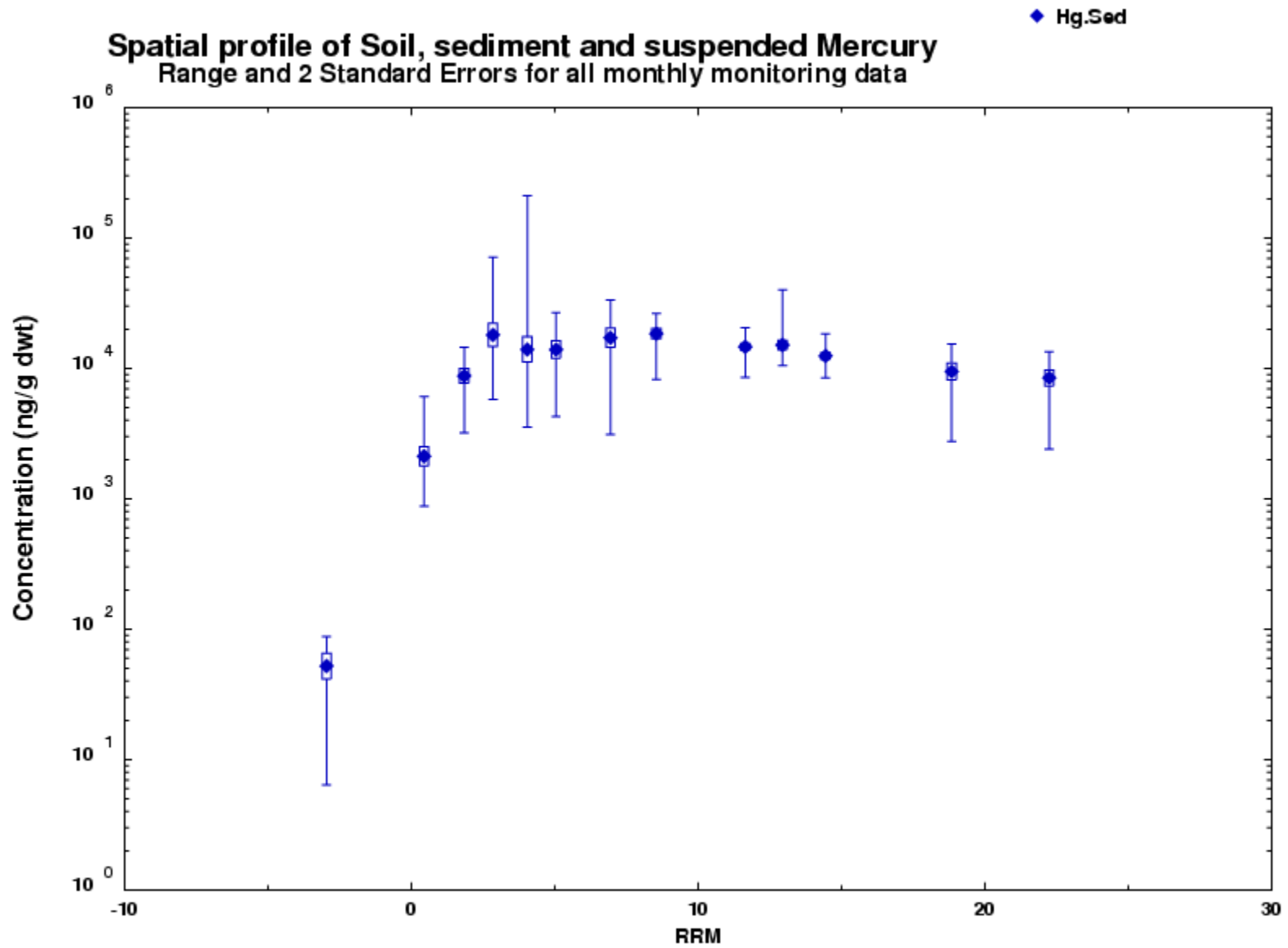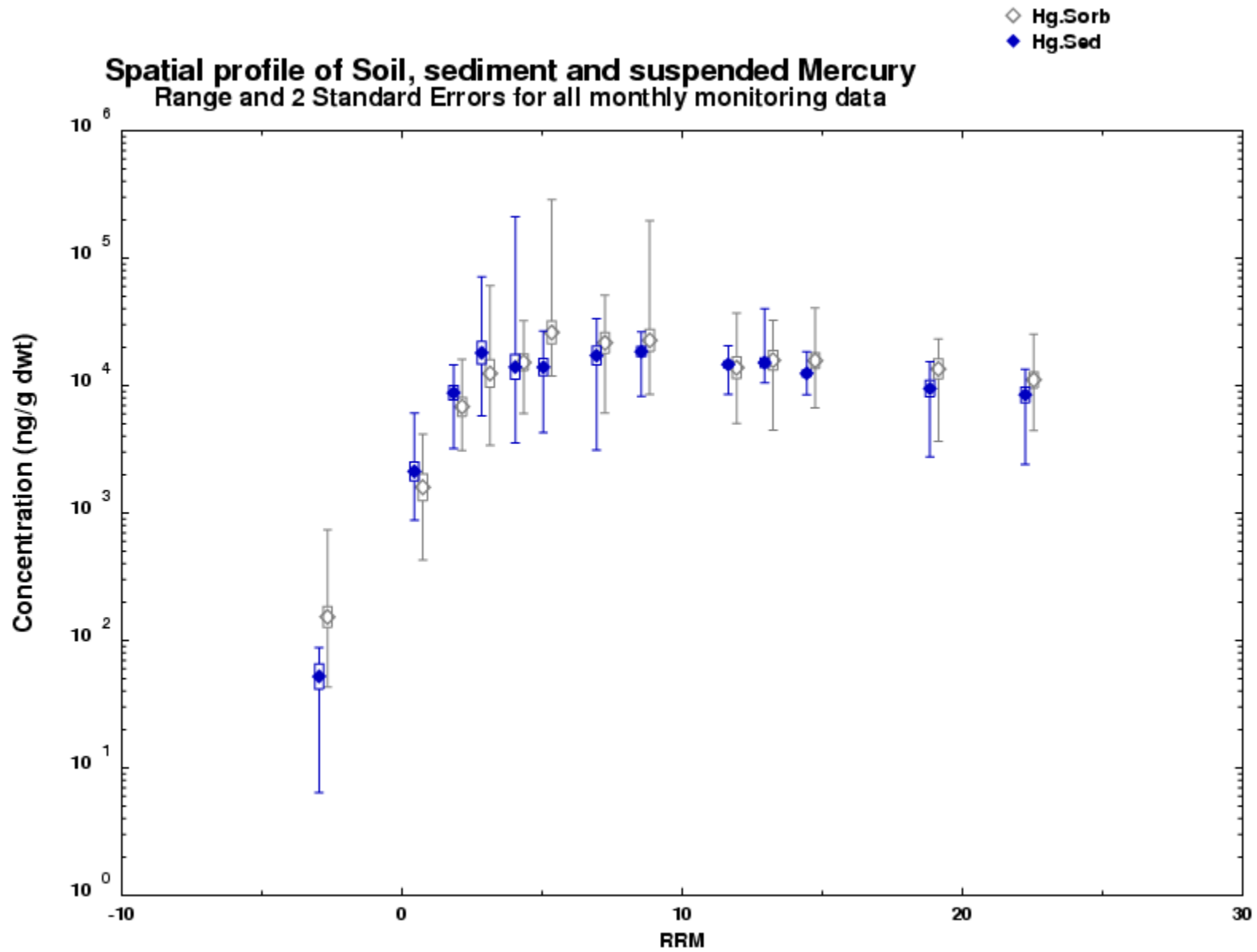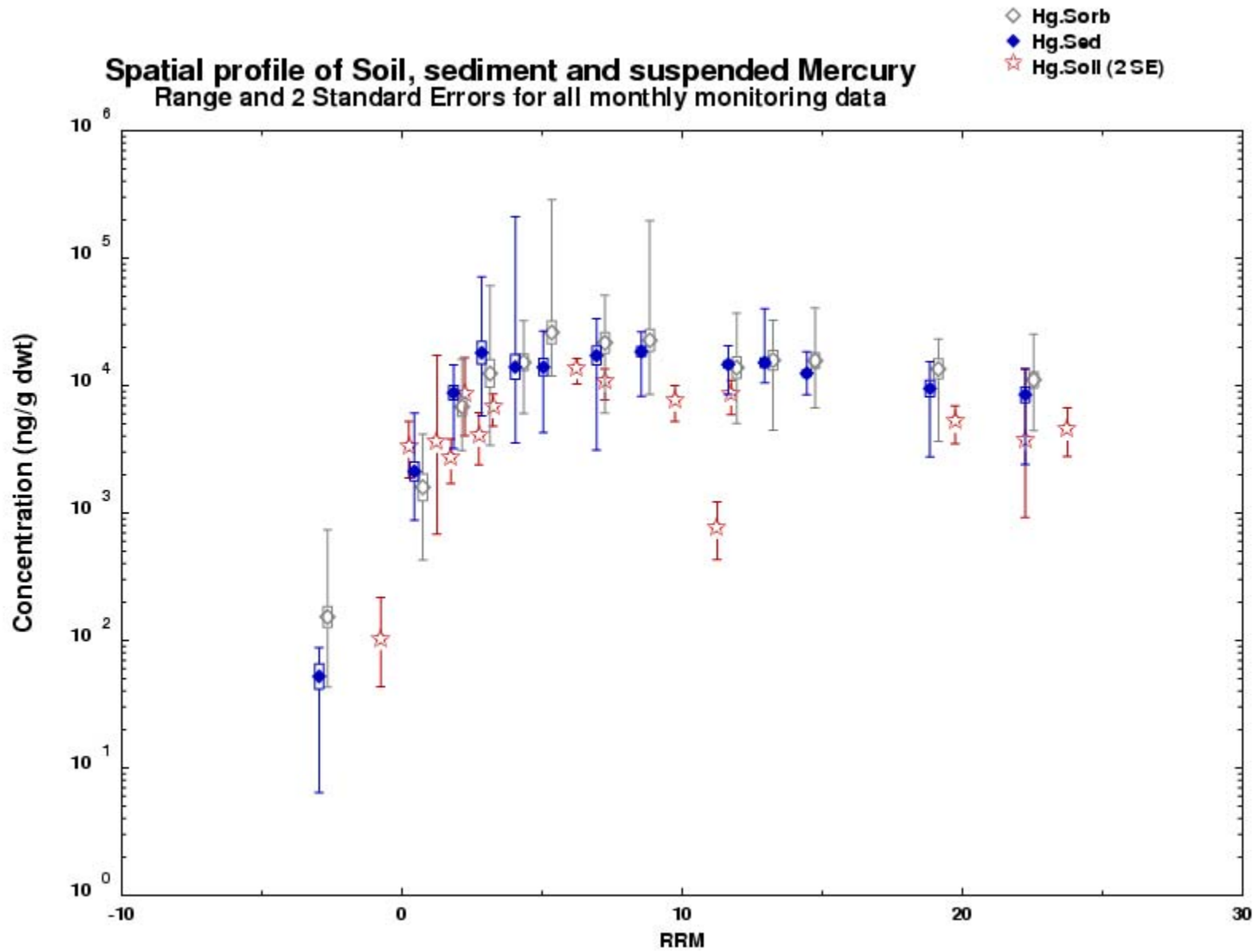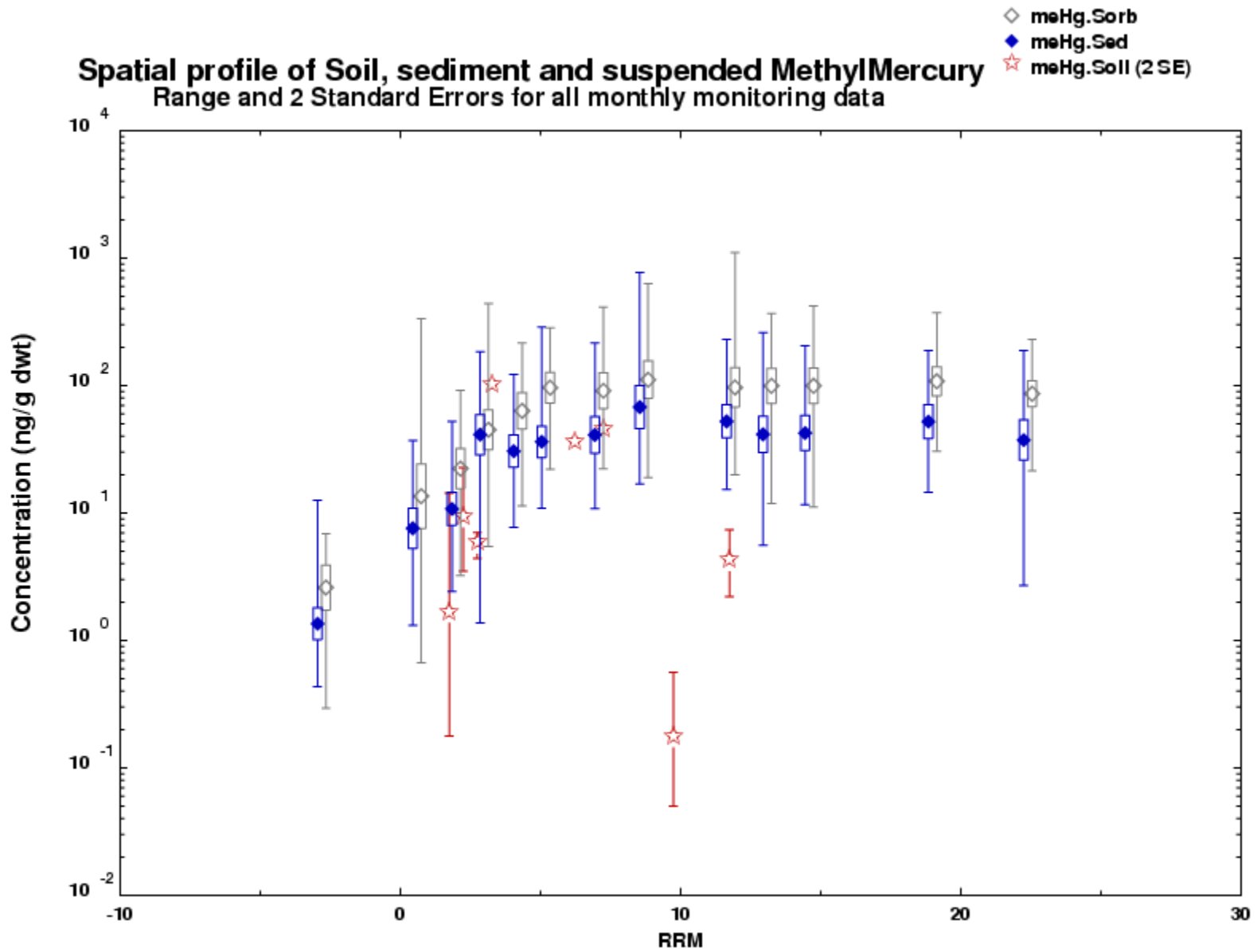
HydroQual

October 10, 2007

Outline

- Data analysis of monthly monitoring data

- Incremental loading analysis of low and high flow data

- Temporal analysis of monthly and storm data

- Integrated loading analysis of storm data
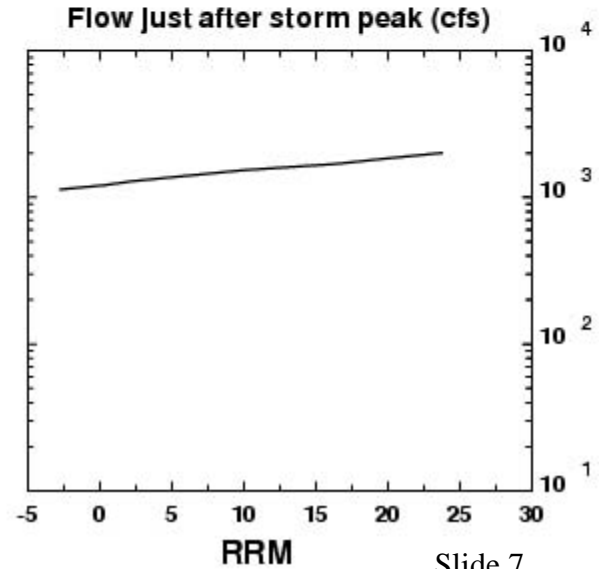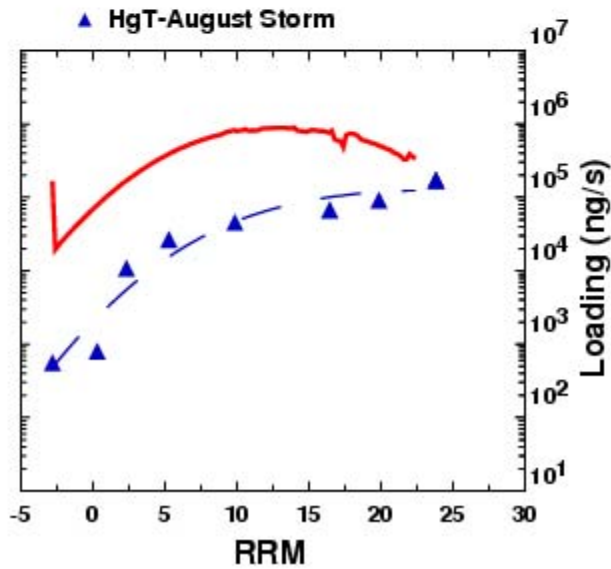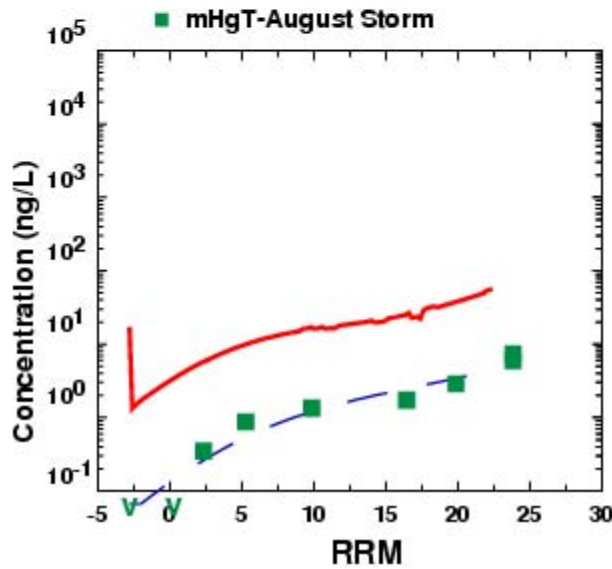
- Biological data analysis

Spatial profile of Soil, sediment and suspended Mercury
Range and 2 Standard Errors for all monthly monitoring data

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Range and 2 Standard Errors for all monthly monitoring data

Legend:
◇ Hg.Sorb
◆ Hg.Sed
☆ Hg.Soil (2 SE)

Y-axis: Concentration (ng/g dwt)
X-axis: RRM

Spatial profile of Soil, sediment and suspended MethylMercury
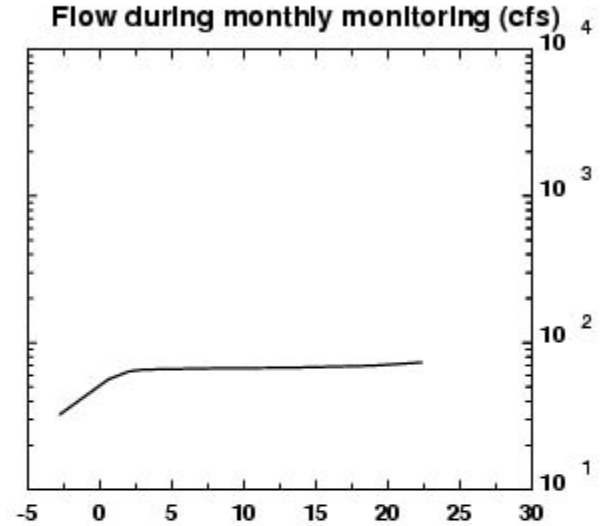Range and 2 Standard Errors for all monthly monitoring data

◇ meHg.Sorb
◆ meHg.Sed
☆ meHg.Soil (2 SE)

Loading Profiles of HgT and meHg in South River
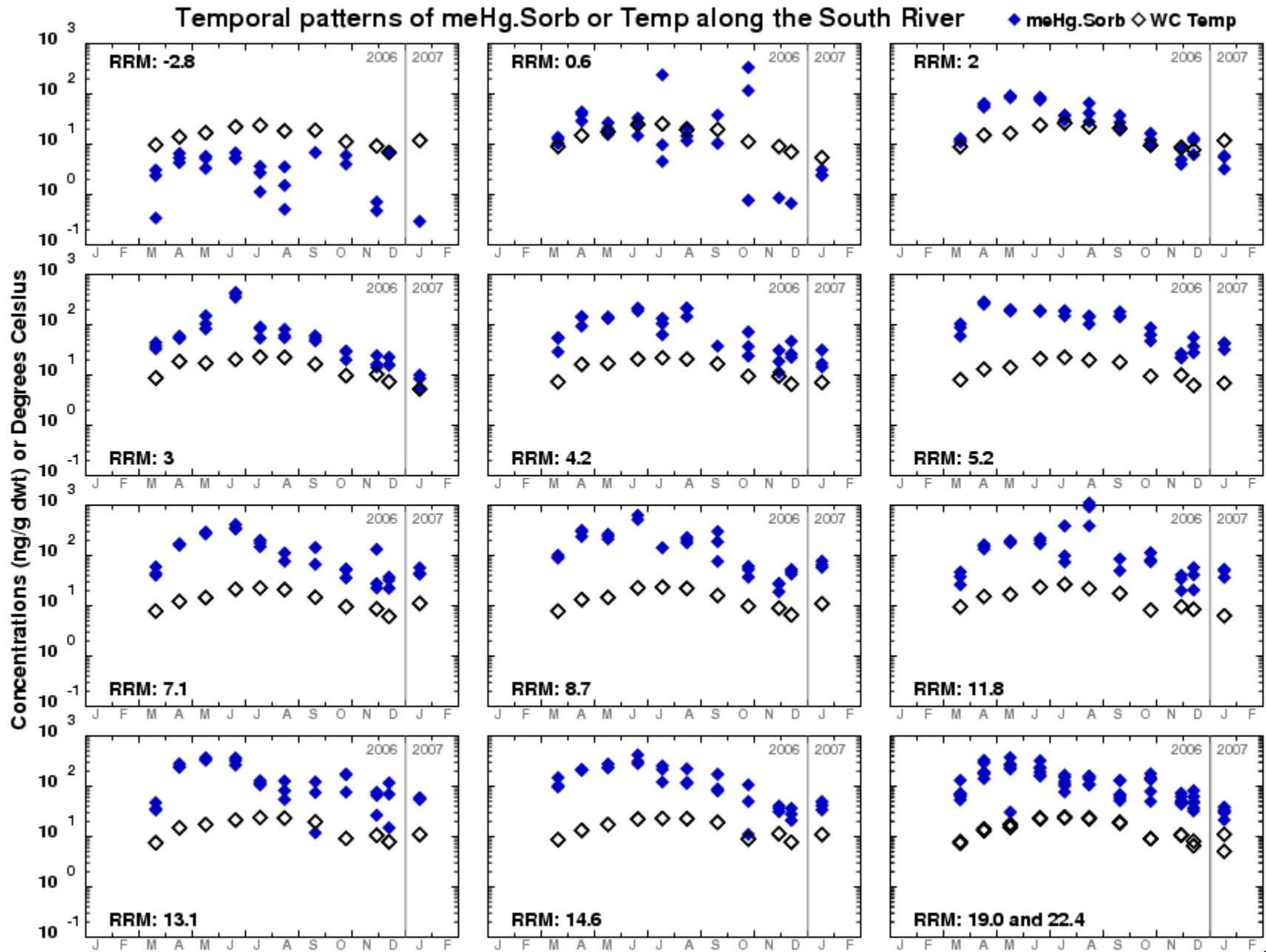
Slide 7
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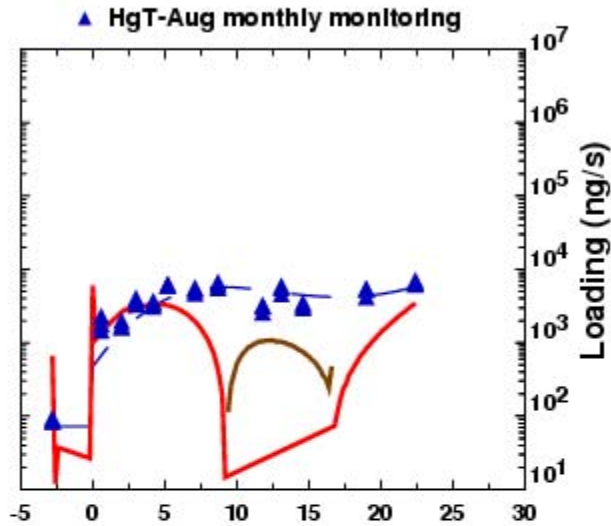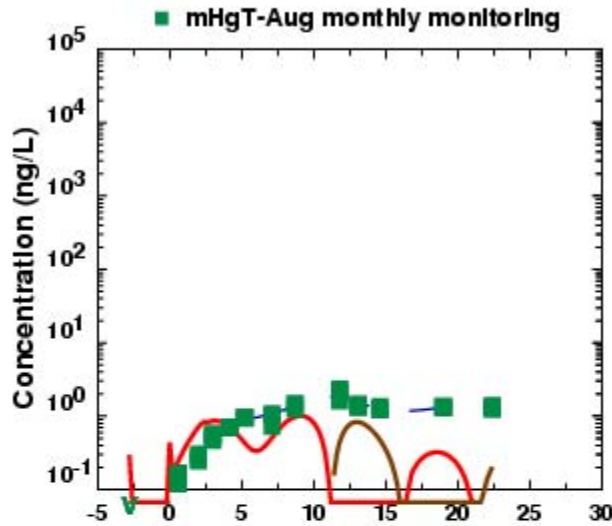
RRM 4.2 →

- HEC-RAS calculated stage at:
  - high flow in Aug-Sept storm (1200-1800 cfs)
  - low flow during August sampling (30-75 cfs)
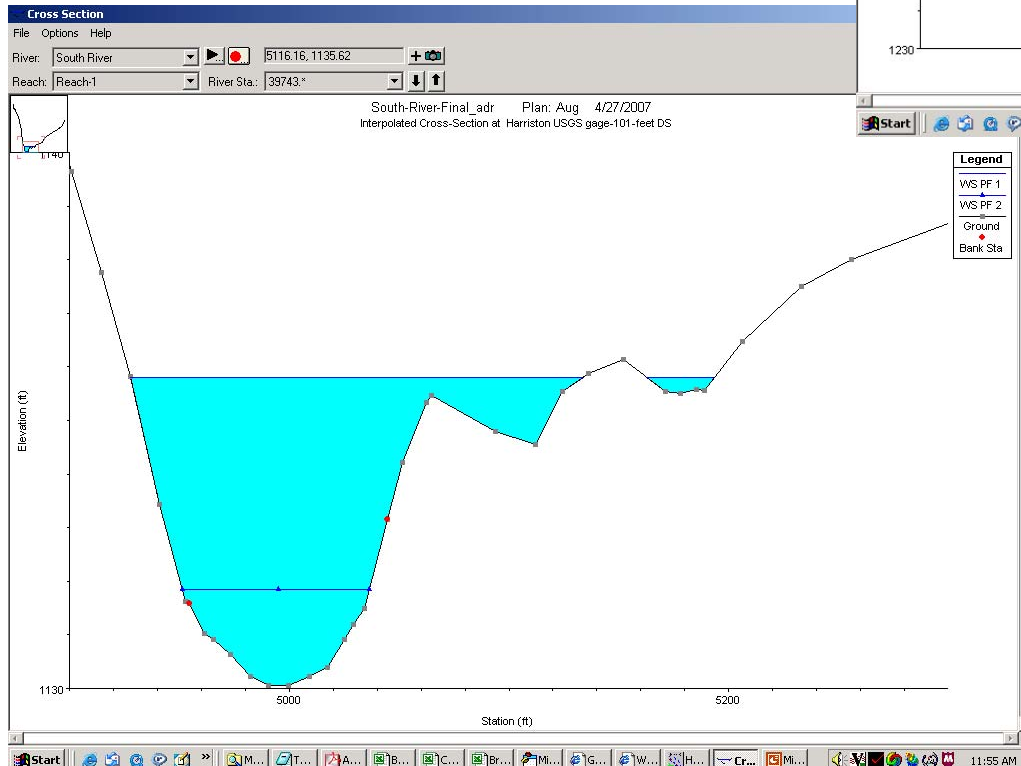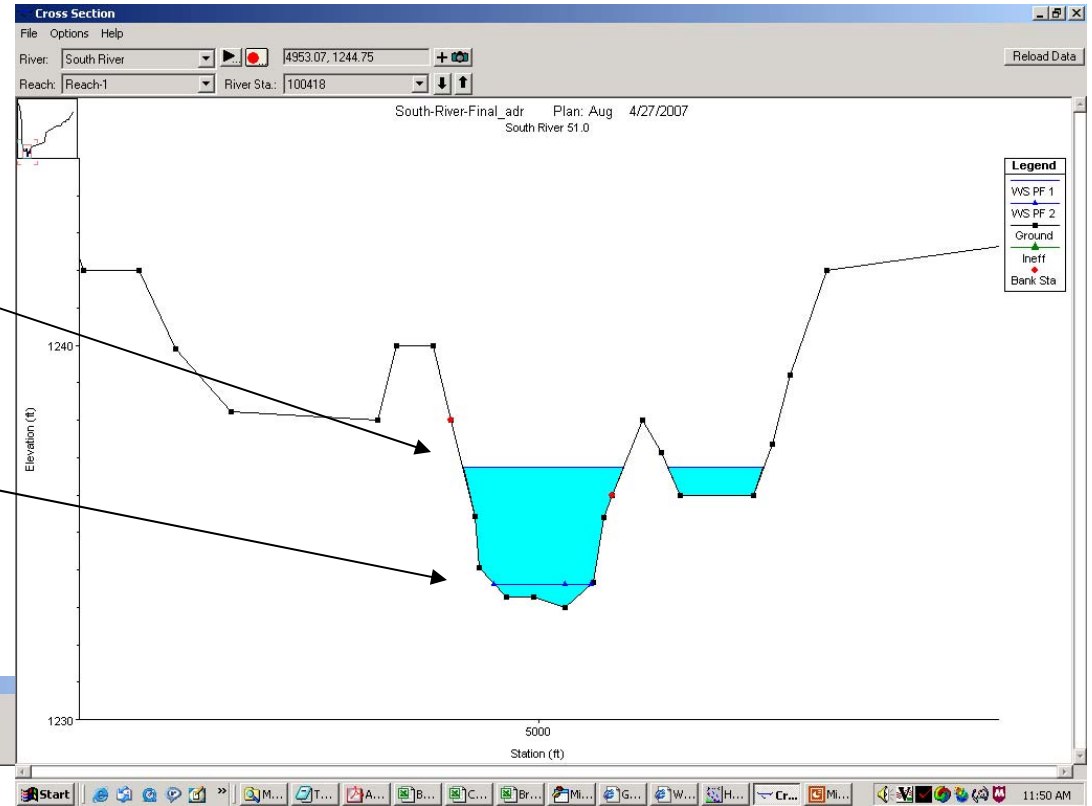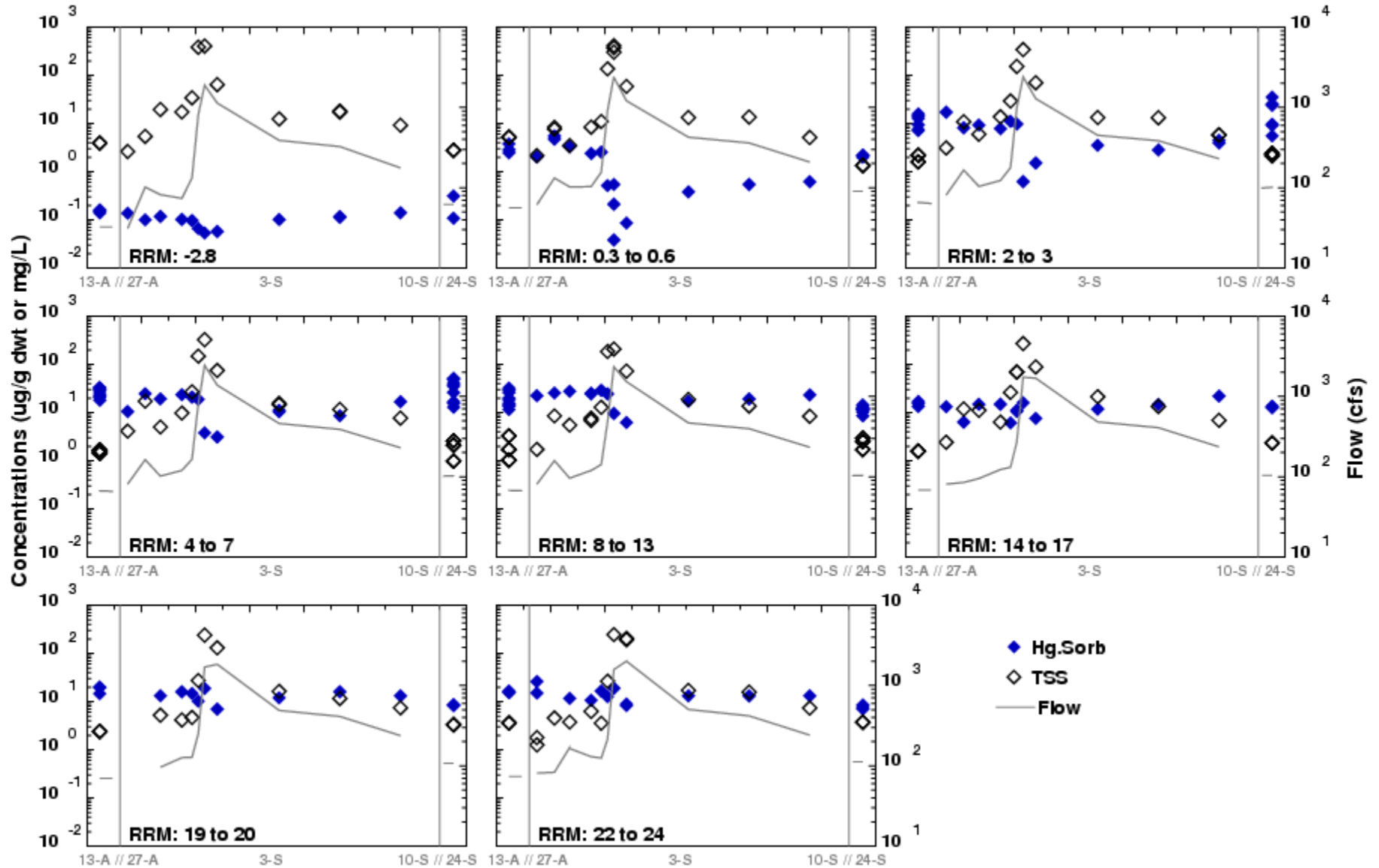

- These side channels are common but not ubiquitous in River

- Incremental loads are widely distributed at high flow
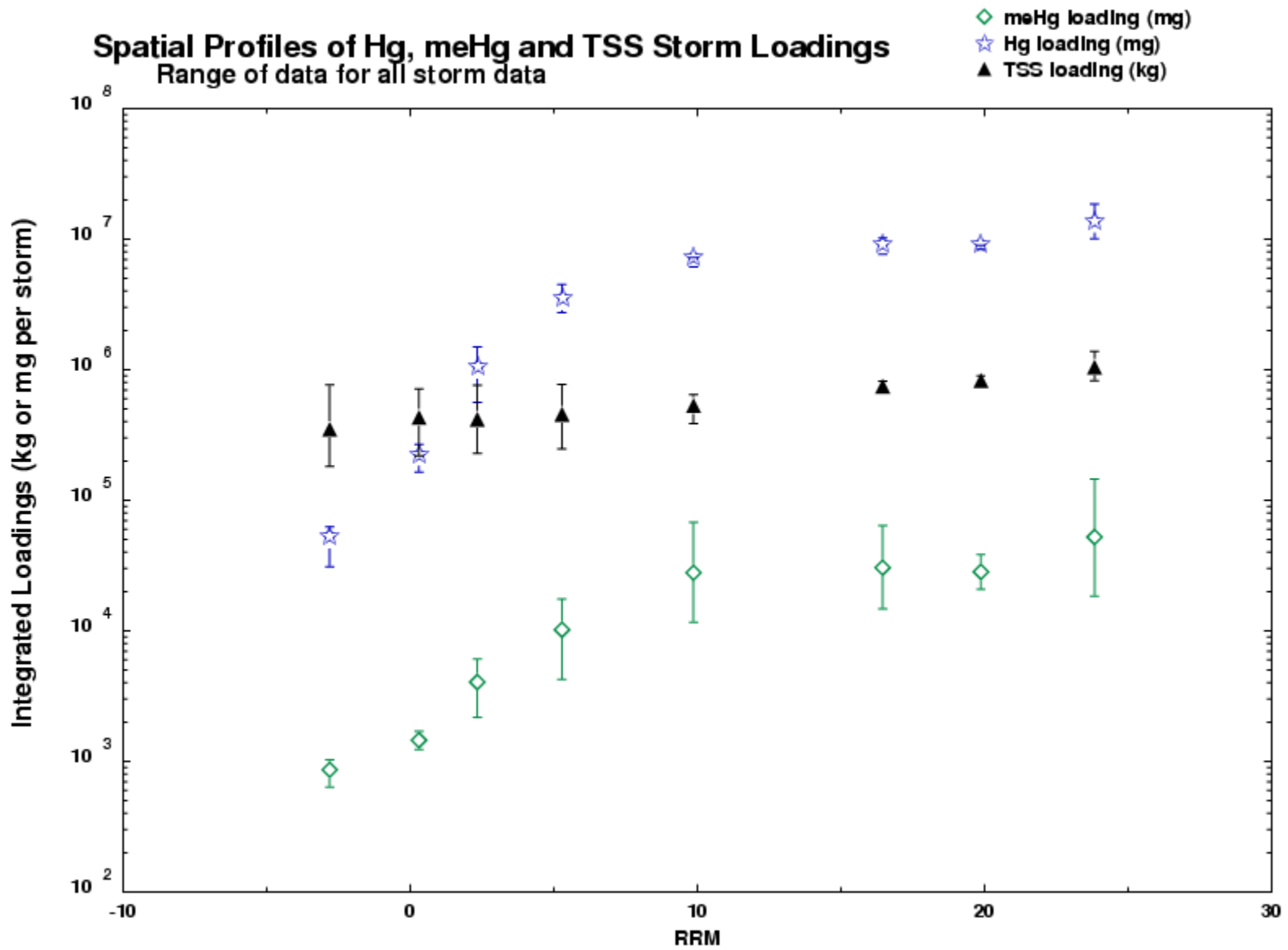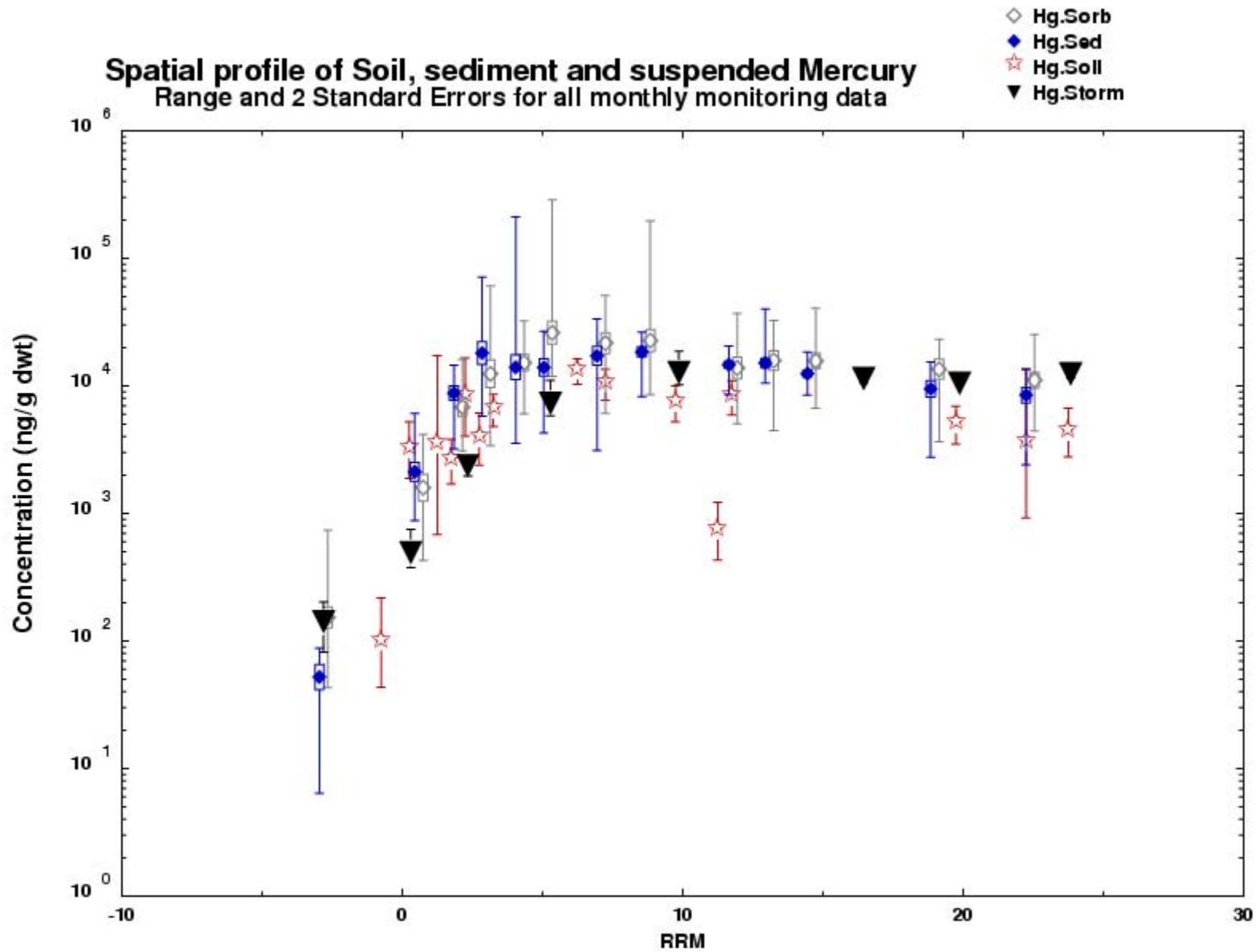 - A possible source at higher flows but not sole contributor

← **RRM 16.4**

Temporal patterns of meHg.Sorb or Temp along the South River

Temporal patterns of Sorbed Mercury and TSS from Aug to Sep 2006

Spatial Profiles of Hg, meHg and TSS Storm Loadings

Spatial profile of Soil, sediment and suspended Mercury
Range and 2 Standard Errors for all monthly monitoring data
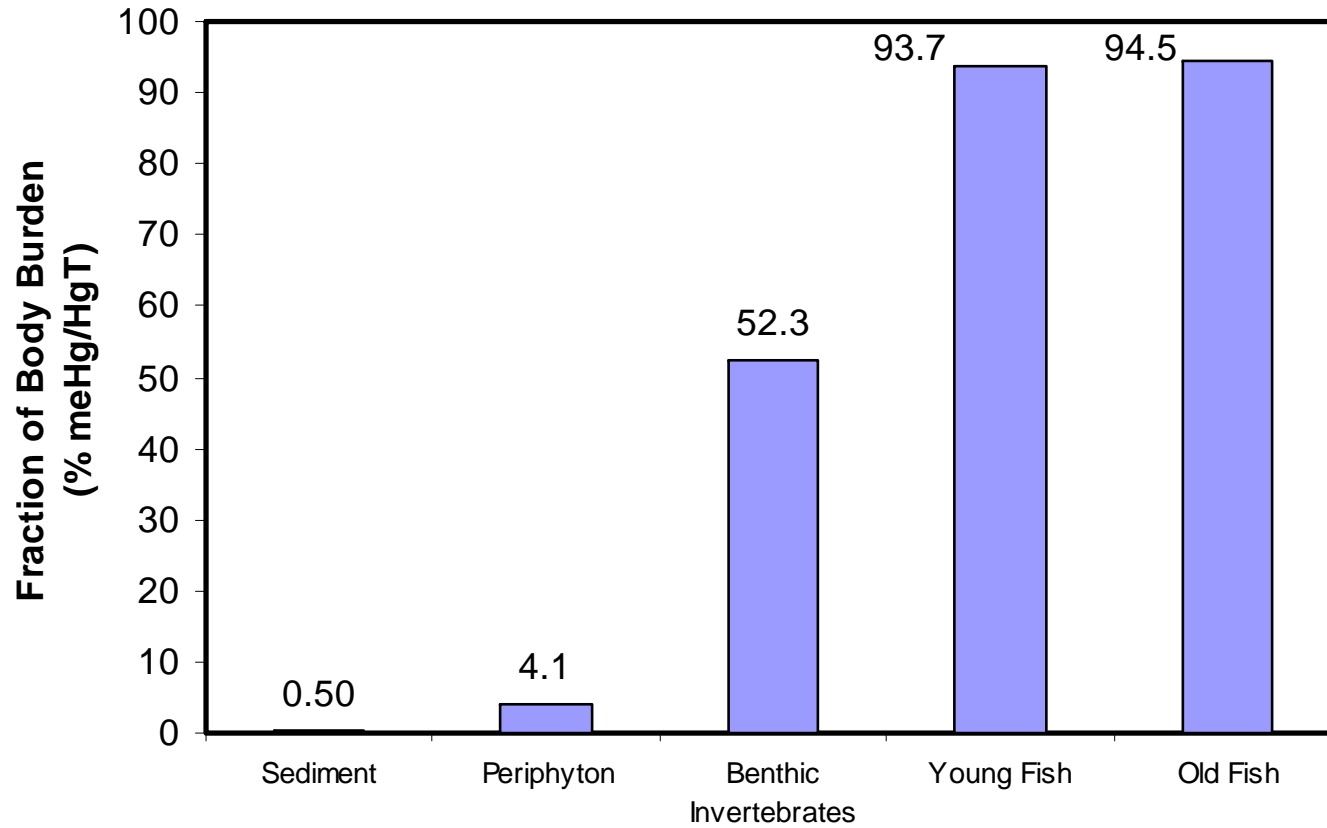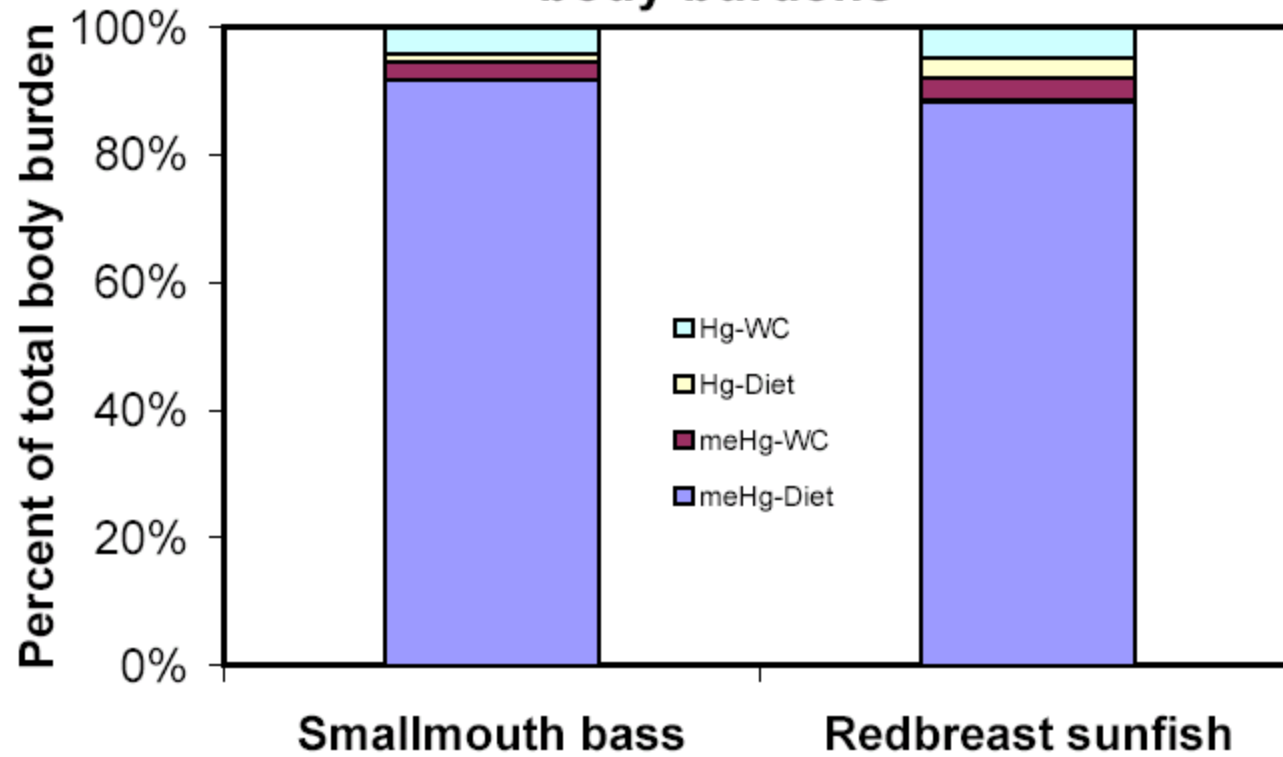
Legend:
◇ Hg.Sorb
◆ Hg.Sed
☆ Hg.Soil
▼ Hg.Storm

Bioaccumulation of HgT

- Sources to higher organisms dominated by feeding

- Understanding links between surface water, sediment and prey HgT, meHg would be important for control strategies as part of the TMDL

Fraction of meHg for different general trophic levels (RRM 5)

Computed contributions to fish HgT body burdens

Summary Conclusions

- Sources are distributed along River
  - Major sources change with River flow
  - Particle exchange likely an important process during storms
- Results are consistent with soil erosion as primary source of HgT to river
- Methylation in the river is likely a major source of meHg
- Initial bioaccumulation calculations suggest diet is major source of fish-HgT body burden
  - Fish data do not suggest decadal-scale changes in bioavailability

Extra Slides

Fish Mercury concentration vs Length Category in the South River (RRM 0 to 24), 1 of 2

Fish Mercury concentration vs Length Category in the South River (RRM 0 to 24), 1 of 2
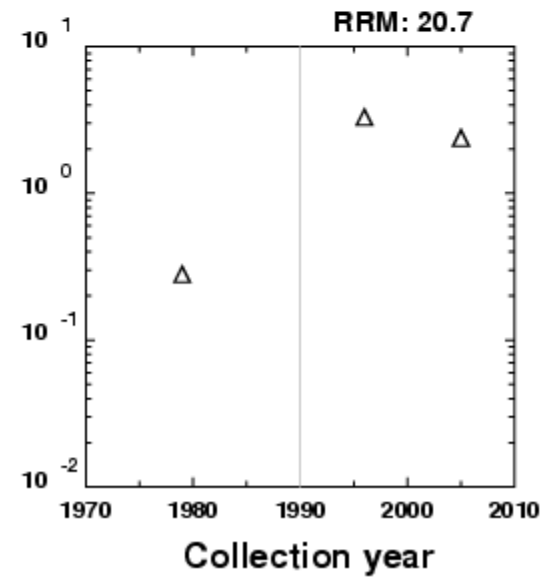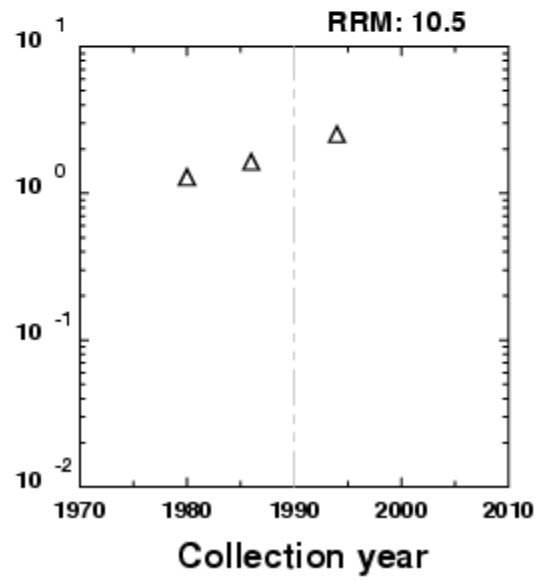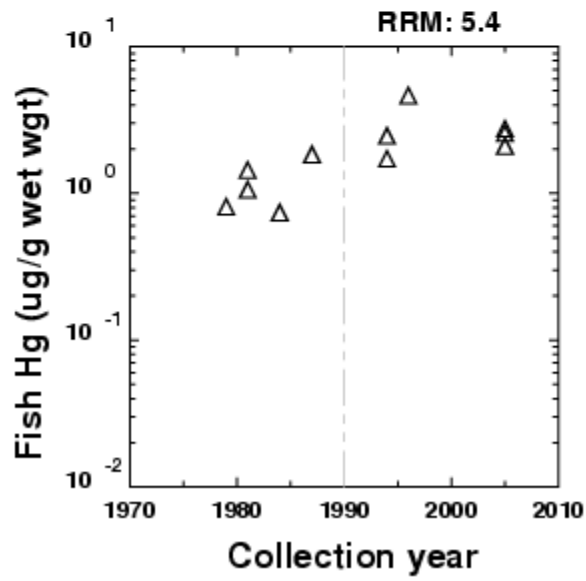1970 to 1989   1990 to 2005   Whiskers are Range, Boxes are 2 SE (approx. 95% CI)
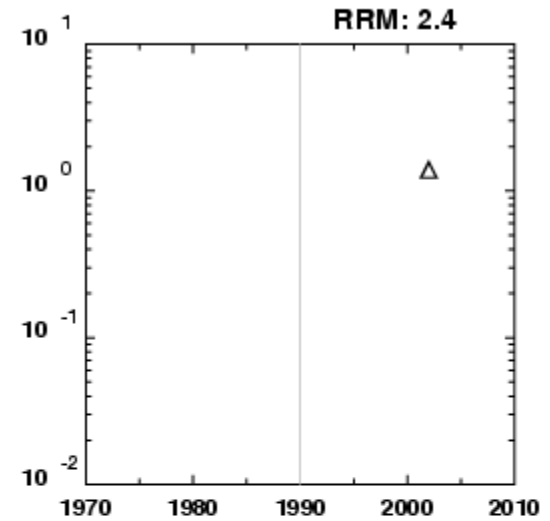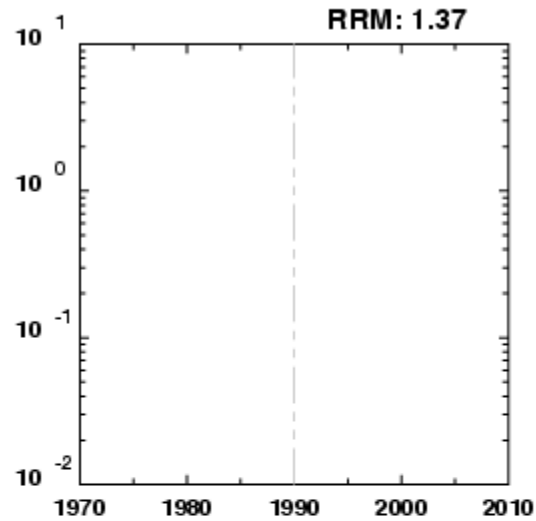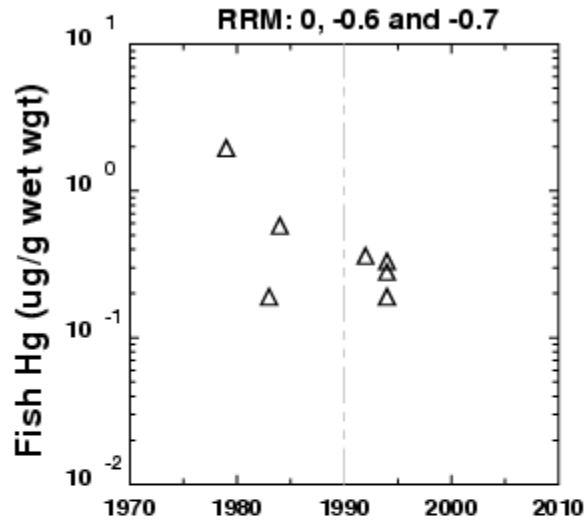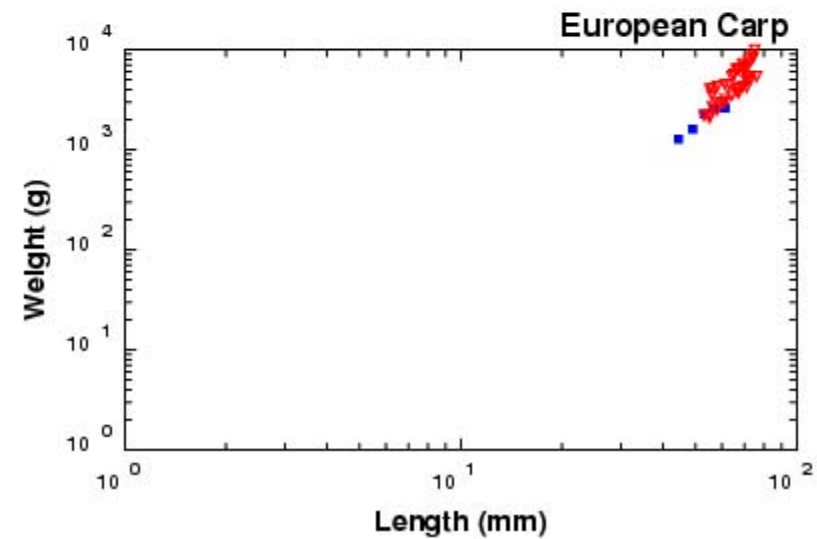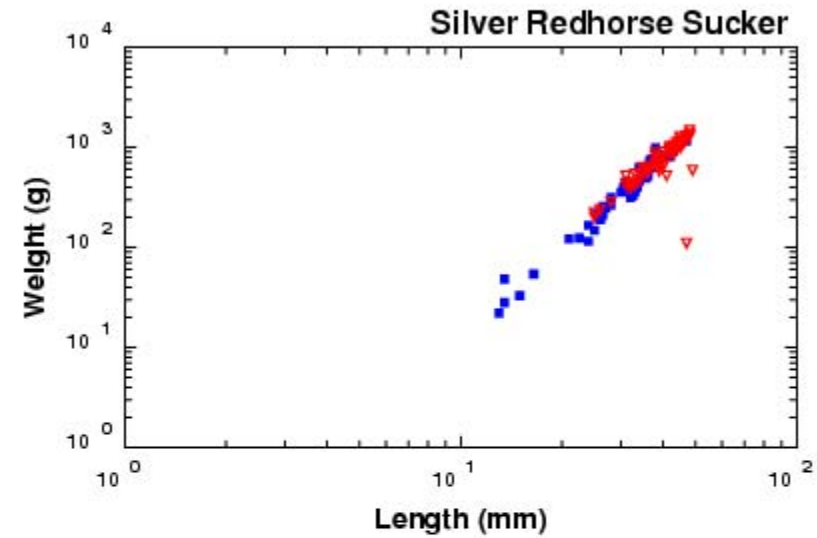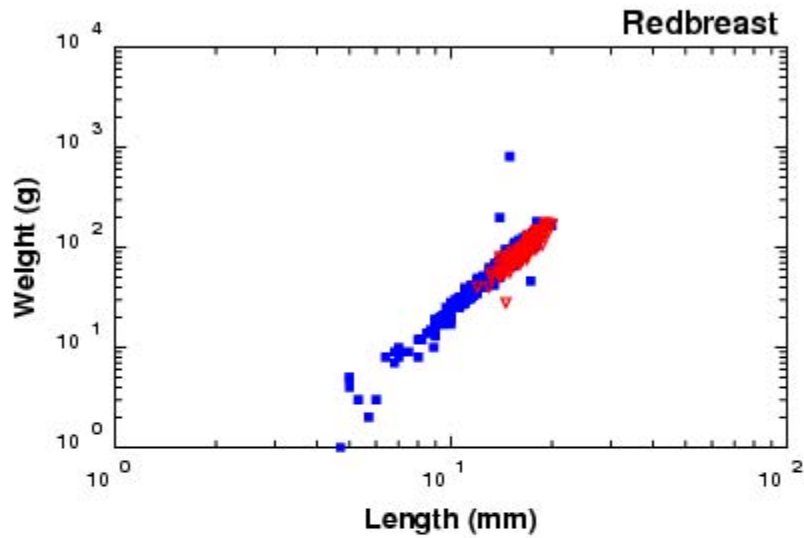★ Means are statistically different (α = 0.05) for sample sets of different sizes and variances
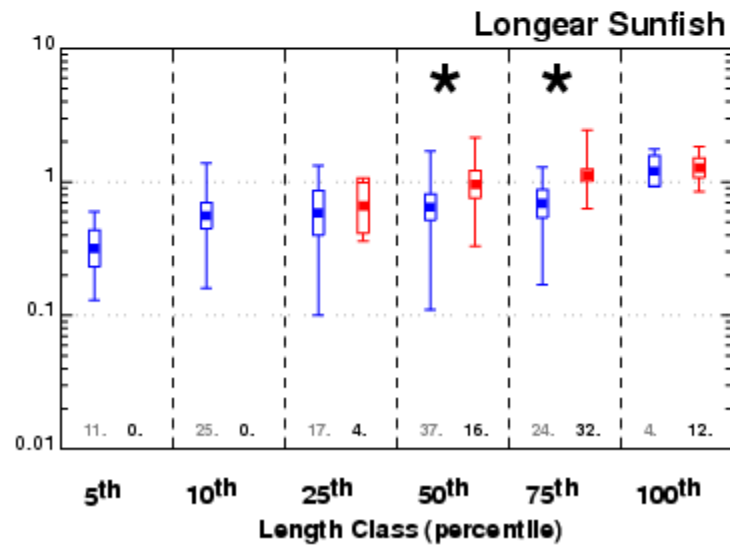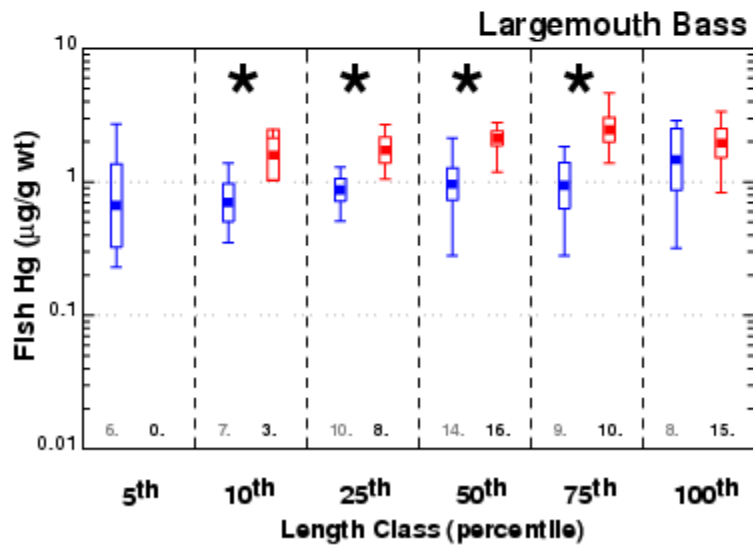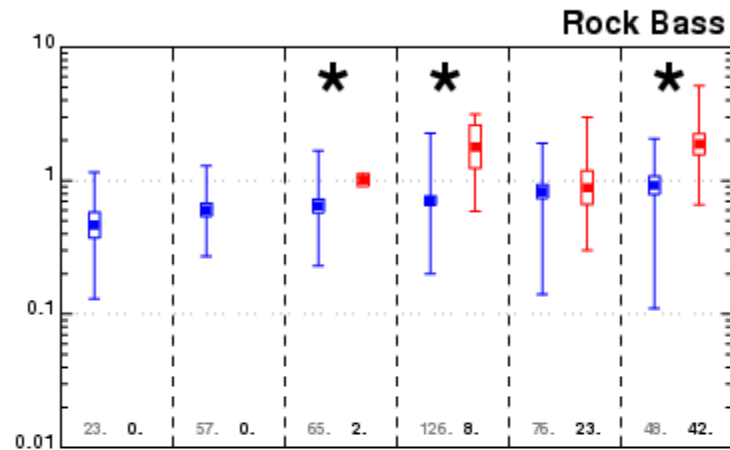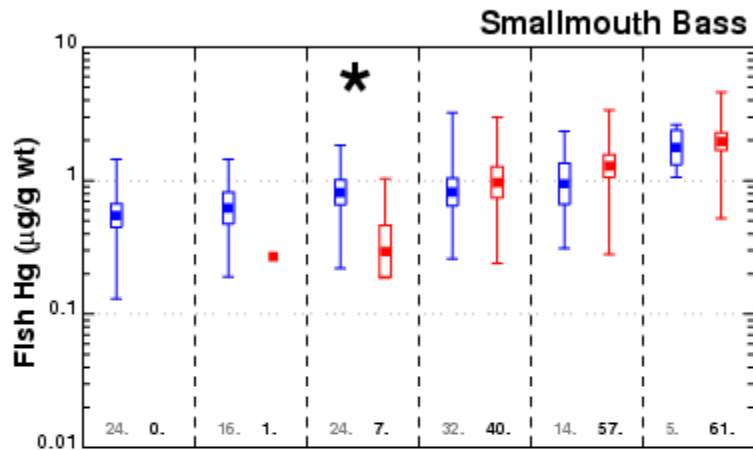
Largemouth Bass - 50 to 75th Length Percentile

Fish Mercury concentration vs Length Category in the South River (RRM 0 to 24), 2 of 2
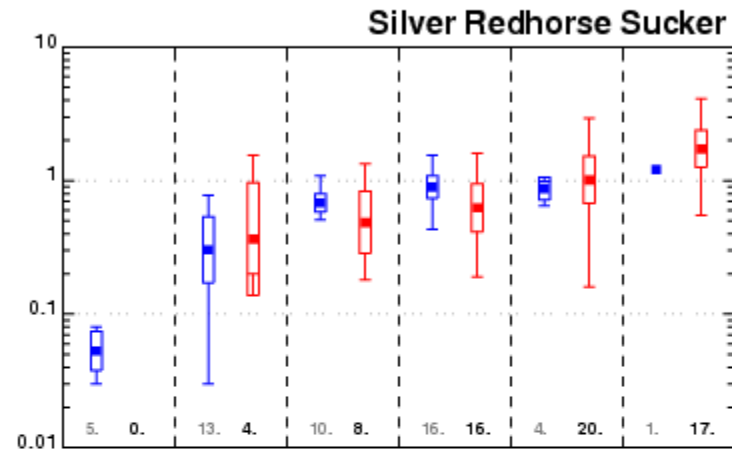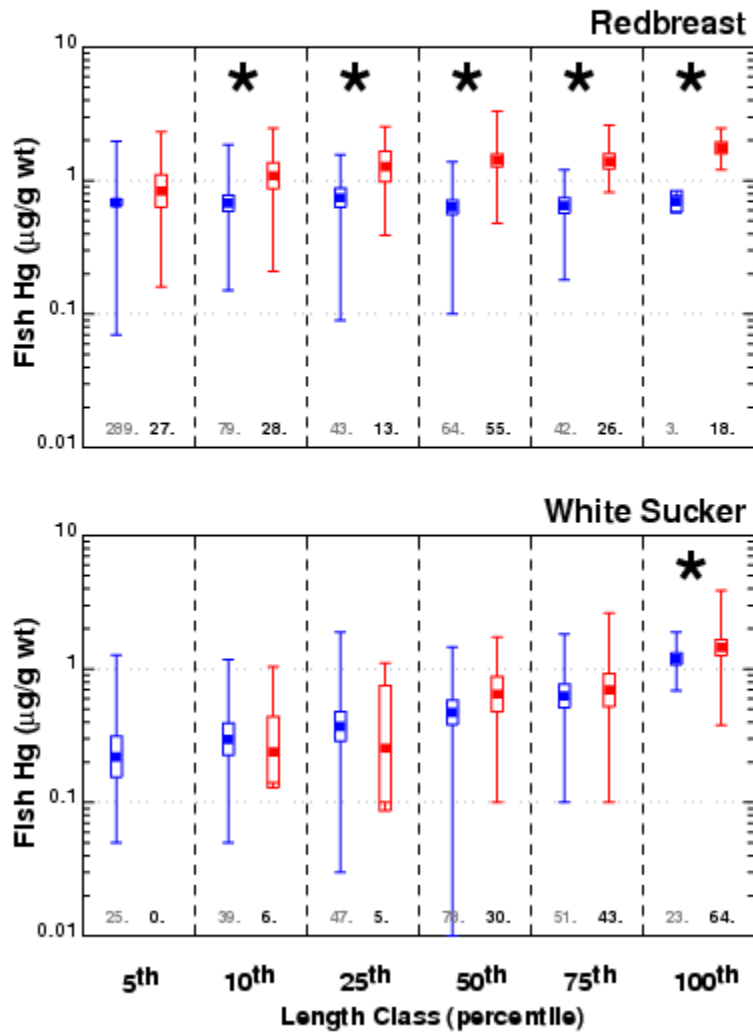
Fish Mercury concentration vs Length Category in the South River (RRM 0 to 24), 2 of 2
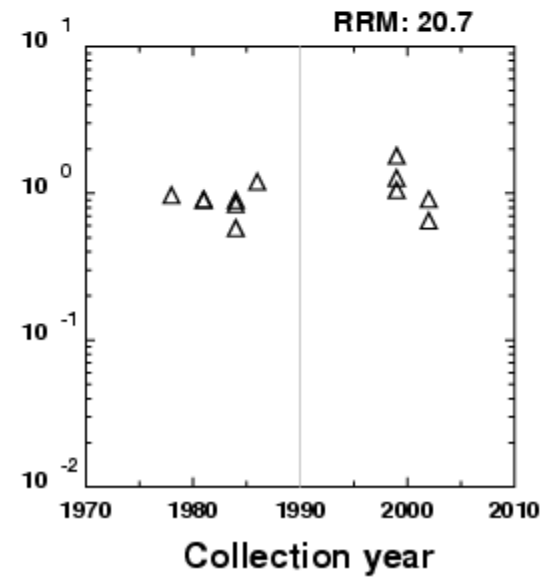1970 to 1989   1990 to 2005   Whiskers are Range, Boxes are 2 SE (approx. 95% CI)
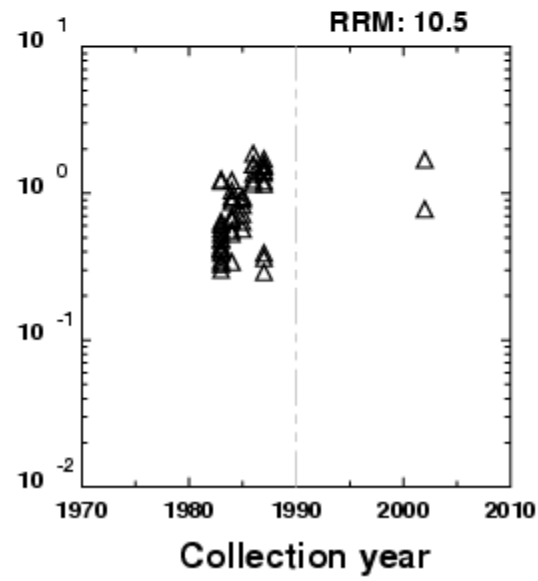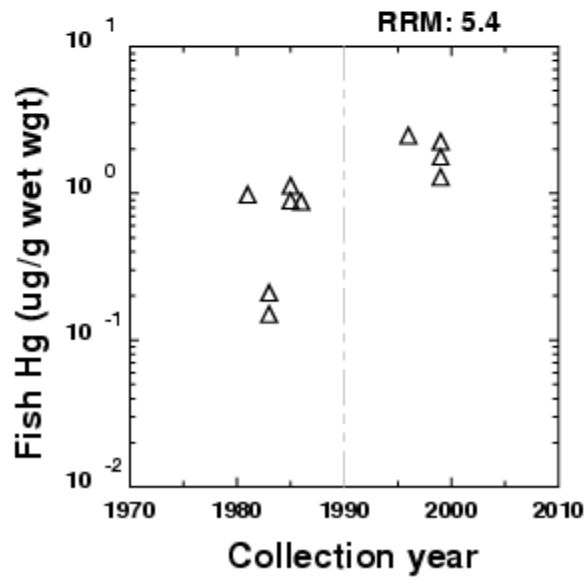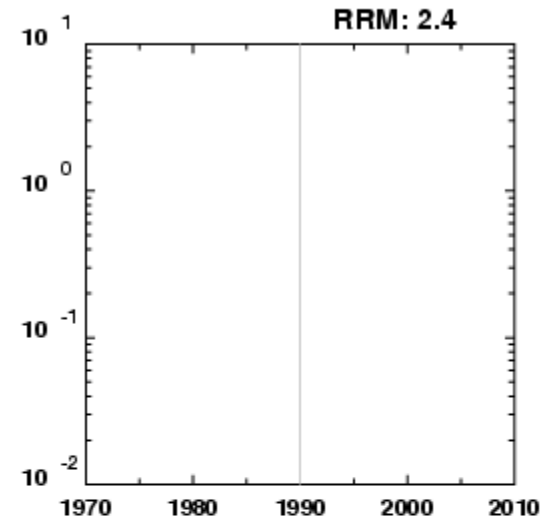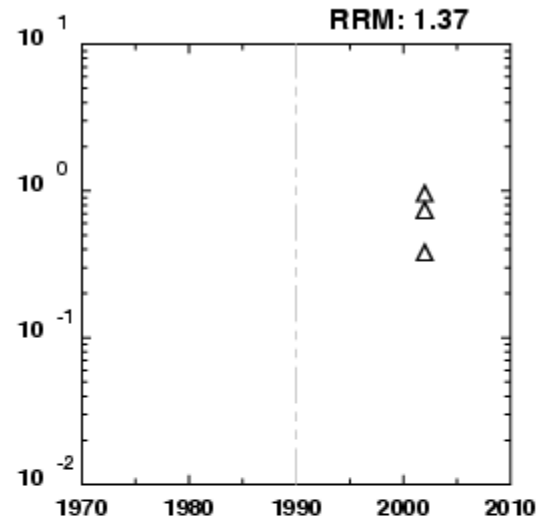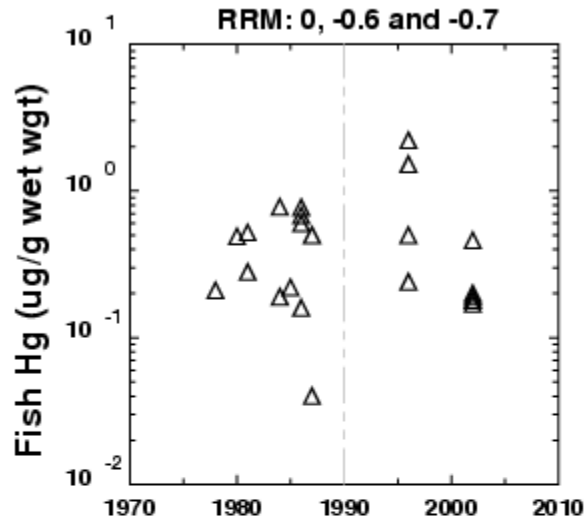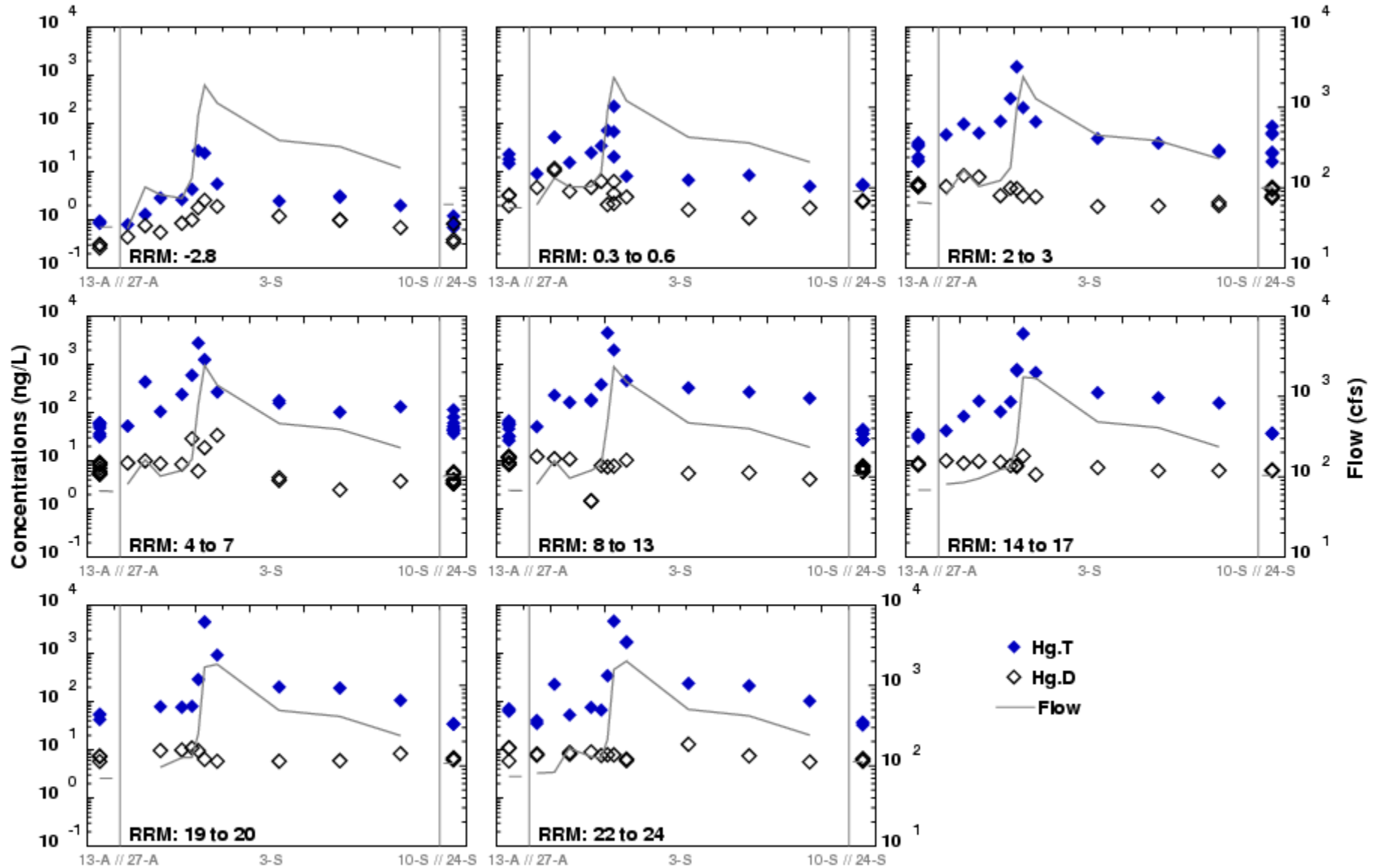★ Means are statistically different (α = 0.05) for sample sets of different sizes and variances
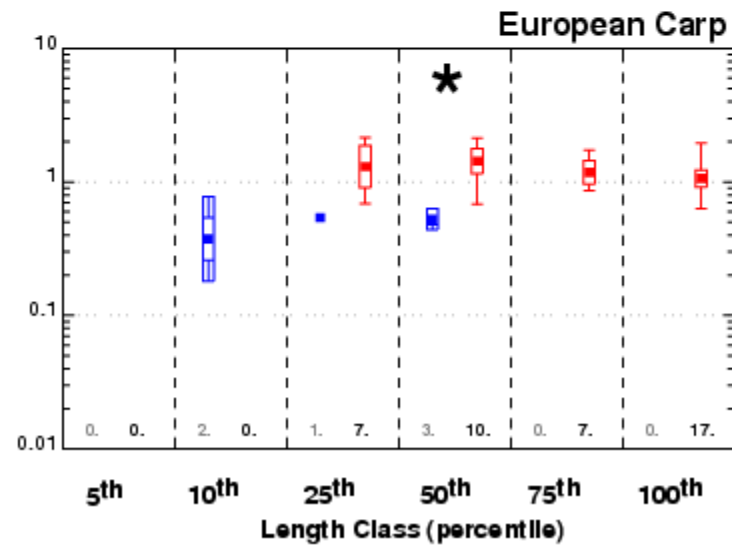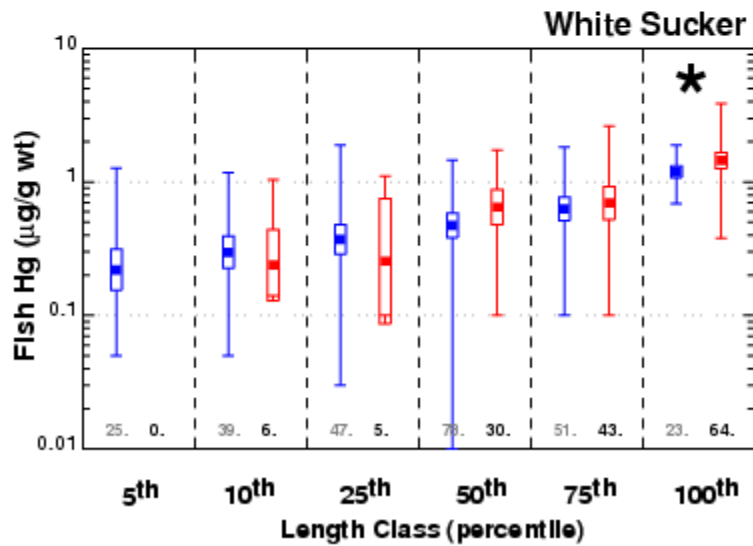
Redbreast - 5 to 15th Length Percentile

Temporal patterns of Mercury from Aug to Sep 2006

Temporal patterns of Sorbed Mercury along the South River

Slide 25
10/10/2007