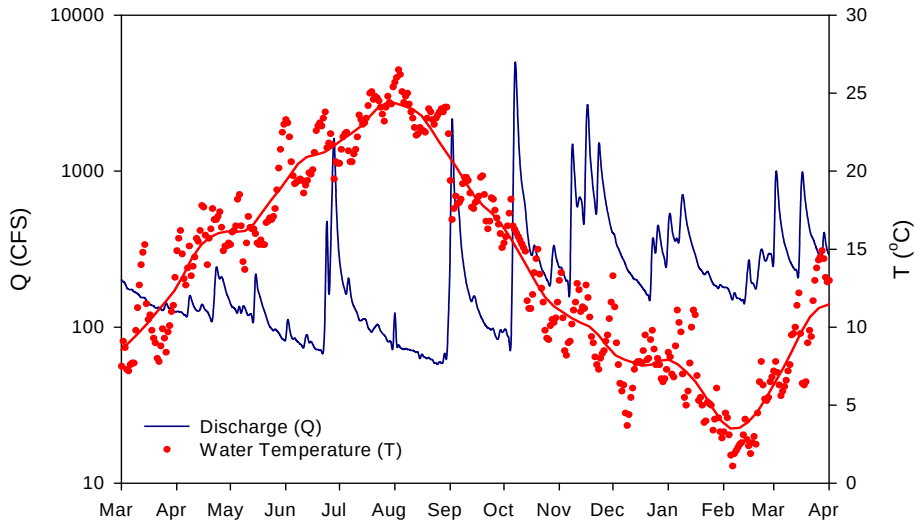
south river SCIENCE TEAM

Phase I System Characterization: Year 1 Data Review

URS

Year 1 Study Conditions

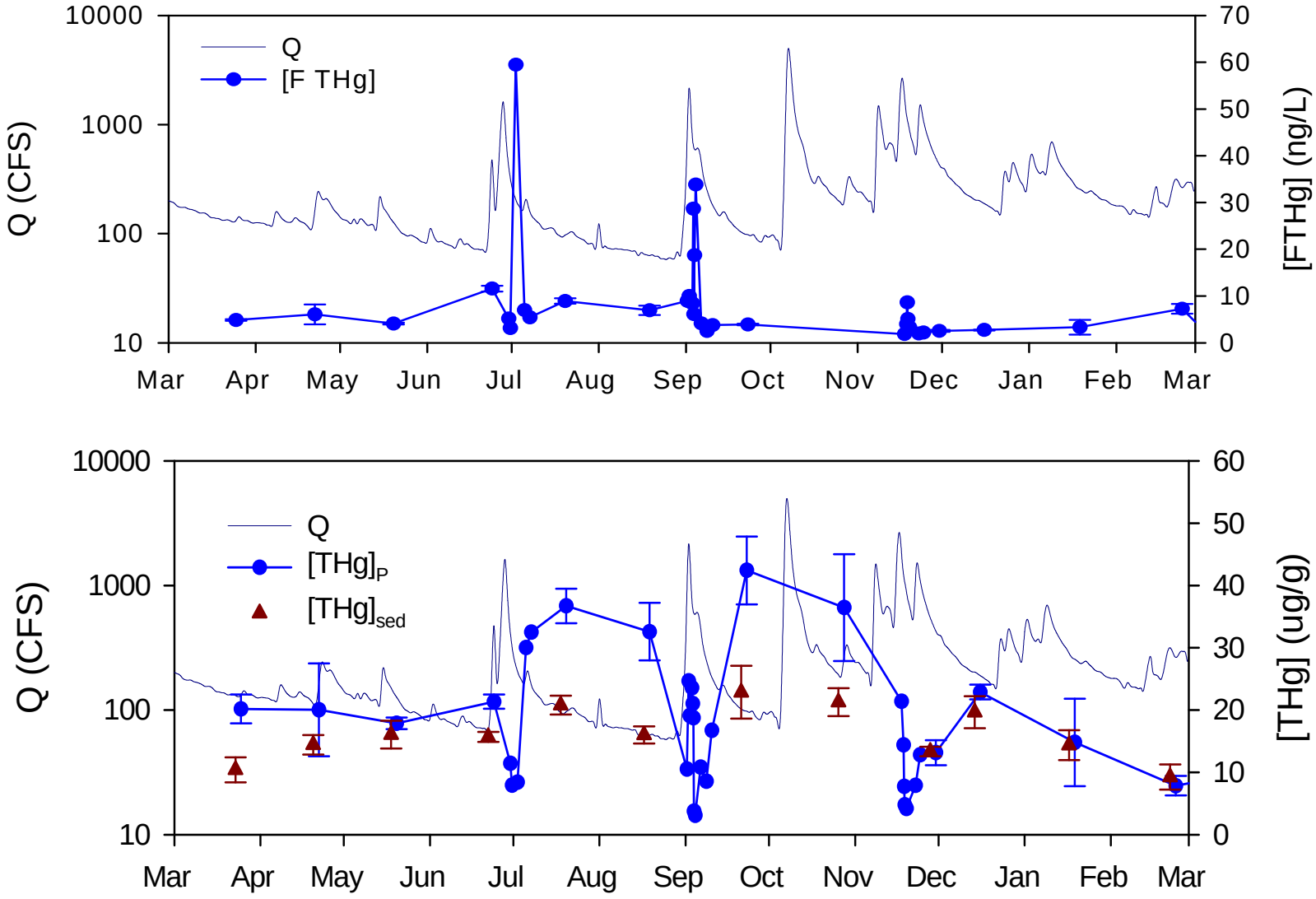
- Spring and summer 2006 had lower discharges than usual
- No storms between March and June, followed by several storms in 2nd half of year
- Relatively distinct temperature regimes
  - >10°C: April – September, 2006
  - <10°C: March 2006, October 2006 to February 2007



Year 1 Summary: Total Mercury in Surface Water

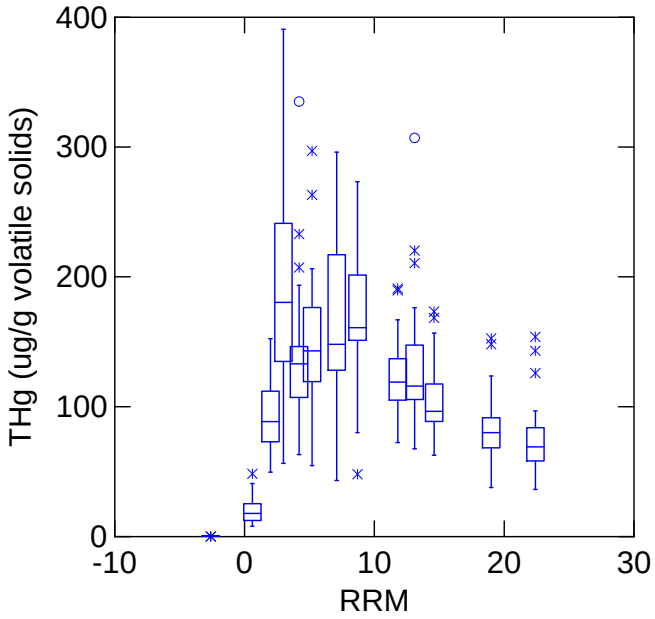
- The concentrations of FTHg and THg_P were stable under baseline conditions over the course of year one
- Increases in FTHg after storms, but only in locations upstream of RRM 9.9
  - Soil or tributary inputs after high water surface elevations
- THg_P diluted by high discharges to levels below sediment concentrations and rebound on falling limb
- Sediment concentrations change little over the course of year one

Holsinger Farms Footbridge (RRM 5.1) and RRM 5.2



Total Mercury in Sediment

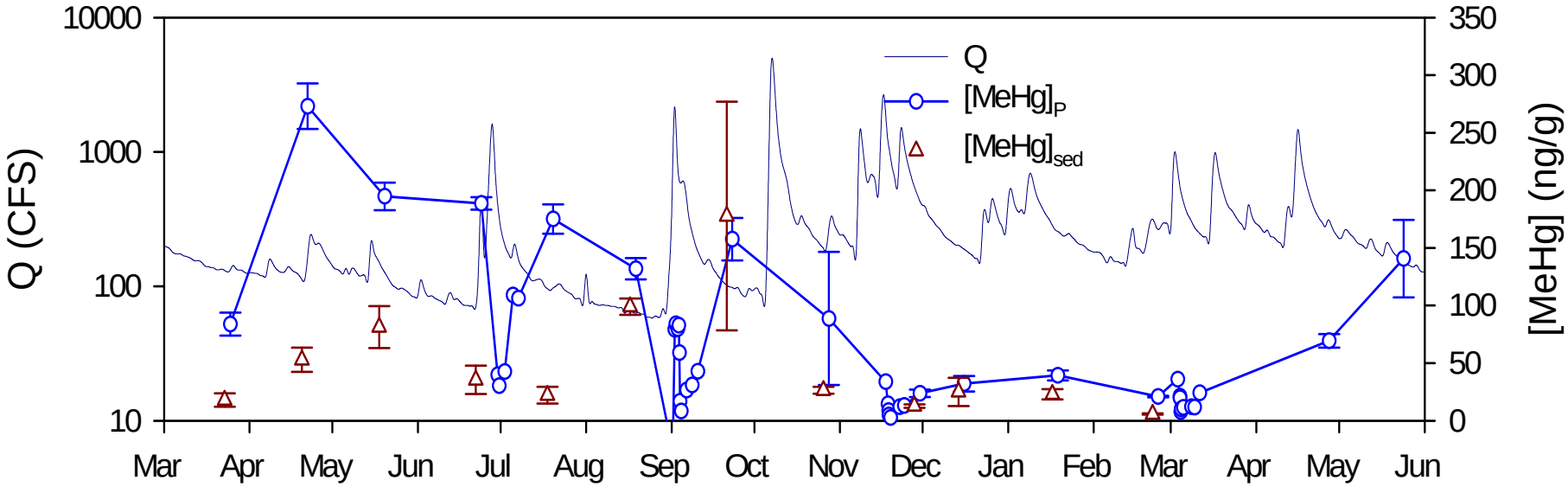
- Sediment THg was generally stable over time at each location
- Highest concentrations observed in upper half of the river
  - RRM 3.0 – RRM 8.7



Year 1 Summary: Methylmercury in Surface Water

- Concentrations of both FMeHg and $MeHg_P$ increased significantly April – June 2006 and decreased steadily after
  - Pattern repeated in 2007, although concentrations were lower
- FMeHg and $MeHg_P$ diluted under storm flows
- $MeHg_P$ in surface water generally higher than MeHg in sediment
- Similar seasonality in sediment, although concentrations increased in September

Holsinger Farms Footbridge (RRM 5.1) and RRM 5.2



URS

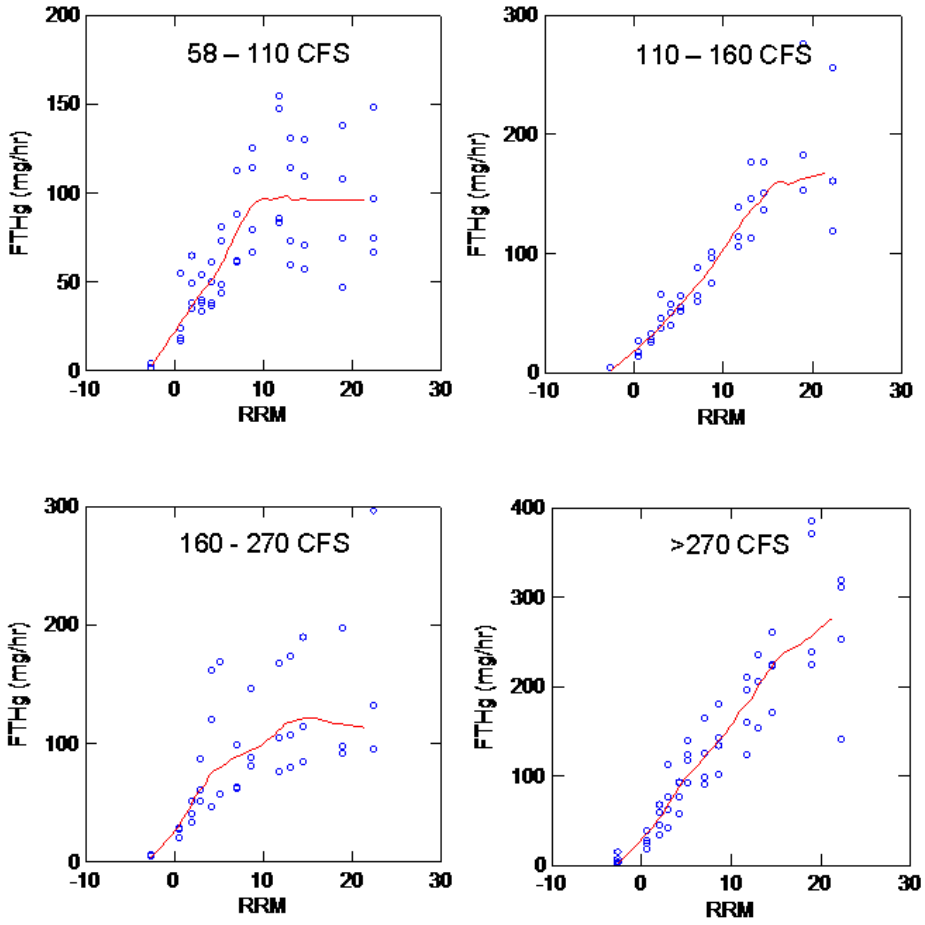
Low Slopes Reaches Concentrate Mercury on Particles

- The concentration of THg and MeHg on particles increases in low slope reaches
- May reflect THg inputs, areas of methylation, or areas of particle coagulation

RRM	ΔTHgP (ug/g)	ΔMeHgP (ug/g)
0.6	**20**	**0.13**
2	**65**	**0.21**
3	**96**	**0.50**
4.2	**5**	-0.02
5.2	**98**	**0.51**
7.1	-17	-0.04
8.7	-11	**0.42**
11.8	-75	-0.43
13.1	**18**	**0.29**
14.6	-18	-0.10
19	-14	0.05
22.4	-32	-0.26

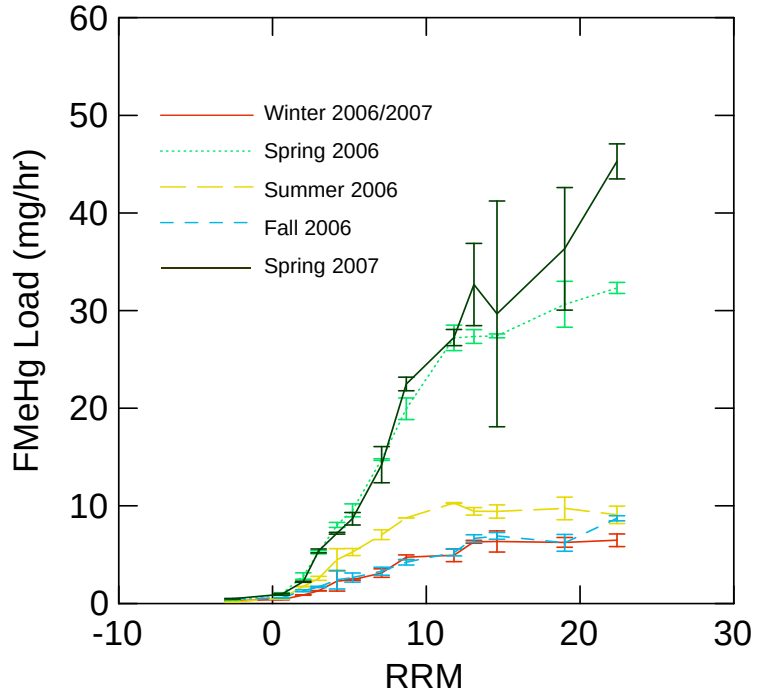
Baseline THg Loading

- Loading constrained to upper half of river under lowest flows
- Location of maximum loads moves downstream as flow increases



Baseline MeHg Loading

- Season drives MeHg loading
- Rate of increase in load is highest in upper half of river
- Highly consistent spring patterns



Incremental Storm Loading

- THg:
  - Loads are positive up to Crimora or Harriston
- MeHg:
  - Loads from background area often 2nd or 3rd highest for unfiltered MeHg

RRM	U THg Load (g)	F THg Load (g)	U MeHg Load (g)	F MeHg Load (g)
March, 2007				
0.2	26	5	3.1	0.72
2.3	552	5	1.3	0.16
5.1	534	4	0.6	0.25
9.9	2986	69	6.3	0.93
16.5	-681	14	3.2	0.36
19.5	-540	-51	-0.6	0.03
23.9	-39	36	2.1	0.53

High Downstream Loads Due to Resuspension?

- Partitioning of inorganic mercury suggests that mercury is more adsorbed to particles