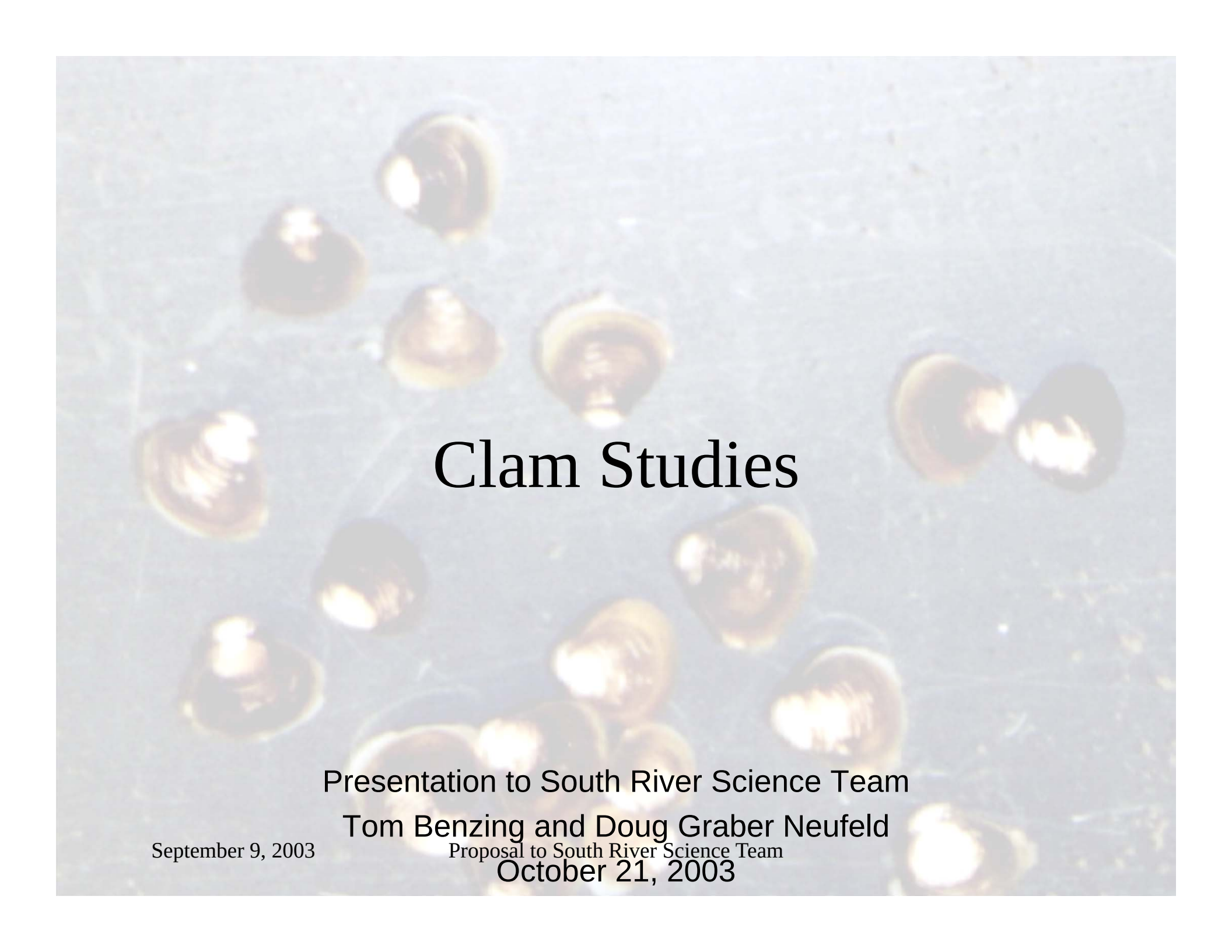


The background of the slide is a photograph of numerous clam shells scattered across a light-colored, sandy or silty surface. The shells are mostly closed, showing their characteristic rounded, ribbed shape. Some shells are slightly open, revealing a dark interior. The lighting is bright, creating highlights on the smooth, wet-looking surfaces of the shells.

Clam Studies

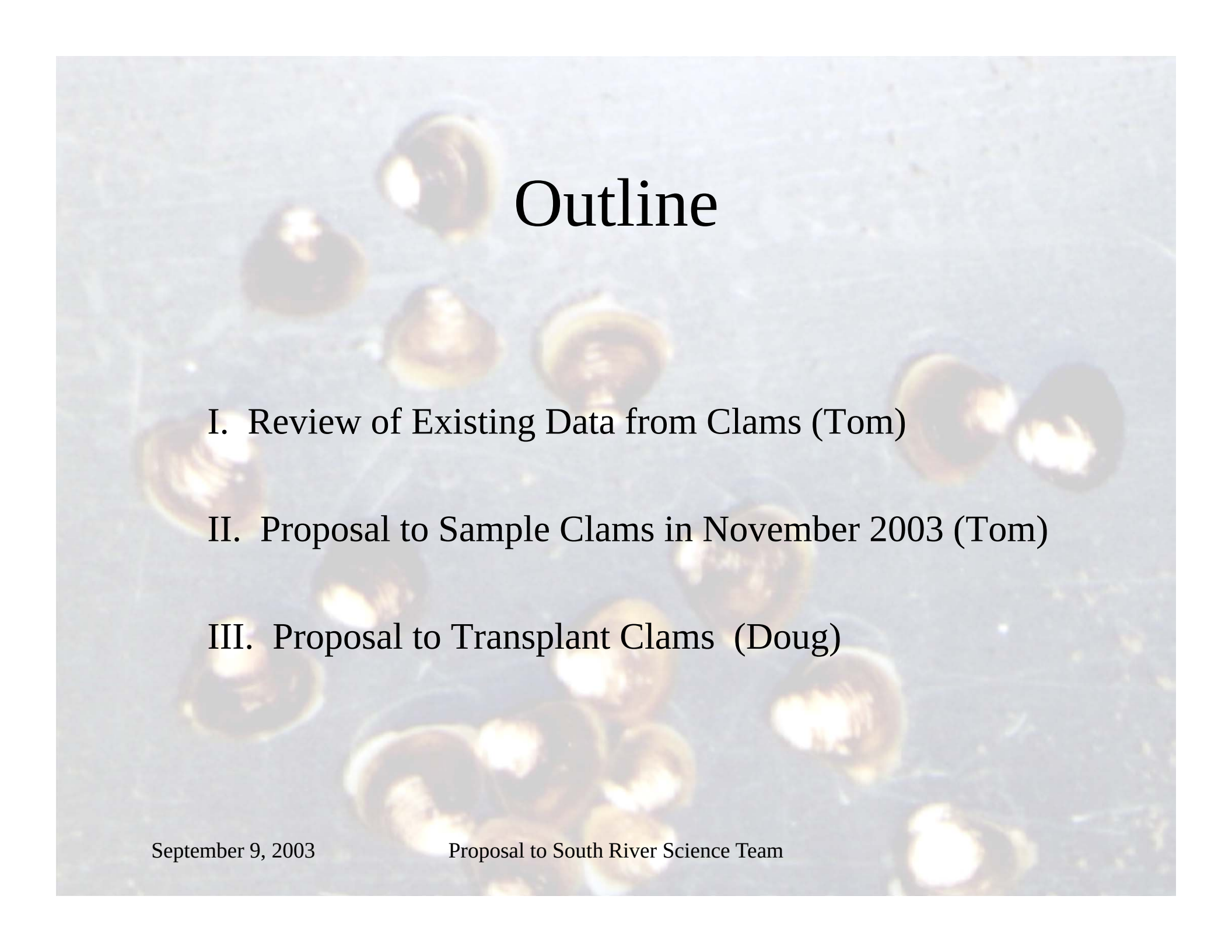
Presentation to South River Science Team

Tom Benzing and Doug Graber Neufeld

September 9, 2003

Proposal to South River Science Team

October 21, 2003

The background of the slide is a photograph of numerous clams scattered on a light-colored, sandy beach. The clams are mostly closed, showing their characteristic rounded, ribbed shells in shades of brown and tan. Some clams are slightly open, revealing a darker interior. The sand is fine-grained and has a subtle texture. The overall lighting is bright, suggesting a sunny day.

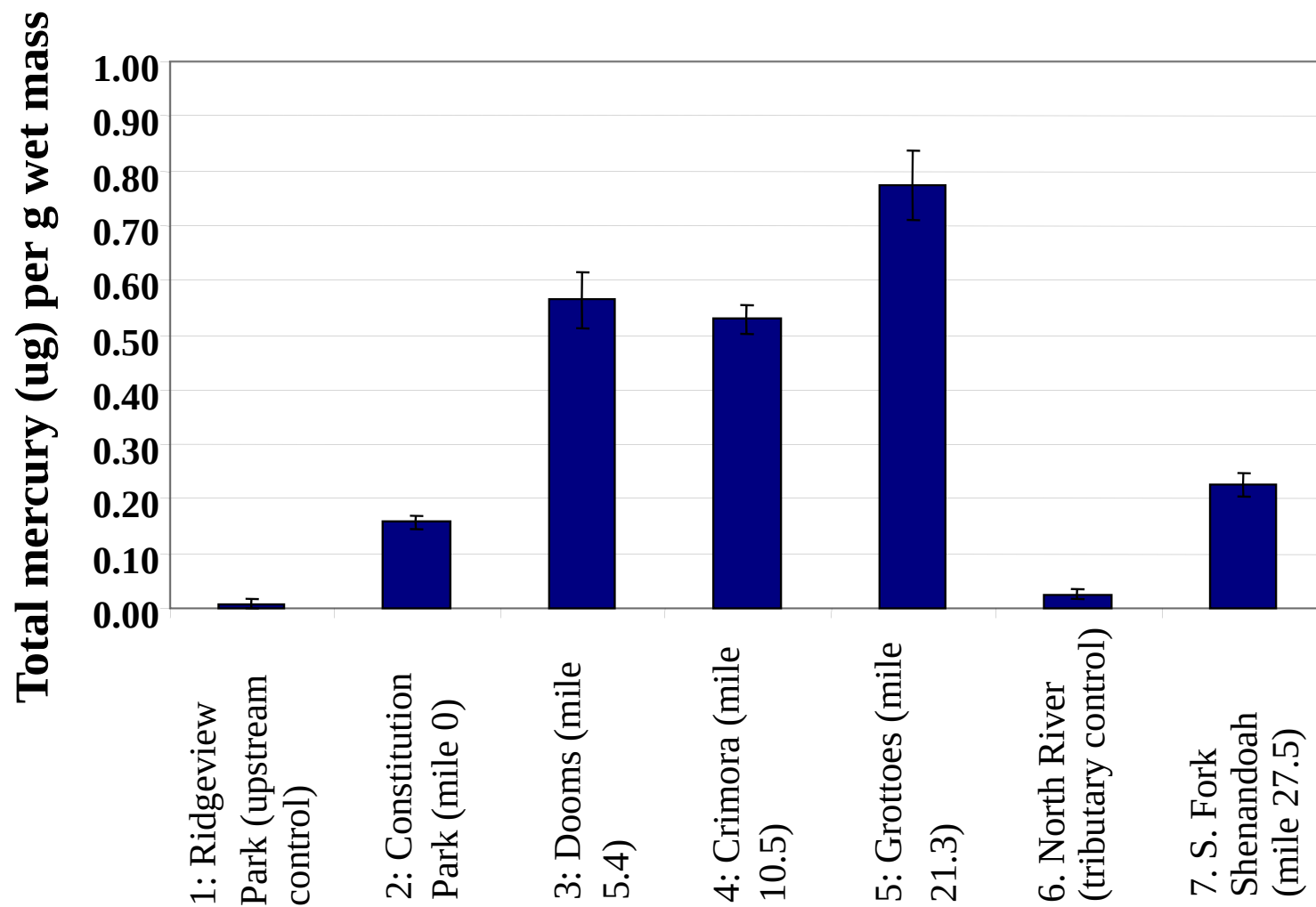
Outline

I. Review of Existing Data from Clams (Tom)

II. Proposal to Sample Clams in November 2003 (Tom)

III. Proposal to Transplant Clams (Doug)

Corbicula 2001 Results (Graber Neufeld)



Clam Sites 2002

2 control sites:

CS01, Ridgeview Park

CS02, Wayne Avenue

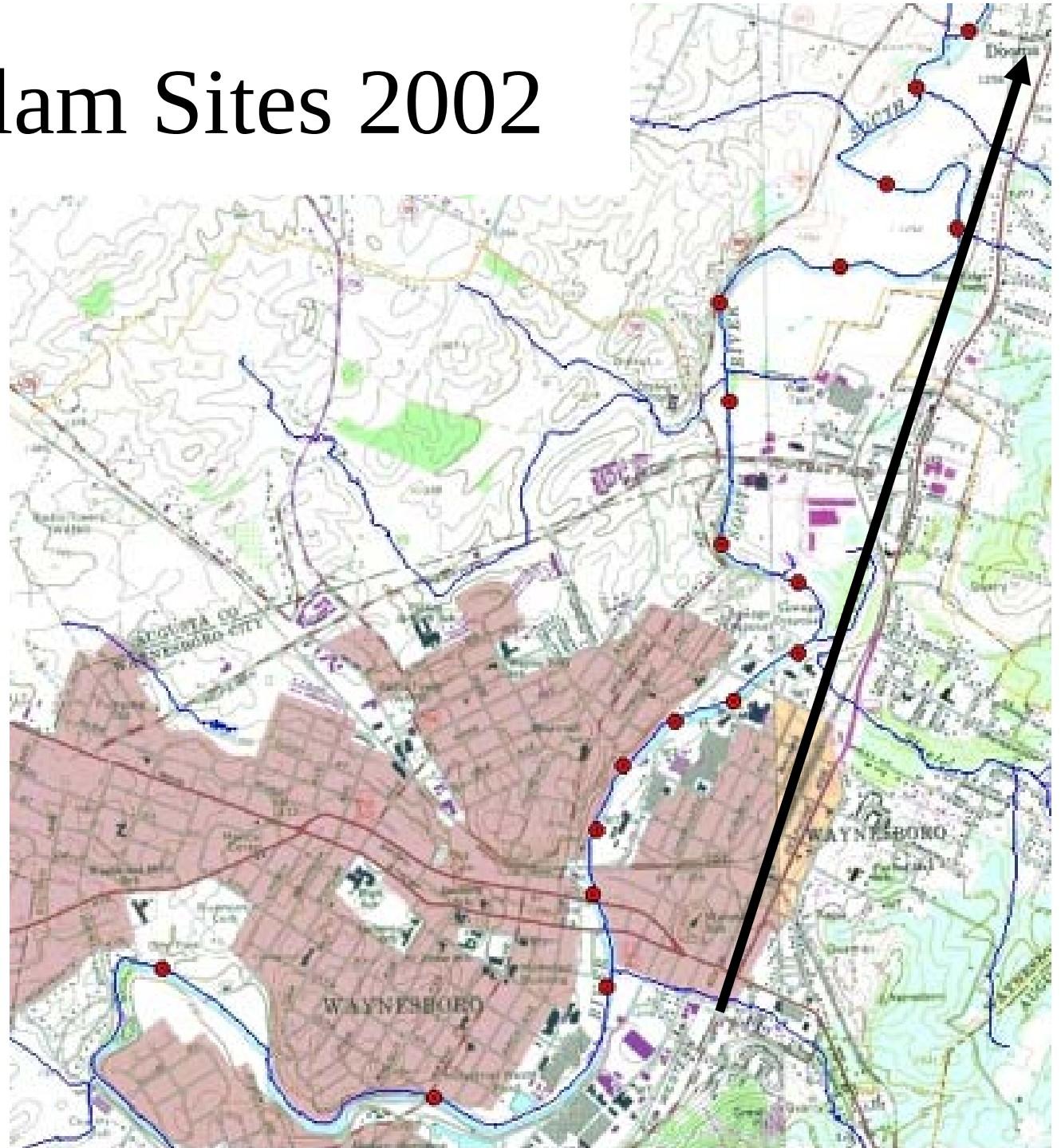
16 test sites:

CS03 to CS18

A = river left

B = river middle

C = river right

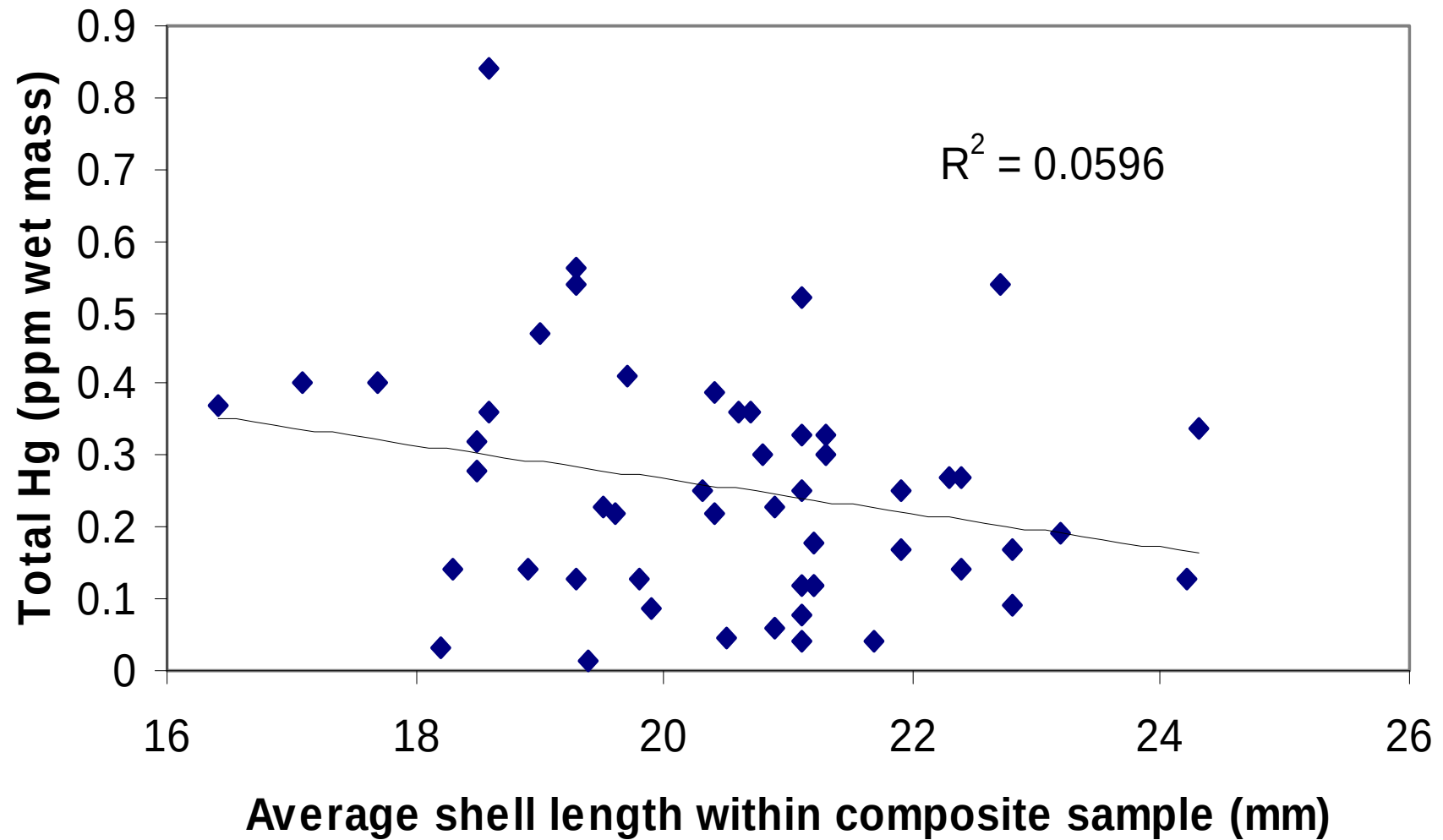


Collection Methods

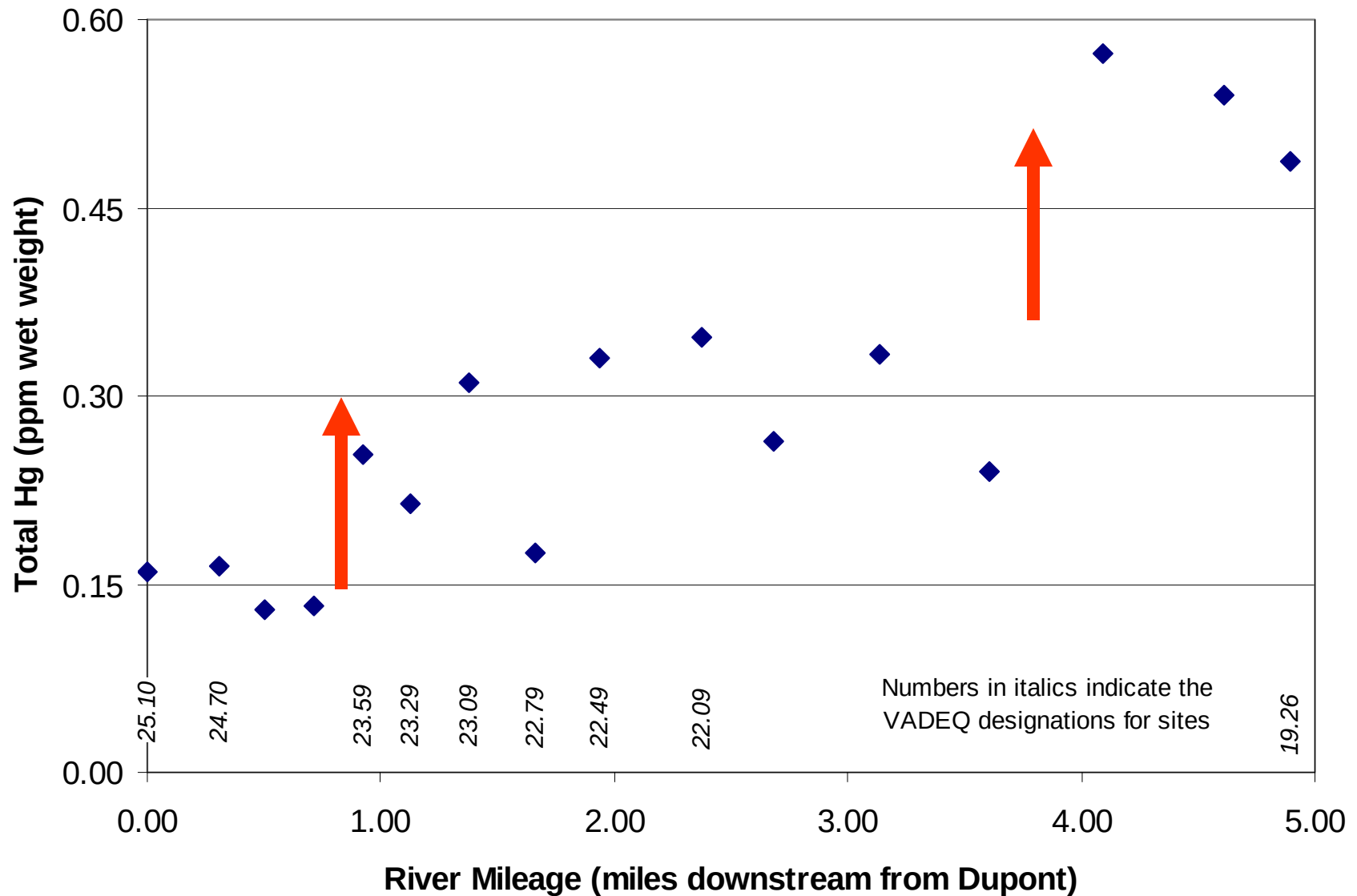


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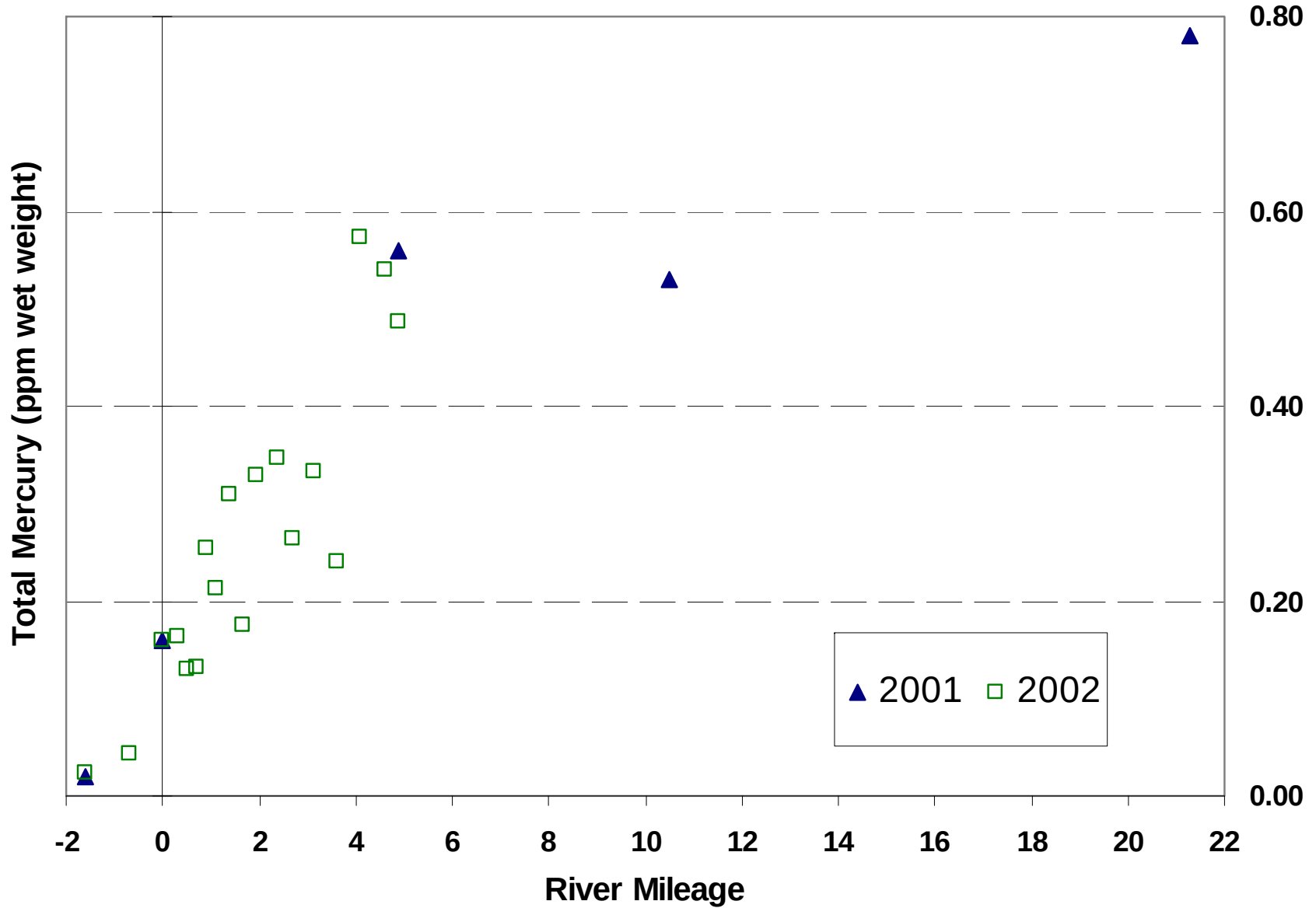
Does Age of the Clams Affect Hg Content?



Corbicula 2002 Results (Benzing and Bowles)



Mercury in Clams, Combined Data for 2001 and 2002



Proposed Sites for November 2003

<u>Site ID*</u>	<u>Site Description</u>	<u>Mileage</u>
CS01	Ridgeview Park	(control)
CS03	Constitution Park	0.00
CS08	above Bridge Street	1.12
CS12	below Hopeman Pkwy	2.38
CS15	above Doods Mill Pond	3.61
CS18	Doods	4.90
1BSTH014.49	Crimora	~10
1BSTH007.80	Harriston	~17
1BSTH004.21	Grottoes (Grand Caverns)	~20
1BSTH000.19	Port Republic	~25

* as identified in Corbicula 2002 Study or by VADEQ

Plan for Sampling Event

- Sampling Day: Saturday, November 8 (rain date: 11/15)
- Collect at least 30 clams from each site
- Process clams to produce 3 replicates/ site
- Analyze using EPA Method 7474 or similar
 - Atomic fluorescence spectrometry
 - Lower detection limit
 - Include total mercury and methylmercury

Proposal for Clam Transplant Project

Why use transplanted clams as biomonitors?

- Transplanted *Corbicula* could be used to monitor mercury levels at any river site, rather than only where *Corbicula* is currently found.
- Using transplants provides increased control of exposure conditions.

2003 Study Goals:

- Establish a protocol for using *Corbicula* transplants as a biomonitoring tool.
- Determine the rate of mercury uptake in *Corbicula*.

Experimental design based on:

DRAFT Standard Guide for Conducting Field Bioassays with Marine, Estuarine & Freshwater Bivalves. Prepared by M. Salazar and S. Salazar, Applied Biomonitoring, August 29, 2000.

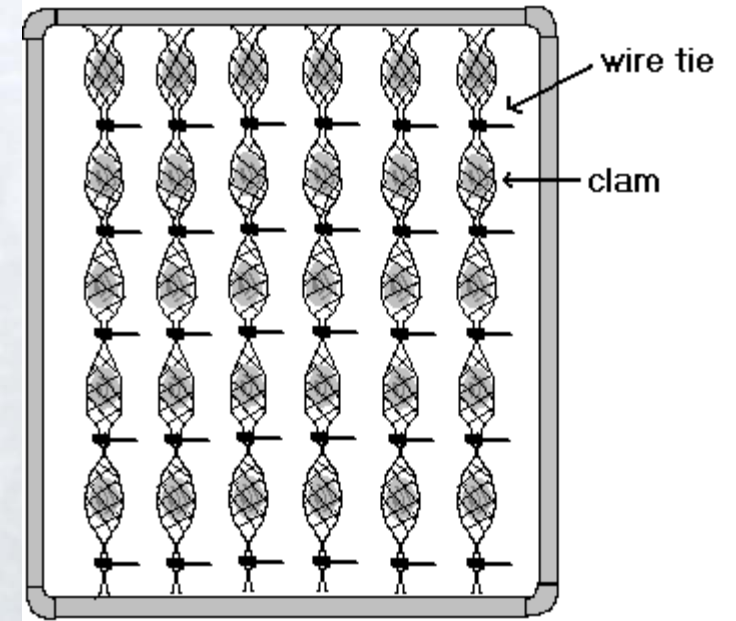
<http://appliedbiomonitoring.com/papers.htm>

DRAFT Pilot Transplant Studies with the Introduced Asiatic Clam, *Corbicula fluminea*, to Measure Methyl Mercury Accumulation in the Foodweb of the Sacramento-San Joaquin Delta Estuary. Chris Foe, Mark Stephenson & Stacy Standish, August 2002. <http://loer.tamug.tamu.edu/calfed/DraftReports.htm>

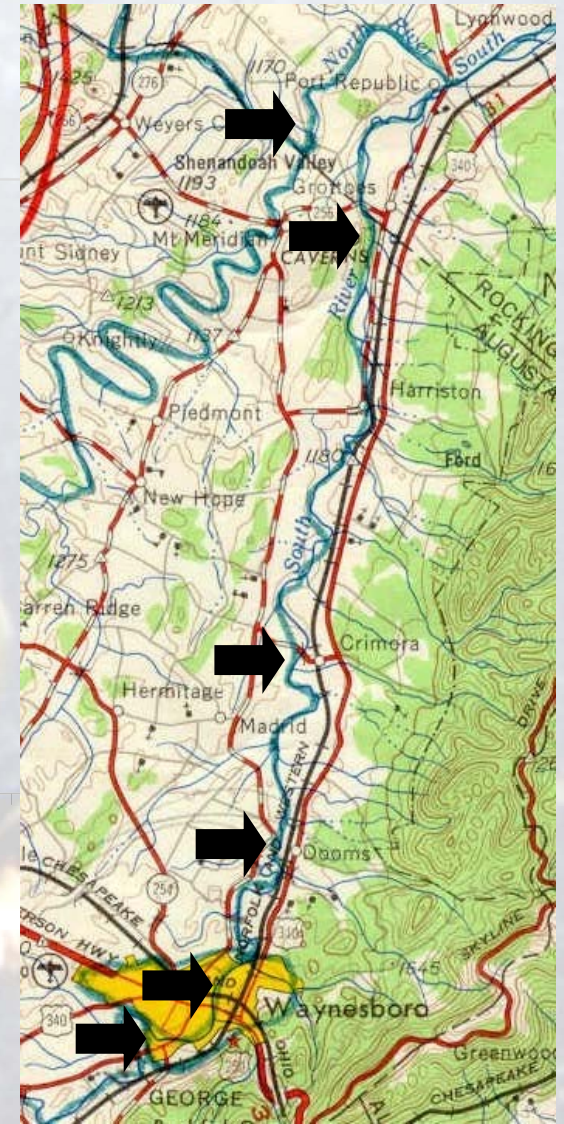
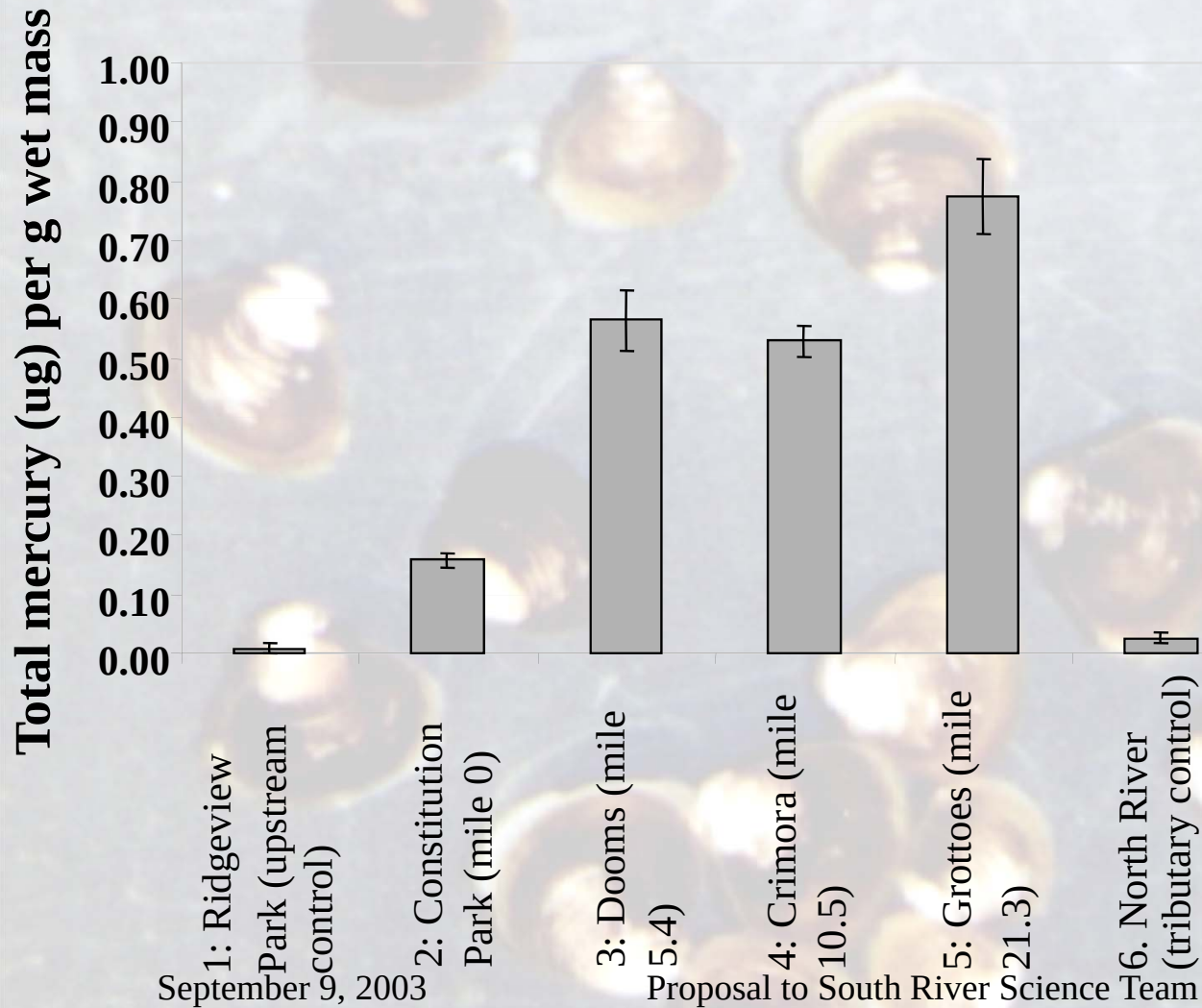
Methods & Materials:

1. *Corbicula* cage

- Individual compartments.
- Place directly on bottom sediments.
- Anchor with concrete blocks

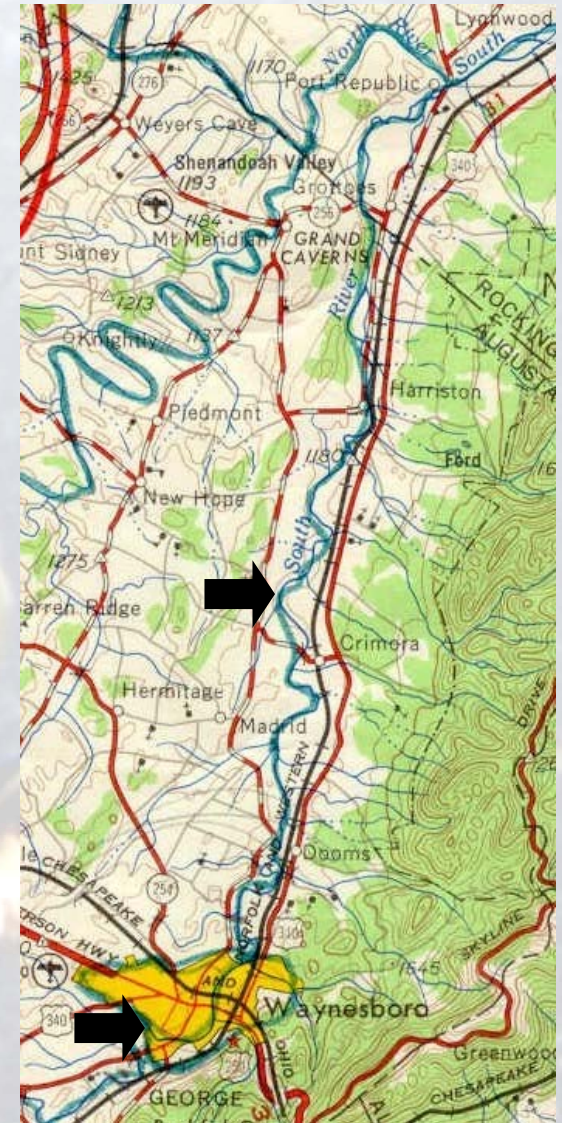
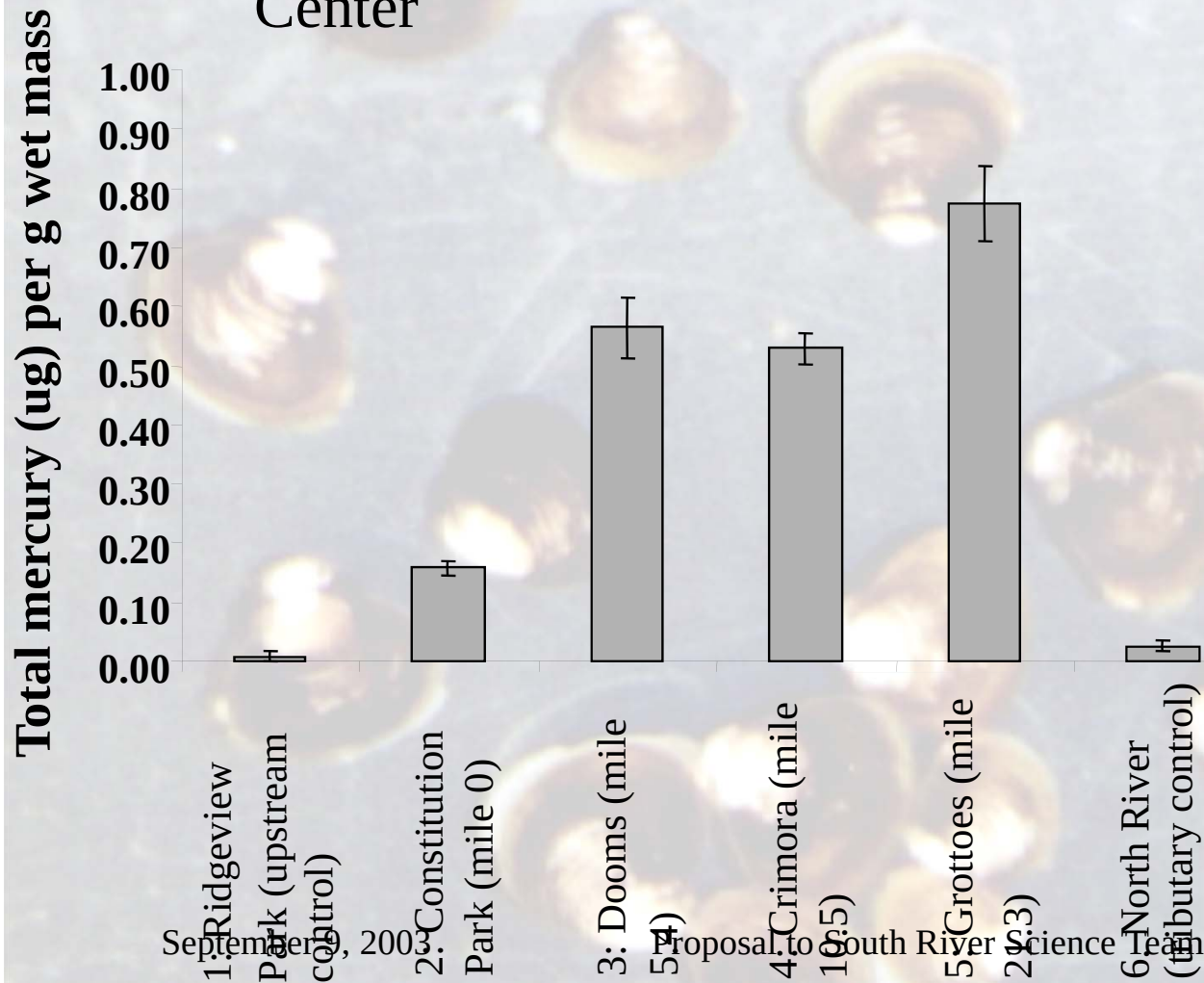


2. Study Sites: 2001



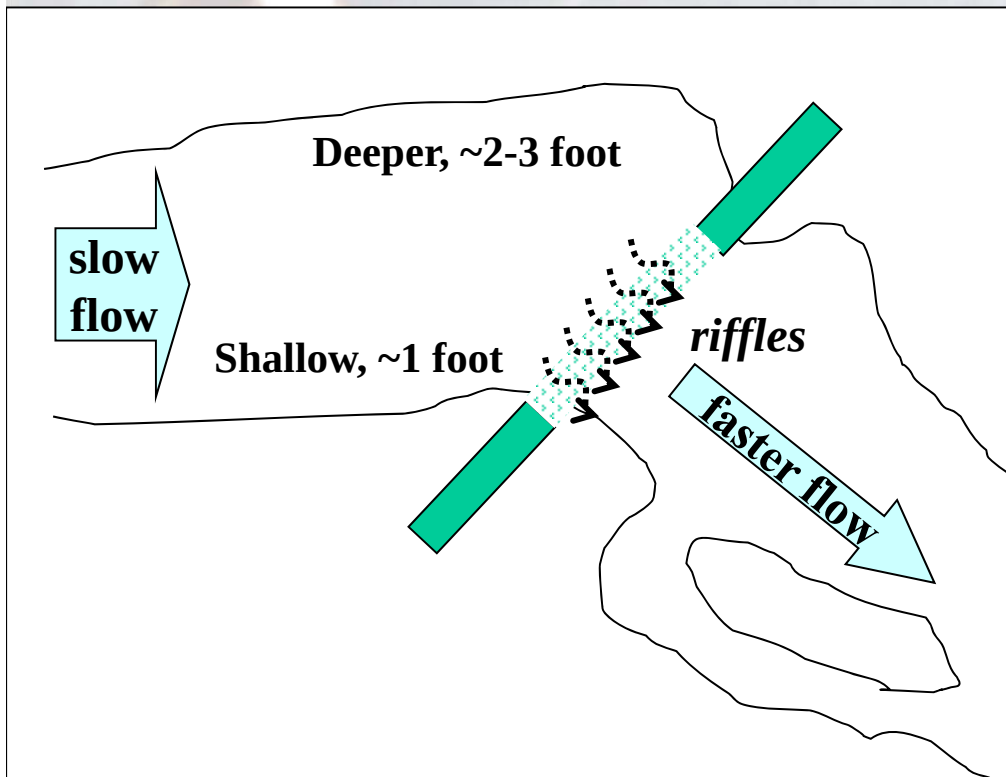
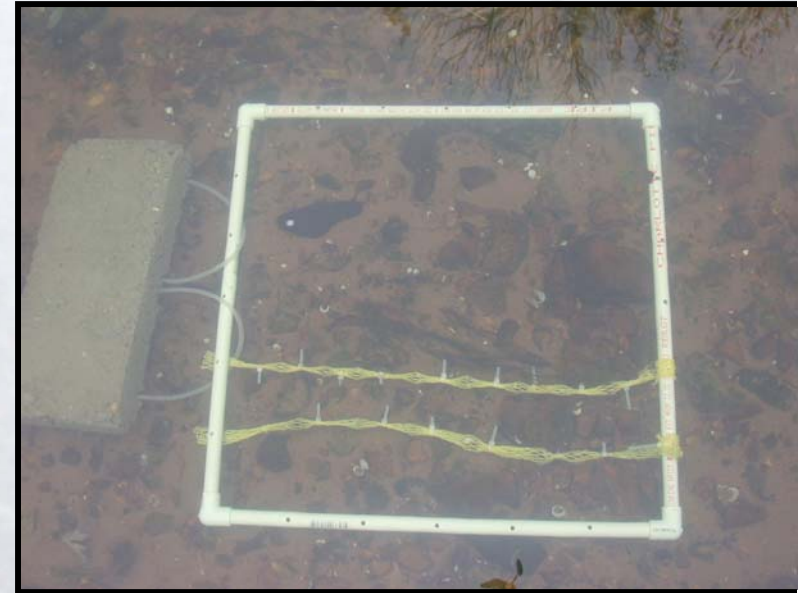
3. Study Site: 2003

- a. Control site is Ridgeview Park
- b. Transplant site is Augusta Forestry Center



4. At the proposed site:

- 1-2 feet depth of water (Oct)
- Substrate is Sand/Rock/Grass
- Clams are very common



Experimental Design

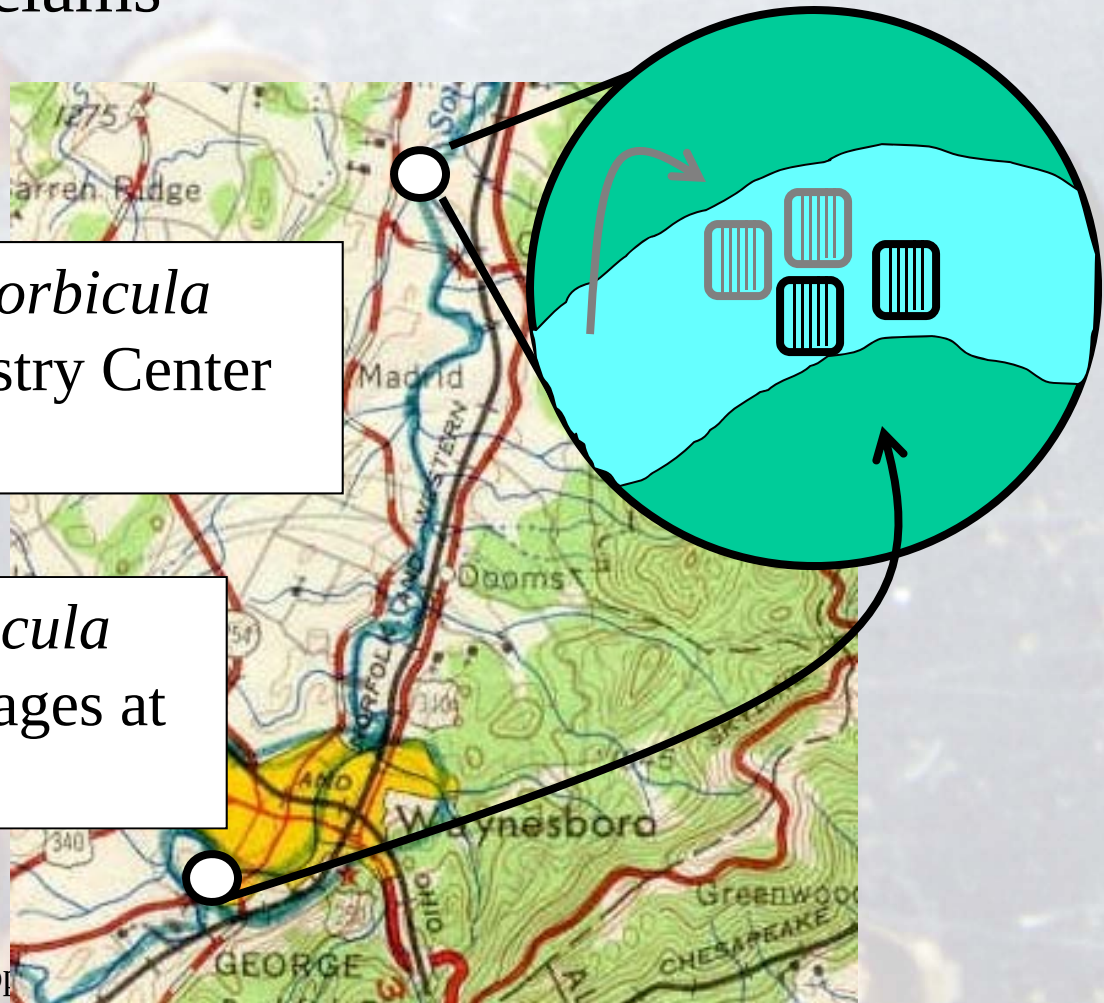
1. Follow mercury content in both control and transplanted clams

Control group of *Corbicula* from Augusta Forestry Center moved into cages.

Transplant group of *Corbicula* from Ridgeview Park to cages at Augusta Forestry Center

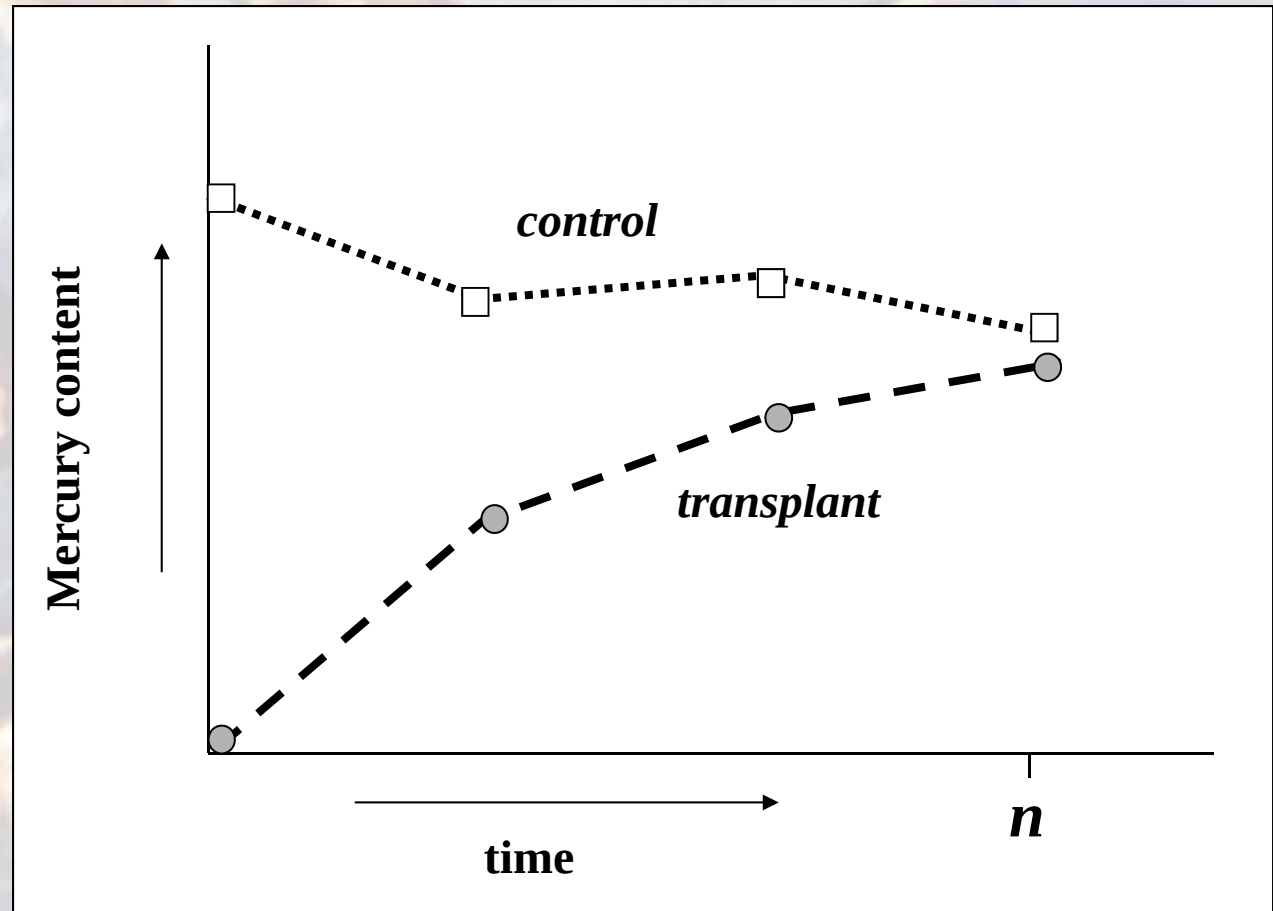
September 9, 2003

Prop



2. What do we expect to see happen?

- Some fluctuations in mercury content of control clams
- After exposure for n months, transplanted “clean” clams will have mercury concentrations equal to control clams



September 9, 2003

3. Sampling regime

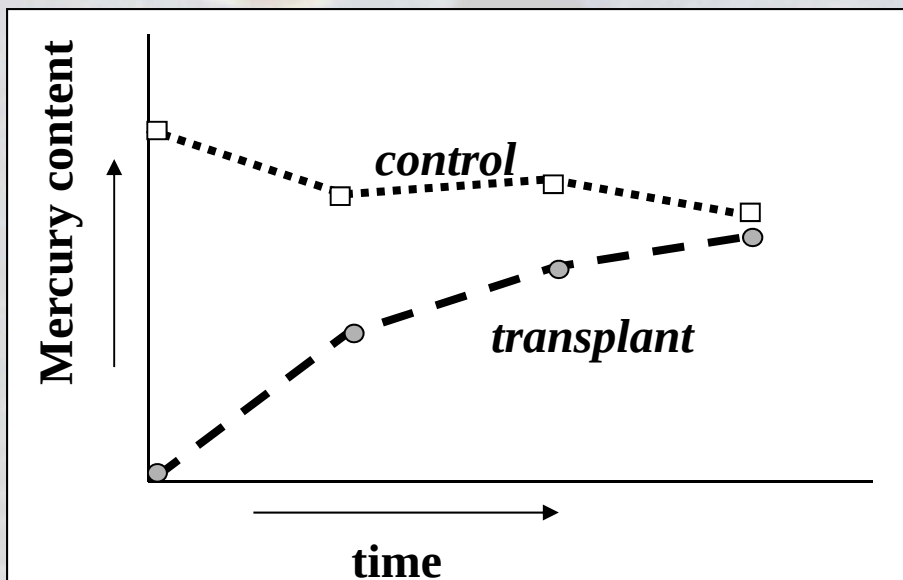
✓ Test deployment of cages with clams in October.

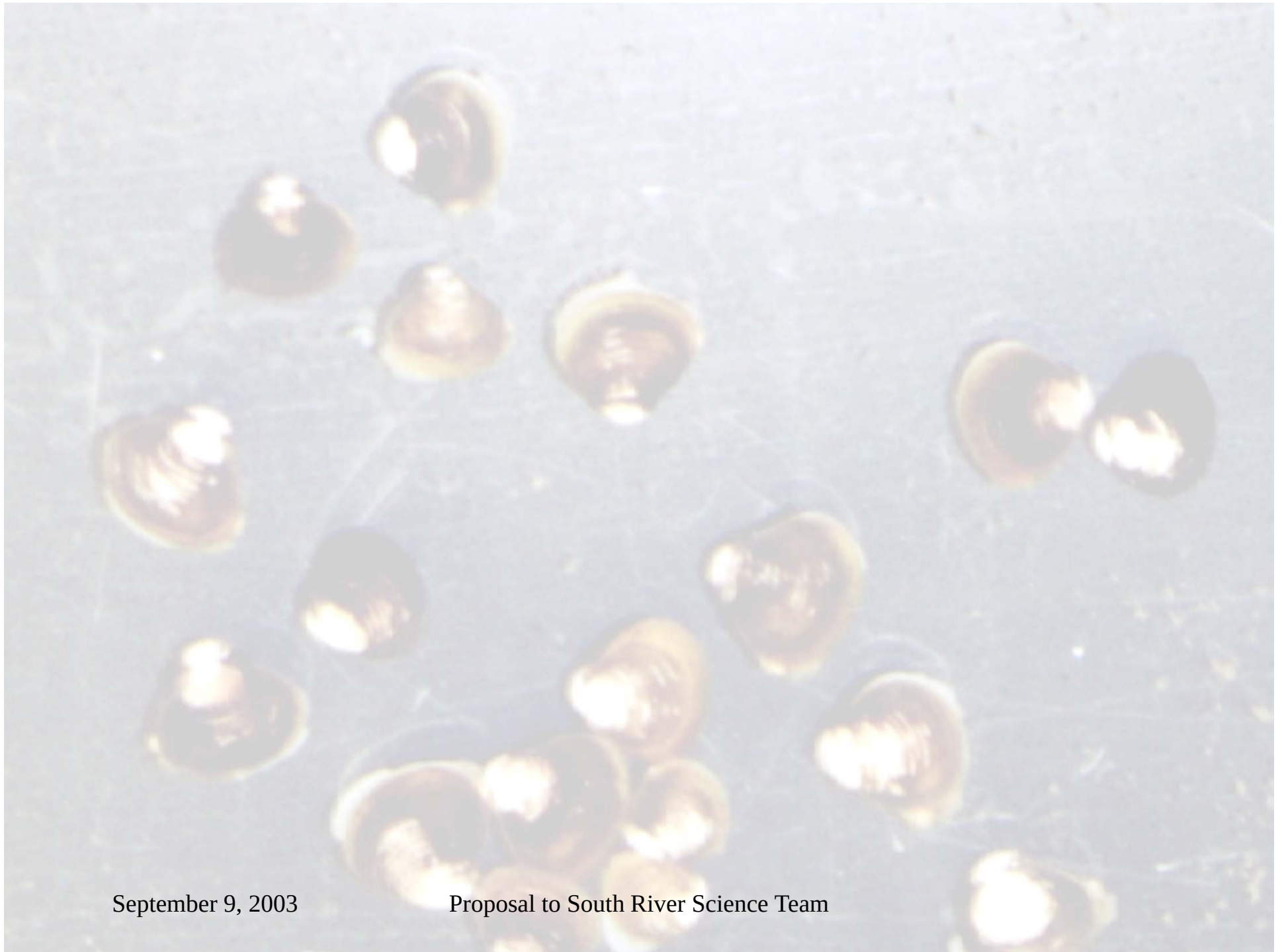
Final deployment of cages with clams in November, at time of project 1 sampling.



- Samples taken monthly, starting at the time of deployment.
- Thirty clams each taken randomly from control and transplant cages at each sampling time.
- Six samples (3 control + 3 transplant) of ten clams each immediately sent for analysis.
- Analyze for both total mercury and methylmercury

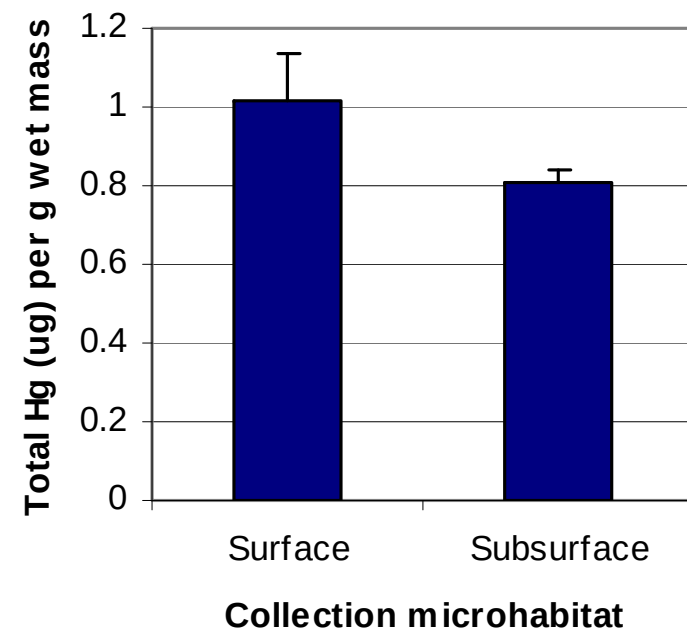
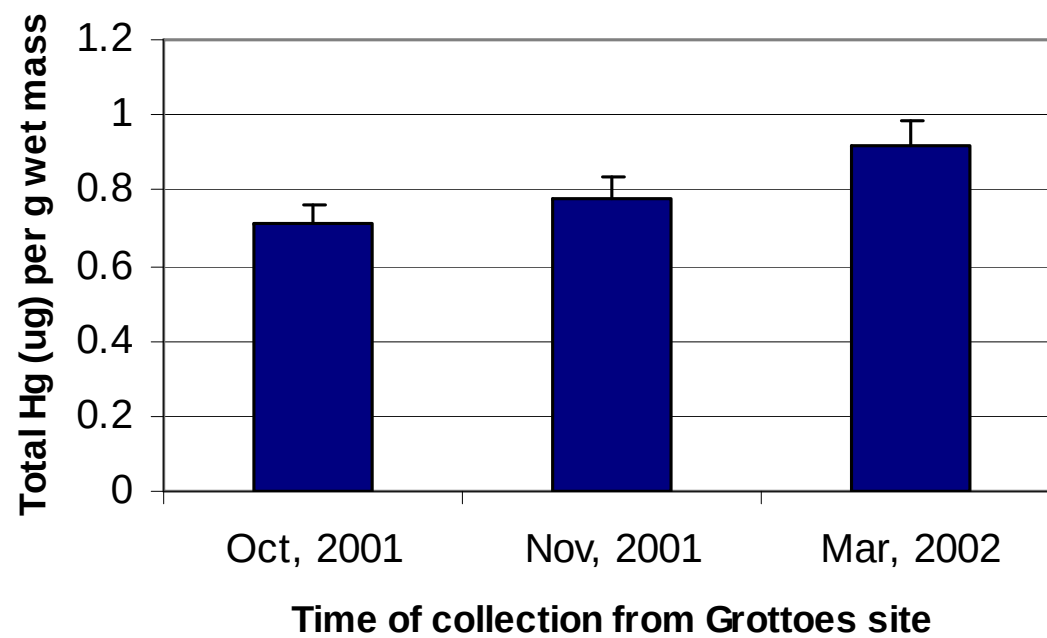
*3 replicates per sampling ×
2 (transplant and control cages) = 6 samples per month*

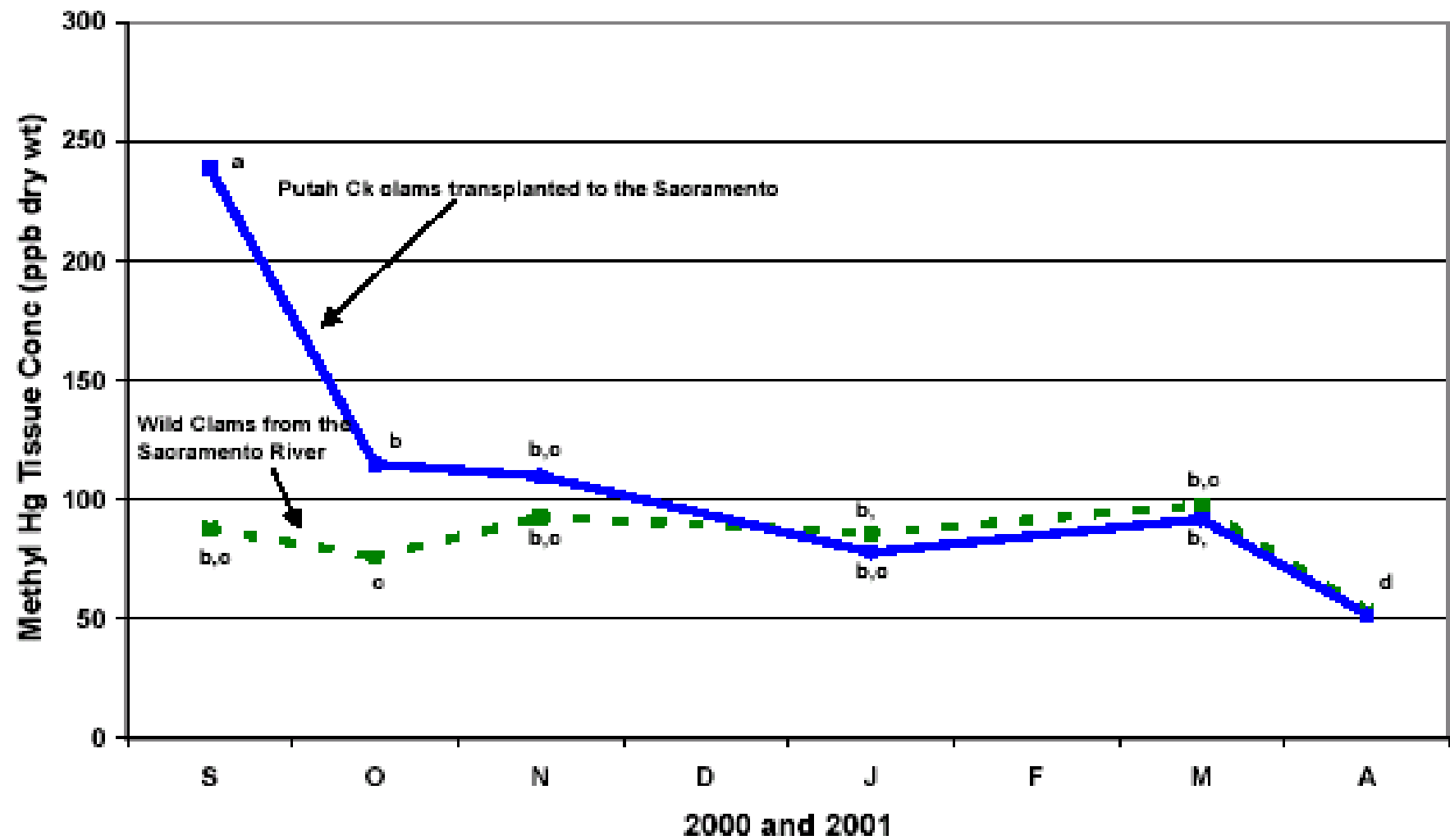




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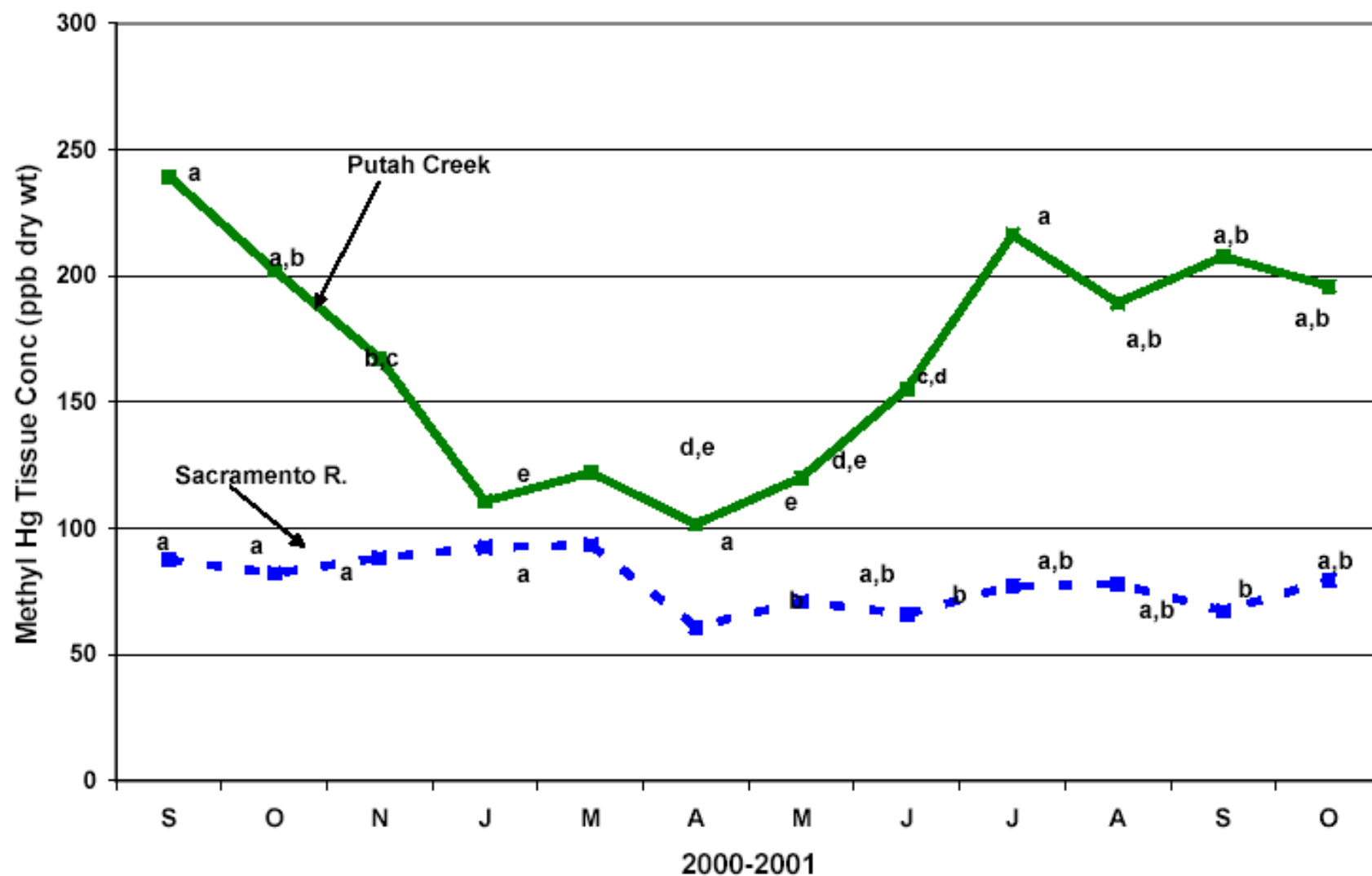
Proposal to South River Science Team





September 9, 2003

Proposal to South River Science Team



September 9, 2005

Proposal to South River Science Team

