Quagga Mussels: An introduction to an aquatic nuisance species

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United Water Conservation District
What are quagga mussels?

- *Dreissena rostriformis bugensis*
- aquatic bivalve mollusk
- Related to zebra mussels (*Dreissena polymorpha*)
Quagga Mussel Life Cycle

1. **Fertilization**
   - Egg and Sperm

2. **Planktonic veliger phase**
   - Free-floating larvae
   - Size: 231-462 microns
   - Metamorphosis
   - Settled juveniles
   - Size: 1-3 mm

3. **Benthic phase**
   - Attached to the lake bottom
   - Size: 3-6 mm

4. **Juvenile mussels**
   - Size: 6-45 mm

5. **Adult mussels**
   - Size: 6-45 mm

6. **Trocophore**
   - Size: 80-100 microns

7. **Strait-hinged**
   - Size: 97-112 microns

8. **Umbonal**
   - Size: 112-347 microns
Where did they come from?

Ventura
How did they get here?
How did they get here?

CLEAN. DRAIN. DRY. EVERYTHING! EVERY TIME!
http://www.100thmeridian.org/
How did they get here?
Why should you care?

Major impacts of quagga mussels:

• attach to any hard surface, quickly clogging pipes and screens, weighing down docks, fouling boat bottoms, and blocking water intakes

• sharp shells wash up on beaches and ramps, making them unusable for recreation

• degrade water quality

• may negatively affect fisheries and wildlife

• require EXPENSIVE and frequent maintenance of facilities and boats
Quagga mussel monitoring
Why monitor for quagga mussels?

• Understand the extent of the problem
• Determine key information about the biology of quagga mussels in Lake Piru
• Assess whether management efforts are effective and determine where to focus control
What methods are used?

- Water quality (every other week)
- Dive surveys (quarterly)
- Artificial substrates (monthly)
- Surface surveys (monthly)
- Veliger surveys (monthly)
Methods (Dive surveys)

**Purpose:** Understand the spatial distribution, density, and size of mussels on natural features and infrastructure

- Performed quarterly in conjunction with infrastructure scraping
Methods (artificial substrates)

**Purpose:** Assess timing of settling and growth of mussels

- Sampled monthly, all year
- Samples processed in Dr. Culver’s lab at UCSB
Methods (surface surveys)

**Purpose:** Assess mussel recruitment downstream of Lake Piru on natural substrates and provide early detection in downstream areas

- Monthly surveys on UWCD property at Santa Felica Dam and Santa Clara confluence
- As needed surveys downstream in Santa Clara River
Methods (Veliger surveys)

**Purpose:** Assess timing and size of spawning events and the potential for spread in the watershed

- Monthly veliger sampling in Lake Piru and Piru Creek
Results: Water quality

- Temperature
- Dissolved Oxygen
- pH
- Turbidity (water clarity)
Dissolved oxygen in water

**Input:** Mixing with air

**Input:** Photosynthesis
- Phytoplankton and aquatic vegetation

**Removal:** Respiration
- Breathing by animals,
- Breakdown of dead materials
Stratification (layering) of lakes

**Input:** Mixing with air

**Input:** Photosynthesis
- phytoplankton and aquatic vegetation

**Removal:** Respiration
- Breathing by animals,
- Breakdown of dead materials

Water temperature

Thermocline
Results (Dive surveys)

Mussel size (mm)

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Results (Dive surveys)

Mussel size (mm)

Natural

04/2015

04/2015

07/2015

07/2015

Count

Count

Mussel size (mm)

Mussel size (mm)
Results (artificial substrates)

General pattern of settlement on artificial substrates
Results (artificial substrates: growth)

March

April

Propportion

Shell Length (mm)

<1 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Propportion

Shell Length (mm)

<1 1 2 3 4 5 6 7 8 9 10 11 12 13 14
Survey results

Piru Creek Study Area

- Piru Creek Reaches
  - Surveys and monitoring
  - Potential monitoring*
  - Spillway Channel (Intermittent)
  - Artificial substrate samplers*
  - UWCD Property Boundary
  - Dry gap

*monitoring dependent on landowner access
Take home message:

• Conditions in Lake Piru are ideal for quagga mussels
• Quagga are abundant in Lake Piru, but have not spread out of Piru Creek
• Quagga reproduce all year and grow quickly
• United’s control measures manage the impacts of the infestation in the lake – but public cooperation is necessary to prevent the spread
What can you do?

Clean. Drain. Dry.

Vehicle
Anchor
Rollers
Hull
Rollers/bunks
Axle
Thru-hull fittings
Gimble area

Storage compartments
Dock lines
Live wells
Bilge
Prop
Motor intakes

Clean.
Drain.
Dry.

Everything...Everytime!