



**CALIFORNIA STATE SCIENCE FAIR
2010 PROJECT SUMMARY**

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Project Title Utilizing the Isotopic Signature of Macroalgae to Identify Sources of Nitrogen in Streams and Rivers	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To utilize the isotopic signature of macroalgae to identify the sources of nitrogen pollution in streams and rivers and to evaluate the usefulness of stable isotope analysis of macroalgae in lotic ecosystems.</p> <p>Methods/Materials Algae samples were placed into 50mm x 9mm petri dishes and stored in a cooler. Samples were placed in a 50°C oven for a minimum of 48 hours to ensure removal of all moisture. Samples were then homogenized. A microbalance was used to weigh 2.00 - 3.00mg of algae into 3.5mm x 5mm tin capsules. Exact weights were recorded for each sample. The samples were then run through a CE Instruments NE2500 Elemental Analyzer coupled to a ThermoFinnigan Delta Plus XP isotope ratio mass spectrometer (IRMS). Using Google Earth Pro, we were able to gain access to a Landcover Mosaic map (LCM) based on 2001 National Land Coverage Data (NLCD). Land surrounding the sites was classified according to the 19-color categories given by the Landcover Mosaic map and then classified into one of our seven categories and percentages were recorded.</p> <p>Results Agricultural sites had mean $\delta^{15}N$ values of +15.15‰ and spread +9.49‰ to +19.73‰. The semi-natural sites had mean $\delta^{15}N$ of +6.44‰ with values ranging between +1.09‰ and +14.34‰. The urban sites had mean $\delta^{15}N$ values of +7.97‰ and ranged from +4.81‰ to +10.15‰. Elkhorn Slough had average $\delta^{15}N$ of +10.47‰ and ranged from +7.20‰ to +12.33‰. Using an ANOVA test, we determined that the means were not all the same. We subsequently performed a comparison of means tests in order to analyze differences between two land use categories. When comparing the semi-natural and agriculture $\delta^{15}N$ values we obtained a t-statistic of -7.427 with $p < .0001$, suggesting that the agriculture $\delta^{15}N$ means were different from those of the semi-natural means.</p> <p>Conclusions/Discussion The macroalgae at our agricultural sites, urban sites and semi-natural sites all have nitrogen isotopic signatures that reflect the surrounding land cover. Thus, the influence land cover has on the nitrogen isotopic signatures of macroalgae suggests that macroalgae can be used as indicators of anthropogenic inputs of nitrogen to the environment.</p>	
Summary Statement Our project illuminates the usefulness of isotopic signatures of macroalgae in identifying sources of nitrogen pollution in streams and rivers.	
Help Received Used lab equipment at University of California, Santa Cruz under the supervision of Dr. Adina Paytan but did research independently.	