



**CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY**

Name(s) Justin W. Woo	Project Number S1921
Project Title The Effect of Temperature on Filtration Rates of Mytilus californianus, the California Mussel	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Can mussels be used as a biological mechanism to decrease high levels of phytoplankton in California bay waters? If so, at what temperature do they function best?</p> <p>Methods/Materials Spec-20D spectrophotometer, 20 Mytilus californianus mussels, thermometers, electric heating wands, algae discs, refrigerator/freezer, filtered seawater, mortar & pestle. Dissolve 300 mL of finely crushed algae in 4000 mL of filtered seawater. In 5 different 500-mL beakers, place 390mL of the algae water. Measure the starting transmittance of each of the 5 beakers, then put 4 mussels in 4 beakers. Leave one beaker empty to measure rate of settling. Take 2 transmittance readings per beaker every 10 minutes for 90 minutes with the spectrophotometer. Repeat process for the 19°C trial, done at room temperature. The 14°C & 9°C trials are done in an open refrigerator and freezer. For 24°C or 29°C, use a heating wand to heat water surrounding the trial beakers.</p> <p>Results Mussels at 19°C consistently had an increased rate of filtration. The rates were second fastest at 14°C, their average seawater temperature. At 9°C, there was a 50% decrease in filtration, while at warmer temperatures of 24°C & 29°C, the mussels barely fed at all. In a 90-minute period of time, mussels working at 19°C improved the water clarity by an average of about 22%. At 14°C they cleared up the water by about 11%, and 5% at 9°C. Warmer temperatures showed less than 1.5% improvement in water clarity.</p> <p>Conclusions/Discussion Due to the fact that they are cold-blooded, mussels# respiration rates and feeding rates vary in proportion to their environment#s temperature. They cannot survive or feed in high temperatures. This information can be used to apply mussels for a practical use of clearing up bay waters of algae. Utilizing the knowledge that mussels function quickest at 19°C, they can be placed in waters during the summer, when water temperatures are increased. Calculations show that a population of 2000 mussels can improve water transparency/clarity of a 1-million gallon body of water by 50% in less than two years.</p>	
Summary Statement If mussels can be used as a biological mechanism to decrease high levels of phytoplankton in California bay waters, my project tested at what temperature they fed and filtered fastest.	
Help Received Father helped to drive and pick up supplies; Mr. P. Hunt (AP Biology teacher) helped with supplying equipment, working space, and suggestions	