



CALIFORNIA STATE SCIENCE FAIR 2014 PROJECT SUMMARY

Name(s) Zane F. Taylor	Project Number 34348
Project Title Benthic Macroinvertebrates as Indicators of Watershed Health	
Abstract Objectives/Goals Benthic macroinvertebrates (BMI) such as mayflies, stoneflies, and caddisflies are highly sensitive to fine sediment and other types of pollution. This is why regulators often rely on BMI sampling to help determine the water quality of streams and rivers. The objective of my project was to determine if the composition of streambed sediment and levels of urbanization affected BMI diversity and abundance. Methods/Materials Three creeks with different levels of urbanization were selected. Two BMI samples were collected from undisturbed areas from a riffle of each creek. I used a fine-meshed net with a one-foot wide opening. A one-foot by one-foot area of the streambed in front of the net was disturbed for 30 seconds. I classified the BMIs into their scientific Orders, counted how many BMIs were in each Order, took photographs, and released the BMIs into the creek. Pebble counts were conducted in each riffle by randomly selecting 100 rocks and categorizing their secondary axis in centimeters with a pebble-o-meter. Water temperatures were measured in Celsius. Data were entered and analyzed in an Excel spreadsheet. Results Widow White Creek, the most urbanized watershed, had only three aquatic worms in the sample. In the moderately urbanized watershed, Strawberry Creek, a total of 15 BMIs were sampled, including three caddisflies and five stoneflies. In Prairie Creek, located in an old growth redwood State Park, a total of 57 BMIs were collected, including 19 mayflies, five stoneflies and three caddisflies. The rocks sampled in Widow White Creek were in size classes between 8 mm and 45 mm. Rocks from Strawberry Creek were in size classes between 8 mm and 60 mm. In Prairie Creek all of the rocks sampled were in size classes between 8 mm and 128 mm. The cumulative frequency analysis clearly showed that Prairie Creek had a wider range of particle size classes as well as a higher percentage of larger particles. Conclusions/Discussion My research showed that a healthier watershed does influence BMI diversity and abundance. Prairie Creek, the least influenced by urbanization of the three creeks, had more BMI Orders and more numbers of BMIs collected. Most of the BMIs in Prairie Creek were also sediment intolerant. Prairie Creek's streambed composition was also the most diverse with larger rocks which created better habitat for BMIs.	
Summary Statement Samples of sediment-intolerant BMIs, including caddisflies, mayflies, and stoneflies, are used by agencies such as the EPA and the California Department of Fish and Wildlife to collect legal evidence for water pollution cases.	
Help Received My dad helped me work in the creeks for safety. John Lee, an aquatic entomologist, leant me the nets and helped key out some BMI Families. My mom helped me with layout.	