

UF Research Project – Port Mayaca, FL

- The Effect of Ultrasound Treatment on Numerical Density and Physiological State of Trophic Levels in Lake Okeechobee, Florida
- Lake Okeechobee, lock area of Port Mayaca, FL
- Problems: regular toxic *Microcystis* blooms, eutrophication, bad odor, poor aesthetic
- Tools utilized: Mesocosm structure and Pulsar 4000
- Study timeframe: August 2023 – September 2023
- A study was conducted in Lake Okeechobee with the primary aim to investigate the potential impact of WaterIQ ultrasound on non-target organisms.
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- Contributor Acknowledgment: Dr. Paul Zimba, Research Faculty -- Virginia Commonwealth University zimbapv@vcu.edu

UF Research Project – Port Mayaca, FL

Project Analyses Breakdown

Overall Supervision / Report writeup

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Jessica Moretto, Ph.D.

Mesocosm Assembly

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Forrest Lefler, Ph.D.

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Sampling

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Nutrient Analyses

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Environmental DNA extraction

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Amplicon Analyses

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Fatty Acid Analyses

University of Florida, Analytical Toxicology

Core Laboratory

Jessica Moretto Altarugio, Ph.D.

Jing Hu, M.S.

Isotope Analyses

University of Florida,

Jessica Moretto, Ph.D.

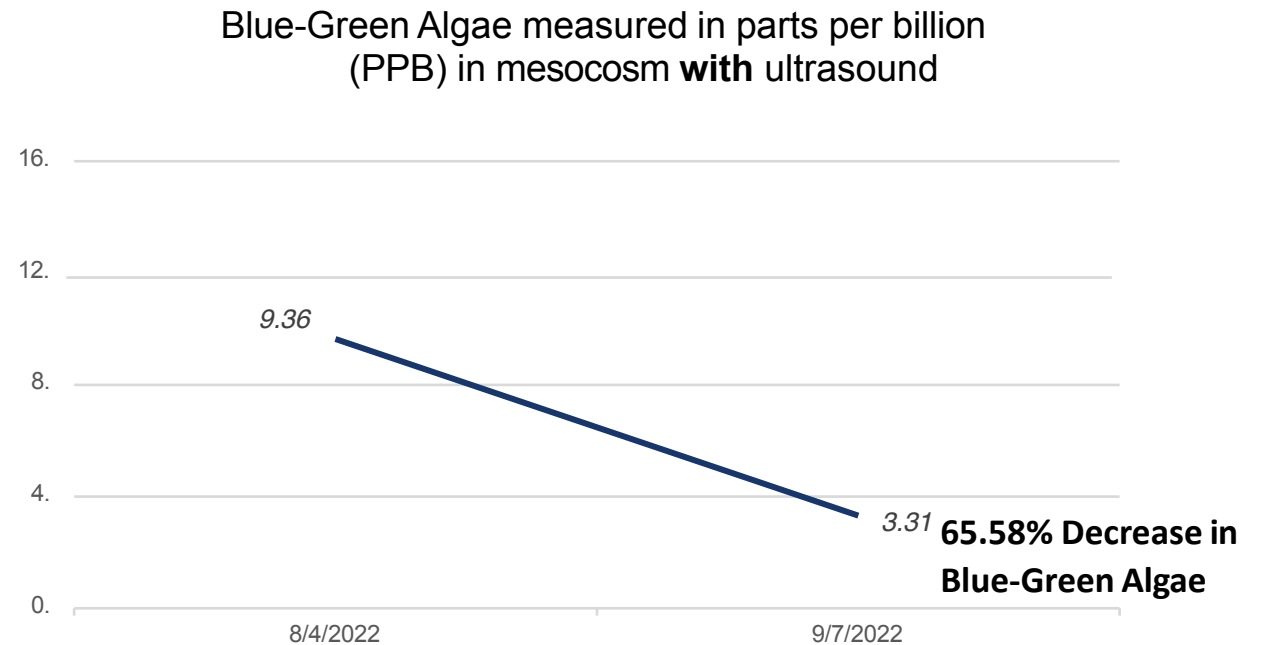
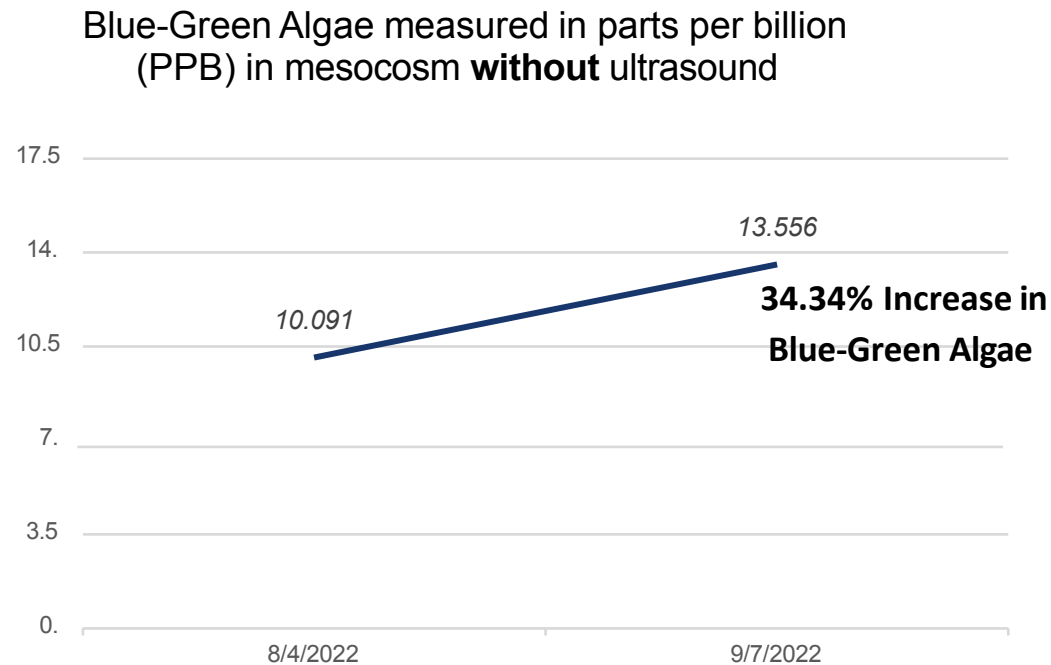
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The Effect of Ultrasound Treatment on Numerical Density and Physiological State of Trophic Levels in Lake Okeechobee, Florida Sponsored by the University of Florida.



UF Research Project – Phycocyanin Response

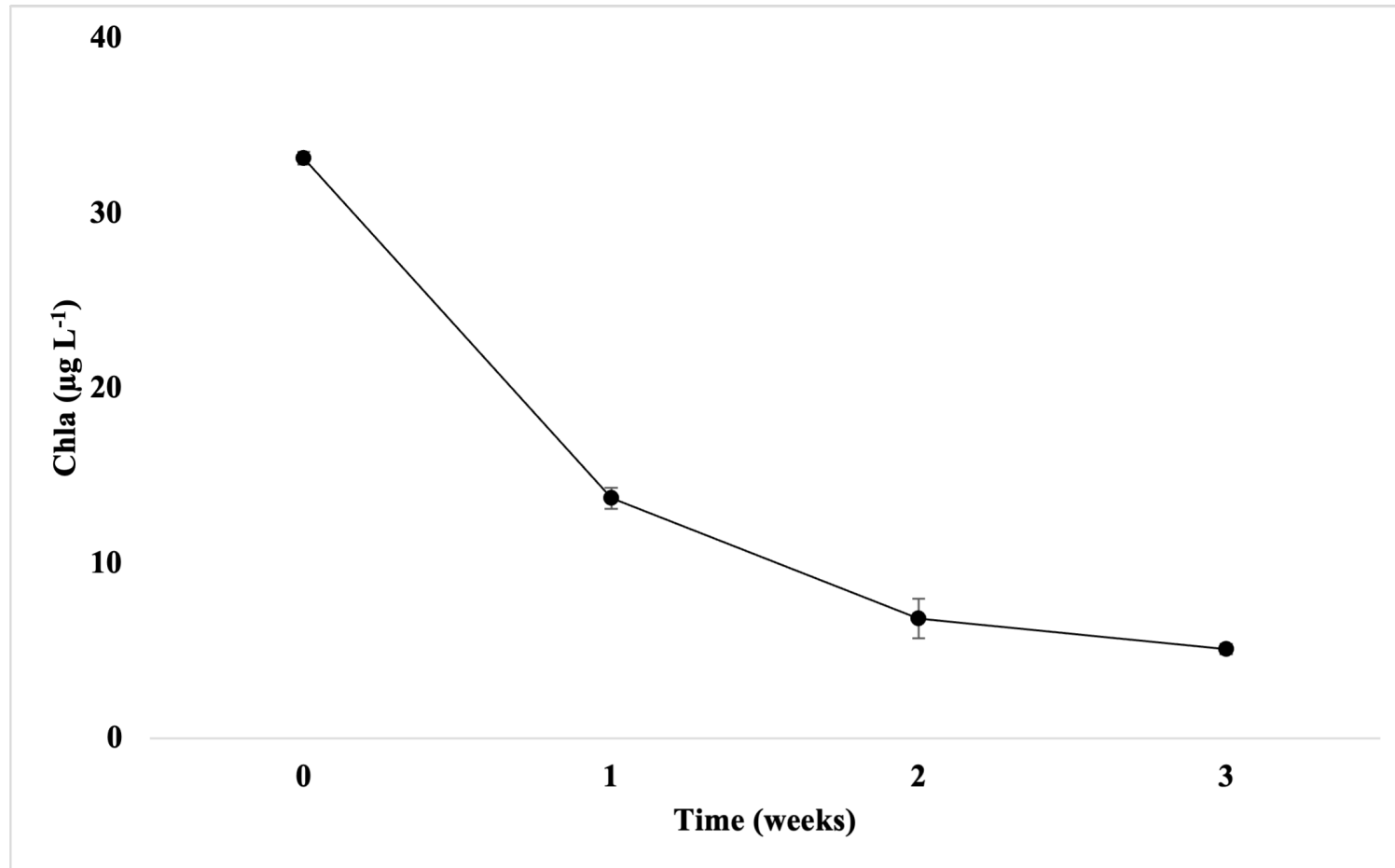
Eureka Digital Blue-Green Algae Monitoring



Highlights: The two mesocosms were side by side. The mesocosm with the ultrasound unit killed 65% of the BGA, while the mesocosm with no ultrasound unit showed an increase in BGA counts by 34% during the test from August 3, 2022 until September 6, 2022 **while not impacting any surrounding zooplankton. More information to be published.**

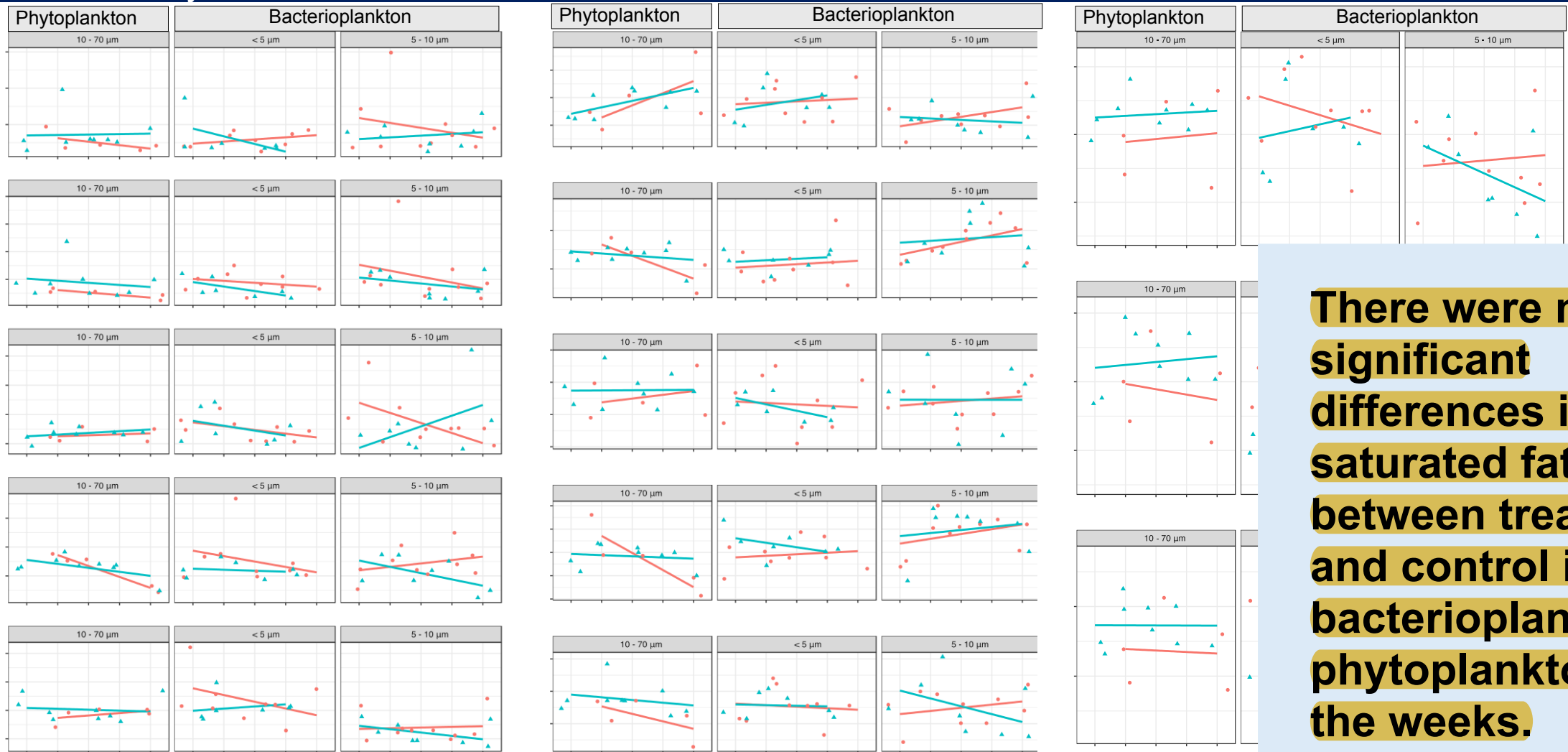
UF Research Project – Phytoplankton Chlorophyll *a* Analysis

Chlorophyll *a* decreased along the weeks in treatment



UF Research Project – Fatty acids Analysis

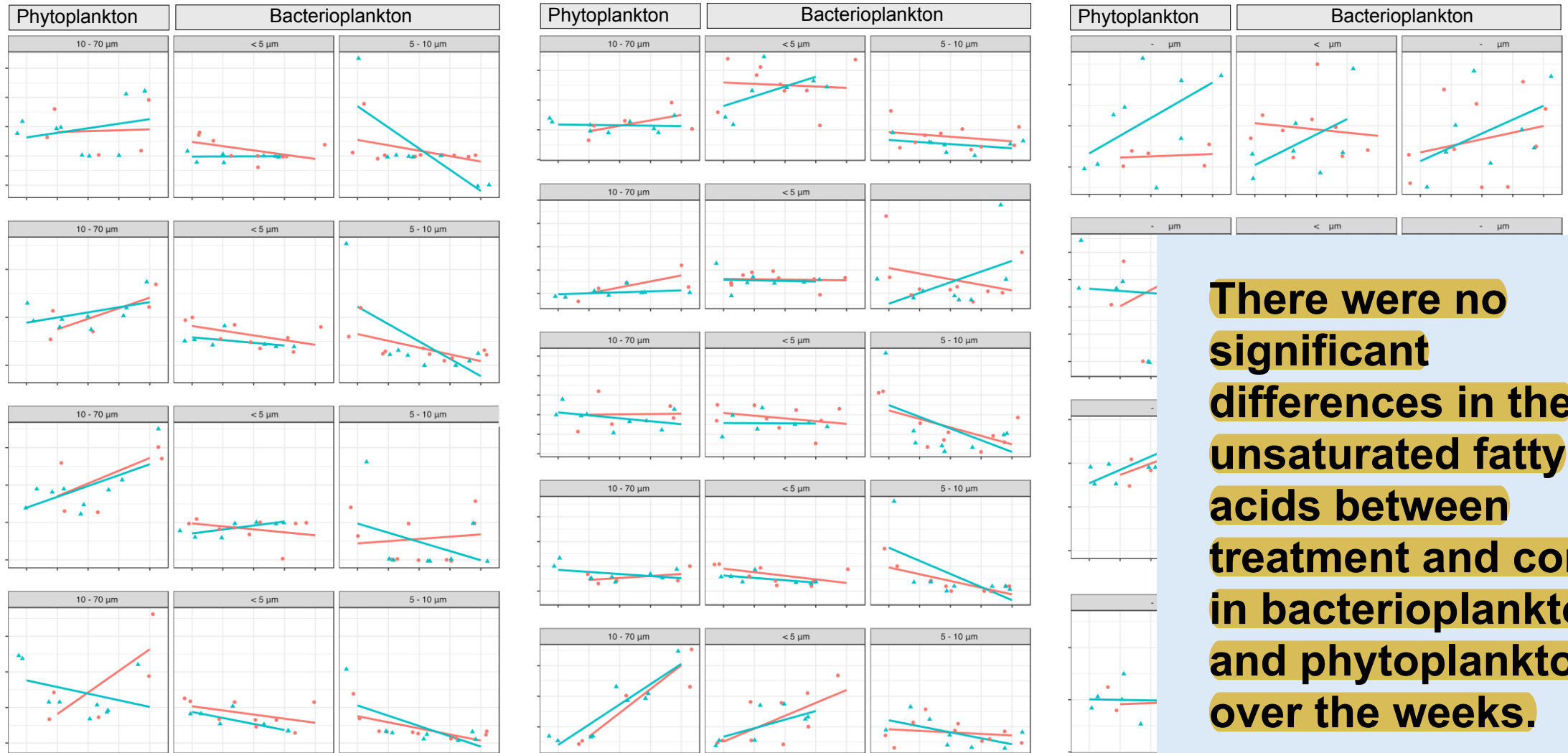
Saturated fatty acids



There were no significant differences in the saturated fatty acids between treatment and control in bacterioplankton and phytoplankton over the weeks.

UF Research Project – Fatty acids Analysis

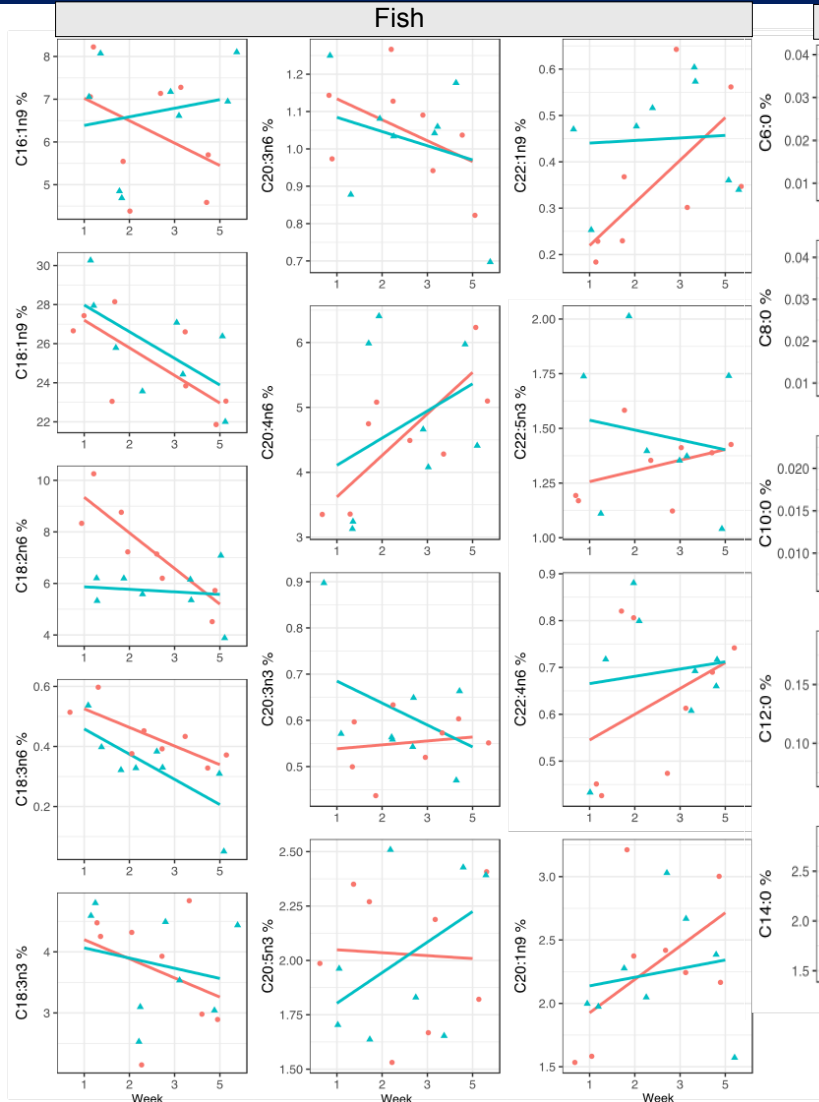
Unsaturated fatty acids



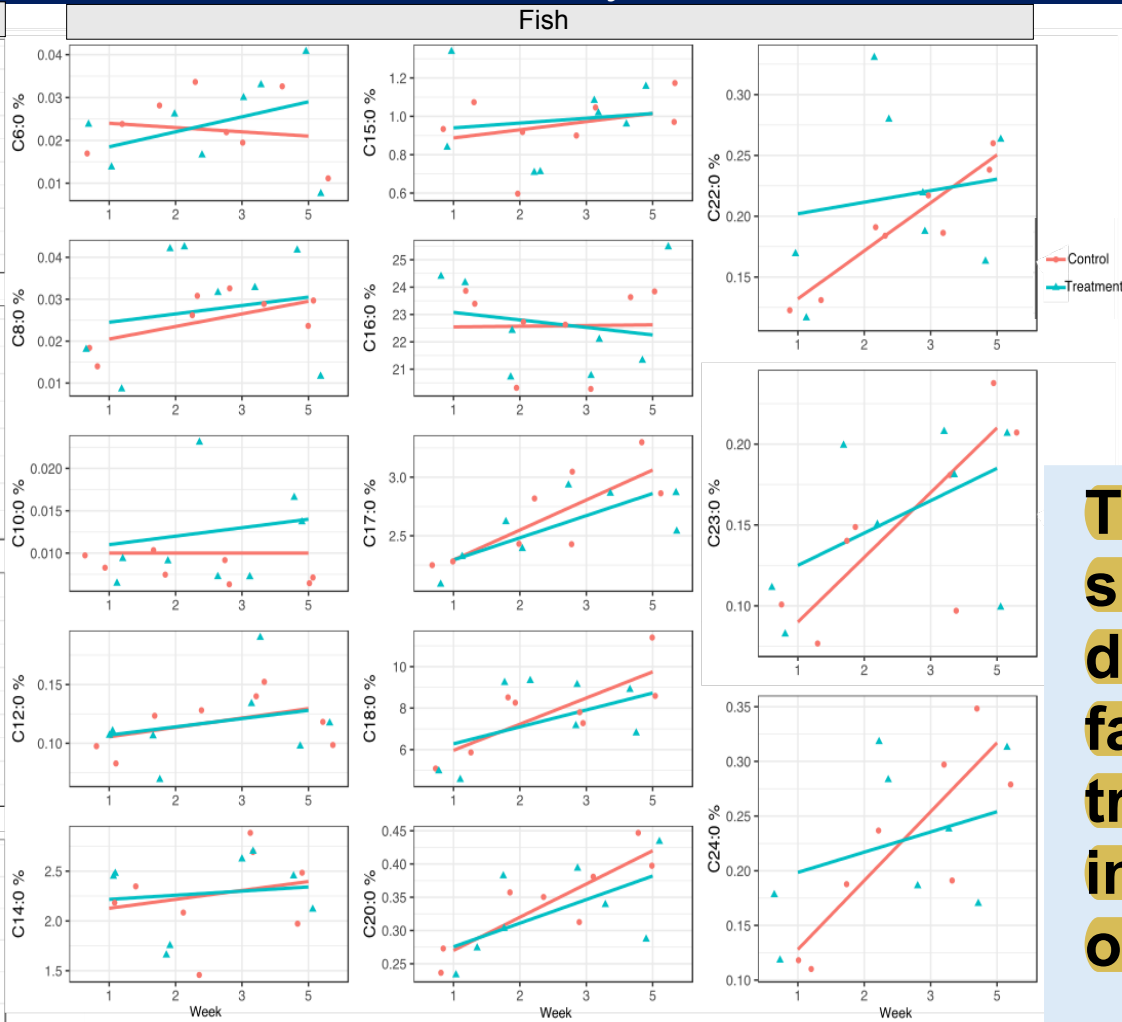
There were no significant differences in the unsaturated fatty acids between treatment and control in bacterioplankton and phytoplankton over the weeks.

UF Research Project – Fish Analysis

Unsaturated fatty acids

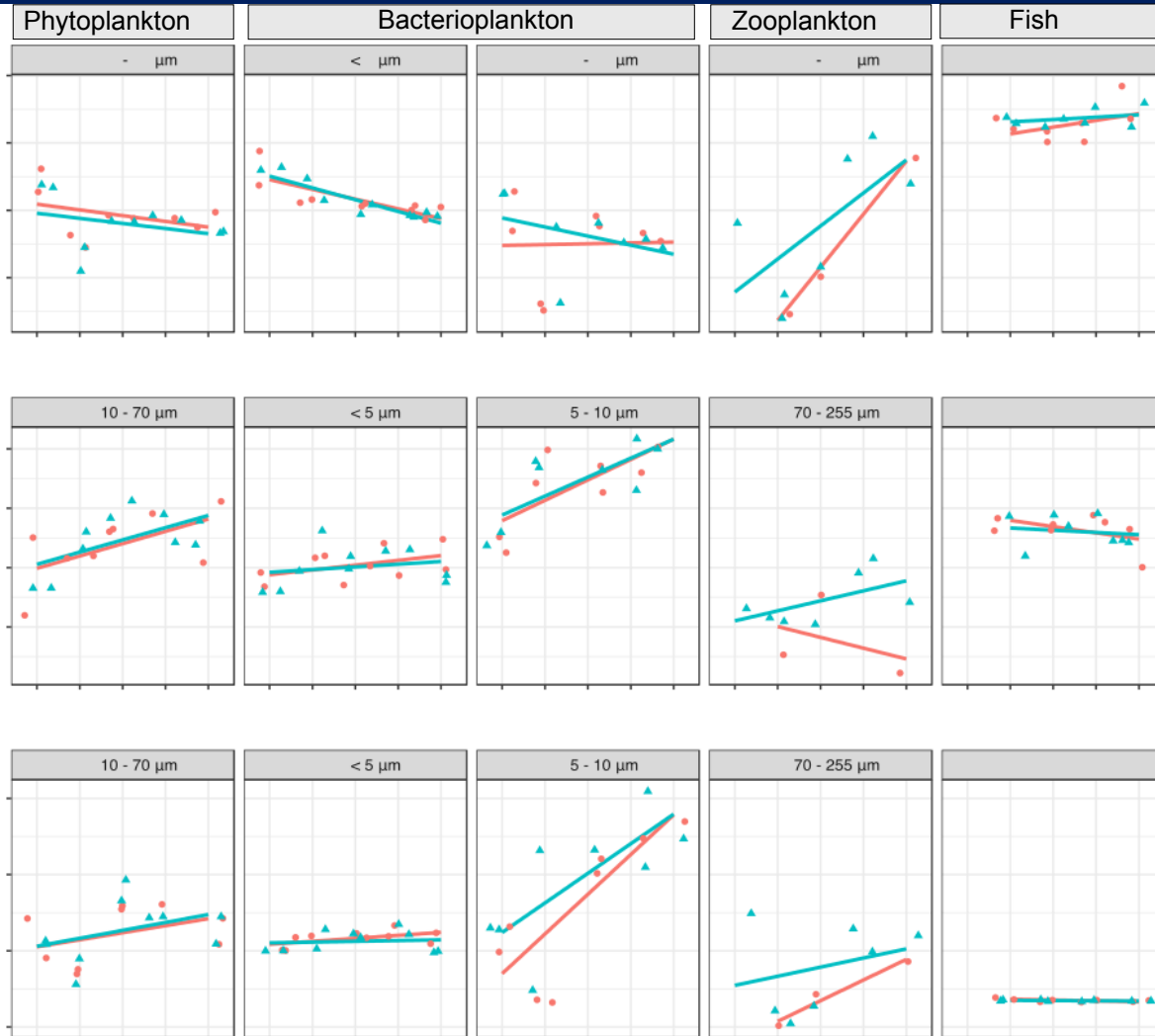


Saturated fatty acids



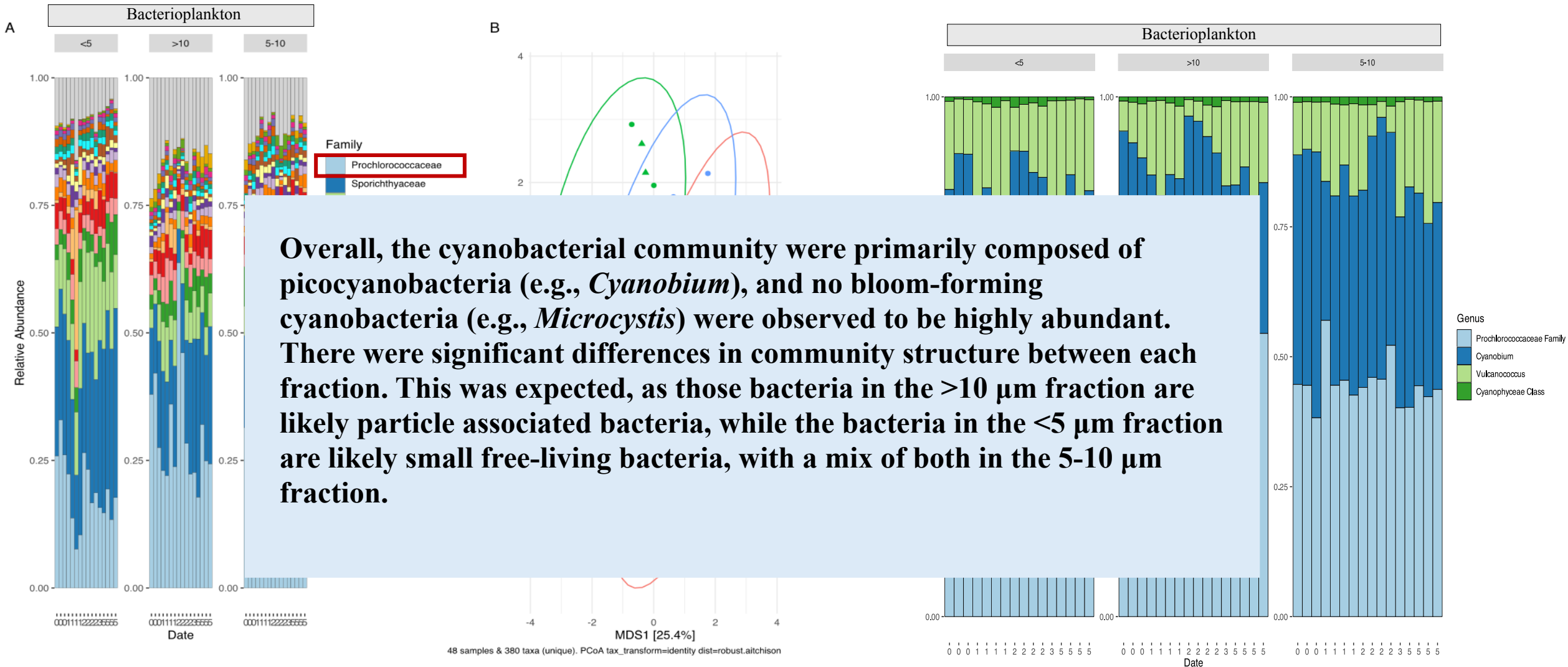
There were no significant differences in the fatty acids between treatment and control in the fish tissues over the weeks.

UF Research Project – Isotopes Analysis



There were no significant differences in the $\delta^{15}\text{N}$, $\delta^{13}\text{C}$, and CN ratio between treatment and control in fish tissues and Zooplankton (70-255 μm) over the weeks. In phytoplankton and bacterioplankton (<5 μm , 5-10 μm , and 10-70) there was a significant difference over the weeks, but there was no significant difference between control and treatment.

UF Research Project – Characterization of bacterial communities



UF Research Project – Conclusions

- Analysis showed that chlorophyll decreased over time in both the treatment and control mesocosms. Additionally, analysis of isotopes and fatty acids in both the water column and fish tissues indicated that time had more of an influence on the fatty acid profile and stable $\delta^{15}\text{N}$ and $\delta^{13}\text{C}$ isotopes ratios than treatment. **Indicating that the ultrasound had no observable effect on non-targets.**
- The composition of the cyanobacterial community structure revealed a consistent pattern throughout the duration of the study. Furthermore, no bloom-forming cyanobacteria, such as *Microcystis*, were also observed. Our investigation into the temporal dynamics revealed significant changes in bacterial, including cyanobacterial, communities through time, indicating a natural shift in community structure. **These data suggest that ultrasound treatment did not have an observable impact on the overall structure of the bacterial community.**