A Comparison of Macroinvertebrate Species in Two Rutland County Streams, One Near an Outdoor Recreation Area

Lori Fretta, Nora Enright, Annmarie Welch
Otter Valley Union High School

Introduction

We investigated potential human impact on aquatic macroinvertebrates by studying differences in species richness, and tolerance between a stream near a popular recreation area and one that is not. Both streams were in a close geographical range and experienced roughly the same weather conditions, but the recreation area stream was rocky and the other stream was sandy. Based on the high possibility of exposure to pollutants like bug spray and sunscreen that accompanies the recreation area location, the macroinvertebrate species in the recreation area are likely to be more tolerant to withstand different contaminants. We used species diversity and richness as an indicator of tolerance. Because macroinvertebrates of the orders Trichoptera, Ephemeroptera, and Plecoptera are generally intolerant to poor water quality, we expected to see higher proportions of these organisms in the sandy stream. Overall, the number and relative proportion of macroinvertebrate species in these two streams were used to analyze differences in water quality and, by extension, human impact in local streams.

Methods

Macroinvertebrates were collected in late fall from two streams within close geographical range that were subjected to similar weather conditions.
The collection and identification protocols used for the OC_SgrHllwBrk_501 were based on field and lab methods used by the Vermont Department of Environmental Conservation and described in Section 4 of the EPSCOR *Streams Project High School Teams 2014-2015* manual.
The identification protocol for the OC_Trb_431 stream was the same as for the OC_SgrHllwBrk_501, but because this is a muddy stream, the sampling method used was the “Sweep Technique”.[1]
Identification work was done at both the St. Michael’s College lab of Dr. Declan McCabe and at Otter Valley Union High School.

Results

	Richness	PMA-O	EPT	Density
Sugar Hollow	3.4	84.4	5	14
OC Tributary	3.39	71.3	6	15

The table contains our combined information and efforts to determine species richness, density, PMA-O and EPT. Our complete calculations and raw data can be viewed upon request. Our two streams were Sugar Hollow Brook and Otter Creek tributary.

References

[1] ”Minnesota Pollution Control Agency." *Biological Monitoring of Water in Minnesota* . 03 Feb. 2014 Web.

Funding provided by NSF grant EPS-1101317

Conclusion

At the start of our project, we had predicted that the stream near the recreation area would have much more tolerant macroinvertebrates due to increased levels of pollutants from human intervention. However, we found that our metrics don’t show a large enough increase to support our hypothesis.

The recreation area stream actually had a slightly greater species richness. Its average value for species richness was 3.4, while the recreation area stream had a slightly lower value of 3.39.

The EPT index, showing the different genuses for the three sensitive orders, was extremely similar on both sites, with the sandy stream notching just one more type of these macroinvertebrates. Analysis of the EPT to Chironomidae population gave another set of close results. The ratio for the sandy site, .763, was slightly less tolerant but still very close to the recreation area’s 0.64. Finally, the biotic index, another measure of tolerance, placed the two streams very close together. The sandy stream’s average biotic index was about 4.738, while the rocky stream’s biotic index was about 5.382. These tolerance values are less than one full integer apart, and also both fall well within the range for moderate tolerance. Though the metrics for the sandy stream were all indicative of a slight decrease in tolerance when compared to the rocky stream, the rocky stream still was able to support sensitive macroinvertebrates. In fact, it housed the species with the lowest tolerance value (0). Overall, our hypothesis was not supported by our data. For further research, we could run our tests again to verify our conclusions. If our conclusions are the same, we could compare the streams based on habitat nature or chemical composition of the water to see if that accounts for any of our data points.

Special Thanks to Vermont EPSCoR and RACC.

VERMONT EPSCoR

RACC Research on Adaptation to Climate Change in the Lake Champlain Basin