Macro-algae Diversity of the Rocky Intertidal Zone in Juneau, Alaska

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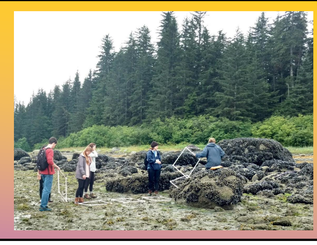

Introduction

- Diversity reveals how specific species react to natural and artificial disturbances and helps us understand community structure.[6]
- Species in the intertidal zone must adapt to fluctuating conditions[2]
- Macro-algae are benthic, photosynthetic organisms that live on rock or coral[5]
- Distribution of flora, such as macro-algae, depends on physical stress, predation, climate change, and nutrient availability[1]

Intertidal Zonation:
High tide (brown algae)
Mid tide (green algae)
Low tide (red algae)

Credit: ShoreZone

Research Question

Why does the diversity of macro-algae vary in relation to height along the rocky intertidal zone?

Hypothesis

The diversity of macro-algae increases in relation to height on the rocky intertidal zone due to competition for resources and space.

References

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Figure 1

Figure 2

Figure 3

Results

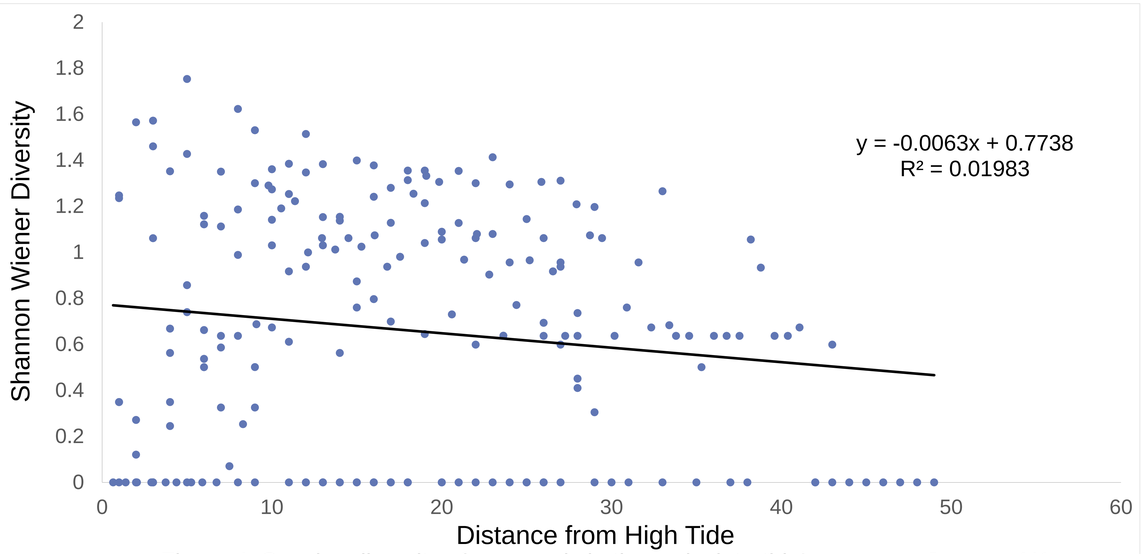

Figure 4: Species diversity of seaweeds in the rocky intertidal zone near Juneau, AK. Data were collected in July 2017. There was a significant negative correlation between distance from the high tide and species diversity.

Macro-algae diversity is significantly correlated to the distance from high tide in the rocky intertidal zone ($F_{1,203}$=4.11, p=0.044, R^2= 0.02, Figure 4). For every 1m increase in the distance from high tide, the species diversity decreases by 0.0063.

Acknowledgements

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Conclusion

As the distance from the high tide in the rocky intertidal zone increased, macro-algae diversity decreased. The genus *Fucus* comprised the majority of macro-algae across all locations observed. When *Fucus* covered more than 50% of the PVC site, there was zero to low abundance other species. Fucoids have higher physiological tolerance limits than other macro-algae species, and are able to endure low zone submersion conditions.[6]

The decrease in flora diversity could also be attributed to nutrient availability and competition with other species.[4] Herbivores, such as *Littorina sitkana*, consume juvenile macro-algae and primarily occupy the middle to upper rocky intertidal. Macro-algae located farther from the edge of the tide are more susceptible to being consumed by herbivores, resulting in lower diversity.[6] Understanding rocky intertidal diversity community dynamics allows us to make predictions about ecological responses to environmental disturbances.[4]

Methods

- Data collected at Sunshine Cove and Bridget Cove (Figure 2) near Juneau, AK at either high low or low low tide
- We used transect tape from the high tide line to the water's edge
- PVC plots of 66 cm^2 were used to measure sites along the transect tape
  - 7 total transects
- Determined percent coverage of each species in each plot which was used to calculate Shannon Wiener diversity
- The following species were observed during our study:
  - Fucus (Figure 1)
  - Pretty Polly
  - Sea Cauliflower
  - Sea Lettuce
  - Gracious Green Hair
  - Brown Algae
  - Golden Seahair