

## Reproduction and Population Structure of *Corbicula fluminea* in an Oligotrophic Subalpine Lake

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quatic Ecosystems





## Outline

- C. fluminea Reproduction
- 2009 Preliminary Study
- 2010 Complete Study
  - Locations
  - Food Availability
  - Temperature
  - Reproductive Effort
  - Population Structure
- Results & Conclusions
  - Thougths About
    Temperature





## How Does C. fluminea Reproduce?







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## How Does C. fluminea Reproduce?

Simultaneously hermaphaditic producing gametes (eggs & sperm) in the gonads.

Gametes (eggs & sperm) move into the demibranches (gills).

Sperm is released into the water column and either self-fertilizes or fertilizes a close neighbor.

Egg fertilized in the demibranches. Developing juveniles are brooded in the marsupial gills.





Ovum with jelly coating embedded with sperm

Adult, simultaneous hermaphroditic Asian Clam.



Fertilized egg



Blastula 24 hours

#### Straight-Hinged Juvenile



# 6 to 14 Day Developmental Cycle



Gastrula 12 - 24hours

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Pediveliger 24 – 96 hours



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Aquatic Ecosystems Analysis Laboratory **University of Nevada, Reno**  Veliger 24 – 48 hours

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Trochophore 24 – 48 hours

## Gills are a Great Place!



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## 2009: Marla Bay





## 2009: Nevada Beach





(Tahoe Environmental Research Center)

## Summer 2010 on Lake Tahoe





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Map courtesy of Dave Rios, 2011

## 2010 Study Design

Temperature would have the greatest influence on the timing of reproduction

Food availability would influence overall reproductive effort

Reproductive efforts would be similar in both shallow and deeper populations resulting in a source of veligers for populating the nearshore environment In situ temperature at each site (°C)

- Total Organic Carbon (mg/L)
- Sediment Particulate Organic Matter (µg/mg)

Reproductive Effort

- Number of Eggs
- Number of Veligers

**Population Structure** 

• Mean Abundance (#clams/m<sup>2</sup>)



## **Bivoltine Reproduction**



Aldridge, D.W. and R.F. McMahon. 1978.

## It's Warm Enough for C. fluminea to Reproduce



### Food Availability is Important for Reproduction



## Food Availability : Total Organic Carbon



#### Food Availability: Sediment Particulate Organic Matter





#### **Others Studies Show Populations Have a Lot of Juveniles**



Hall, 1984.



## What's Going on with Nevada Beach 20 m?



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## **Dispersal via Floatation**





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## **Physical Action within Tahoe**





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## How are Tahoe's C. fluminea different?

- 588 (Spring) and 735 (Fall) per clam per day
- Annual high of 1,800 (late June) to 1200 (early October) per clam per day



- 10±2 (n=603)
- 286±28 (4% with ≥100)
- 20±2 (12% with <100)
- 498 had no veligers (84%)



## **Results & Conclusions**

- Hypothesis: Temperature would influence reproductive timing
  - Univoltine beginning in mid-August
  - Delay in spawn
- Hypothesis: Locations with greater food availability would have an increased reproductive effort
  - Sediment particulate organic matter was greater at Lakeside, this did not influence overall reproductive effort
  - Total organic carbon was not different between sites
- Hypothesis: Deeper water population would have similar reproductive effort as shallow populations
  - No reproductive effort
  - High abundances
- Population structure shows a strong adult population with a minimal juvenile population indicating that deeper water populations are likely a sink population rather than a source



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# Questions?

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