

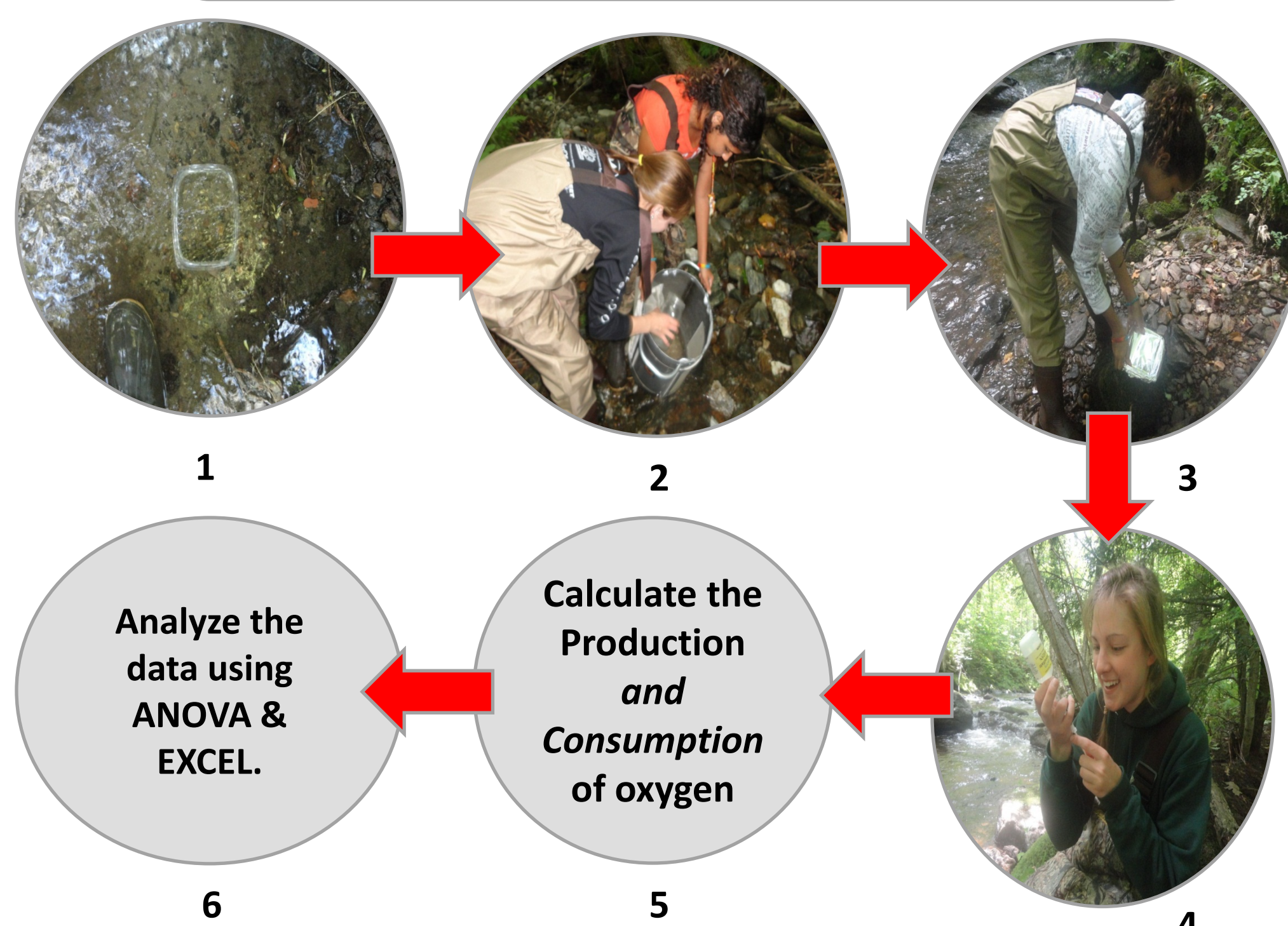
Abstract

Community metabolism can be measured using oxygen production and consumption. Oxygen is produced through photosynthesis, mostly during the day, and is consumed during respiration. High dissolved oxygen increases the capability of the stream to serve as an acceptable ecosystem to support aquatic life and allows diverse macro invertebrates to settle. Our objective was to use oxygen production and consumption to determine the effects of sediment deposition on community metabolism in streams. Plastic trays filled with natural stream sediment were inserted in three urban and three forested streams for two weeks in riffles with canopy cover. Each week, sand was poured in the experimental trays. After two weeks, the trays were sealed for one hour using clear or darkened lids. Dissolved oxygen readings were taken in bright and dark trays to infer photosynthesis and respiration. Sand treatment significantly reduced productivity. Sand treatment did not affect respiration. Contrary to our hypothesis, grazer abundance increased with the addition of sand. These results suggest that fine particle deposition in streams may reduce primary productivity.

Introduction

- Dissolved oxygen is essential for macro invertebrates for respiration.
- Oxygen production is a measure of primary productivity in flowing water systems, is produced during photosynthesis and consumed during respiration.
- When water has high levels of dissolved oxygen its considered to be an acceptable habitat, capable of supporting lots of different kinds of aquatic organism.
- Sediment deposition, canopy cover and water temperatures are factors that have a direct effect on the levels of oxygen in the water.
- Dissolved Oxygen concentration (DO) changes are used to estimate community primary productivity, gross productivity, and community respiration.
- Respiration is defined to be how much oxygen is being consumed by the biota in the stream. Productivity is defined as how much oxygen is produced. If the stream benthic community consumes more oxygen than it produces then it can sustain only animals resistant to low levels of oxygen.
- Macroinvertebrates classified in the functional feeding group as grazers/scrapers are those feed on attached periphyton located on submerged underwater surfaces.

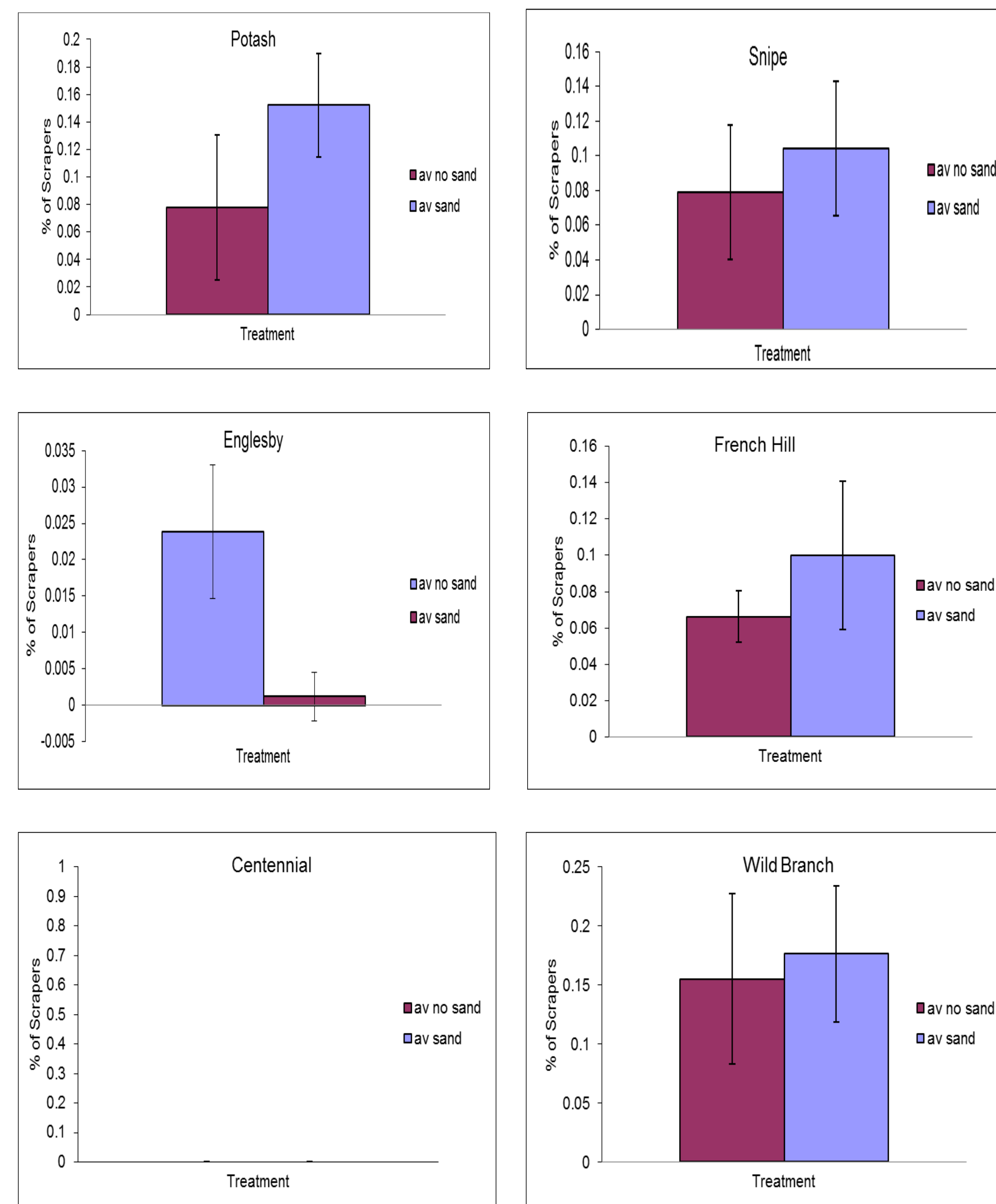
Methodology



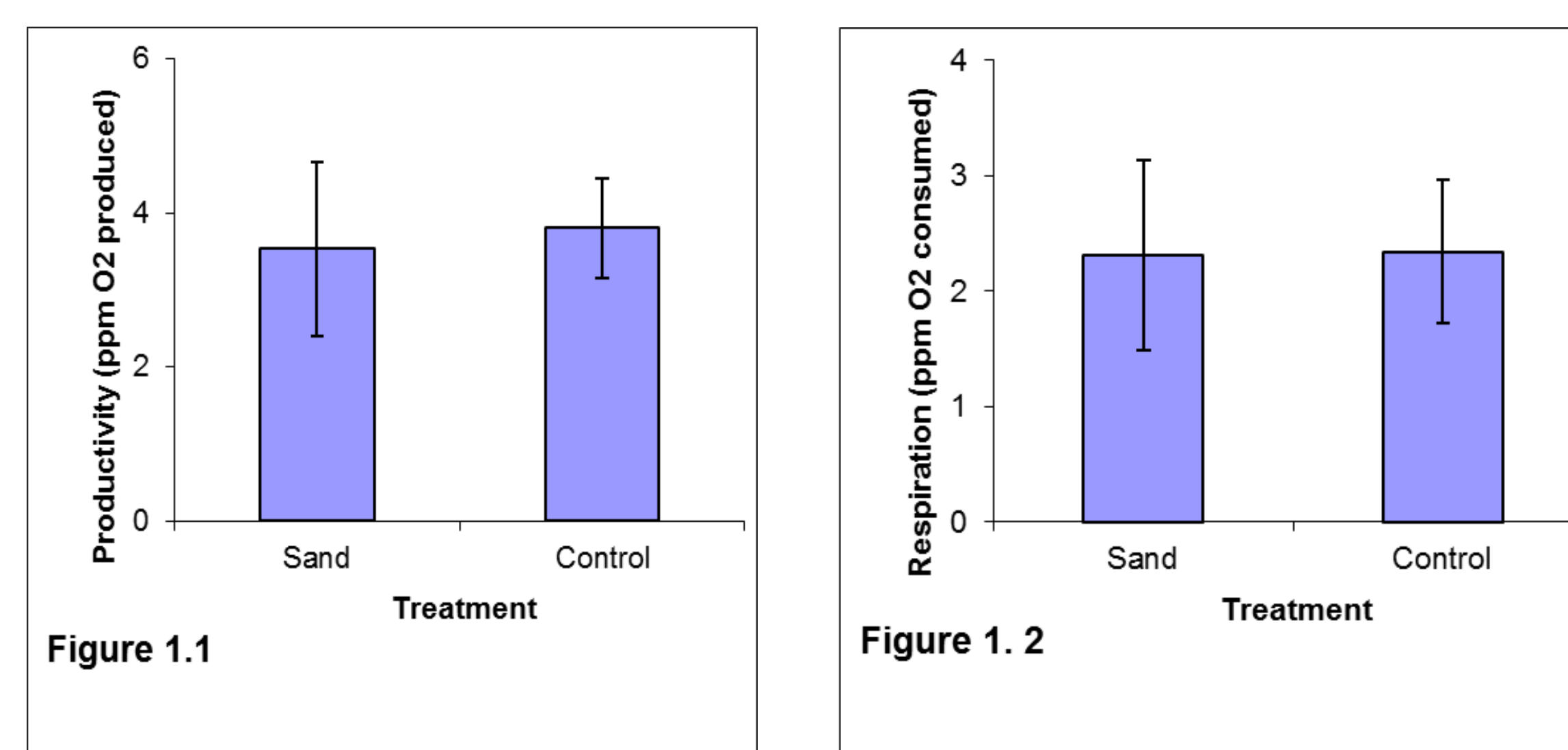
- Plastic Containers with natural substrate are going to be inserted into the forested and urban streams.
- For a 2 week period, each week sand was added to the experimental containers in each streams.
- The 2nd week, all the containers are pulled out of the stream to cover randomly assigned trays with foil and then they are inserted back for 1 hour.
- Passed the hour the D.O readings are taken and written down in a sheet.
- Calculate the Production and Consumption of Oxygen.
- The data is analyzed using excel & Anova. First we pair respiration and consumption and approximate those who don't have data with the nearest replicate, then, a paired Sample T-Test is made to compare the samples with the controls. The graphics are made in Excel.

Results

Grazers with Sand/No Sand Exposure



Average Community Productivity with Sand Exposure



Future Works

The future idea is re-do this experiment and compare and contrast the data obtained between them to see if the relationship between productivity and sediments stays the same or changes.

Discussion and Conclusion

- No significant relationship between community productivity and Respiration with or without treatment.
- A relationship between grazer abundance and fine sediment was found.
- Scrapers were more abundant in forested streams that were treated with sediment.
- Average productivity in streams didn't show any change while affected by sedimentation.
- Dissolved oxygen readings in urban streams were lower than those in forested streams.
- Individual oxygen readings in forested streams showed a significant decrease while treated with sand.
- Future studies with the objective of explaining if dissolve oxygen readings in streams are affected by saturation and temperature variables while treated with sand would be valuable

References

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