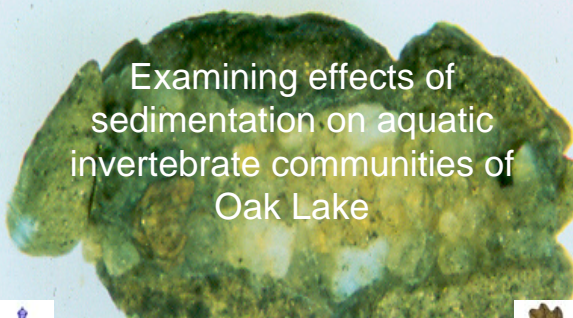




## Examining effects of sedimentation on aquatic invertebrate communities of Oak Lake






**Kristopher G. Dozark and Dr. Nels H Troelstrup, Jr.**

## Sediment Effects on Aquatic Invertebrates

- Smothering
  - Chou et al. 2004; Koel and Stevenson 2002; Wood et al. 2001
- Clogging of respiratory and feeding apparatuses
  - Donohue and Irvine 2004; Shaw and Richardson 2001; Hanson and Butler 1994; Lemly 1982
- Habitat reduction
  - Suren and Jowett 2001; Lenat et al. 1981
- Metal contamination
  - Ali et al. 2002; Courtney and Clements 2002; Borgmann et al. 2001; Moore et al. 1979
- Scouring of exoskeleton
  - Crowe and Hay 2004

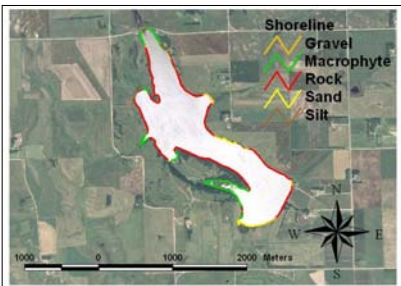
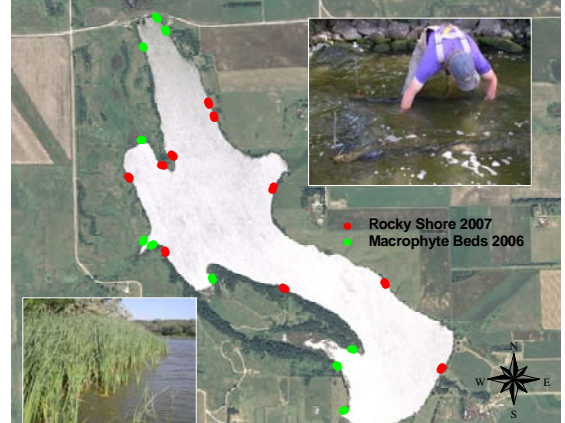




## Objectives

- Determine differences in invertebrate communities dosed with varying levels of sedimentation
  - Macrophyte Beds
  - Rocky Shores
- Generate a load-response relationship between sediment load and invertebrate communities

## Shore Habitats


Macrophyte beds (Year 1/Green Lines)~30%  
Rocky shores (Year 2/Red Lines)~60%

● Rocky Shore 2007  
● Macrophyte Beds 2006

## Methodology

- 10 replicate experimental locations
- Five treatment plots (Carroll 2005)
  - One control, four treatment levels
  - Numbers generated using Mississippi River loads (Dunne and Leopold 1978)
    - 0.1 kg
    - 1.0 kg
    - 10 kg
    - 100 kg



## Methodology

- Plot Size
  - 1m x 4m plots
  - Placed at 0.5 meter water depth
  - Constructed of silt fence
- Treatments were randomly assigned at each location
- Samples were collected (300 total)
  - One week prior to treatment
  - One and two weeks following treatment



## Laboratory Methodology

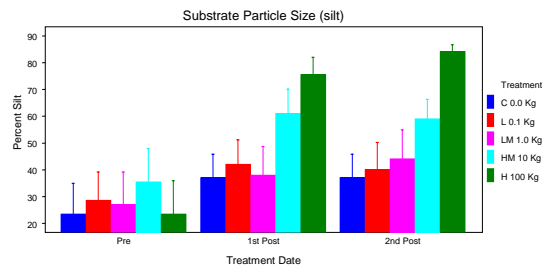
- A sub-sampling approach was used to sort and identify invertebrates
  - Samples were placed in gridded sorting trays
  - Random grids were sampled
- Sort invertebrates
  - 300 invertebrates were sorted (EPA 2004)
  - After 300 organisms were collected, large and rare organisms were collected
- Invertebrate Identification
  - Identified to the lowest practical taxonomic level
  - Identifications will aid in the calculations of metric values

## Analysis

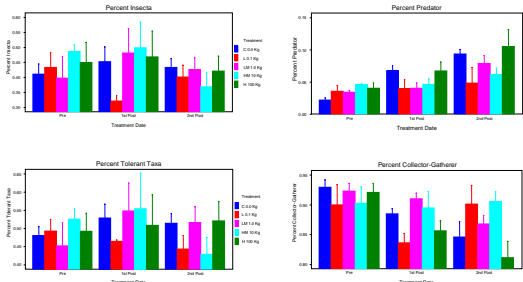
- Metrics are measurable components of biological systems that can be used to predict change
  - Optimized sediment metrics from Braskamp (2002)
    - Diptera Richness, Ephemeroptera Richness, % Dominant Taxa
    - % Gliders, % Swimmers,
    - % Collector-Gatherers, and % Predators
    - % Chironominae, % Insecta
    - Modified Hilsenhoff's Biotic Index



## Macrophyte Bed (2006) Results

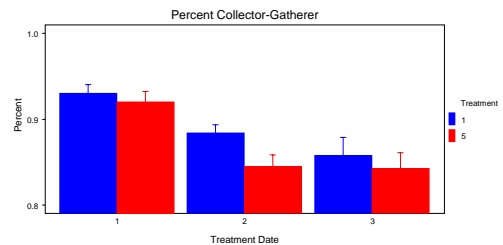


## Macrophyte Bed (2006) Results

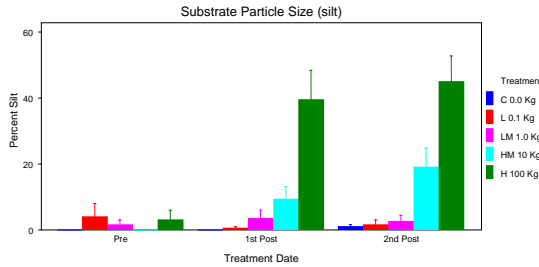


## Macrophyte Beds (2006) Results

- Percent collector-gatherer showed moderately significant ( $p=0.09$ ) treatment effect between control and high treatment plots



## Rocky Shore (2007) Results



## Conclusions

- Few associations have been found in macrophyte bed samples
  - Percent collector-gatherer showed a moderate treatment effect
  - Other metric values showed no treatment effects
  - Possible explanations
    - Depositional habitat
    - Adaptation to deposition
- Rocky shore samples are in preliminary stages of being sorted and identified
  - Treatment effects from sedimentation should be more prevalent in erosional habitats

## Conclusions

- About 100 unique taxa have been identified
- Four taxa have been identified for the first time for Oak Lake
  - 3 insects and 1 crustacean



*Argulus*, a fish parasite.  
Photo: www.cryki.com



*Zavreliella*, a chironomid.  
Photo: www.paleolab.ca



*Chauliodes*, a hellgrammite.  
Photo: www.ant.ohio.edu



*Nyctiophylax*, a caddisfly.

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## Any Questions?

