

Survey of the Mercury Content of Earthworms on the South River VA Floodplain



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South River Science Team
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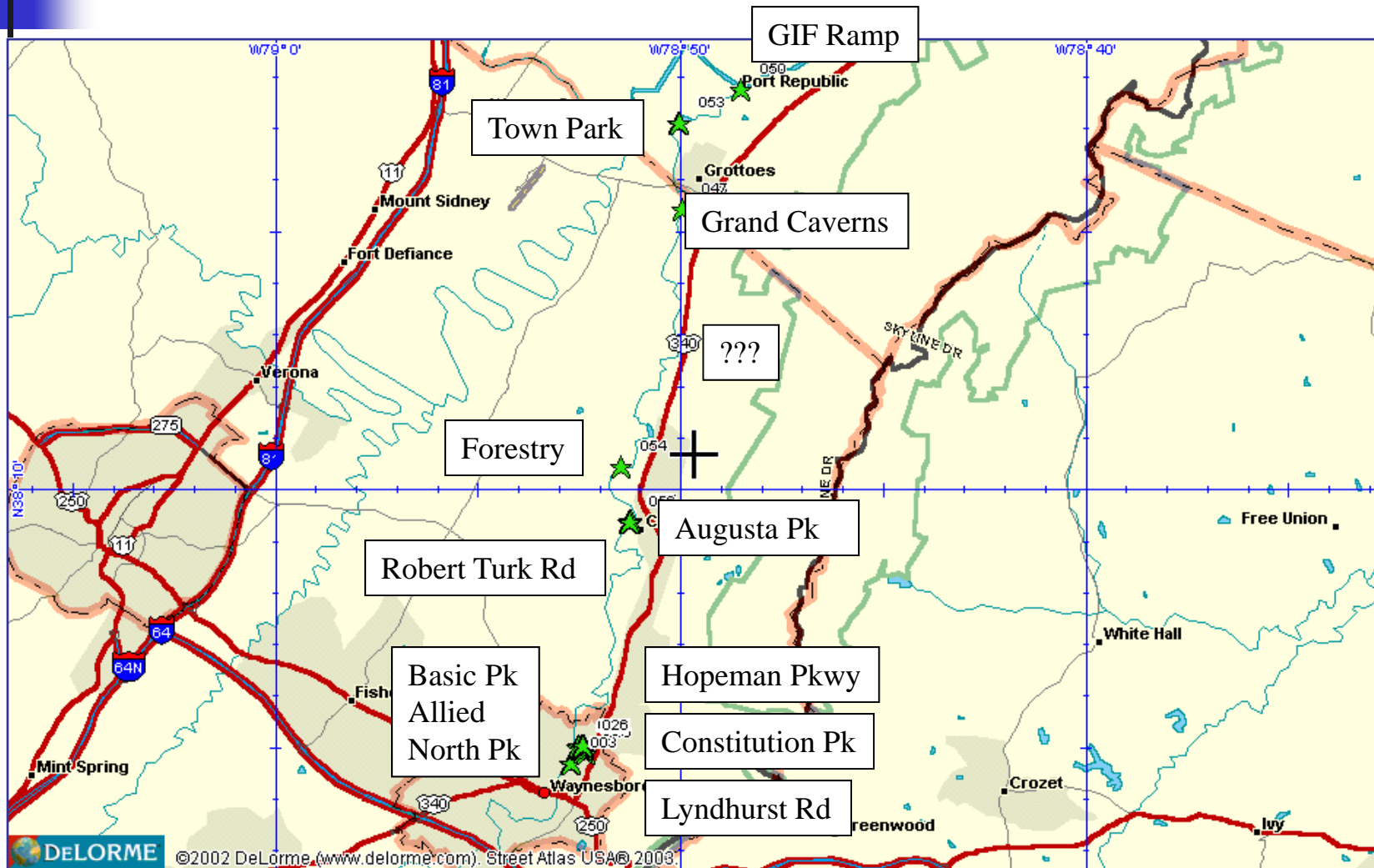
Objectives of Study



- Contribute to an understanding of potential food web interactions using earthworms, which are an example of a lower trophic level organism in terrestrial ecosystems.
- Conduct a survey of Hg concentrations in earthworms collected on the South River floodplain to understand the extent to which mercury bio-accumulates in earthworms.
- Evaluate the relationship between total Hg and Me Hg concentrations in earthworms and paired soil samples.

Floodplain Soil Sample Locations

...final decision on 10 or 12 sites





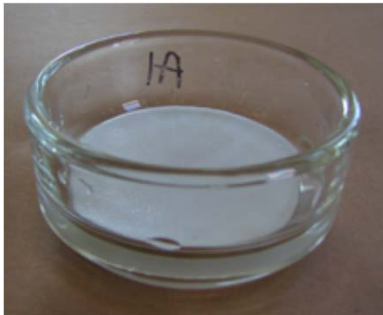
Sample collection procedure

- Five earthworm and soil samples from a 10x10m grid at each site
 - Randomly select five 1 x 1m quadrats within grid for earthworms and soil samples.
 - Excavate each quadrat to collect minimum of 30 individual earthworms.
 - Soil sample excavated from each quadrat analyzed for Hg.
- Site composite soil sample for characterization.
- Include sufficient quantities for quality control (e.g., duplicates and matrix spikes).

Earthworm preparation



Earthworms are collected live from the site, stored in soil, kept cool, and returned to laboratory. Worms are washed in DI water to represent each quadrat.



Individuals are placed into culture dishes, which contain moist filter paper and kept at about 10°C for 24 hr to void gut contents. Dead earthworms discarded.



Numbers and fresh weights of the voided earthworms are obtained and then they are placed in sample vials and frozen. Vials with frozen tissue samples are sent for total Hg & MeHg analysis.

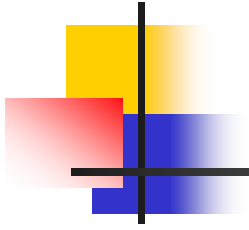


Earthworm and Soil samples at each Site

Quadrat No.	Earthworms				Soil		
	Total Hg		MeHg		Total Hg	MeHg	Soil test
	Deperated	Unde- perated	Deperated	Unde- perated			
1	1	1	1	1	1		
2	1				1		
3	1	1	1	1	1	1	
4	1				1		
5	1	1	1	1	1	1	
Total samples/site	5	3	3	3	5	3	1

Voided earthworms are relatively transparent, frequently even more so than this individual.

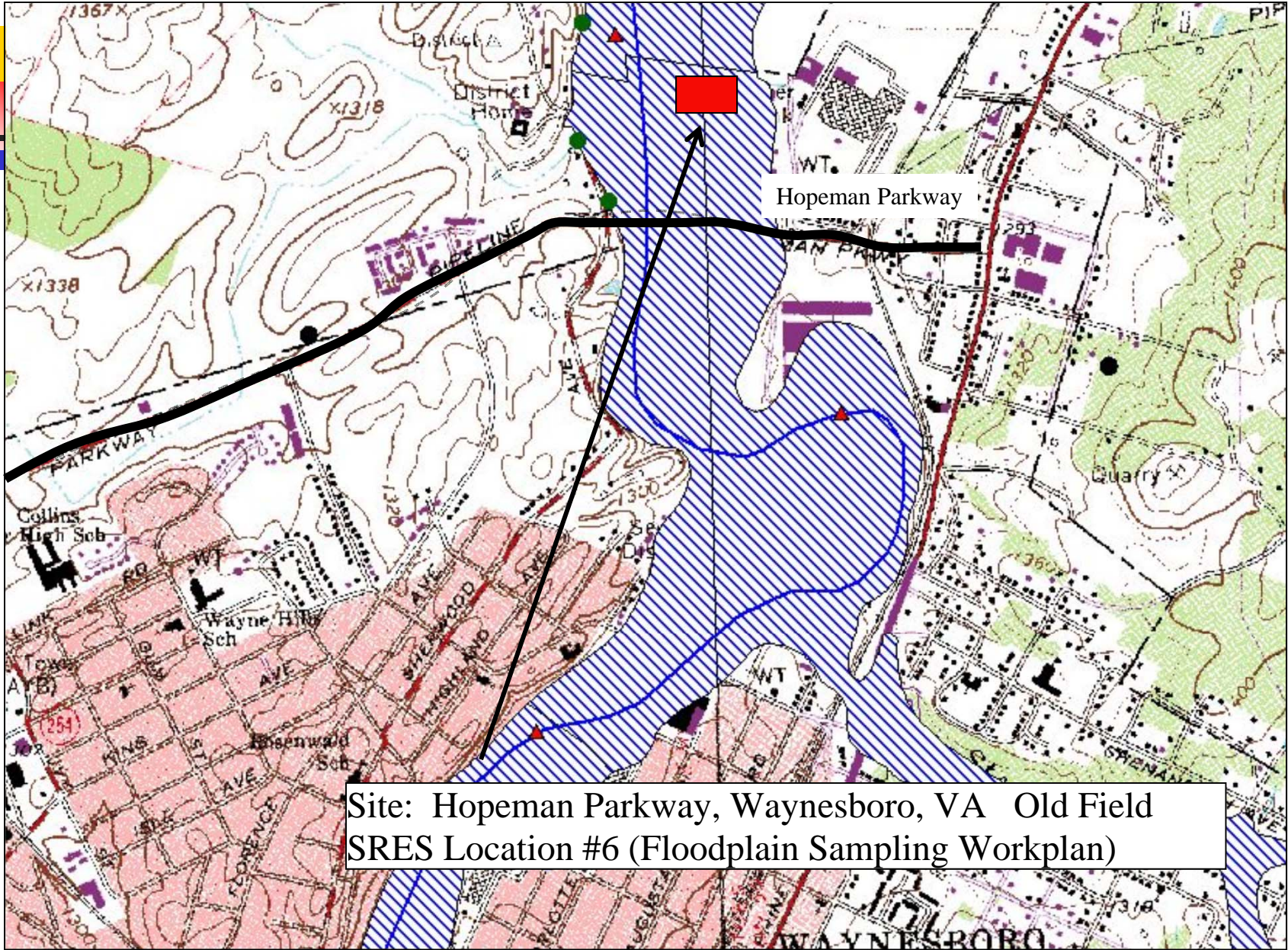




Test of Earthworm Collection and Depuration Procedure

Date of collection: April 24, 2006

Field Collector: Andy Carnahan





Earthworms collected from five random 1 x 1 m quadrats.

- At least 15 worms were rinsed in DI water and allocated to each of the following treatments
 - Depurated for 72 hr.
 - Depurated for 24 hr.
 - Depurated for 12 hr.
 - Not depurated, processed within 15 min of establishing depuration conditions in a culture container.
- A composite soil sample was also collected.



Soil Hg in composite of 5 quadrates at Hopeman Parkway

- Total Hg
 - 25.5 $\mu\text{g} / \text{g}$ dry wt soil
- MeHg
 - 0.0028 $\mu\text{g} / \text{g}$ dry wt soil



Earthworm Hg in composite of five quadrats at Hopeman Parkway

Mean depurated earthworm Hg
at collection site:

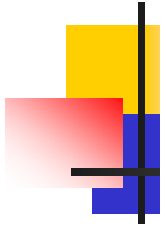
3.88 $\mu\text{g} / \text{g}$ wet wt T Hg

0.039 $\mu\text{g} / \text{g}$ wet wt Me Hg

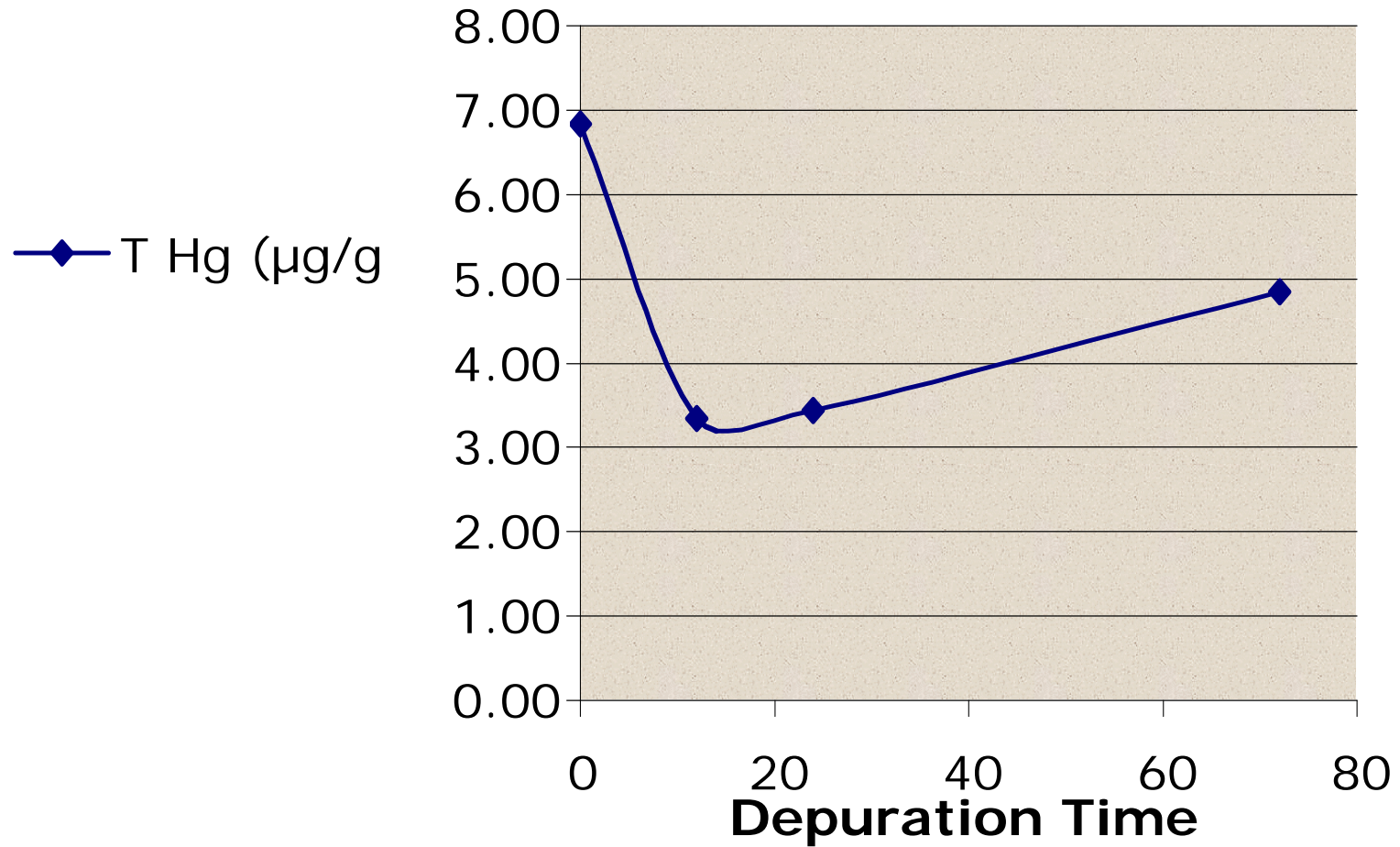
Undepurated earthworm Hg
at collection site:

6.82 $\mu\text{g} / \text{g}$ wet wt T Hg

0.045 $\mu\text{g} / \text{g}$ wet wt Me Hg



Effect of depuration time on earthworm weight Hg content





Current plans

- Finalize work plan
- Finalize selection of sites and lay out grids for sampling - May/June 2006
- Collect earthworm and soil samples – June/July 2006
- Evaluate data and prepare appropriate reports – August/Sept 2006
 - Compare results to literature
 - Develop path forward

