



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Benjamin Lee	Project Number J1012
Project Title DuckWeeding Out Contaminants	
Objectives/Goals The objective of this experiment was to investigate the use of duckweeds, Lemna minor and Spirodela polyrhizza, in phytoremediation in removing acetaminophen, caffeine and estradiol safely from contaminated water.	
Abstract Methods/Materials Duckweeds were harvested from a pond in the Golden Gate Park. Stock solutions of acetaminophen, caffeine and estradiol were prepared. Eight mason jars were set-up as follow: <ol style="list-style-type: none">1. One jar of 200 ml of distilled water and one jar of 200 ml of the pond water as negative controls.2. Three jars of 200 ml of each of the three chemicals tested, positive controls.3. Three jars of 200 ml of each of the three chemical with three grams of duckweeds in each. Six 2 ml samples were obtained from each jar over seven days. All samples were cryodesiccated and reconstituted for analysis using the gas chromatograph mass spectrometer (GCMS). Results were tabulated and plotted.	
Results The chromatograms did not show the presence of acetaminophen, caffeine or estradiol in the distilled water or pond water at any time point. There was a slight decreasing trend in the acetaminophen concentration without duckweeds over time. In the presence of duckweeds, there was total removal of the acetaminophen after seven days (T0-T168: -100%). The concentration of caffeine remained relatively constant without duckweeds. In the presence of duckweeds, there was a significant decreased in caffeine concentration after seven days (T0-T168: -41.6%). There was an overall decrease in estradiol concentration without duckweeds, but the decrease was more marked in the presence of duckweeds after seven days (T0-T168: -93.3%).	
Conclusions/Discussion The experiment proved that duckweeds removed acetaminophen, caffeine and estradiol effectively from	
Summary Statement Duckweeds removed acetaminophen, caffeine, and estradiol from water using phytoremediation.	
Help Received Ms. Bryan at USF supervised the use of lab equipment and advised during the interpretation of results and wiite-up. Dad helped with poster board.	