Corbicula 2003

Proposals to South River Science Team

Tom Benzing and Doug Graber Neufeld

September 9, 2003

Topics

Mercury Source Tracking Using Clams (Tom)

Clam Transplant Project (Doug)

Clam Sites 2002

2 control sites:

CS01, Ridgeview Park

CS02, Wayne Avenue

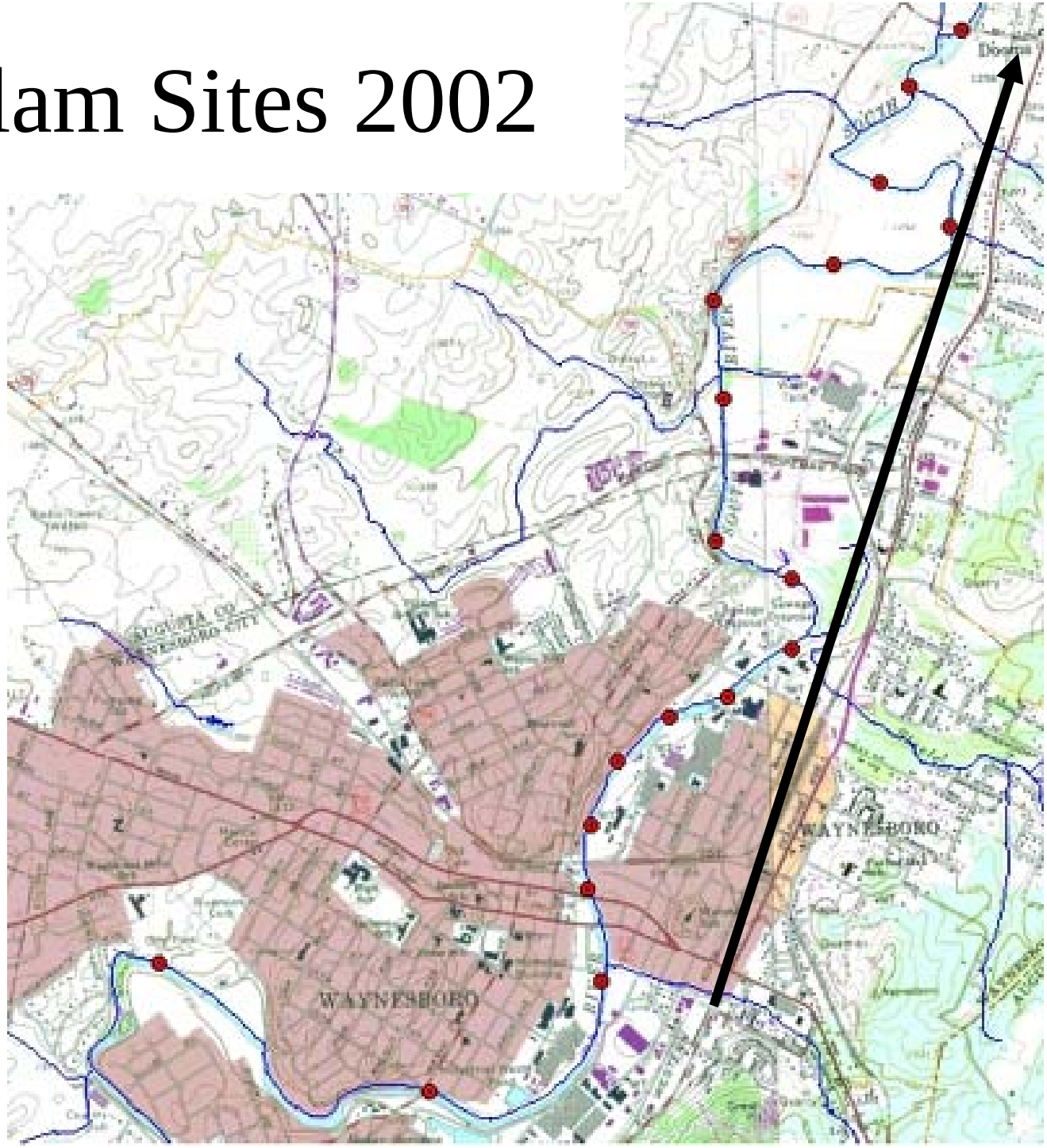
16 test sites:

CS03 to CS18

A = river left

B = river middle

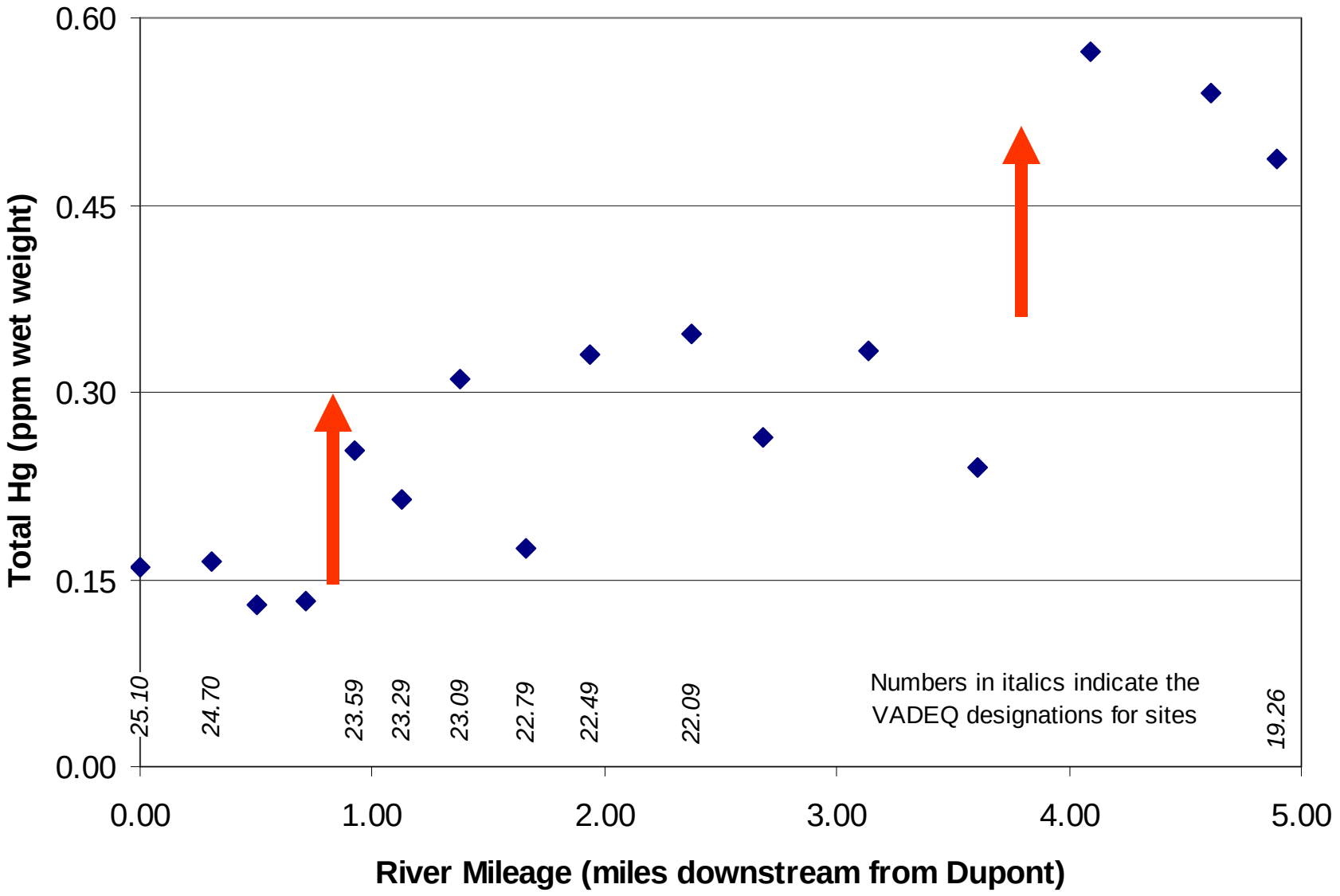
C = river right



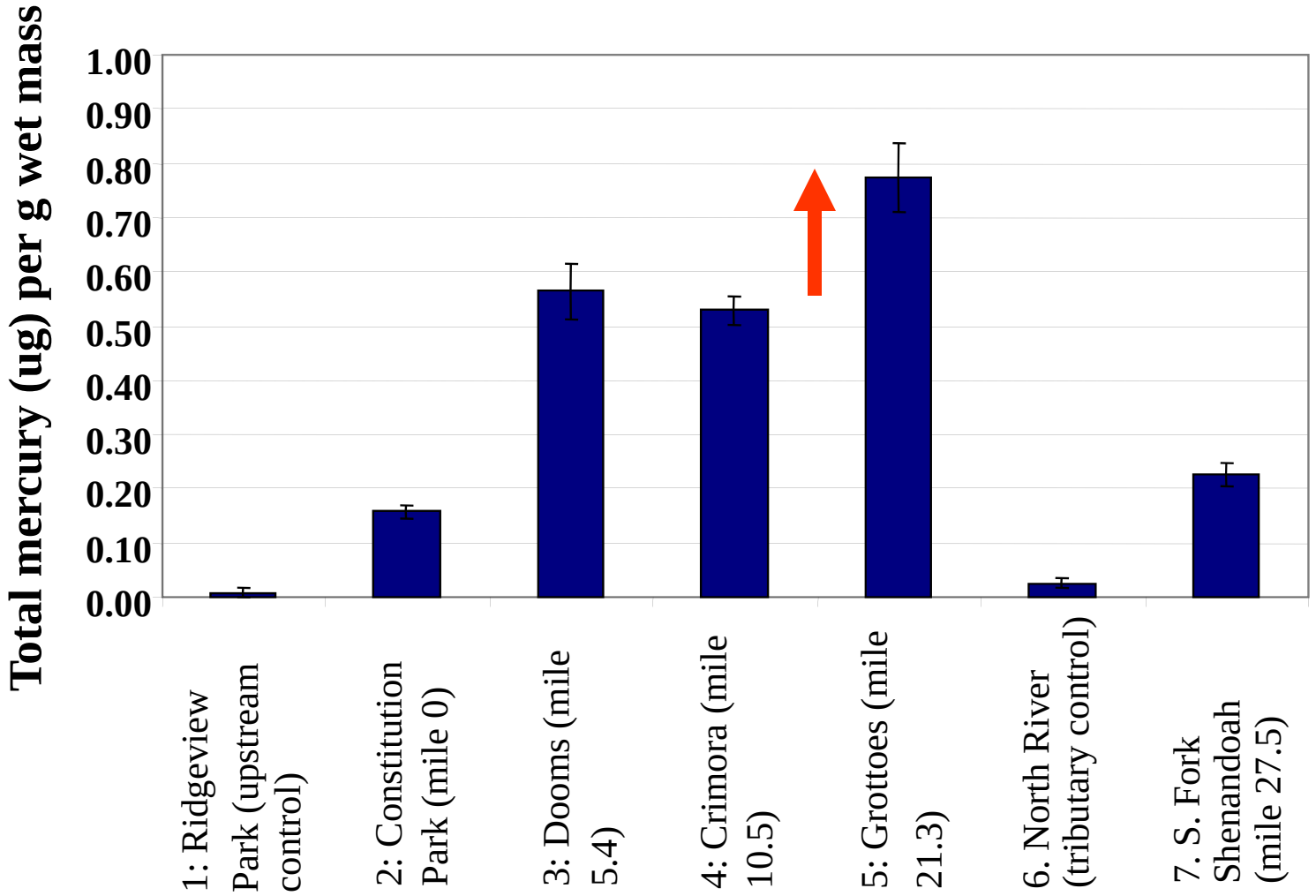
Collection Methods

September 9, 2003

Corbicula 2002 Results
(Benzing and Bowles)



Corbicula 2001 Results
(Graber Neufeld)



Proposed Sites for November 2003

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

* as identified in Corbicula 2002 Study or by VADEQ

Tentative Plan

- 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
- Finalize proposal/ funding request before October meeting

Proposal for Clam Transplant Project

Goals:

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

Rationale:

- Using transplants increases the flexibility of *Corbicula* as a biomonitor
- Using transplants provides increased control of exposure conditions

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

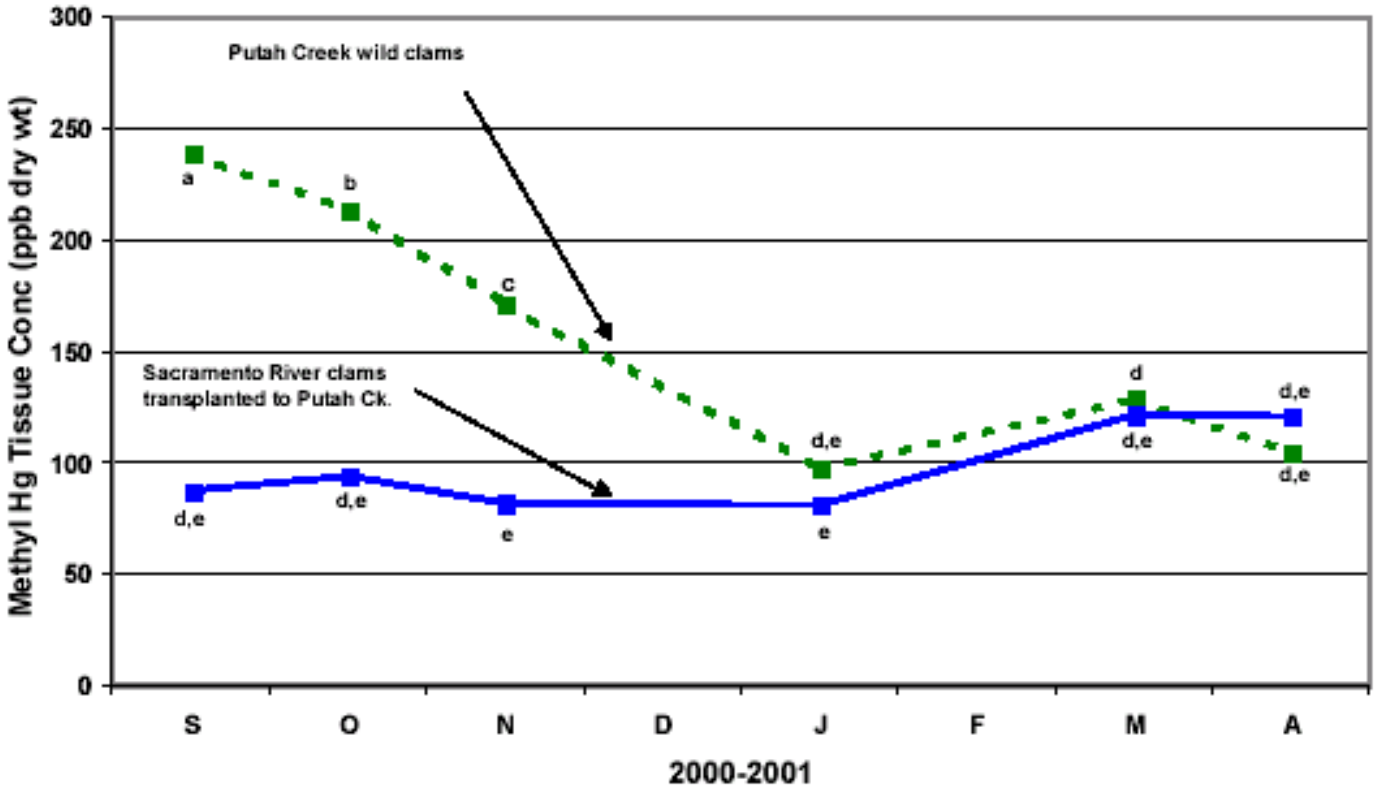
DRAFT Pilot Transplant Studies with the Introduced Asiatic Clam, *Corbicula fluminea*, to Measure Methyl Mercury Accumulation in the Foodweb of the Sacaramento-San Joaquin Delta Estuary. Chris Foe, Mark Stephenson & Stacy Standish, August 2002. *http://loer.tamug.tamu.edu/calfed/DraftReports.htm*

Some Relevant Results from the Sacramento River Study:

1. Hg concentrations were not different in caged and “wild” *Corbicula* from the same area.

2. There were seasonal changes in MeHg in *Corbicula.*

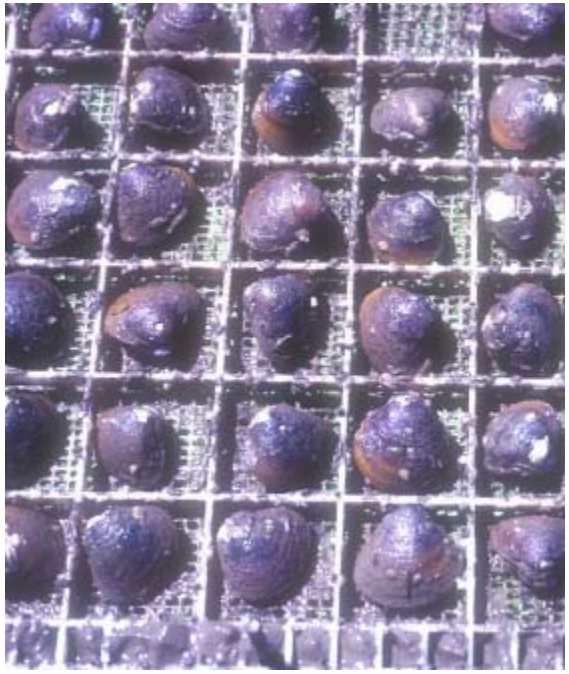
3. Equilibrium conditions for transplanted *Corbicula* were reached in 2-4 months.

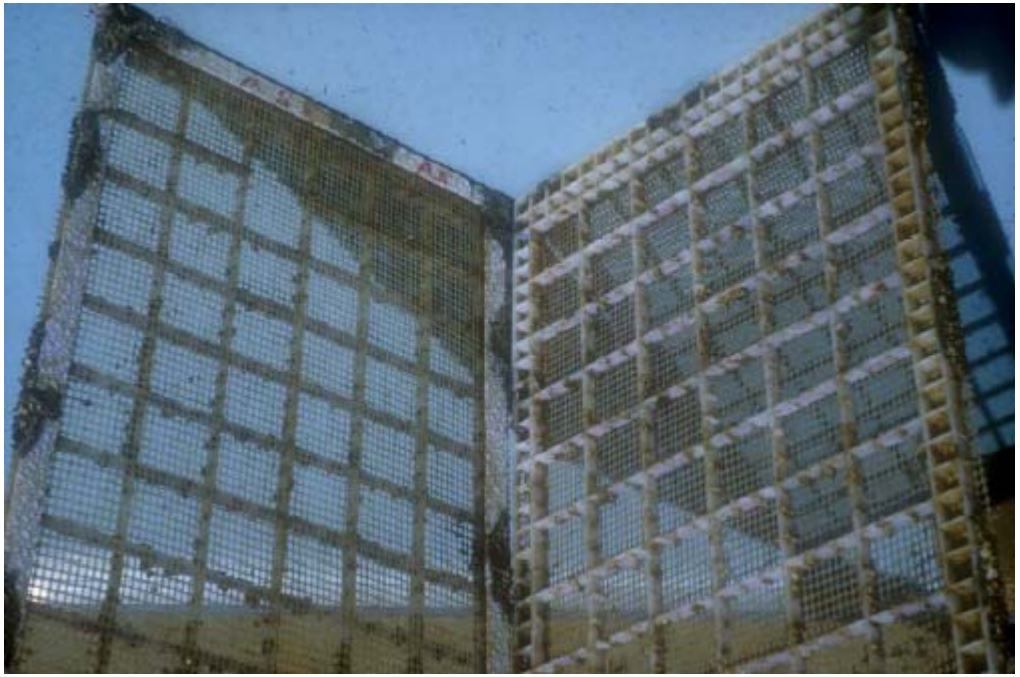


Methods & Materials:

1. *Corbicula* cage

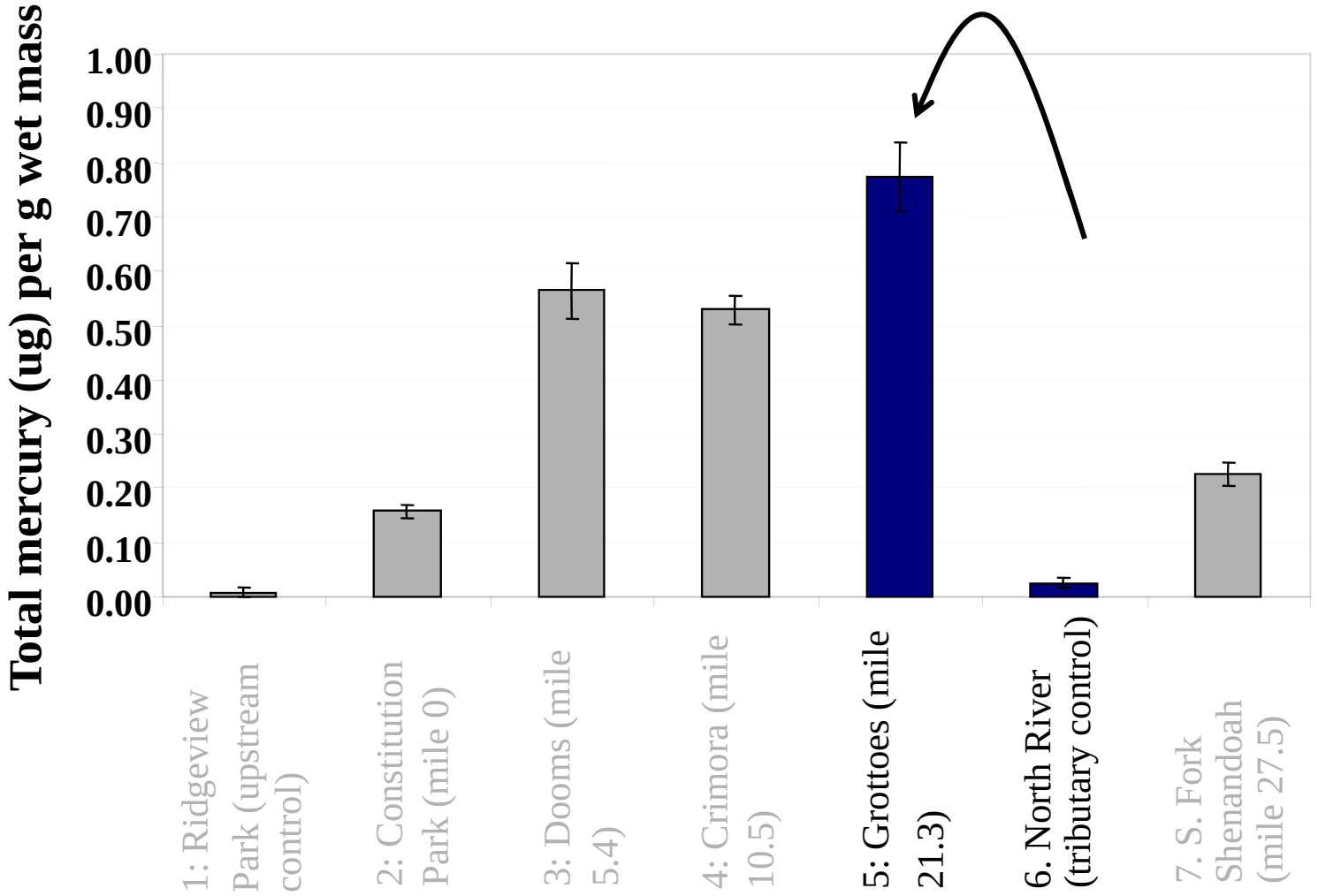
- Individual compartments.
- Place directly on bottom sediments.
- Anchor with rebar or concrete blocks





2. Study Sites:

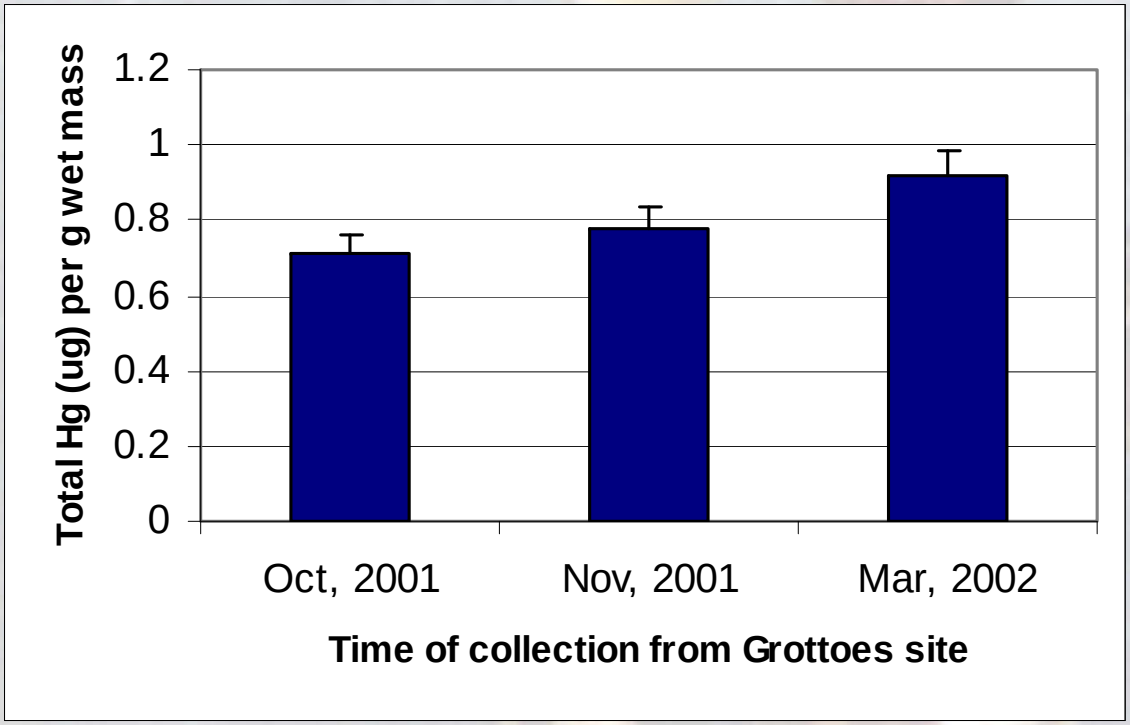
- Transplant group of *Corbicula* from North River to cages at Grottoes
- Control group of *Corbicula* from Grottoes moved into cages.

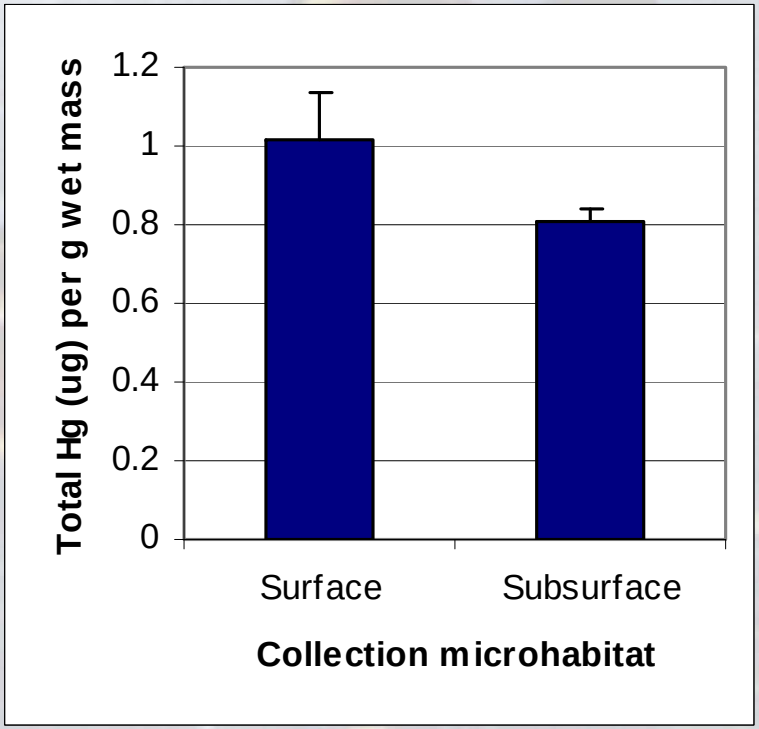


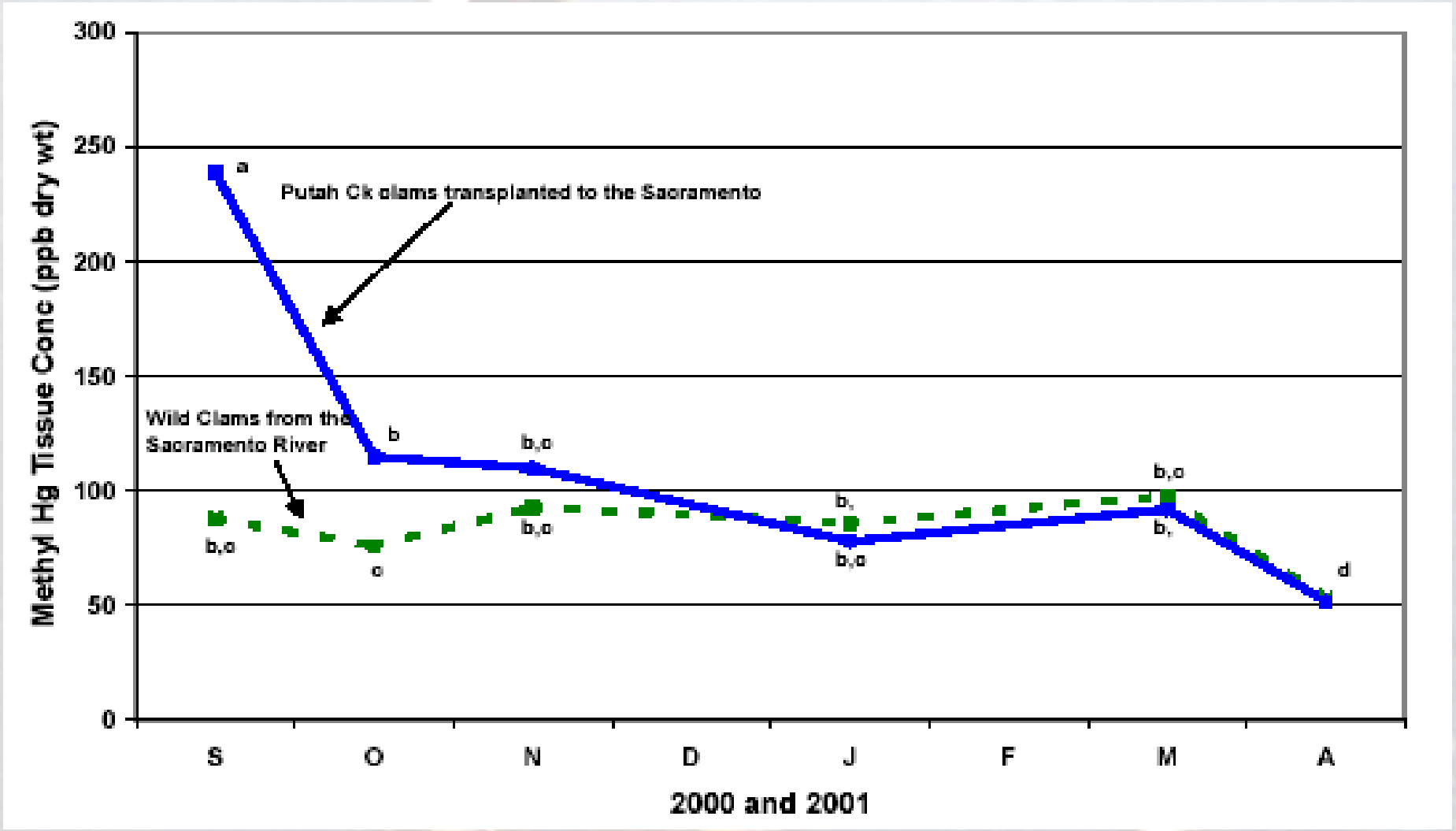
3. Sampling regime

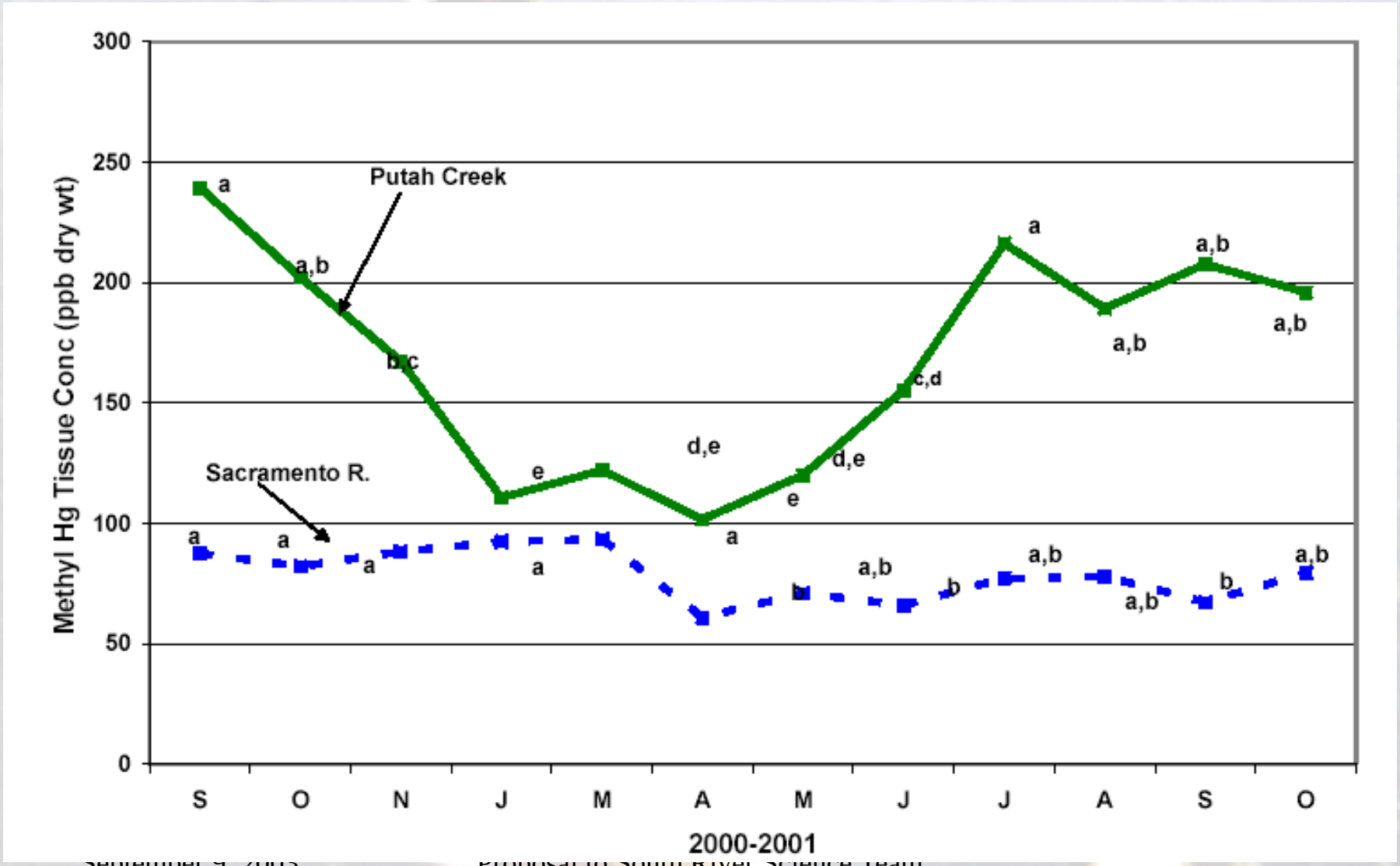
- Test deployment of cages with clams in October.
- Final deployment of cages with clams in November, at time of project 1 sampling.
- Samples taken monthly, starting at the time of deployment, and ending after four months (March).
- Thirty clams each taken randomly from control and transplant cages at each sampling time.
- Three samples of ten clams each stored at -70^{o}C until sent for analysis.

5 sampling times ×
3 replicates per sampling ×
2 (transplant and control cages) = <u>30 samples in total</u>


Total Hg (ug) per g wet mass
1.2
1
0.8
0.6
0.4
0.2
0
Oct, 2001
Nov, 2001
Mar, 2002
Time of collection from Grottoes site


Total Hg (ug) per g wet mass
1.2
1
0.8
0.6
0.4
0.2
0
Surface
Subsurface
Collection microhabitat


Methyl Hg Tissue Conc (ppb dry wt)
300
250
200
150
100
50
0
Putah Ck clams transplanted to the Sacramento
Wild Clams from the Sacramento River
a
b
b,c
b,c
c
b,c
b,c
b,c
b,c
d
S
O
N
D
J
F
M
A
2000 and 2001


Methyl Hg Tissue Conc (ppb dry wt)
300
250
200
150
100
50
0
Putah Creek
Sacramento R.
a
a,b
b,c
e
d,e
a
e
d,e
c,d
a
a,b
a,b
a,b
a
a
a
a
b
a,b
b
a,b
a,b
b
a,b
S
O
N
J
M
A
M
J
J
A
S
O
2000-2001