



August 28, 2008

To: Chris Lee, SCWA
Melissa Brockman, USBR

Subject: Update - Monitoring Lake Berryessa for Dreissenid Mussels

NOTE: As of 8/28/08, ALL MUSSEL SURVEYS IN LAKE BERRYESSA HAVE BEEN NEGATIVE

Report

Background:

The early detection of dreissenid mussels is paramount. Water users need to have an early warning of the arrival of zebra mussels to their area, and especially into their facility, in order to properly prepare for biofouling problems (Claudi 1994). In July 2008, the Solano County Water Agency initiated plankton sampling and colonization surveys in Lake Berryessa. The USBR (Berryessa) has assisted by providing a watercraft and operator. Current information suggests that the most efficient and accurate methodology for the early detection of dreissenid mussel larvae is plankton sampling using 63 micron tow nets and specimen examination with a cross-polarized light (CPL) microscope.



Lake Berryessa. Southeast side of Capell Cove. Downwind site ideal for collection of plankton



Lake Berryessa. Markley Cove Marina. Shows tow net on surface. Samples taken from 4 - 30 feet deep.

Invertebrate Inventory and Baseline:

Development of baseline data such as identifying spawning periods and size parameters for Asian Clam larvae is important for the taxonomic differentiation of Asian Clams and Dreissenid Mussel larvae. That process is currently being completed in the Lake Berryessa.

Monitoring in Lake Berryessa:

1. Tow Samples

Tow samples have been collected from the following sites in 2008. Sampling alternates from boat tows to bank tows every other week.

- Markley Cove (July & August)
- Pleasure Cove (July)
- Capell Cove (July & August)
- Spanish Bay (August)
- Management Cove (July & August)
- Rancho Monticello (August)
- Steele Cove (August)



Lake Berryessa. Headquarter's Cove. Shows tires exposed by low water conditions. Structures checked for adult dreissenid mussels.



Lake Berryessa. Capell Cove. Shows willows exposed by low water conditions.



Asian clam "D-shaped" veliger showing foot and filament of algae caught between shells.

- Pope Creek Bridge (July & August)
- Putah Creek Resort (August)
- Lake Berryessa Marina (August)

2. Colonization Substrates

The colonization plates in Headquarters Cove, Capell Cove and at the Buoyline at Monticello Dam were checked in July and August for settled adults. All colonization plates have been negative for adult dreissenid mussels. Additional structures are scheduled to be added to the existing plates.

3. Existing Structure in Lake Berryessa

Various existing structures have been visually inspected for adult mussels. Those structures include water pipes (Spanish Flat), boulders along banks including Markley Cove, Capell Cove, and Pope Creek Bridge.

Microscopic exams:

All plankton tow samples are subsampled and examined with cross-polarized light stereo microscope according to the protocol recommended by Claudi (1993) and Johnson (1995).

Taxonomic Verification:

All unusual, unknown, and "veliger-like organisms" (VLOs) are videotaped and photographed. The quality of high-definition images and video allows for rapid transmission of the images to other taxonomists for confirmation. For example, Dr. Robert McMahon (University of Texas) recently examined high-definition images and confirmed that the specimens were Asian Clam (*Corbicula fluminea*) veligers (larvae). See attached Report "Berryessa 2863-17G."

References:

Claudi R. and Mackie, G.L. 1994. *Practical Manual for Zebra Mussel Monitoring and Control*. CRC Press. Boca Raton, Florida.

Johnson, Ladd E. 1995. Enhanced early detection and enumeration of zebra mussel (*Dreissena spp.*) veligers using cross-polarized light microscopy. *Hydrobiologia*. 312:139-146.

Nickols, S.J., and Black M.G. 1993. Identifications of larvae:



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Lake Berryessa. Headquarters Cove boat dock. Dock inspected for adult dreissenid mussels July and August 2008.



Lake Berryessa. Headquarters' Cove boat dock.



Lake Berryessa. Water intake pipes for Spanish Flat Resort. Pipes and support structure inspected for adult dreissenid mussels.

the zebra mussel (*Dreissena polymorpha*), quagga mussel (*Dreissena rostriformis bugensis*), and Asian clam (*Corbicula fluminea*). Can. J. Zool. Vol 72. 406-417.

Submitted 9/4/08 via e-mail.

Ken W. Davis

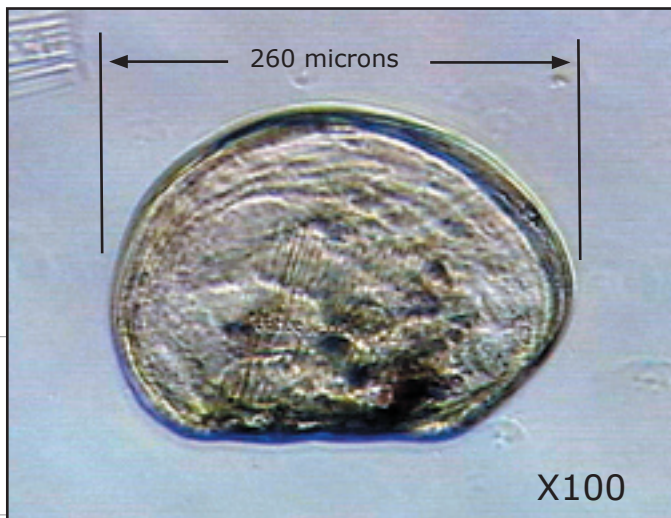
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Taxonomic Worksheet - Microscopic Examination

Exam Date:	7/24/08	Time:	8:30AM
Results:	Confirmed by Dr. Robert McMahon that organisms are <i>Corbicula fluminea</i>		
Collection Site:	Lake Berryessa	Subsite:	Headquarter's Cove / Ramp side
Collection Date:	7/23/08 (repeat collection)	Collection Time	10:30AM
Collection Protocol:	Plankton tow / 63 micro Wildco Net / Vertical, Horizontal, Oblique / 7 - 21 feet deep		
Collection No:	2863-17G (collected by Ken Davis)	Videotape No:	513 & 514
GPS:			
Cross-polarized light:	Positive with Maltese Cross on CPL Stereo microscope.		
Phase Contrast:	Videotaped (shell) at 100x power		
Comments:			
Taxonomist:	Ken W. Davis (916) 747-8537	ken@creekman.com	

IMAGES OF ORGANISM OF CONCERN



Identification

Examined:	<input checked="" type="radio"/> Alive	<input checked="" type="radio"/> Dead
Length:	260 microns	Height: 217 microns
Foot Present:	YES	
D-Shape Shell:	YES	
Water Temp:	25.3 C	Depth Collected: 7 - 20 feet

***** Actions Taken *****

1. Repeat collections (Lake Berryessa - Headquarter Cove)
2. Intensify collections (Six samples in Headquarter's Cove)
3. Collect other sites with *Corbicula* populations
 - a. All Berryessa launch ramps
 - b. Lower Putah Creek
 - c. American River
4. Send images / video to second taxonomist
 - a. Dr. Robert McMahon (University of Texas). Images and video transmitted to Dr. McMahon who has confirmed that the specimens are *Corbicula*

Taxonomic Results: *Corbicula fluminea*
(confirmed by Dr. McMahon)