



A Mussel by any other name...

Implications of a potential zebra mussels invasion in Song Lake

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Introduction

Song Lake is a kettle lake without inlets or outlets located in Tully, New York. Currently, the lake is only known to be inhabited by the native "pearly" mussels from the family Unioniidae, which is experiencing population declines and extinctions at high rates throughout North America.¹ Specimens of the unionid species residing in Song Lake, likely *Lampsilis radiata*, were used for this experiment.² The neighboring lake, Little York, has been colonized by an invasive species from Asia, *Dreissena polymorpha*, commonly called zebra mussels. Zebra mussels can be introduced to native habitat via human activity. The introduction of zebra mussels in a lake can lead to dramatic alterations in its ecological balance and can cause decline in unionid populations.^{1,3}

Hypotheses

- Consumption rates of phytoplankton will be higher in *D. polymorpha* tanks.
- Nutrient release of phosphorus will be higher in *D. polymorpha* tanks.
- Bioturbation in sediments will be greater in *L. radiata* tanks.
- Average rate of change in dissolved oxygen in the sediments will be greater in *L. radiata* tanks

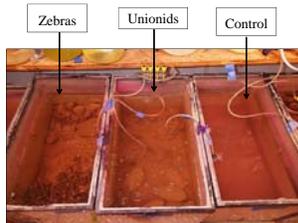


Lampsilis radiata
Native to Song Lake

D. polymorpha
Native to Asia

Methods

- Sites
- Song Lake- Tully, NY
 - Little York Lake- Preble, NY
 - Tully Lake- Tully, NY

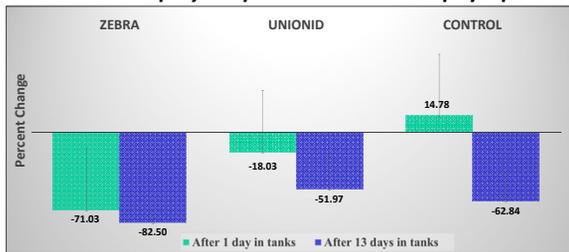


- Nine tanks were separated into groups of three

Response Variables

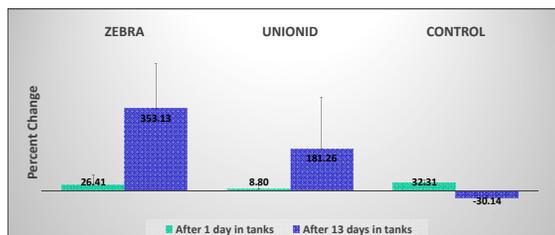
- (1) Phytoplankton consumption : chlorophyll-a was measured for each tank using a fluorometer.
- (2) Nutrient release: phosphorus concentration was measured for each tank using a spectrometer.
- (3) Sediment effects: bioturbation was measured using microbeads measured to each cm. Change in average rate of dissolved oxygen was looked at to see the effects of mussels on microbial activity. This was measured using oxygen probes and constructed benthic chambers.

How do *L. radiata* and *D. polymorpha* mussels affect phytoplankton grazing?



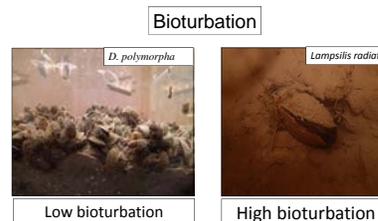
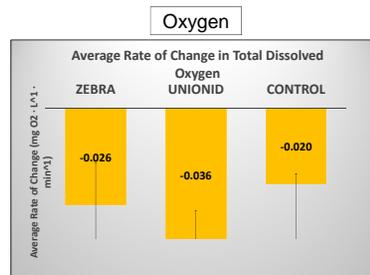
- Decline of chlorophyll-a were found to be the greatest for zebra mussels. This means that phytoplankton grazing was highest for *D. polymorpha*.

How do *L. radiata* and *D. polymorpha* affect nutrient release in terms of biologically available phosphorus in the water column?



- Nutrient release of phosphorus was found greatest for *D. Polymorpha*.

How do *L. radiata* and *D. polymorpha* movement affect bioturbation and oxygen consumption of microbes in the sediment?



- *L. radiata* tanks contained the highest average rate of change in total dissolved oxygen.



Discussion

If *D. Polymorpha* were to colonize Song Lake and *L. radiata* population experienced subsequent declines then...

- The higher rate of filter-feeding activity and P-recycling by *D. polymorpha* could contribute to alterations in the lake's primary productivity, community composition and foodweb dynamics.^{4,5}

- Higher rates of P-recycling caused by *D. polymorpha* could also promote the abundance P-limited species such as Cyanobacteria.⁶ This type of algae can create toxic algal blooms, which have historically been a problem in Song Lake.

- The reduction of bioturbation activity in the sediment layer could contribute to:

- shifts in the benthic community composition
- decreases in oxygen in the sediment
- reduction in microbial activity and nutrient concentrations
- reduction in favorable habitat conditions for interstitial organisms^{4,5}



Literature Cited

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Acknowledgments

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