

INTRODUCTION

We compared the taxonomic richness of benthic macroinvertebrates (BMI) at two areas on Copeland Creek. We proposed that there would be greater taxonomic richness in the upstream section located at the Fairfield Osborn Preserve than in the downstream section that runs through the main SSU campus, due to the higher elevation and subsequent cooler temperatures at the Preserve. The SSU site also has relatively more human impacts, as it is located on a university campus, whereas the Osborn Preserve is closed to the general public, and only used for educational activities. Our results shed light on the relative health of the aquatic community at each site, based on the pollution tolerance of the species sampled.

MATERIALS & METHODS

In order to assess taxonomic richness of benthic macroinvertebrates (BMI) in Copeland Creek, two survey locations were compared: the main campus of Sonoma State University (SSU), and the Fairfield Osborn Preserve (FOP), approximately eight kilometers upstream. At each location, we selected our survey site to control for a similar canopy density and stream width. We also measured elevation, air temperature, substrate type, and stream contour for each site.

We collected samples from the creek by overturning rocks and skimming the topmost layer of substrate with fine nets. Surveys were conducted for one hour at each site. All BMI samples were extracted and preserved in alcohol for later identification. In the biology lab on campus, we used dissecting scopes and dichotomous keys to group the BMI samples into taxonomic orders or families. We then analyzed these taxonomic groups and their pollution tolerance values, and graphed our results using Microsoft Excel.



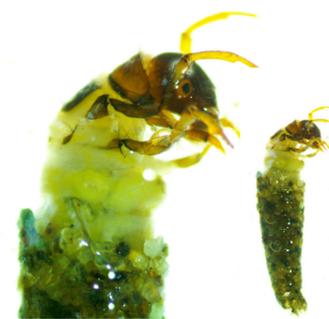
Lutvija and Ian field sampling at FOP



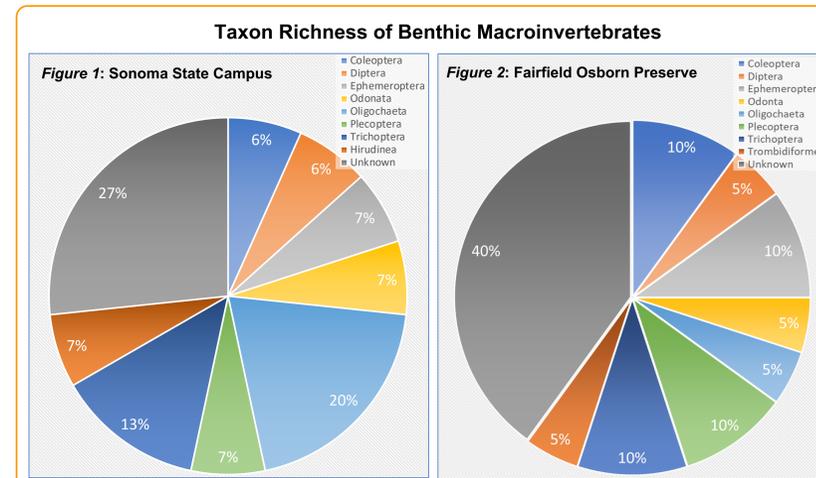
Jessica field sampling at FOP

RESULTS

We found a total of 15 distinct taxa of BMIs at the SSU site (Figure 1), and a total of 20 at the FOP site (Figure 2). The taxa with known pollution tolerance levels sampled at SSU had a pollution tolerance range from 1 – 4, with 0 being completely intolerant of any level of pollution and 10 being extremely tolerant of most forms of pollution. The range of pollution tolerance for the taxa sampled at FOP ranged from 0 – 5 (Figure 3).



Trichoptera (Caddisfly Larvae)
Photos by: W.A. St. John



Odonata (Dragonfly Larvae)



Coleoptera (Water Penny)



Trombidiformes (Water Mite)



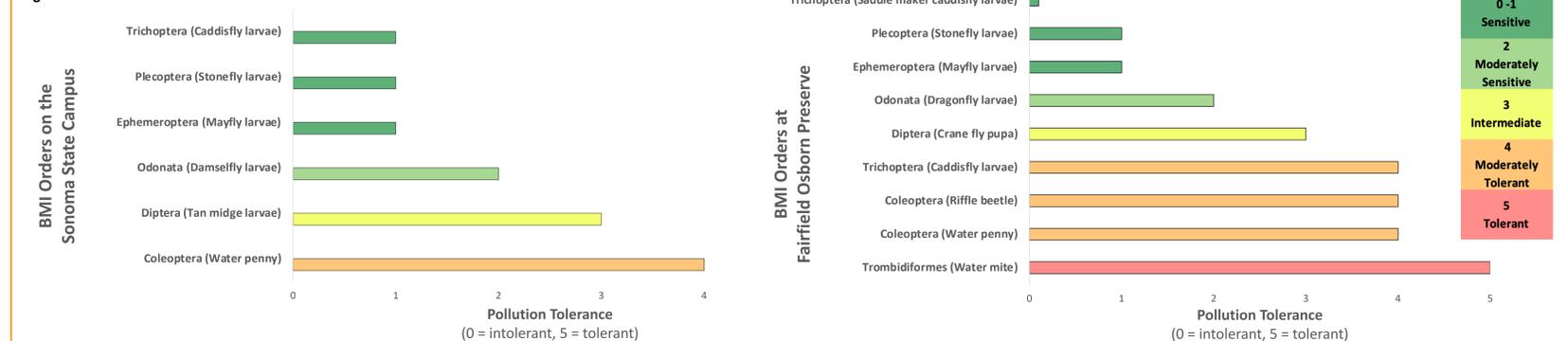
Plecoptera (Stonefly Larvae)

DISCUSSION

Significance: The data collected in this experiment supports our hypothesis that there would be a higher level of taxonomic richness of benthic macroinvertebrates (BMI) at Fairfield Osborn Preserve (FOP) than in the Sonoma State University (SSU) section of Copeland Creek. Canopy cover, stream width, and stream depth were similar between the two sites and are not likely to explain the variance in taxonomic richness. Pollution tolerance values of the taxa sampled at each site were similar and indicate that pollution tolerance is not a driving factor between the variation of taxonomic richness between the two sites. The higher elevation, cooler temperatures, and lower level of human disturbance are all factors that may explain the greater taxonomic richness of BMIs at FOP.

Future directions for research: Future surveys of BMI taxonomic richness that compare multiple sections of a watershed should be sampled on the same day or within a narrow time frame. In this experiment, the second site (FOP) was sampled 14 days after the first site (SSU). This long period between sampling dates may have allowed a discrepancy in the size and number of individuals found and may account for errors in our data.

Figure 3: Pollution Tolerance



ACKNOWLEDGEMENTS

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* All photos taken under standard magnification of a dissecting microscope with an OMax microscope camera.

REFERENCES

- Cairns, J. & Pratt J. 1993. A history of biological monitoring using benthic macroinvertebrates. *Freshwater biomonitoring and benthic macroinvertebrates* 10: 27.
- Mandaville, S. 2002. Benthic Macroinvertebrates in Freshwaters - Taxa Tolerance Values, Metrics, and Protocols. *Soil and Water Conservation Society of Metro Halifax*. 31-37.
- Serpa, L. 1986. The rearing imperative associating immature and adult stream insects. Thesis submitted to Sonoma State University. 73-139.