

Source Scouting, Method Development, & Mechanistic Studies

Turner/Jensen

July 2006

Turner/Jensen Updates

2006 Source/Mechanism Studies

- Plant reach loading studies
- Near-bank Hg flux studies

Loading Inputs Near Plant

Between Key Sample Stations

grams Hg per day

Reaches	RRM	4-Aug	Flood 04	5-Feb	5-Sep
Reference & Plant Reach	-1.5 to 0.3	1	1230	24.4	1.2
Constitution Park to Dooms	0.3 to 5.5	14.6	1689	-14.1	12.9
Dooms to Crimora	5.5 to 10.5	-4.5	374	14.4	-8
Crimora to Harriston	10.5 to 17	0.4	2842	-1.5	-0.3
Harriston to Port Republic	17 to 25	-3.8	211	-5.9	-0.2

Note: In two instances, plant reach loading was significant portion of all river loading measured.

Possible Sources of Loading

Plant Reach

- Unidentified groundwater loading
- Exchange between clean suspended solids entering upstream with elevated Hg sediments in plant reach
- Unidentified outfall loadings from plant
- **Bank and/or floodplain soil erosions** ←
- Atmospheric deposition



Plant Reach

Bank/Floodplain Soil Results - May 06



Plant Reach

Bank/Floodplain Soil Results - July 06



Plant Reach Soils Results

- Floodplain soils above/near footbridge low in Hg (< 1 ppm)
- Higher Hg values (up to 50 ppm) in bank composites downstream of footbridge on river right
- Before Main Street on both sides, Hg has reached “typical” downstream values (above background).

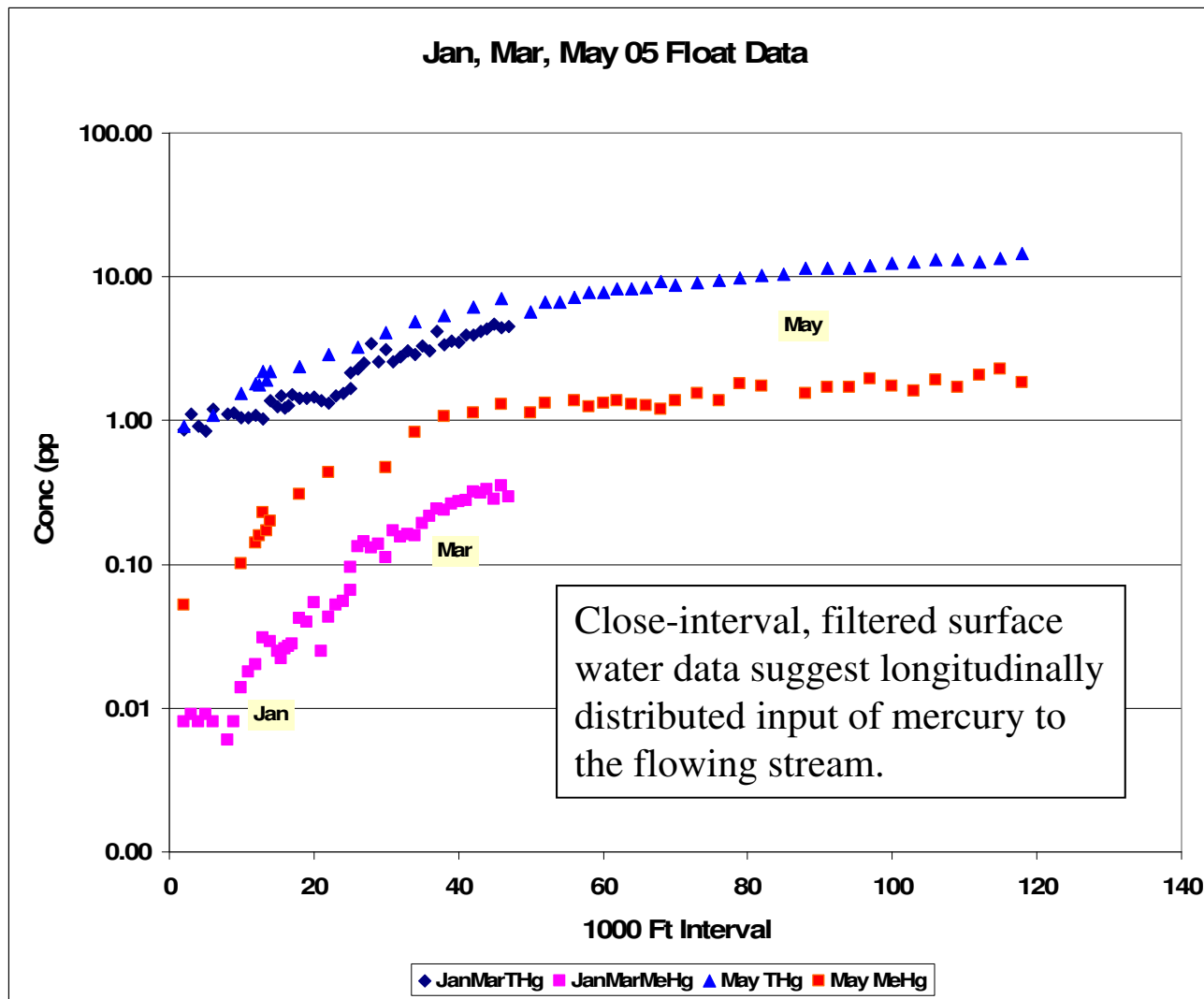
Plant Reach Path Forward

- Awaiting results (ecostudy) of recent storm flow sampling.
- Need > 200 CFS at Harriston to study surface water in plant reach.
- Began flow gauging prep in July 06
- Planning “detailed material balance” study across plant reach in Fall 06.

Near-Bank Hg Flux Studies

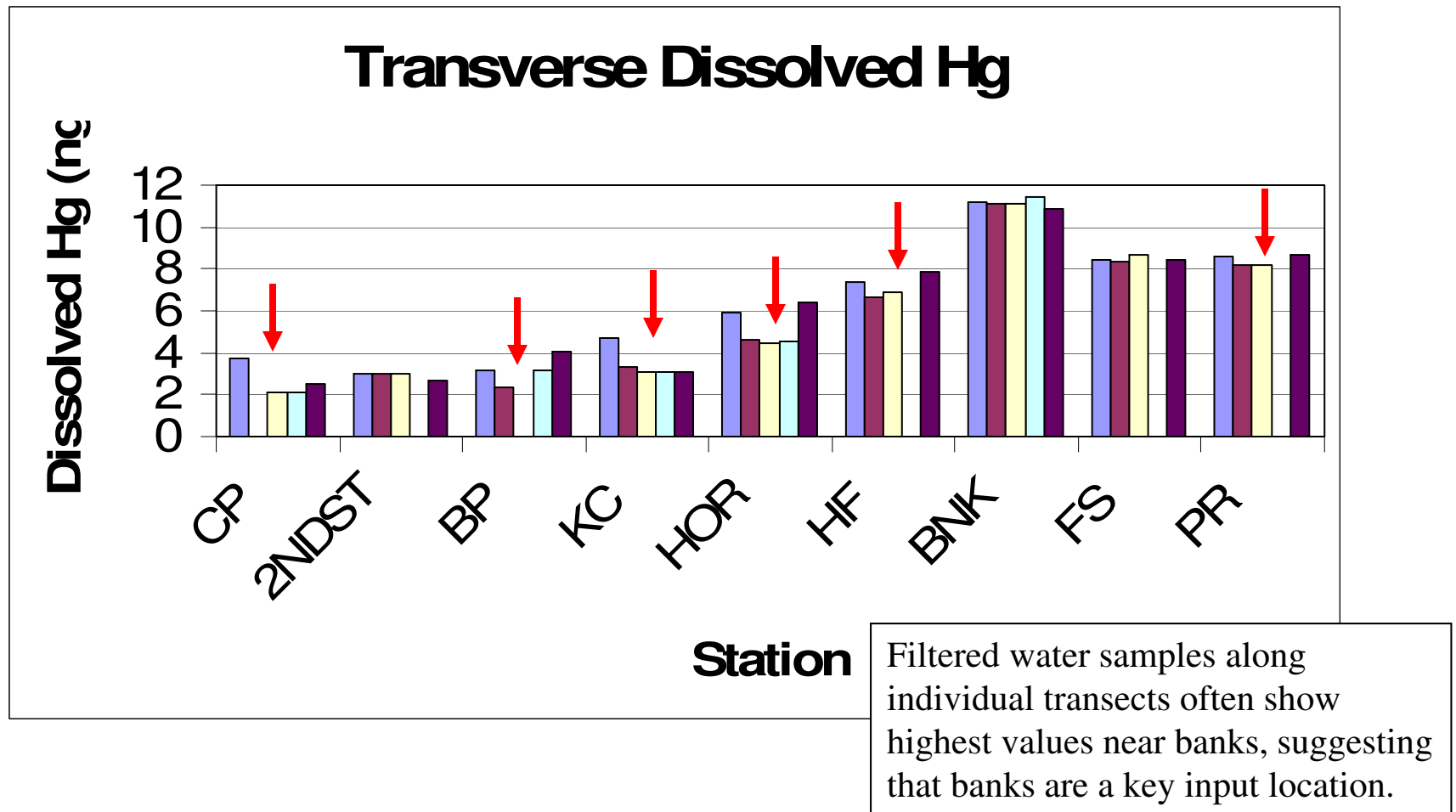
Basic Park Location

Near-Bank Study Background



Near-Bank Study Background

Continued



Special Clarification

- Elevated dissolved Hg results for near-bank SW samples **do not** rule out possible additional center stream inputs/fluxes.
- They **are** a strong indicator that a reach is an active input reach to SW.
- They **are** a strong indicator that the near-bank locations are active input locations to SW.

Near-Bank Study

Investigative Approaches in Phase I

- Choose location coincident with ecostudy
- Synoptic measurement of
 - Surface water Hg, transverse and longitudinal in study area, to verify elevated near-banks and provide baseline. 
 - Near-bank sediment Hg. 
 - Pore water/groundwater Hg 
 - Sequential extraction of near-bank sediments 

Near-Bank Study

Have initially chosen Basic Park for Phase I



Surface Water Pattern

Filtered THg (ng/L), May 2006

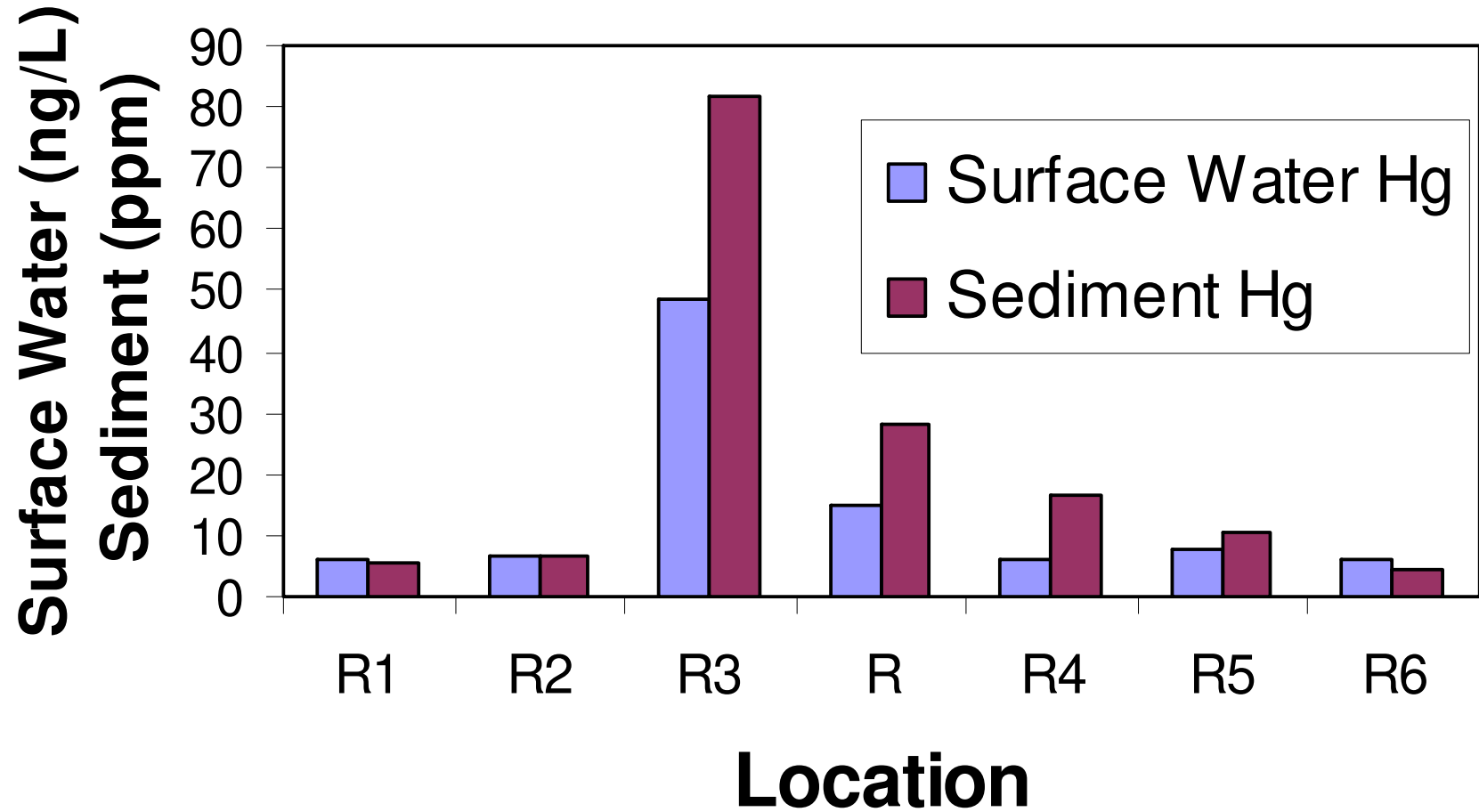


Shallow Sediment Pattern

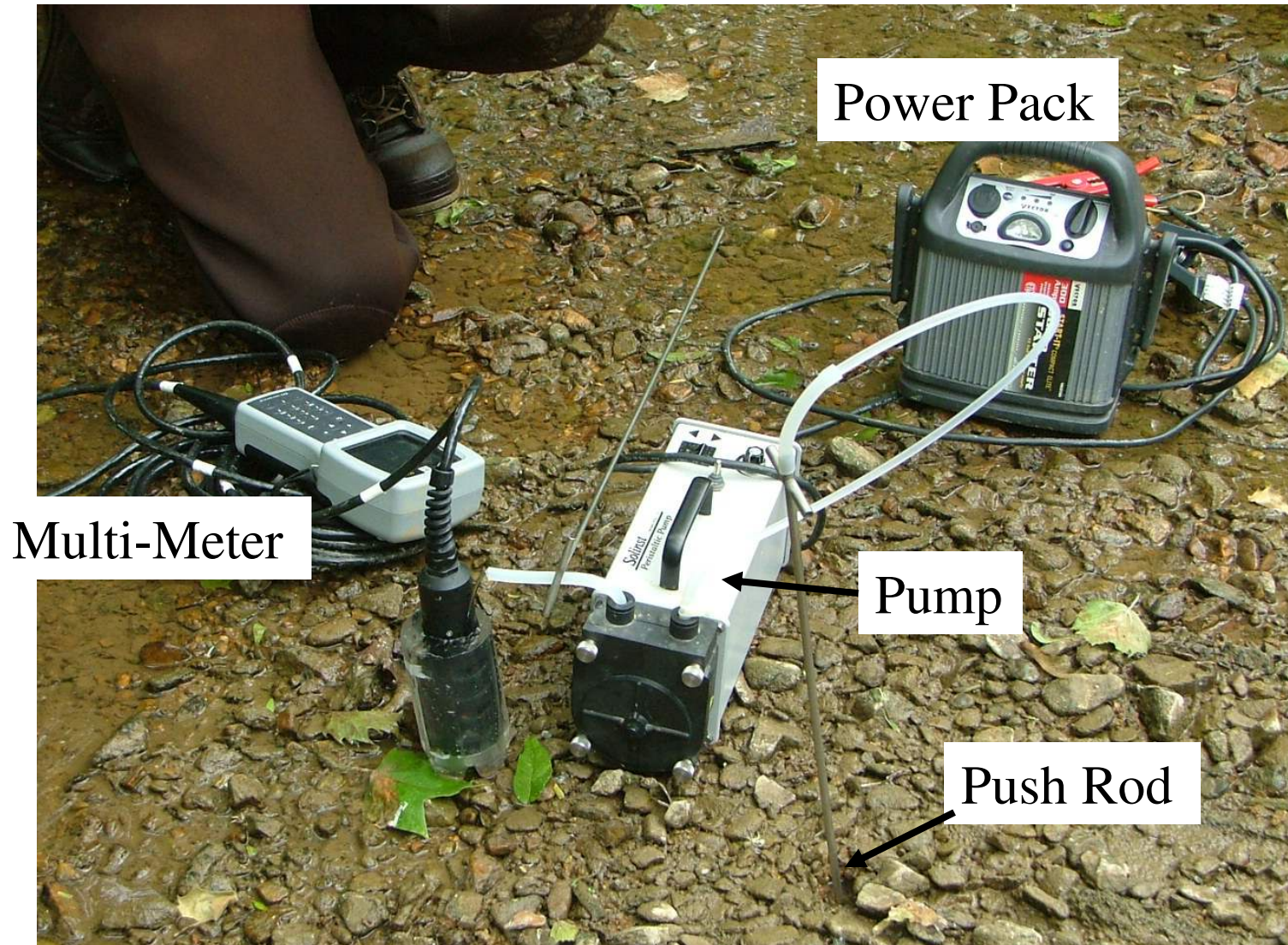
THg ($\mu\text{g/g}$)



Basic Park - May 2006



Pore Water Equipment



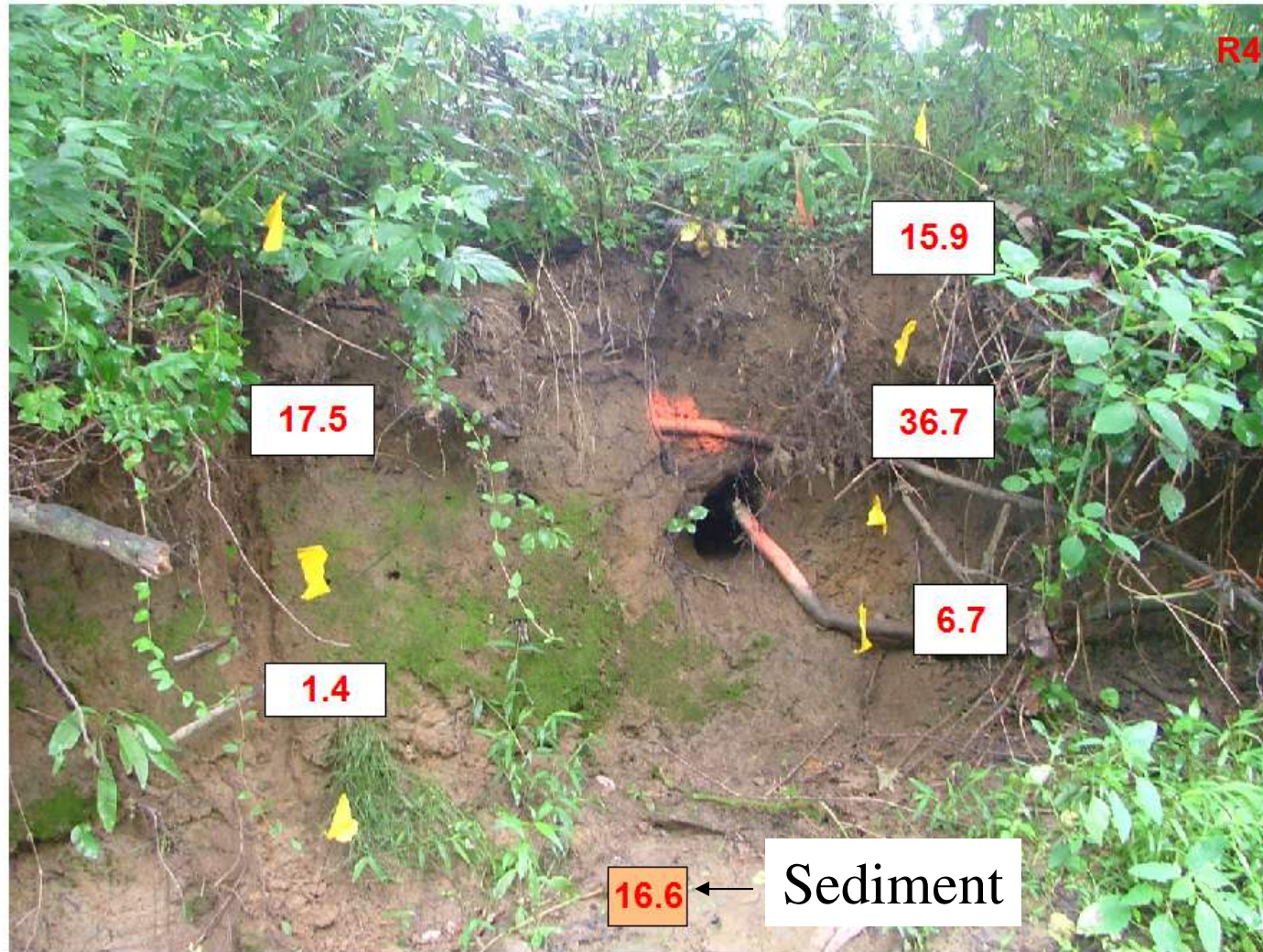
Pore Water Pattern

THg dissolved, ng/L; Spec Cond, uSiemens



Bank Soil Characterization, R4

vertical channels between flags in ppm



Near Bank Results - May/July 06

- Strong SW “signal” at chosen location
 - Did we “luck out”, or is this common?
- SW results seem to “follow” sediments
- Sediments perhaps more “localized” than previously expected?
- Sufficient bank soil Hg to account for sediments
- Pore water relatively clean in many locations
 - Pore water elevations do not “follow” SW or seds
- Still awaiting sequential extractions on sediments
- Flux dam QA successful

Bonus Topic

THg/MHg in SW Near Crimora

Unusual THg/MeHg Results

Near Crimora-Sept 2005 (ng/L)



May 06 SW Results

THg; MHg; all ng/L dissolved

