CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY

Name(s)
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Project Number
J1120

Project Title
Macroinvertebrates in Local Stream Habitats: Effects of Habitat Type on Biodiversity

Abstract

Objectives/Goals
The purpose of this project is to measure the effect of habitat type in a local stream on biodiversity according to the Shannon-Wiener Index for the following habitats: 1) submersed vegetation, 2) snags, logs, and roots, 3) muddy bottom, and 4) gravel and sand. I hypothesized that the greatest biodiversity would be in submerged vegetation because the plants would provide food and shelter.

Methods/Materials
I chose a portion of the stream with many habitat types and rushing water. I selected three 1m^2 areas for each of the four habitat types, with fifteen samples per type. During sampling, I used a trowel to vigorously disturb the habitat and used a 0.5mm mesh net downstream of the area to catch the dislodged organisms. At my control area, I sampled in the middle of the water without disturbing the bottom substrate. For each sample, I tallied and identified each organism by drawing a quick sketch of each new species to create a key. To verify that the sampling sites were constant, I conducted pH, temperature, depth, ammonia, nitrate, nitrite, alkalinity, hardness, TDS, and EC measurements from water samples. I calculated the Shannon-Wiener Biodiversity Index for each habitat type: -summation [x(i) log2(x(i))] for i = 1 to the number of species, and x(i) is the ratio of abundance over richness.

Results
According to the index, the areas with snags/logs/roots were the most biodiverse, with a value of 3.15. Muddy bottom was second with a value of 2.61, and gravel and sand was third with a value of 2.17. Submersed vegetation was the least biodiverse with a value of 1.94, the closest to the control area's value of 1.50.

Conclusions/Discussion
My hypothesis was incorrect because I believed that submersed vegetation would be the most biodiverse, although it was the least. It had the fewest number of species and the second fewest number of organisms, so it had the lowest index value. Snags, logs, and roots had the greatest number of species and the second largest number of organisms, which contributed to its high index value. This area must have had a good balance of amount and variety of food as well as protection to support a biodiverse population.

Summary Statement
My project was investigating which habitat type of 1) submersed vegetation, 2) snags, logs, and roots, 3) muddy bottom, and 4) gravel and sand in a local stream was the most biodiverse using the Shannon-Wiener Index.

Help Received
My dad helped me by buying supplies, explaining the Shannon-Wiener Index, and handed me instruments and acted as another pair of hands during experimentation.