# Determining the Impact of Nutrient Enrichment on Algal Growth

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# INTRODUCTION

- Algae: photosynthetic organisms, primary producers in ecosystems
- Algae use nutrients such as nitrogen and phosphorus to grow
- Nutrient enrichment leads to algal blooms that are harmful to aquatic life. Can overgrow corals
- The purpose of this research is to determine how different species of algae react to varying levels of nutrients in water
- Results can inform resource managers  about problematic nutrient levels

# HYPOTHESES

- An increase in nutrients will cause an increase in biomass for all algal species

- *Valonia fastigata* will have the greatest increase in biomass

Hawaii

Philippines

Marshall Islands


Papua New Guinea

Samoa

American Samoa

Fiji

Tonga

French Polynesia

Australia

New Zealand

# Sites

Pago Pago

Gataivai

Nuuuli

Fagaalu

*Padina boryana*

*Dictyota bartyresiana*

*Valonia fastigiata*

*Turbinaria ornata*

# Methodology-Experimental Design

## Control

## Nutrient

Round 1: 6/18-6/25

0 mg/l $NO_3$ 

26 mg/l $NO_3$ 

Round 2: 6/28-7/5

0 mg/l $NO_3$ 

53mg/l $NO_3$ 

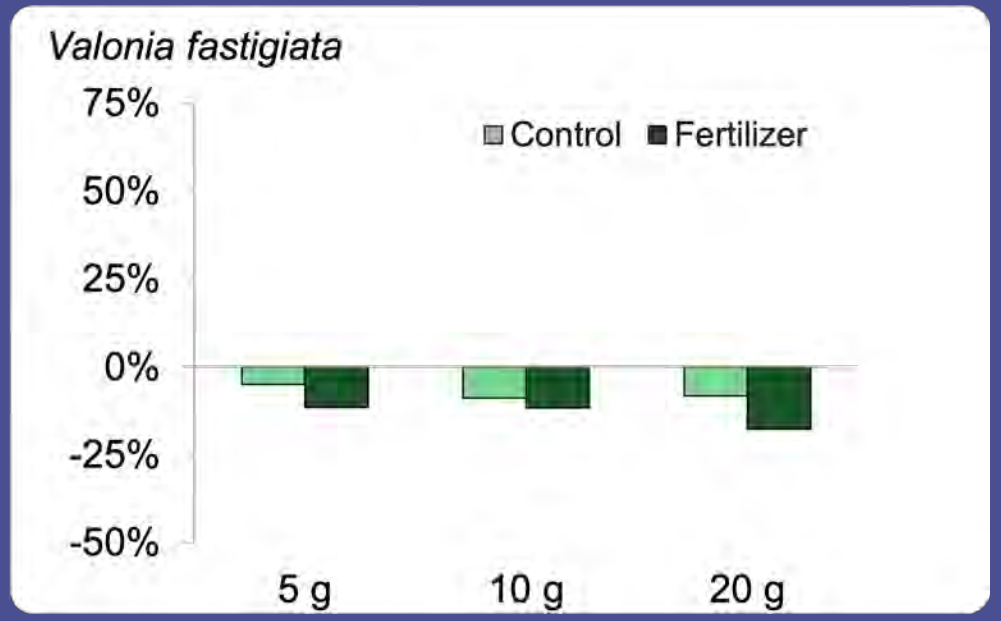
Round 3: 7/9-7/16

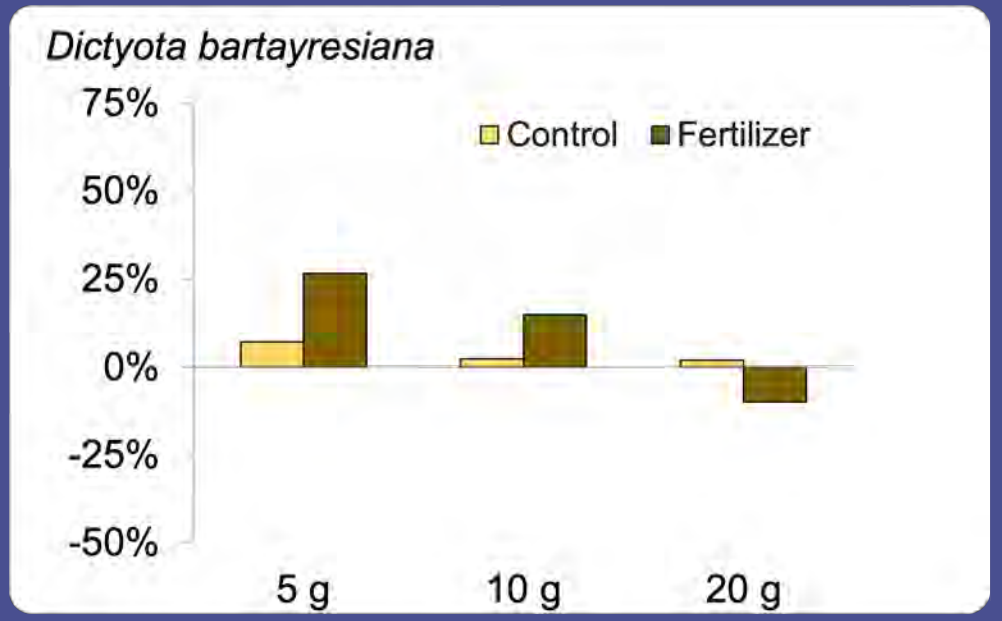
0 mg/l $NO_3$ 

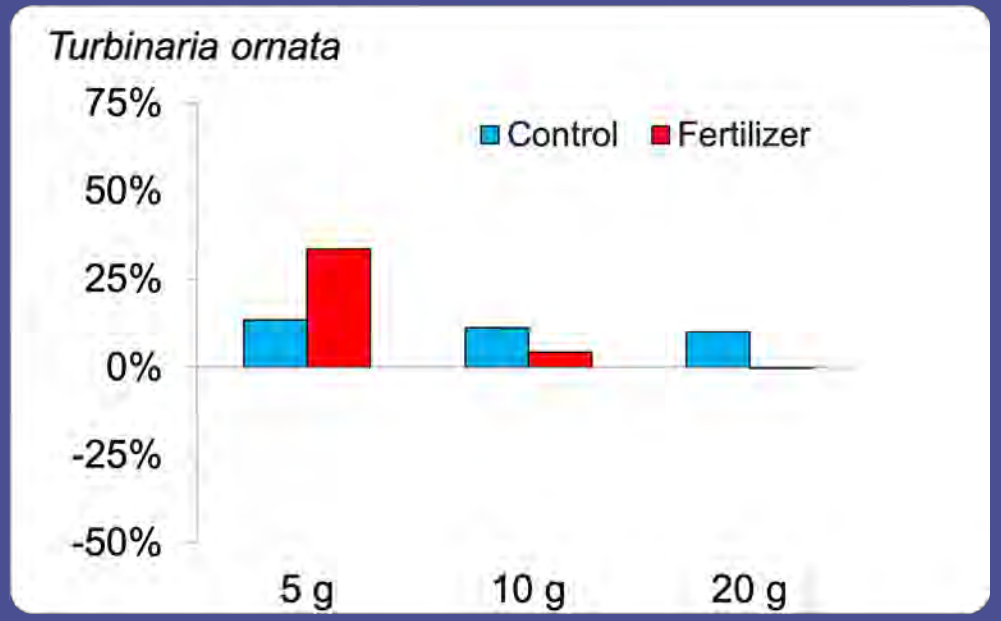
105 mg/l $NO_3$ 

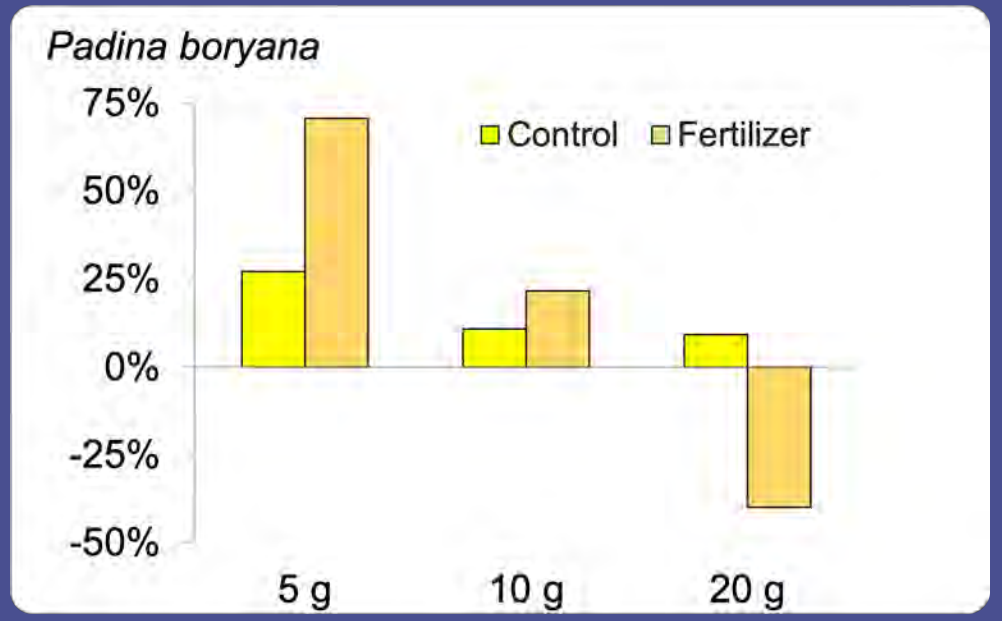

USED
USED

# Results-Growth

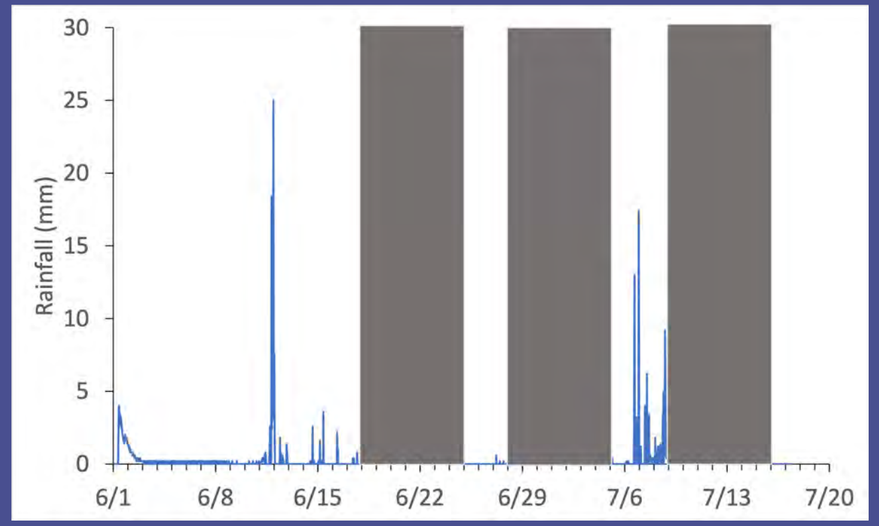


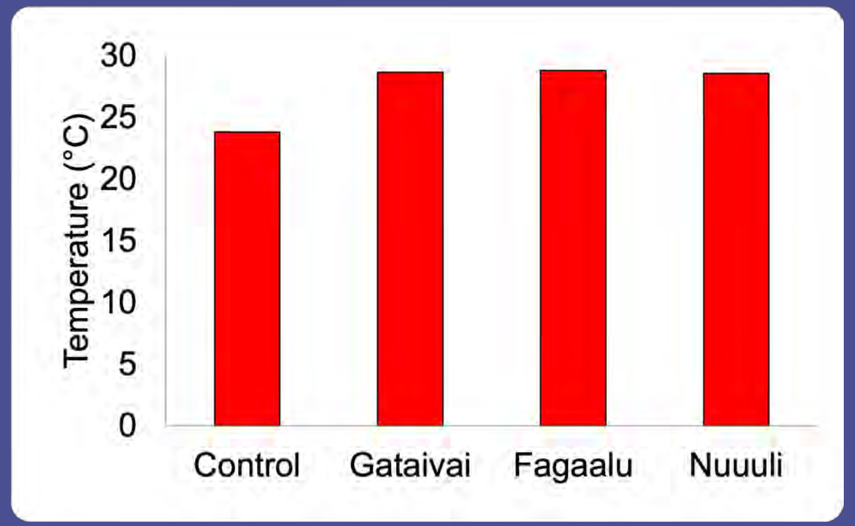



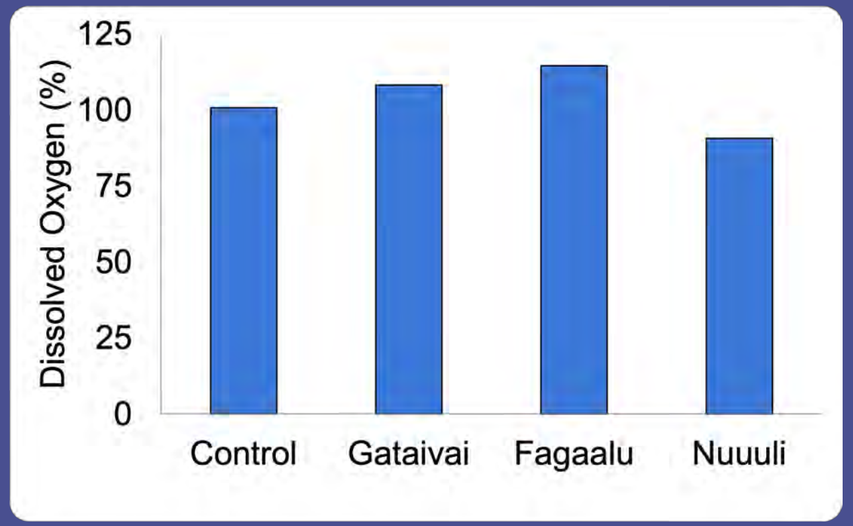
# Results-Environmental



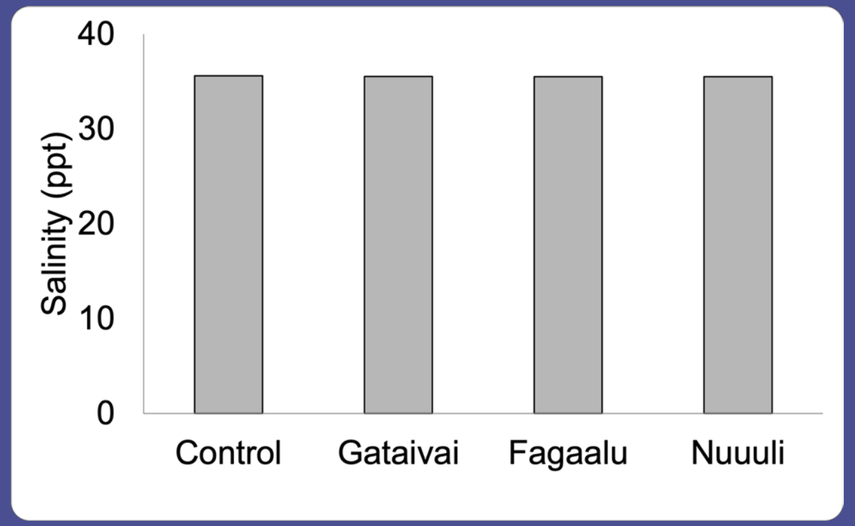

Rainfall




Temperature

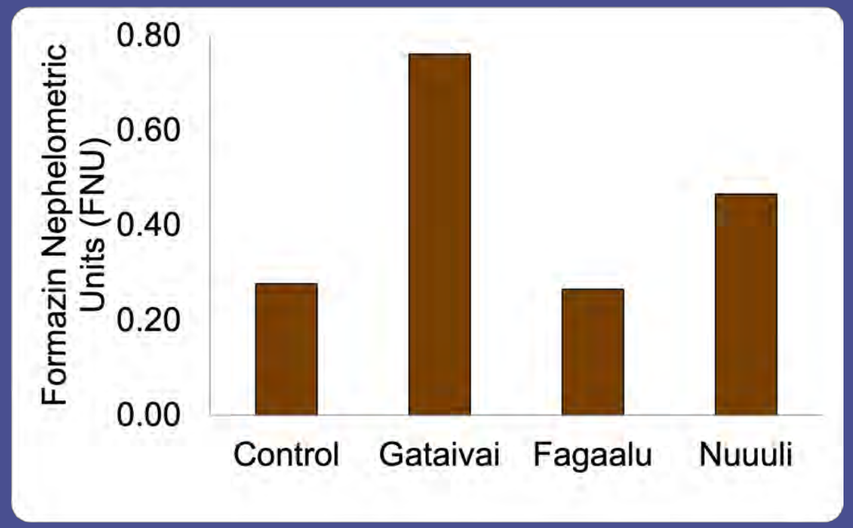



Dissolved Oxygen

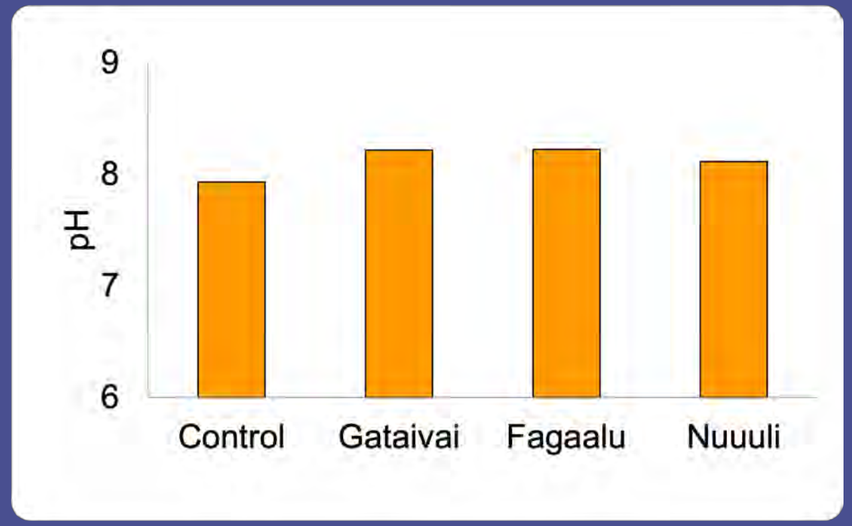



Salinity

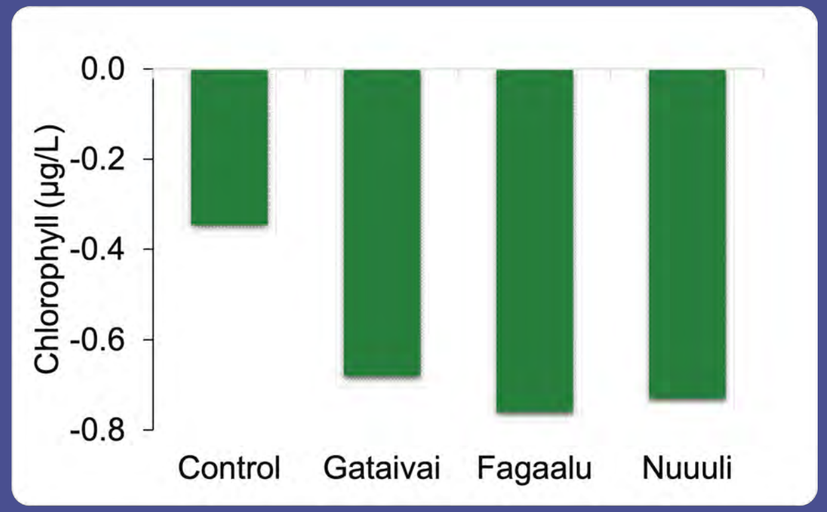
# Results-Environmental




Turbidity

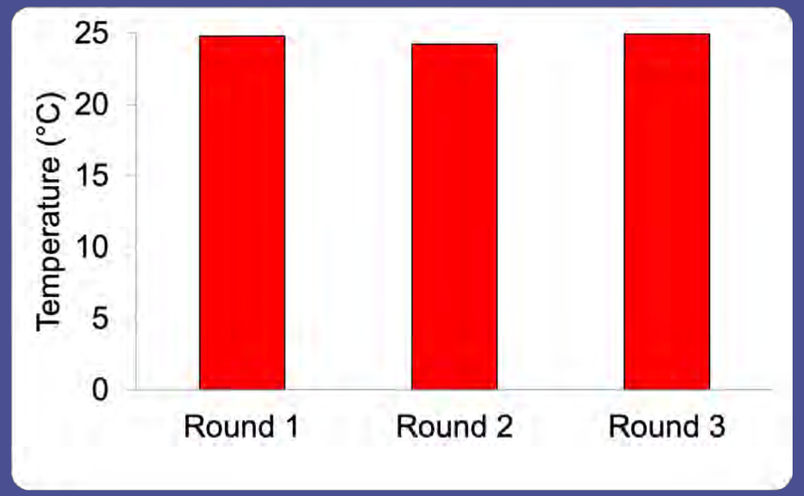



pH

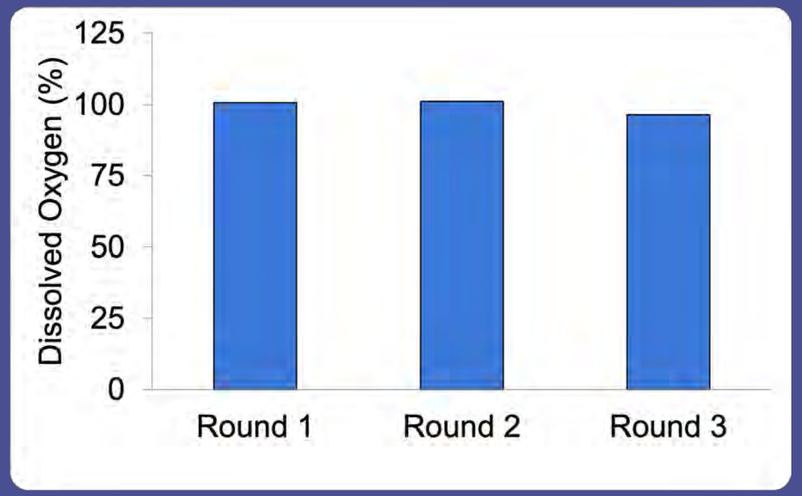



Chlorophyll

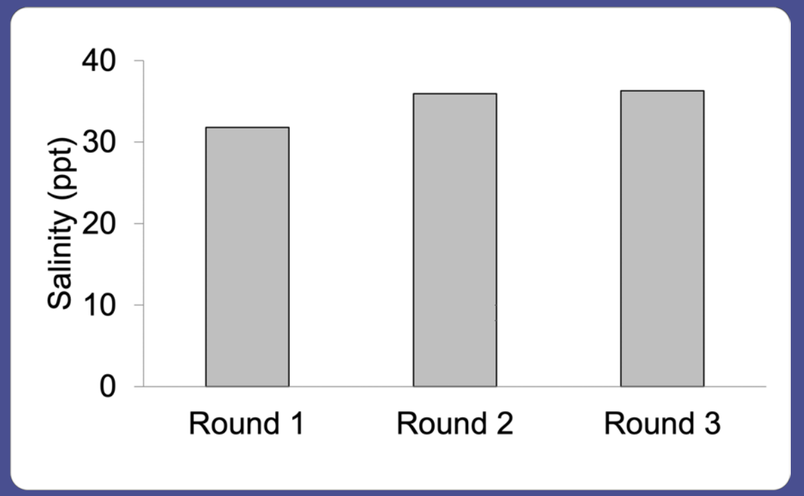
# Results - Nutrient environmental



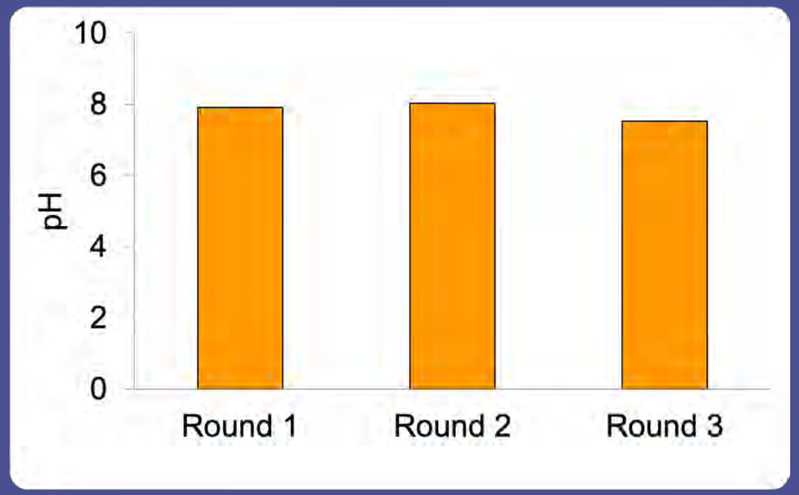

Temperature (°C)



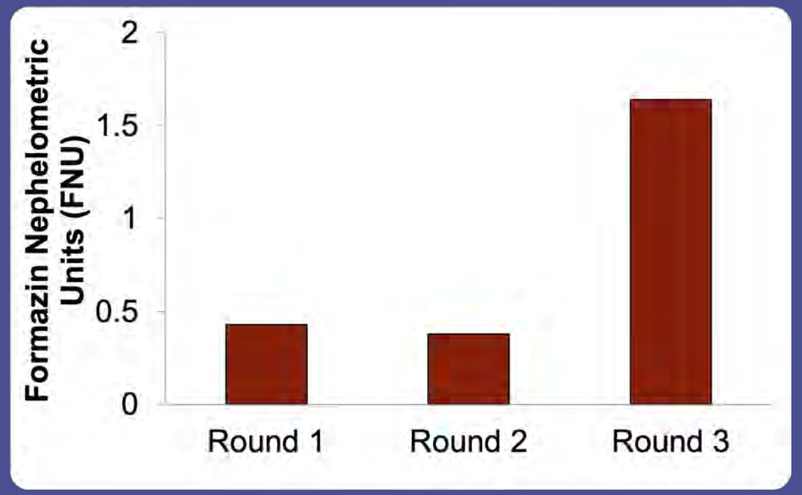

Dissolved Oxygen (%)



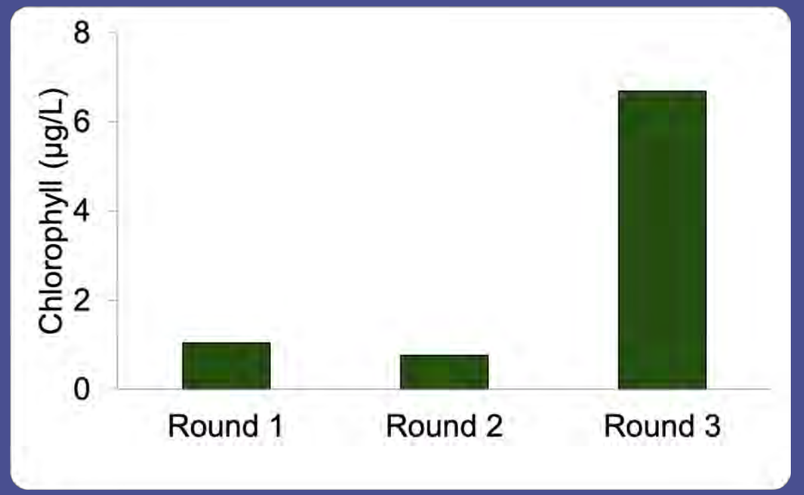

Salinity (ppt)




pH




Turbidity (FNU)




Chlorophyll (µg/L)

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# Conclusions

- Hypothesis was partially correct. Nutrient levels initially increased growth levels
- Excess nutrients however decreased growth levels (E.g., dead zone)
- *Padina boryana* exhibited the highest increase in biomass among species
- *Valonia fastigiata* had a significant decrease in biomass
- *Turbinaria ornata* and *Dictyota bartayresiana* both decreased in biomass as nutrient levels increased
- Future changes/ modifications

- This research showed that some species of algae are more sensitive to fertilizer and could serve as sentinel species to indicate high nutrients
- Understanding the ecological impact of high nutrient levels is crucial to prevent algal overgrowth and protect the resilience and biodiversity of coral reef ecosystems

# Acknowledgements


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# Questions?