Evaluating The Interactive Effects of Elevated pH and Hypoxia on Growth of The Diatom *Thalassiosira pseudonana*: Implications for Harmful Algal Blooms in The Laurentian Great Lakes

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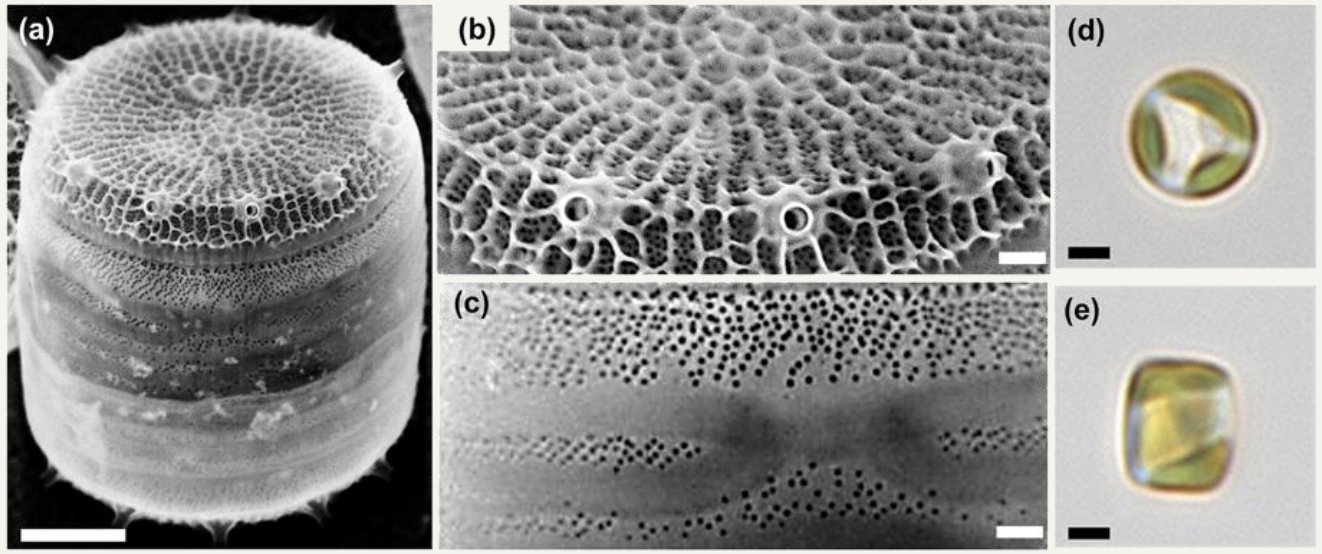
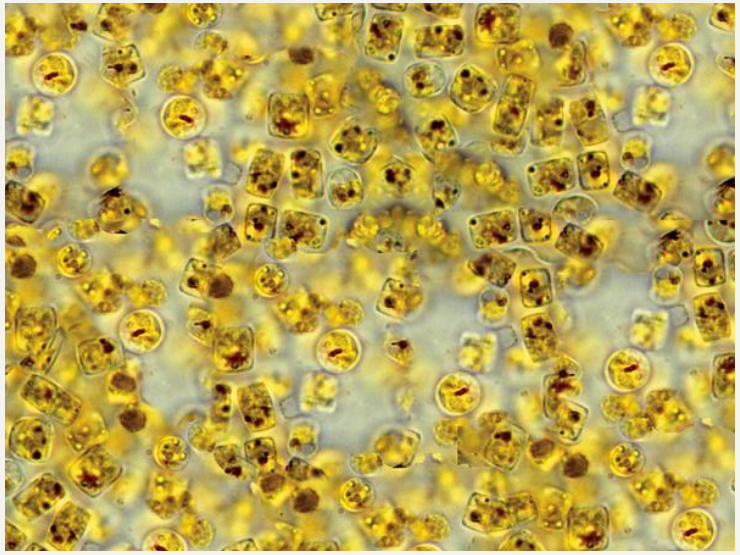
Problem Statement

- Elevated pH
- Hypoxia (DO <2.0 mg/L)

Research Question



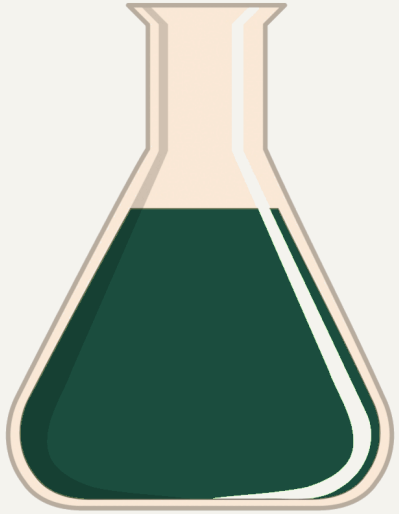


- How do elevated pH and hypoxia affect the growth of the diatom *Thalassiosira pseudonana*?
- Are there significant interactive effects between elevated pH and hypoxia on the growth of the diatom *Thalassiosira pseudonana?*

Methodology

Hypoxia + Elevated pH

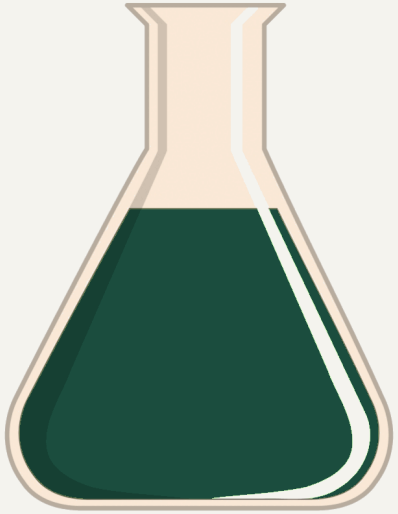
n = 4



pH: 9.2
DO: 0.5 mg/L

Hypoxia

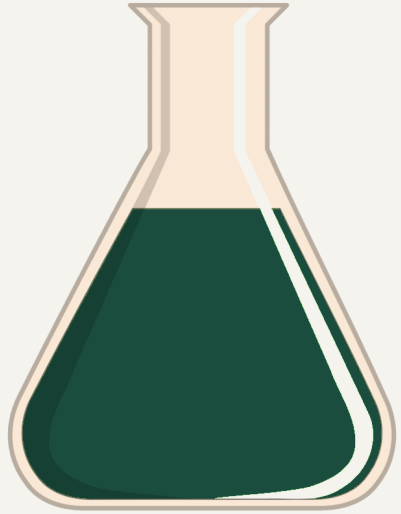
n = 4



pH: 7.7
DO: 0.5 mg/L

Elevated pH

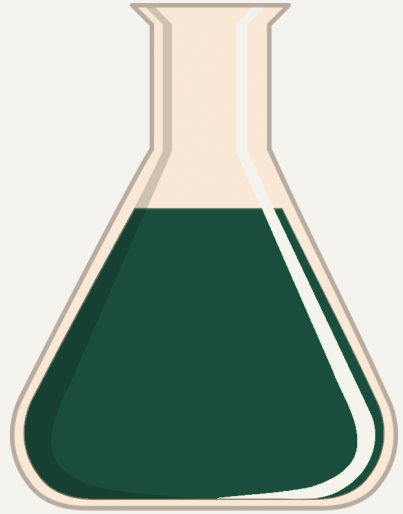
n = 4



pH: 9.2
DO: ~7 mg/L

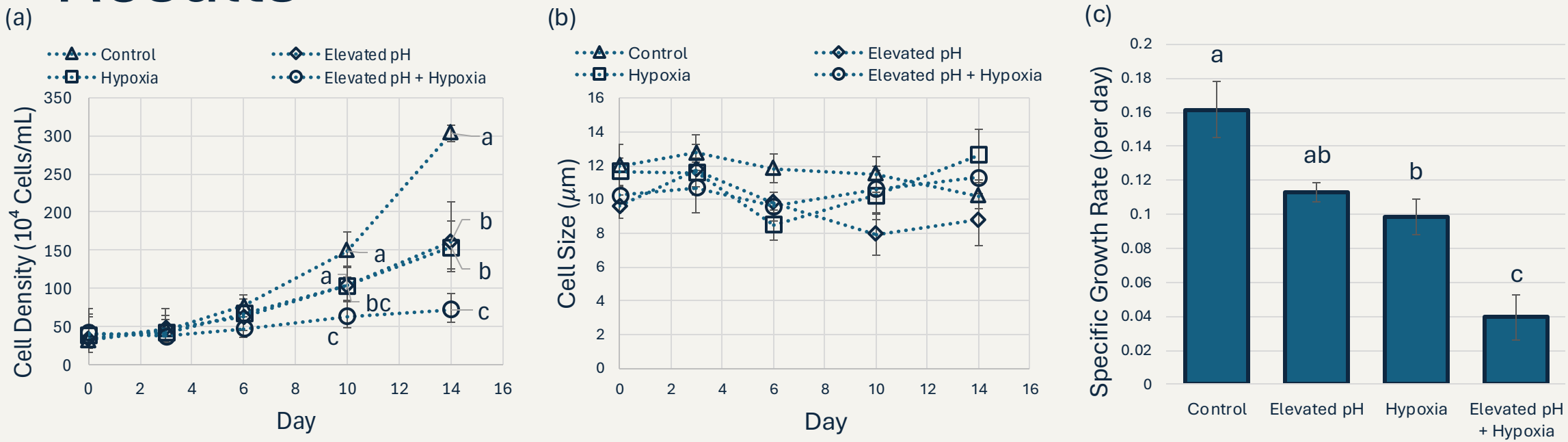
Control

n = 4



pH: 7.7
DO: ~7 mg/L

Results



- For cell density, the interaction between treatment and time was significant (df=12, F=11.502, p<0.001) (a).
- For cell size the interaction between treatment and time was not significant (df=12, F=0.855, p=0.597) (b). Additionally, the main effects of treatment (df=3, F=3.410, p=0.0.67) and time (df=4, F=2.741, p=0.079) were not significant.
- For specific growth rate, treatment had a significant effect (df=3, F=17.364, p<0.001) (c).

Implications

Average Temperature

2.3°F
1951-2017

Growing Season

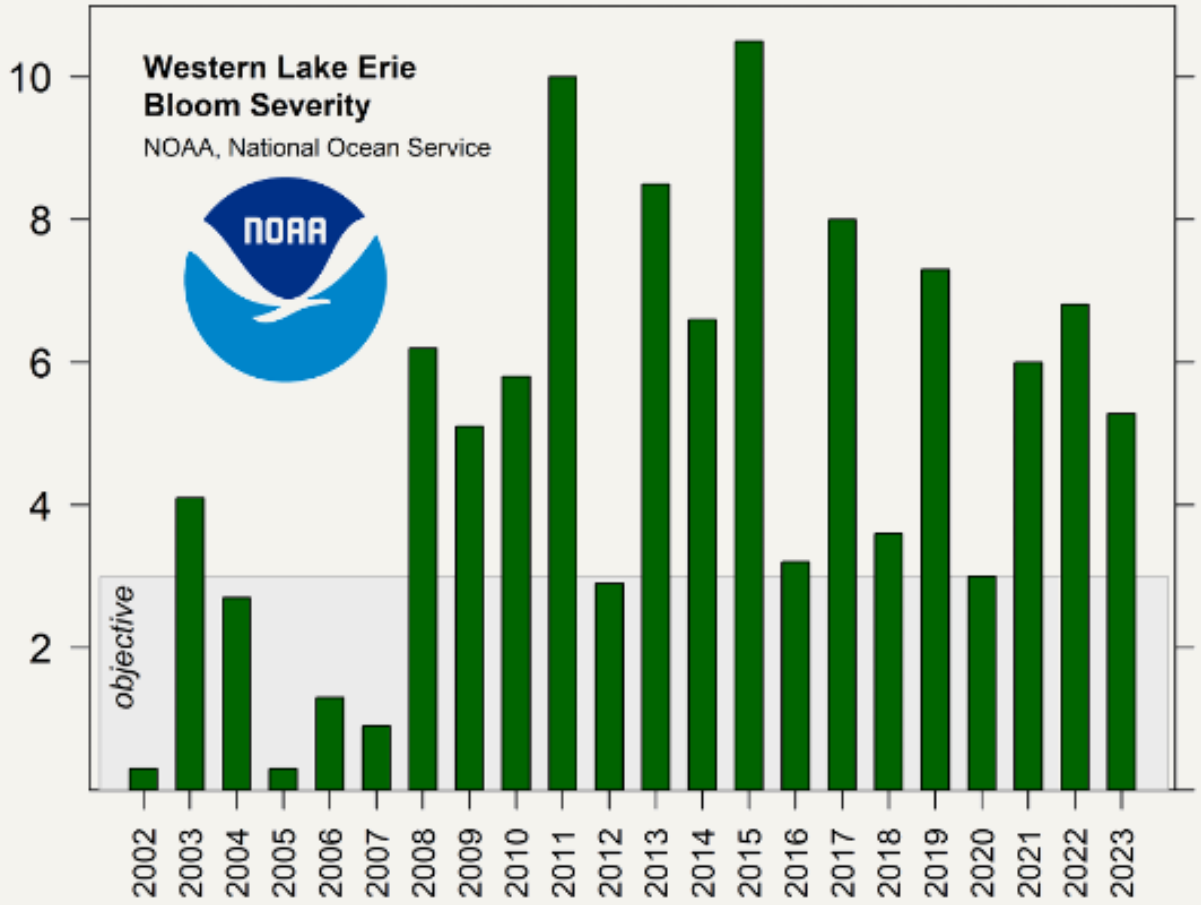
16 Days
1951-2017

Total Precipitation

14%
1951-2017

Heavy Precipitation Events

35%
1951-2017



Future Aims

Additional Factors:

- Turbidity
- Presence of Microcystin Toxins

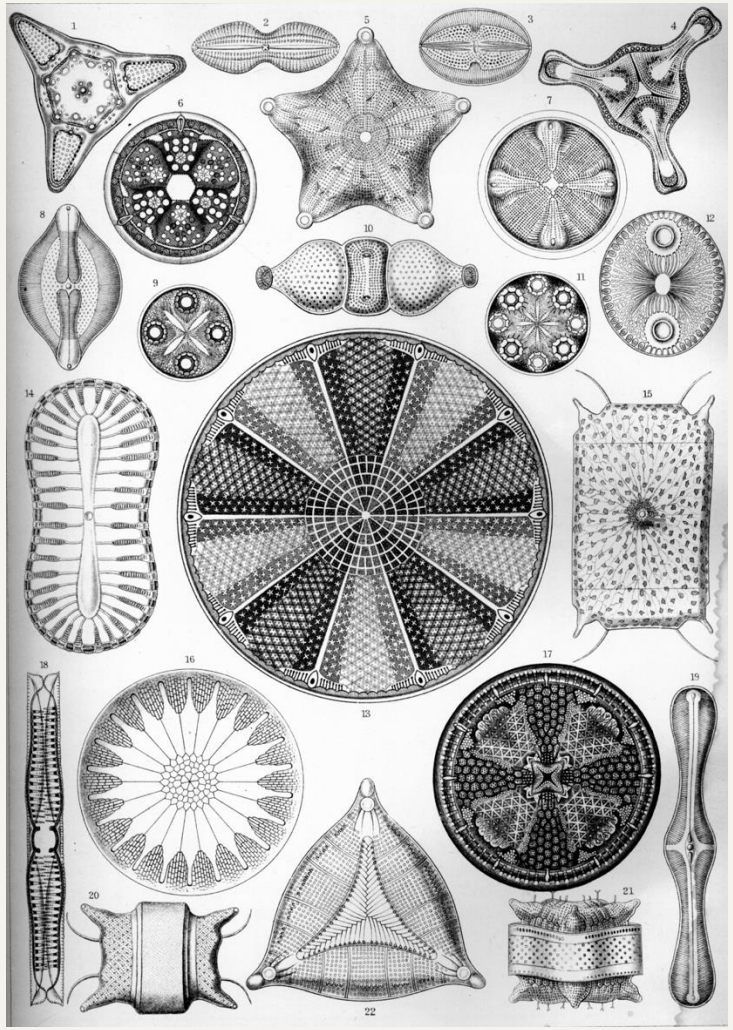
Additional Measures

- Chlorophyll-a Concentrations
- Adenylate Energy Charge (AEC)
- Silicate Incorporation

Co-Cultures

- *Microcystis aeruginosa*

Thank You!



- I would like to extend my thanks to my advisor, Dr. Carlo Moreno. Your support was invaluable to me.
- Thank you to my family. I couldn’t have done it without you.
- Lastly, thank you to my coaches and teammates on the swim team.