

2017

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

Matthew McBride

Andrew Meashaw

Lorenzo Natalie

Follow this and additional works at: <http://digitalcommons.esf.edu/clbs>

 Part of the [Aquaculture and Fisheries Commons](#), [Biodiversity Commons](#), [Biology Commons](#), [Ecology and Evolutionary Biology Commons](#), [Entomology Commons](#), and the [Forest Sciences Commons](#)

Recommended Citation

McBride, Matthew; Meashaw, Andrew; and Natalie, Lorenzo, "Session D, 2017 Third Place: The Effects of Sunscreen on Photosynthetic Filamentous Algae" (2017). *Cranberry Lake Biological Station*. 29.
<http://digitalcommons.esf.edu/clbs/29>

This Presentation is brought to you for free and open access by the Environmental and Forest Biology at Digital Commons @ ESF. It has been accepted for inclusion in Cranberry Lake Biological Station by an authorized administrator of Digital Commons @ ESF. For more information, please contact digitalcommons@esf.edu, cjkoons@esf.edu.

The Effects of Sunscreen on Photosynthetic Filamentous Algae



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

Matt McBride, Andrew Meashaw, Lorenzo Natalie

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

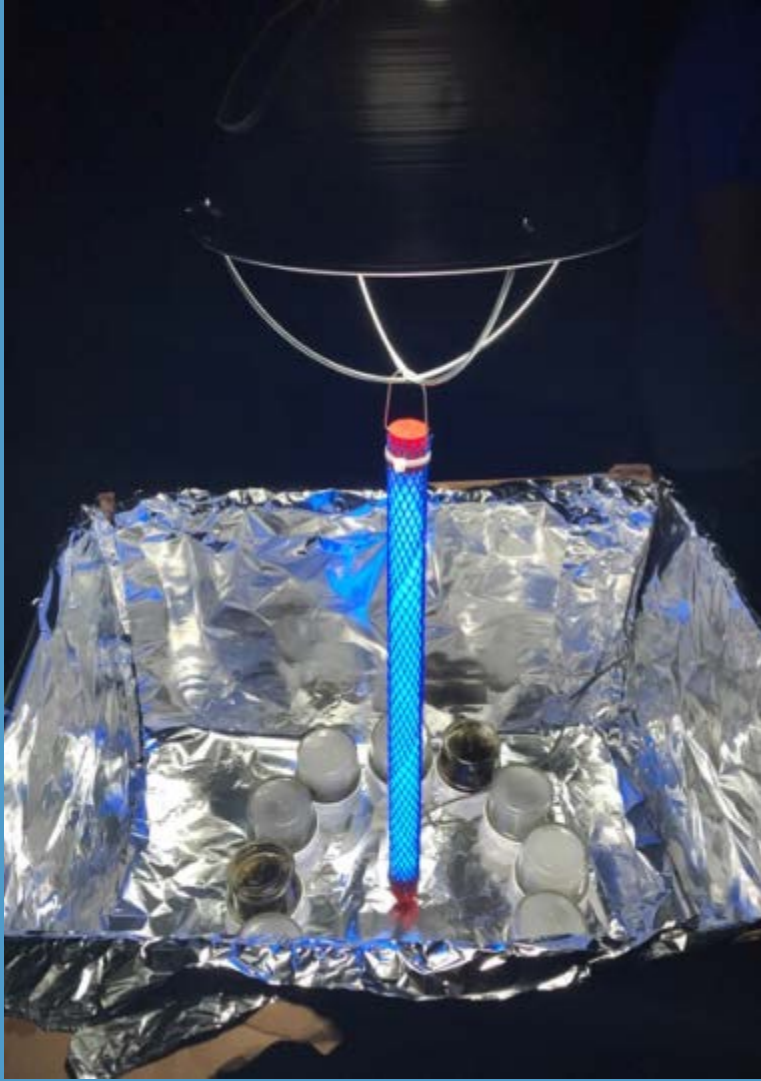
Methods



Methods

- Sunlight and Artificial light experiments
- Two sets of sunscreen concentrations
 - $\frac{1}{4}$ mL, $\frac{1}{2}$ mL, 1 mL
 - $\frac{1}{32}$ mL, $\frac{1}{16}$ mL, $\frac{1}{8}$ mL
- Control: algae with no sunscreen
- 188 mL Jars with 4 ml of Algae

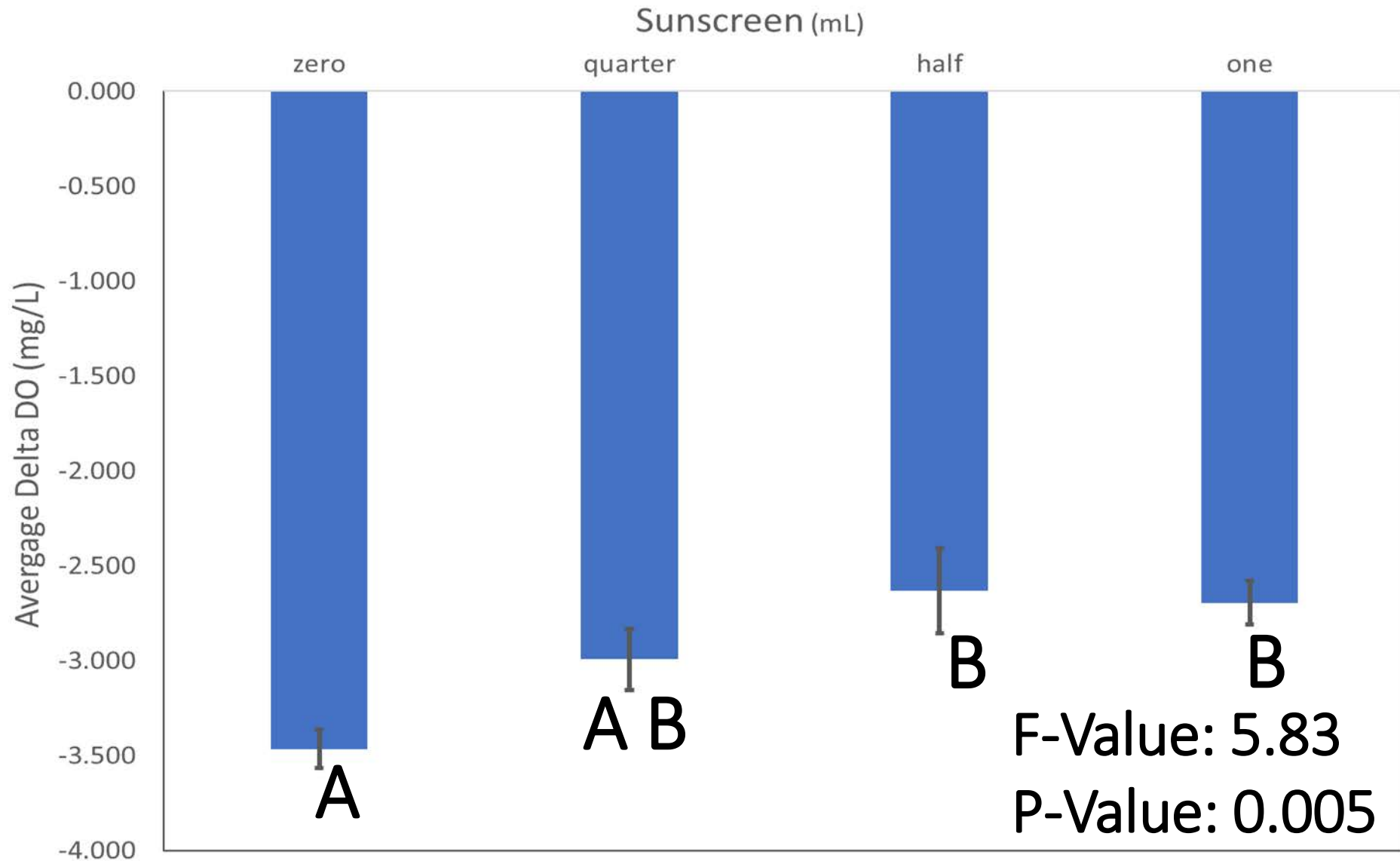
- DO probe: before and after measurements



Results

- A total of 84 jars of algae were tested
- Six different trials lasting six hours

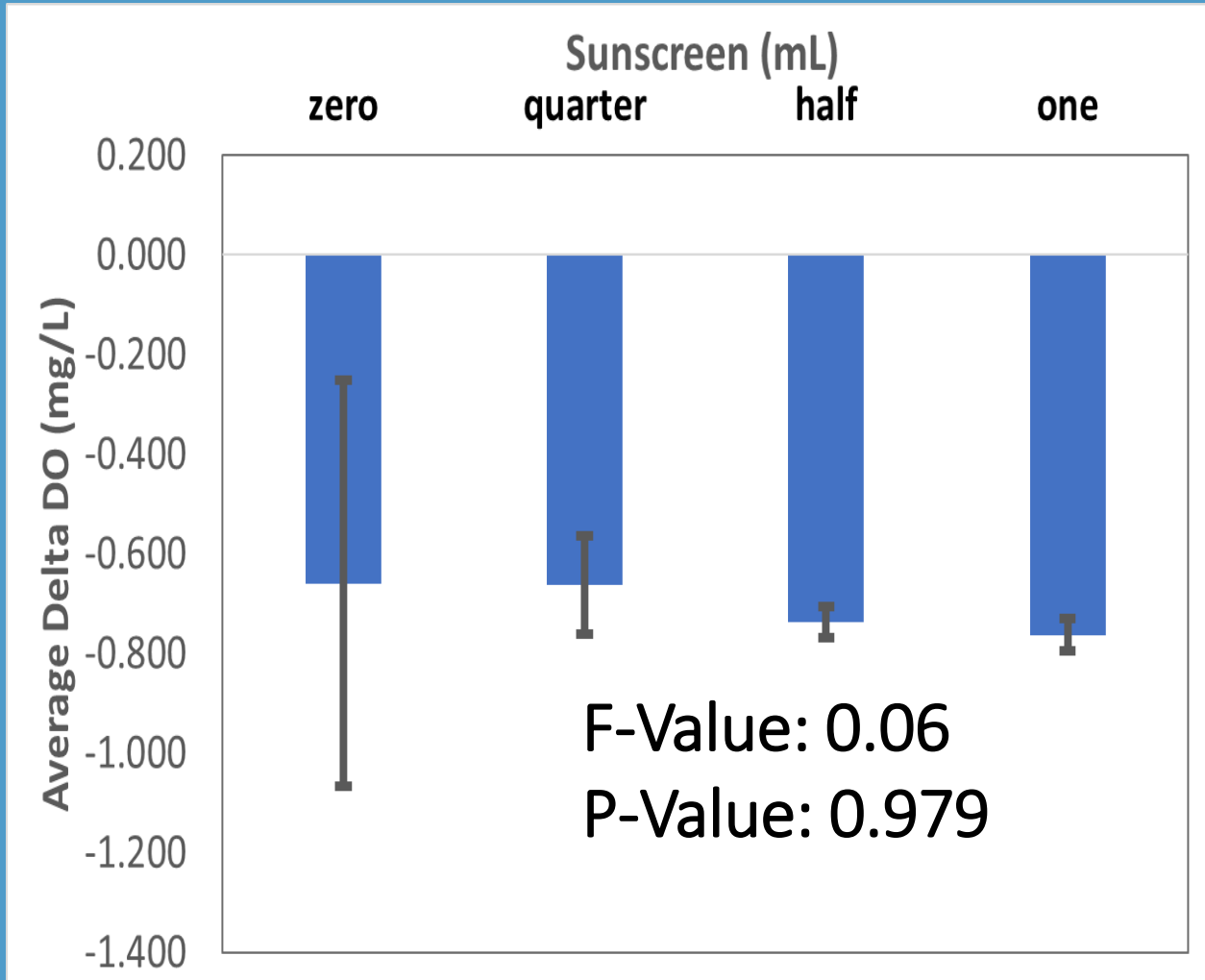
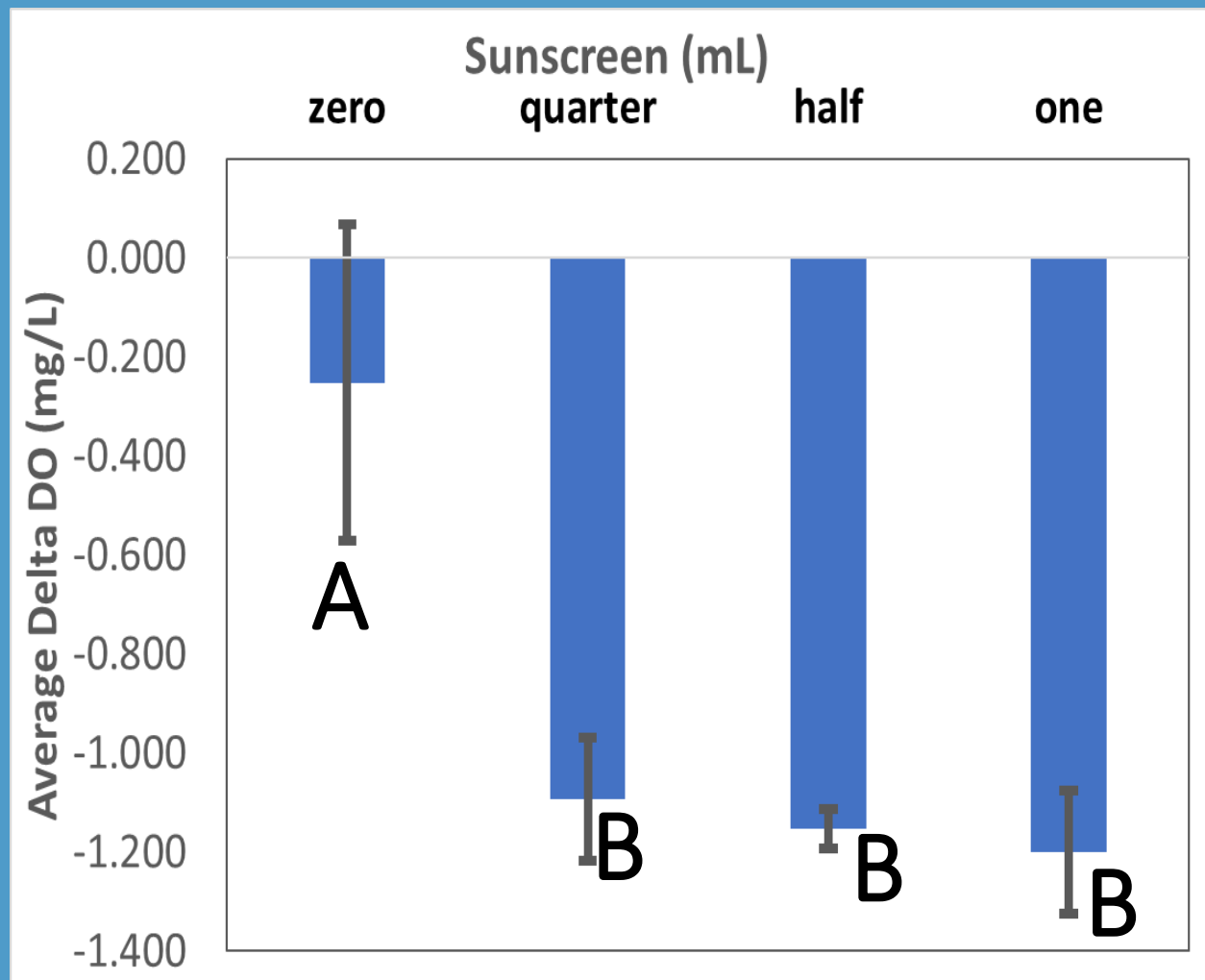
Results



Results

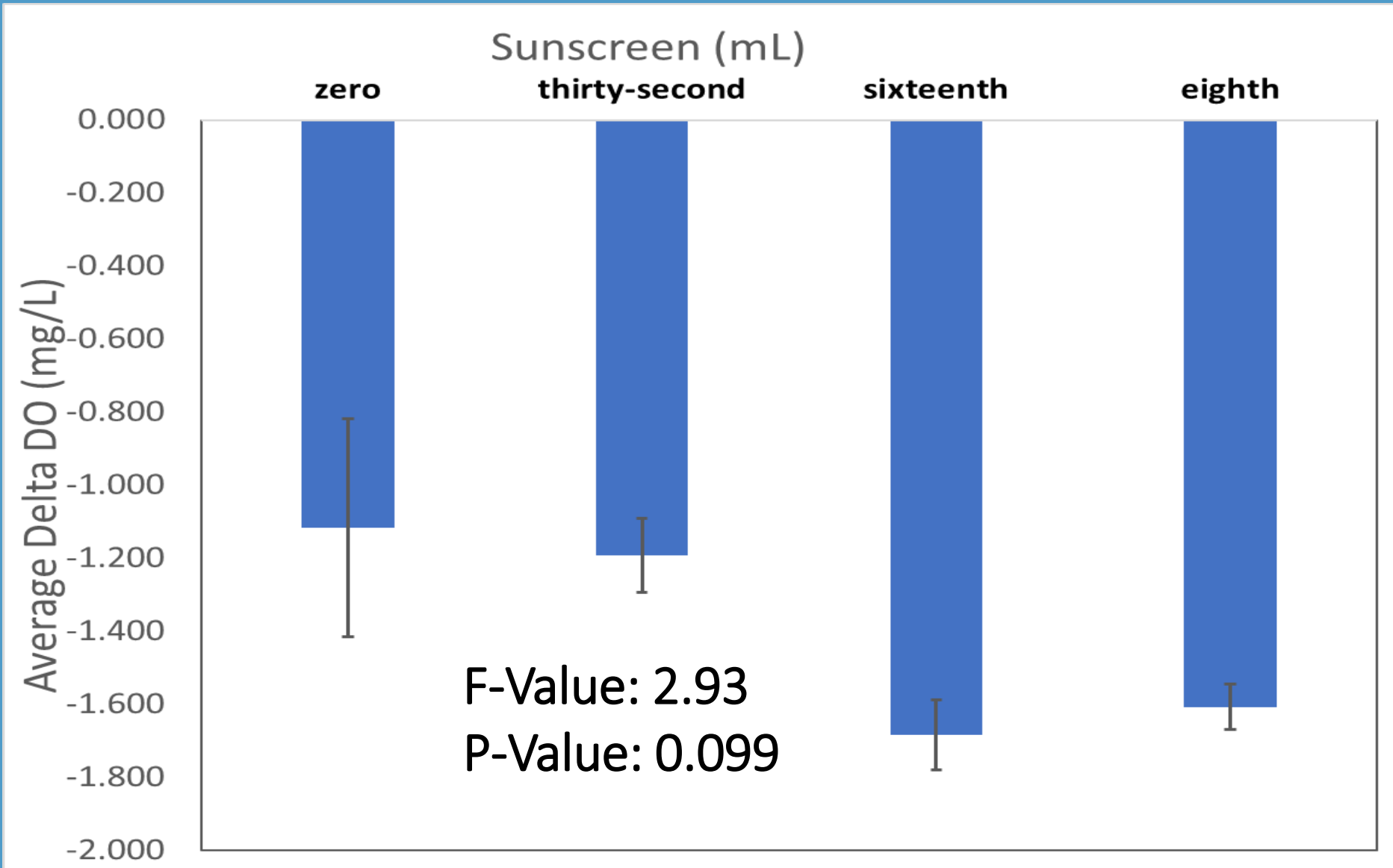
Grown light and UV Light

Grown light and No UV Light



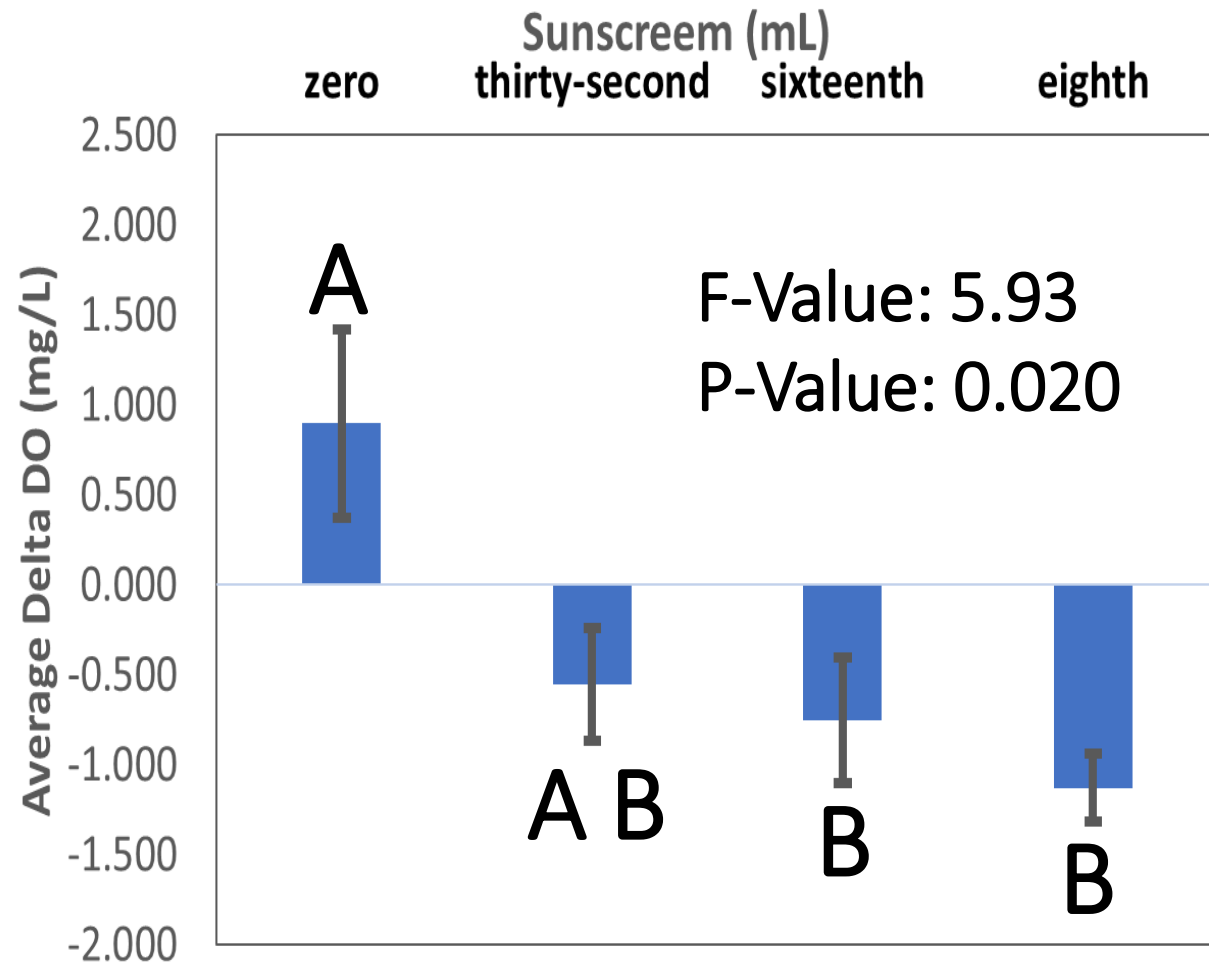
F-Value: 6.77 P-Value: 0.014

Results

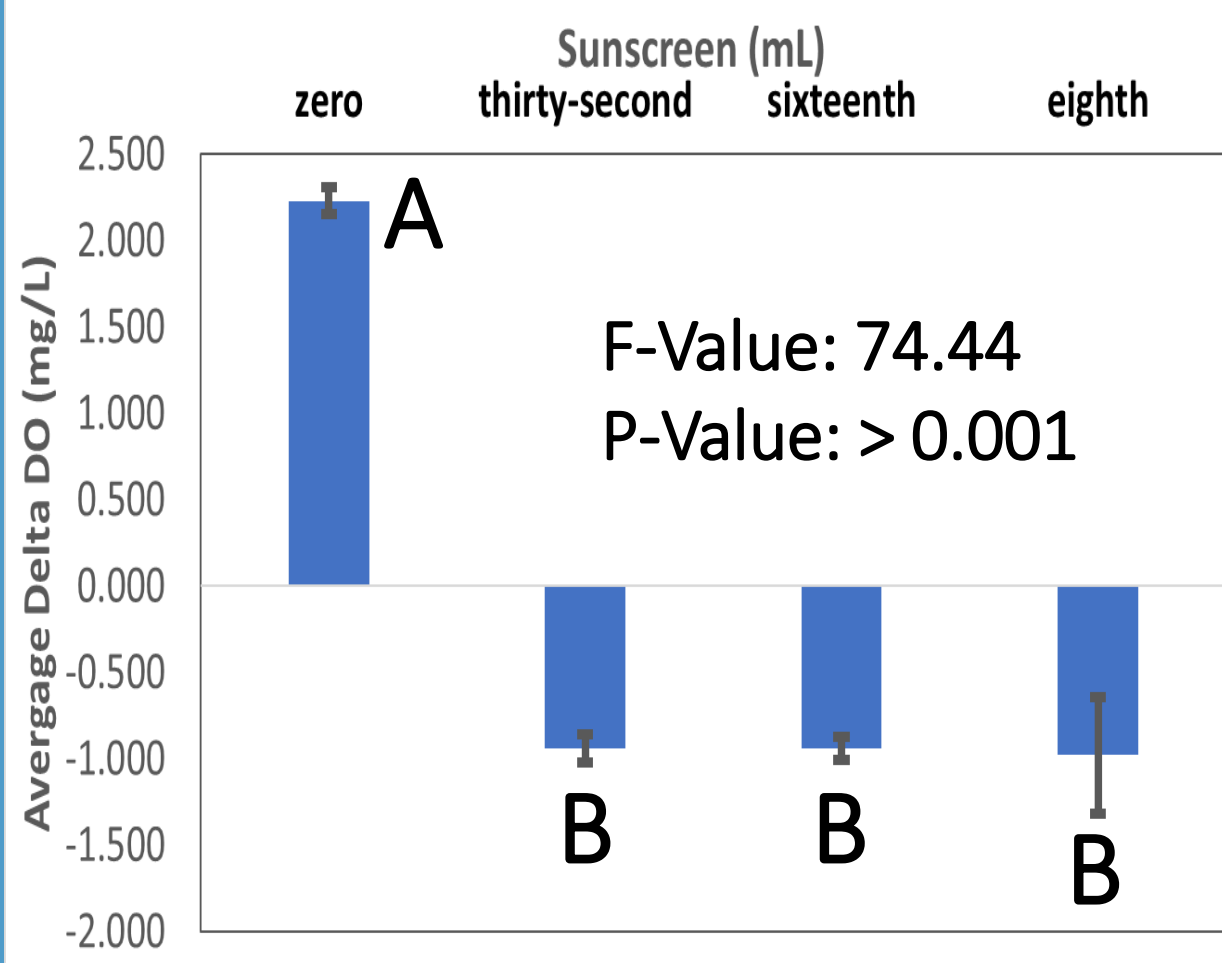


Results

Grown light and UV Light



Grown light and No UV Light



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

Acknowledgements

Special thanks to;

Dr. Shultz

Maria

And all other CLBS Staff

Emily

Dr. Bowman

Citations

Cullen, J.J., Neale, P.J., and Lesser, M.P. 1992. Biological weighting function for the inhibition of phytoplankton photosynthesis by ultraviolet radiation. *Science* (Washington, D.C.), 258: 646–650

Danovaro, Roberto, Lucia Bongiorno, Cinzia Corinaldesi, Donato Giovannelli, Elisabetta Damiani, Paola Astolfi, Lucedio Greci, and Antonio Pusceddu. "Sunscreens Cause Coral Bleaching by Promoting Viral Infections." *Environmental Health Perspectives*. National Institute of Environmental Health Sciences, 3 Apr. 2008. Web. 28 July 2017. <<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2291018/>>.

Joint, Ian, and Michael B. Jordan. "Effect of Short-term Exposure to UVA and UVB on Potential Phytoplankton Production in UK Coastal Waters | Journal of Plankton Research | Oxford Academic." *OUP Academic*. Oxford University Press, 17 Nov. 2007. Web. 27 July 2017. <<https://academic.oup.com/plankt/article-lookup/doi/10.1093/plankt/fbm090>>.

Killgore and Hoover. "Effects of hypoxia on fish assemblages in a vegetated waterbody" *Aquatic Plant Management* (2001). Web. 8 August 2017

Citations

Piiparinen, Jonna, and Harri Kuosa. "Impact of UVA Radiation on Algae and Bacteria in Baltic Sea Ice." *Aquatic Microbial Ecology* 63.1 (2011): 75-87. *Research Gate*. Web. 28 July 2017. <https://www.researchgate.net/publication/215693277_Impact_of_UVA_radiation_on_algae_and_bactria_in_Baltic_Sea_ice>

Yoshikawa, Takashi, Osamu Murata, Ken Furuya, and Misturu Eguchi. "Short-term Covariation of Dissolved Oxygen and Phytoplankton Photosynthesis in a Coastal Fish Aquaculture Site." *Short-term Covariation of Dissolved Oxygen and Phytoplankton Photosynthesis in a Coastal Fish Aquaculture Site - ScienceDirect*. Elsevier, 5 July 2007. Web. 27 July 2017. http://www.sciencedirect.com/science/article/pii/S0272771407001473?_rdoc=1&_fmt=high&_origin=gateway&_docanchor=&md5=b8429449ccfc9c30159a5f9aeaa92ffb&ccp=y.



Questions?