



Analysis of Biochemical Oxygen Demand and Organic Matter after Stream Restoration

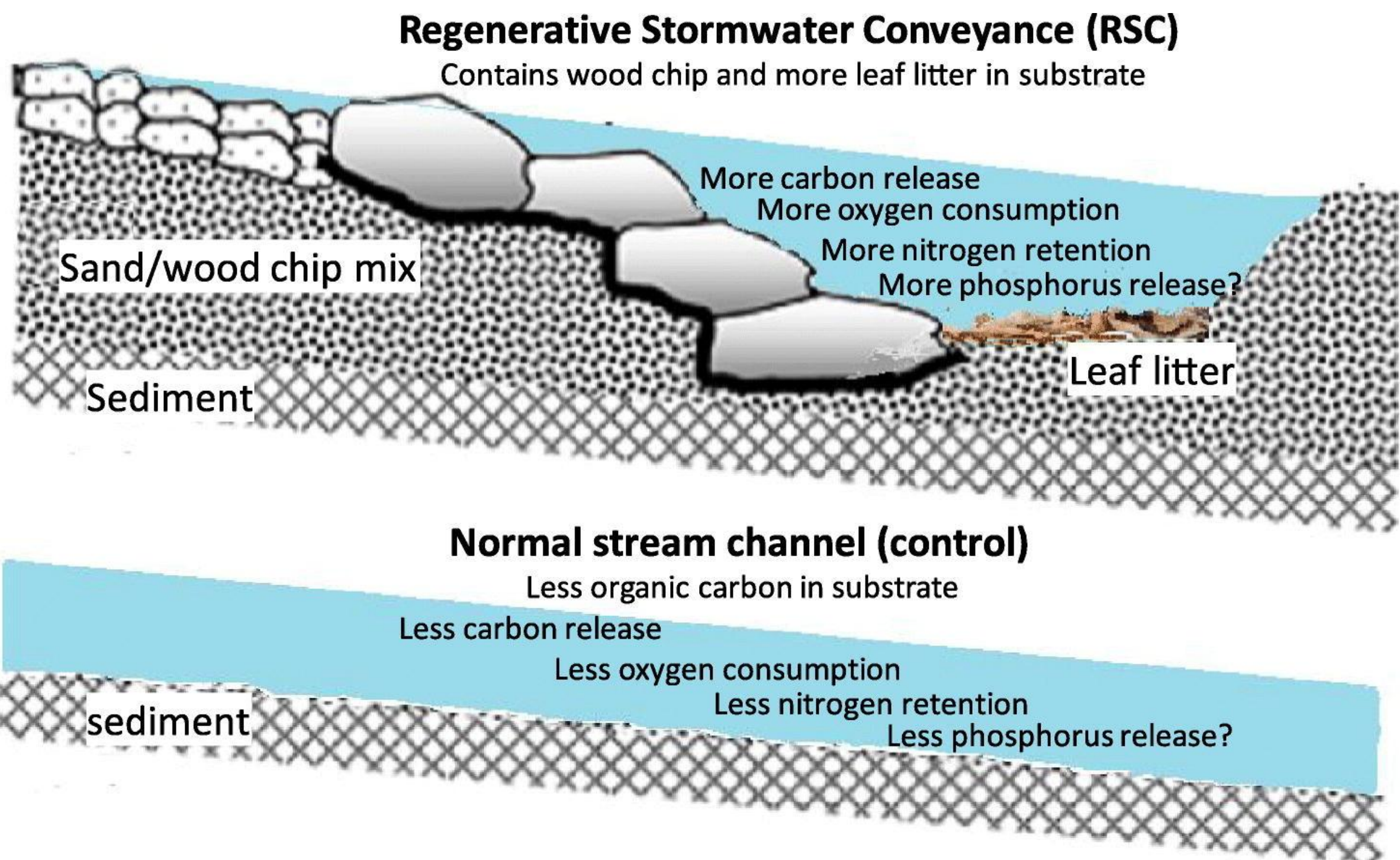


Nicholas Salanitri – Geol 394

Advised by Dr. Sujay Kaushal

Introduction

- Regenerative stormwater conveyance (RSC) was implemented along part of Campus Creek (CC1-5) during its restoration in 2019



(Duan et al. 2019)

- Biochemical oxygen demand (BOD) effectively quantifies dissolved oxygen (DO) consumption by microbes as they decompose organic matter
- It is unknown how RSC affects BOD and organic matter quality

Hypotheses

- Null hypothesis: No trend in BOD or organic matter quality because RSC does not affect them.
- Alternative 1: Trend in BOD but not organic matter quality
- Alternative 2: Trend in organic matter quality but not BOD
- Alternative 3: Trends in both BOD and organic matter quality because RSC affects multiple parameters

Methodology

Sample 12 Campus Creek sites and 3 routine monitoring sites

Conduct a 5-day BOD experiment

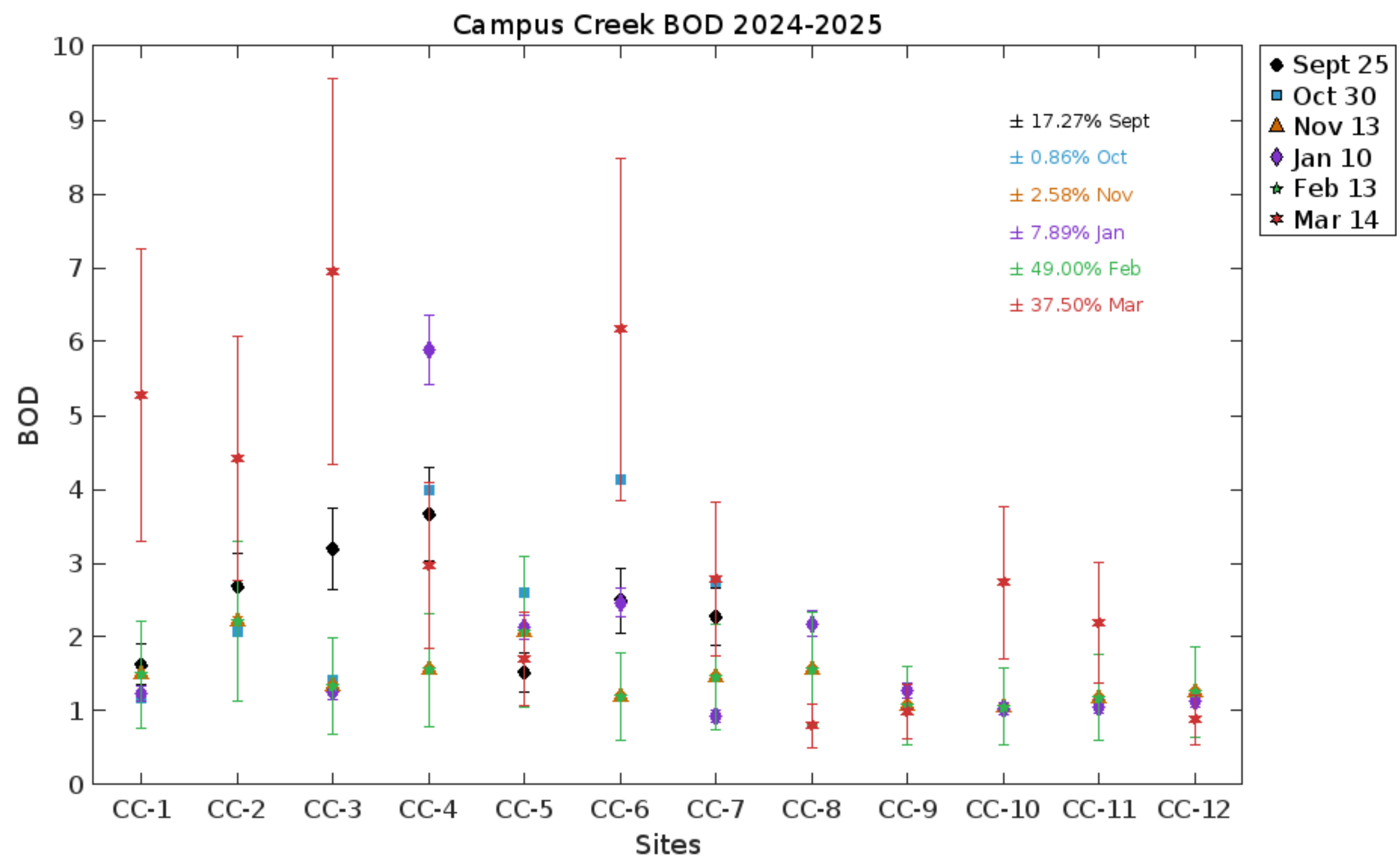
Characterize the organic matter quality using fluorescence indices

Repeat once a month to track temporal changes

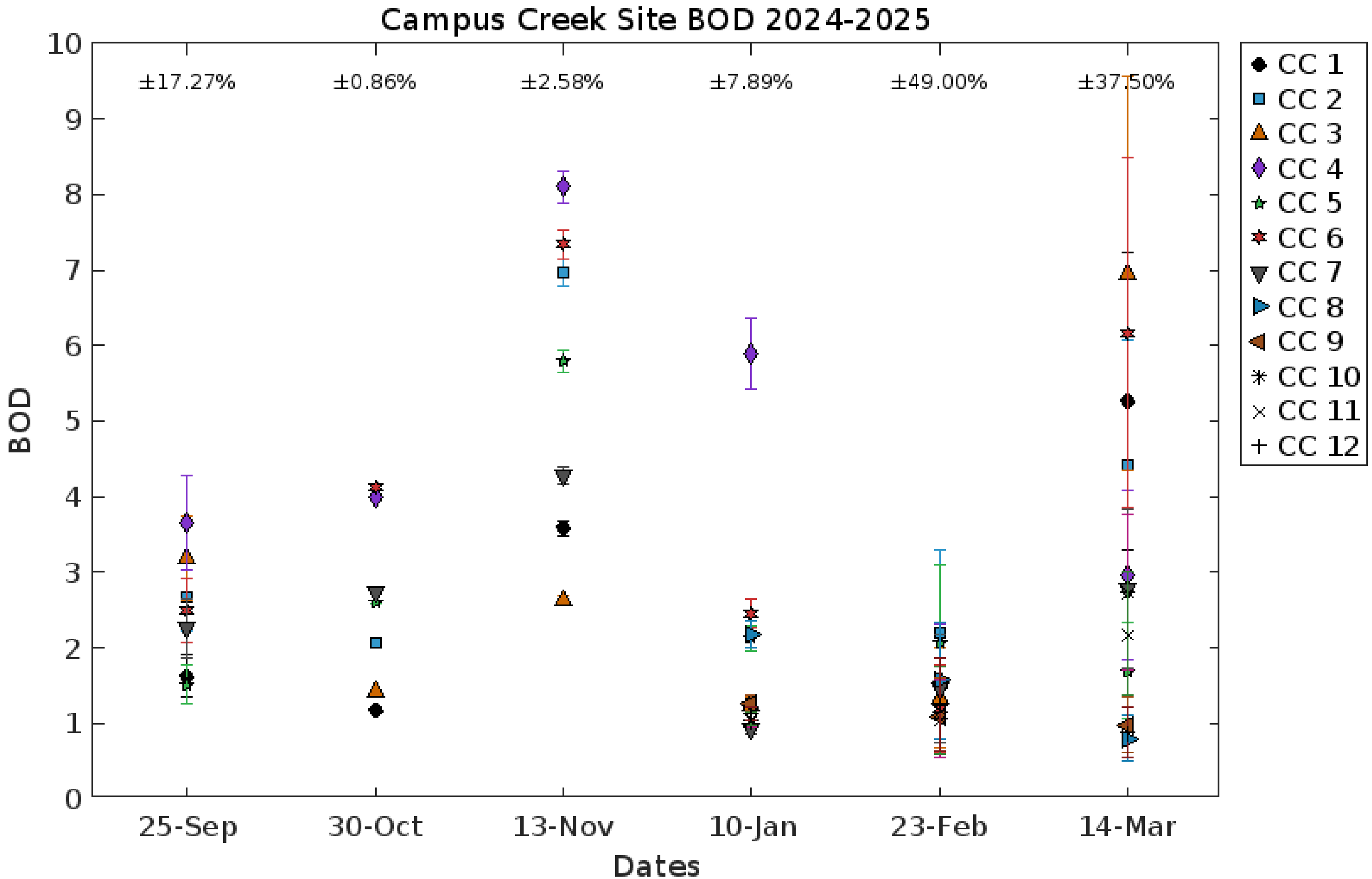
Conduct statistical analyses to determine correlations

Results

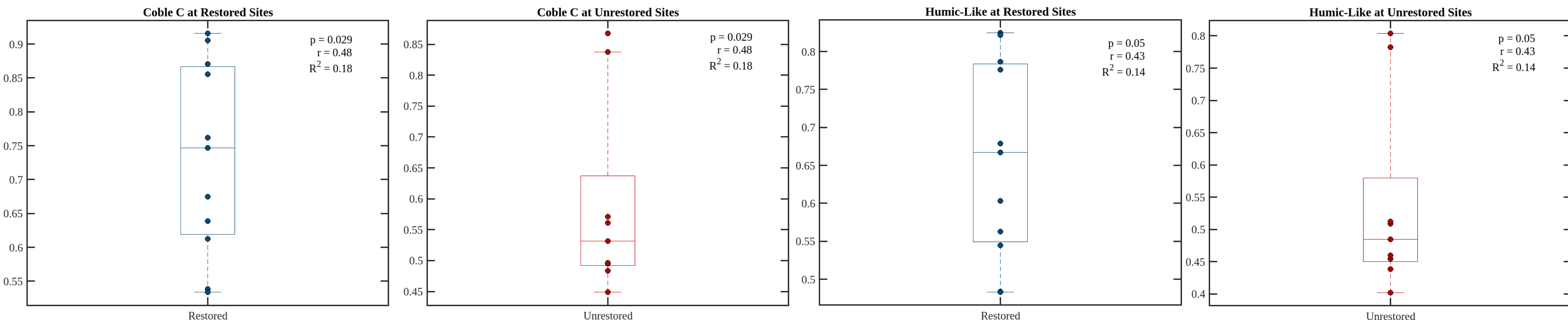
Longitudinal Changes in BOD



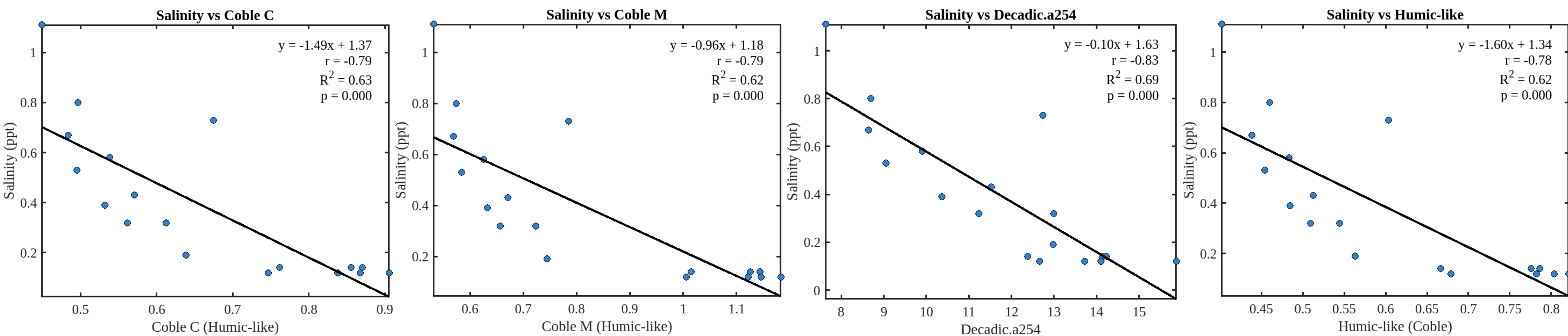
Seasonal Variations in BOD



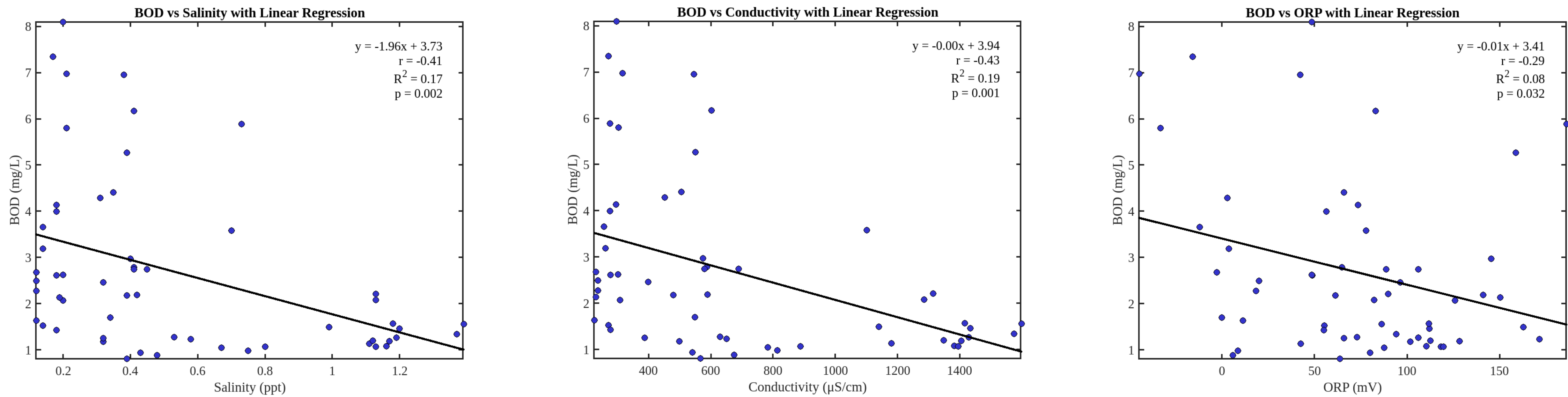
Box Plots of Fluorescence Indices at RSC sites and non-RSC sites



Salinity vs Fluorescence Indices



BOD vs Salinity, Conductivity, and Oxidation-Reduction Potential



Discussion of Results

- BOD was impacted by multiple parameters:
 - Conductivity
 - Salinity
 - Oxidation-Reduction Potential
- RSC restoration impacted multiple fluorescence indices:
 - Coble C
 - Humic-like
 - Decadic.a254
- BOD and organic matter quality were not related, indicating that the concentration and type of organic matter present do not impact BOD levels in Campus Creek
- Salinity impacted organic matter quality, suggesting salt affects microbial processes
- Salinity was correlated with BOD, suggesting that salinity may be a predictor of BOD and organic matter quality, especially in RSC pools with higher BOD and organic matter concentrations

Conclusions

- RSC restoration impacted the concentration and type of organic matter in Campus Creek
- RSC restoration also impacted BOD levels, altering the amount of DO available for organisms
- The results of this study allow me to reject my null hypothesis and accept my third alternative hypothesis that RSCs affect both BOD and organic matter quality in Campus Creek

References

Duan, S., Mayer, P.M., Kaushal, S.S., Wessel, B.M. and Johnson, T., (2019). Regenerative stormwater conveyance (RSC) for reducing nutrients in urban stormwater runoff depends upon carbon quantity and quality. Science of the Total Environment, 652, pp.134-146

Acknowledgments

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