Session D, 2017 Third Place: The Effects of Sunscreen on Photosynthetic Filamentous Algae

Matthew McBride
Andrew Meashaw
Lorenzo Natalie

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The Effects of Sunscreen on Photosynthetic Filamentous Algae

Matt McBride, Andrew Meashaw, Lorenzo Natalie

http://aquaplant.tamu.edu/plant-identification/visual-index/filamentous-algae/
Introduction

• We observed people applying sunscreen around swimming docks

• Sunscreen can have impacts on marine plants/environments (Danovaro et al. 2008)

• Algal photosynthesis and growth inhibited by UV rays (Piiparinen et al. 2011 and Joint et al. 2007)

• Algae impacts dissolved oxygen (Yoshikawa et al. 2007)

• DO impacts species richness/diversity (Killgore et al. 2001)
Introduction

$H_1$: Treating algae with sunscreen will increase photosynthesis

$H_0$: There will be no difference in photosynthesis between the control and sunscreen treated algae
Methods
Methods

- Sunlight and Artificial light experiments
  - Two sets of sunscreen concentrations
    - \( \frac{1}{4} \text{ mL}, \frac{1}{2} \text{ mL}, 1 \text{ mL} \)
    - \( \frac{1}{32} \text{ mL}, \frac{1}{16} \text{ mL}, \frac{1}{8} \text{ mL} \)
- Control: algae with no sunscreen
- 188 mL Jars with 4 ml of Algae
- DO probe: before and after measurements
Results

• A total of 84 jars of algae were tested

• Six different trials lasting six hours
Results

Sunscreen (mL)

<table>
<thead>
<tr>
<th>Zero</th>
<th>Quarter</th>
<th>Half</th>
<th>One</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

Average Delta DO (mg/L)

- F-Value: 5.83
- P-Value: 0.005
Results

Grown light and UV Light

Grown light and No UV Light

F-Value: 6.77  P-Value: 0.014

F-Value: 0.06  P-Value: 0.979
Results

F-Value: 2.93
P-Value: 0.099
Results

Grown light and UV Light

F-Value: 5.93
P-Value: 0.020

Grown light and No UV Light

F-Value: 74.44
P-Value: > 0.001
Discussion

• Sunscreen significantly decreased DO

• Sunscreen and UV light are likely additive stressors

• Impacts on DO may impact aquatic organisms
Discussion

Drawbacks in methods:
• Replace/filter Water?
• Small containers
• Temp. as covariant
• Measuring algae/content of algae
• UV levels (Collen et. Al, 1992)
Conclusion

• The data did not support our initial hypothesis

• Samples treated with sunscreen significantly decreased dissolved oxygen.
Conclusion

Ultimately, we:

- Found that sunscreen had a negative impact on algae in the environments we tested

- Explored and modified our experiment using the scientific method

- Potential for other studies to build upon in the future
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Killgore and Hoover. “Effects of hypoxia on fish assemblages in a vegetated waterbody” Aquatic Plant Management (2001). Web. 8 August 2017

Questions?