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# Using the Asiatic Clam (*Corbicula*) to Find Mercury Source Areas in South River

Thomas R. Benzing, James Madison University  
Doug Graber-Neufeld, Eastern Mennonite University  
Proposal to the South River Science Team  
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# Outline

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1. Ecology of the Asiatic clam
2. Summary of 2001 EMU Study (Dr. Graber-Neufeld)
3. Proposal for 2002-2003 Study (Dr. Benzing)

# Ecology of *Corbicula fluminea*

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- non-native freshwater clam
- first reported in Virginia in 1972
- average life span: 1-3 years
- abundant in South River
- filter rate: 8 – 800 mL per hour
- typical adult size: 0.2 – 0.5 grams



Asiatic clam, *C. fluminea*

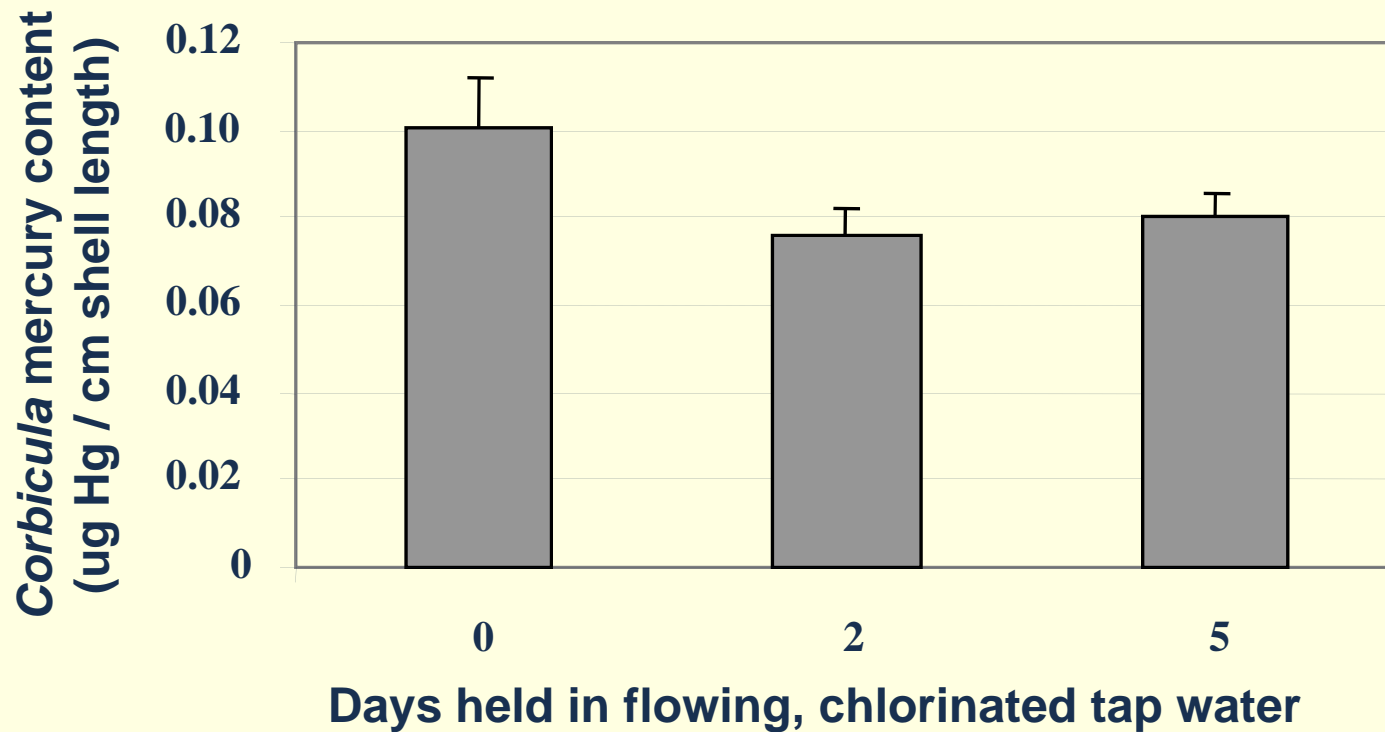
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“ Bivalves are good accumulators of heavy metals  
...and, because they are sessile, they may reflect  
local contaminant concentrations more accurately  
than more mobile crustacean and finfish species”

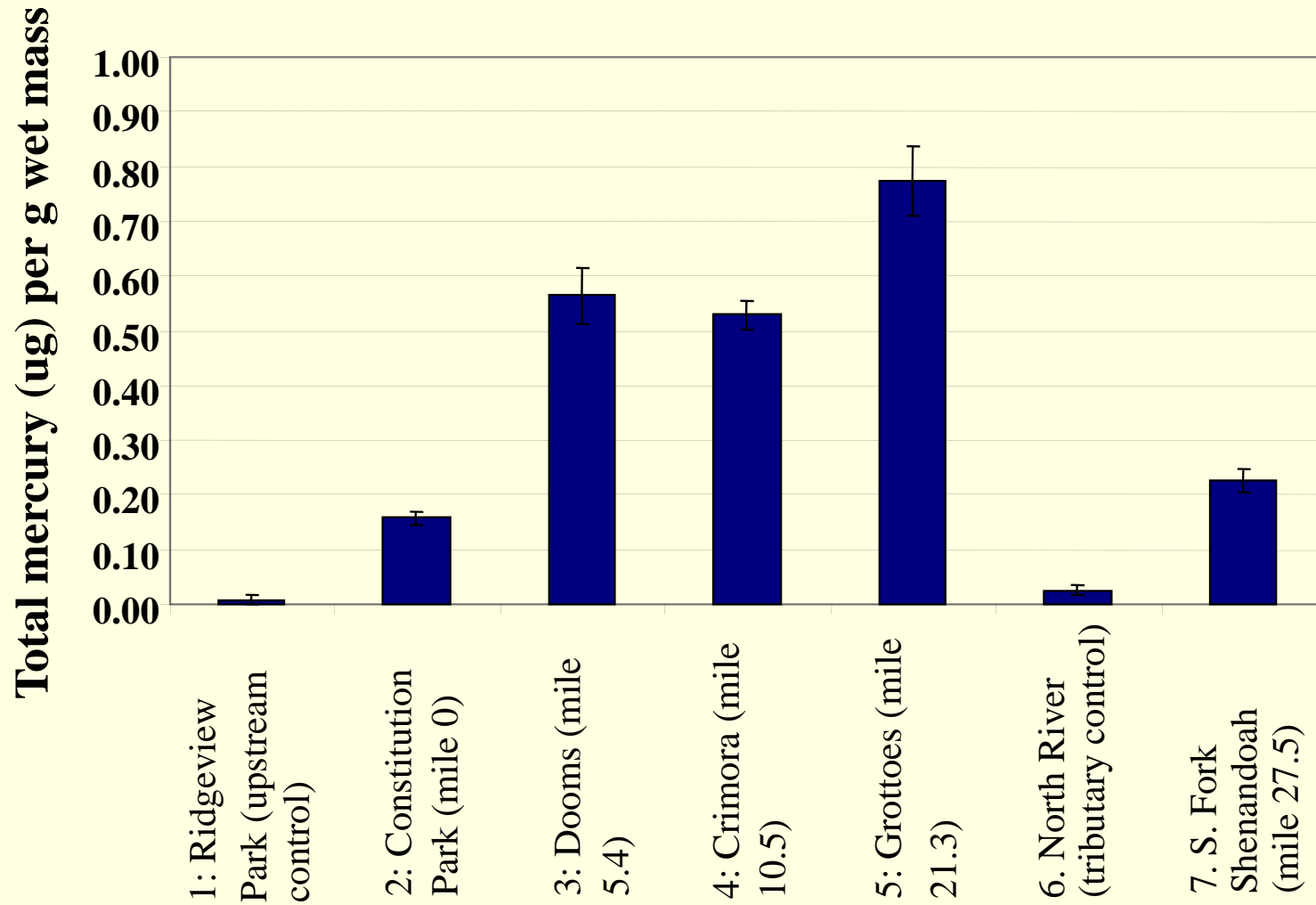
- USEPA, *Guidance for Assessing Chemical Contaminant  
Data for Use in Fish Advisories*, vol. 1 -

# Methods for the 2001 EMU Study: Collection and CVAAS

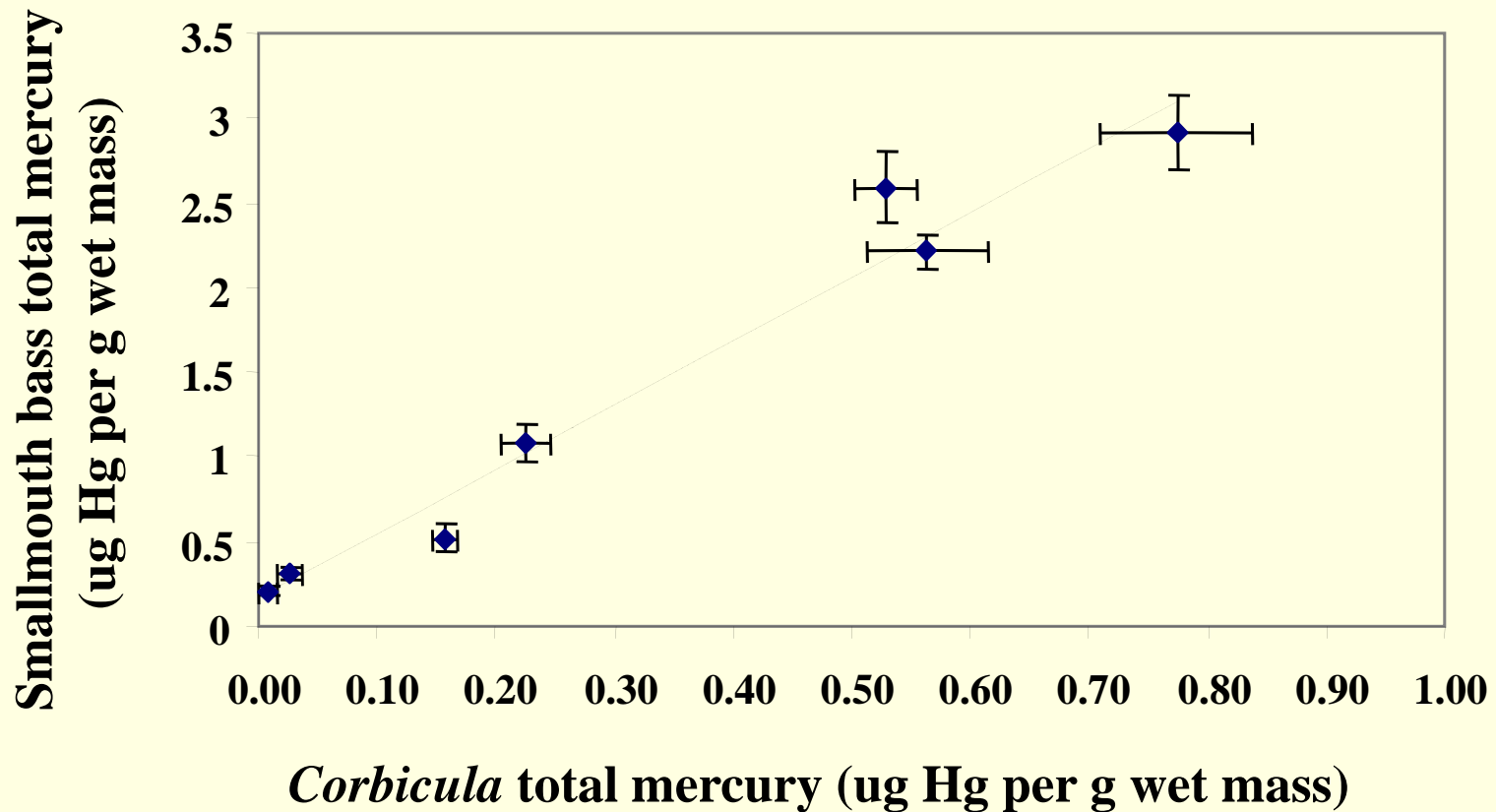
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# *Corbicula* Mercury Content at Seven Sampling Sites



# Correlation between Mercury in *Corbicula* and Smallmouth Bass\*



\* Smallmouth data from 1999, <http://www.deq.state.va.us/pdf/rivers/mercurytext.pdf>

# Proposal for 2002-2003

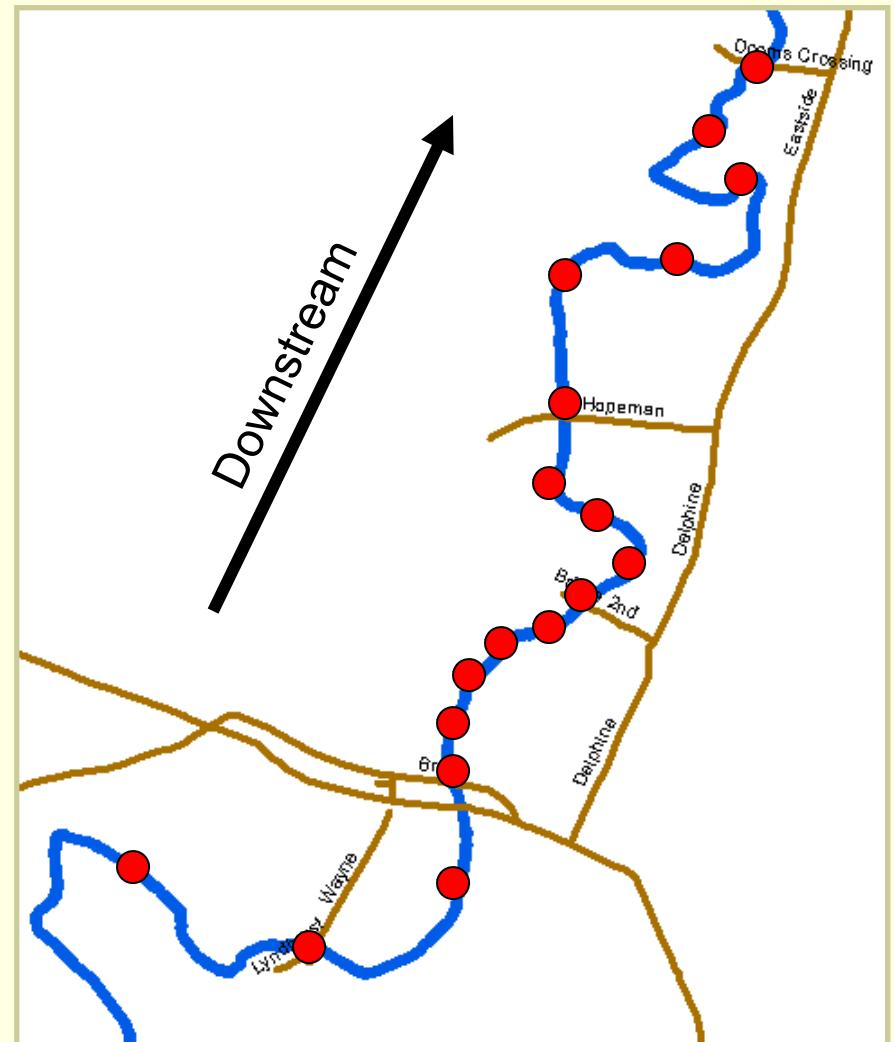
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- Collect Corbicula at 17 locations between Waynesboro and Dooms on same date in October or November 2002
- Include 2 duplicates + 1 background sample (taken at Ridgeview Park) for quality control
- Analyze 20 composite tissue samples for total Hg using the state lab or a commercial lab under contract
- Present and report the results at the South River Science Team meeting in April 2003



# Proposed Sampling Locations

- Ridgeview Park (control sample)
- Constitution Park (near footbridge)
- Lyndhurst Road (aka. Wayne Ave)
- Broad Street (aka. 250 Bypass)
- Selected “intensive sweep sites”
  - 3 PIMS sites (14, 12, and 2)
  - + sweep sites 17, 9, and 6
- 3 sites between Broad and Bridge St.
- 5 sites between Hopeman and Dooms
- 2 duplicate samples



# Sampling Methods

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1. Collect 10 large clams (15-30 mm) per sample site
2. Maintain live clams for at least 48 hours in clean water (to allow gut contents to clear)
3. Shuck clams and harvest soft tissue
4. Place clam tissue from each site into one container (i.e. create composite sample)
5. Freeze and maintain at -70 degrees until analysis



*James Madison University's  
Mobile Environmental  
Laboratory*

# Analysis Methods and Costs

Laboratory	Method Number	Method Description	Cost (\$/sample)
State Consolidated Laboratories	3051/3052 245.1	Microwave digestion Cold-vapor AA	\$85.37
En Chem Inc. (Madison, WI)	7471	Cold-vapor AA	\$75
Frontier Geosciences (Seattle, WA)	1631 + addendum	Cold-vapor AFS	\$115
Lancaster Labs (Lancaster, PA)	5711 7471A	Cold-vapor AA	\$93.80

AA = atomic absorption spectrophotometry

AFS = atomic fluorescence spectrophotometry

# Proposed Budget

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## Clam tissue analysis:

- 20 samples x \$85.37/sample \$1,710

## Clam tissue collection, preparation, shipping:

- Mobile lab travel to and from JMU \$70
- Laboratory expenses \$430
- Shipping to analytical laboratory \$100

\$2,310

# References

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McMahon, R.F. In *The Mollusca, Ecology*. Edited by Wilbur, K.M. vol. 6. Academic Press: New York, (1983): 505-561.

NOAA, “An In-Situ Assessment of Mercury Contamination in the Sudbury River, Massachusetts, Using Bioaccumulation and Growth in Transplanted Freshwater Mussels” (Technical Memorandum NOS ORCA 89)

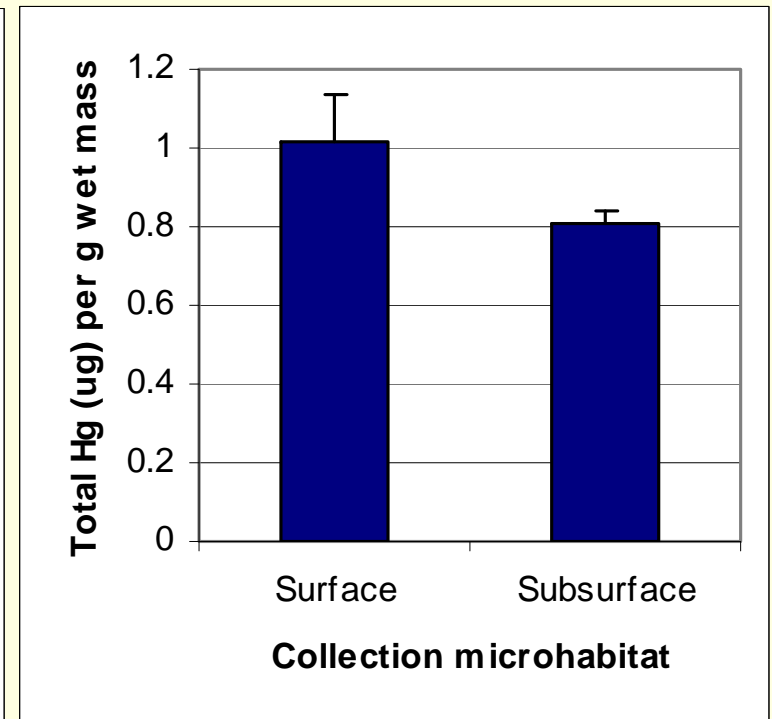
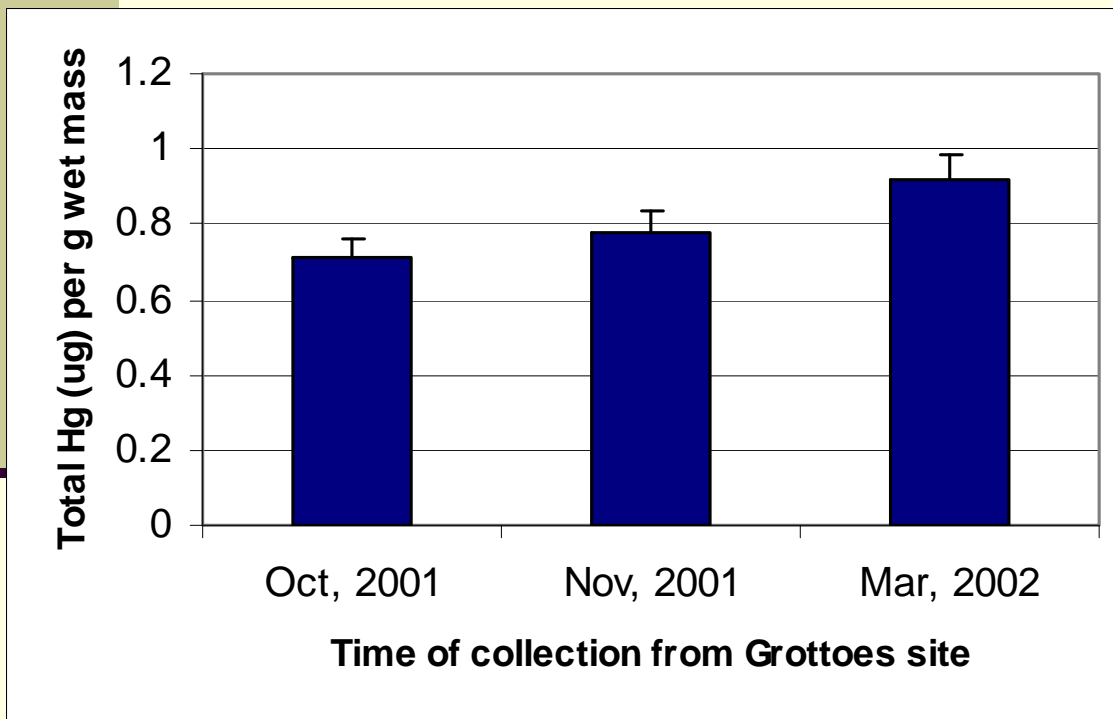
USEPA, “Fish Field and Laboratory Methods for Evaluating the Biological Integrity of Surface Waters” (EPA 600/R-92/111 March 1993)

[http://www.epa.gov/bioiweb1/html/fish\\_methods.html](http://www.epa.gov/bioiweb1/html/fish_methods.html) (19 September 2002)

USEPA, “Guidance for Assessing Chemical Contaminant Data for Use In Fish Advisories” vol. 1. (EPA 823-B-00-007 November 2000)

<http://www.epa.gov/ost/fishadvice/volume1/index.html> (19 September 2002)

# Additional Findings from EMU Study of Corbicula in South River, 2001



# Occurrence and Spread of *Corbicula* through North America (McMahon)

