



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Anthony A. Stenzel	Project Number J1025
Project Title The Biochemical Oxygen Demand Dilemma: What Can We Do to Get More DO (Dissolved Oxygen)?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals Would the installation of a bio-remediation water treatment system increase the levels of dissolved oxygen enough to withstand the biochemical oxygen demand of the sudden algal blooms at the Madrona Marsh sump?</p> <p>Methods/Materials For 10 months prior to installation of the bio-remediation water treatment system, I took bi-weekly measurements of the sumps water chemistry. I have continued to follow the sampling protocol and plan to continue for another 10 months. This included measuring the Dissolved Oxygen, Temperature, Phosphates (PO₄) and pH. For measuring Dissolved Oxygen, I used the Winkler Method in which a water sample is "fixed" by adding a series of reagents that form an acid compound that is then titrated with a neutralizing compound that results in a color change. The point of the color change coincides with the DO concentration in the sample.</p> <p>Results The dissolved oxygen levels did increase dramatically once the treatment system became active.</p> <p>Conclusions/Discussion Conclusion: Bio-remediation water treatment systems are an effective means of increasing dissolved oxygen levels at Madrona Marsh sump.</p> <p>Discussion: The idea to do this project came to me through my work on the Environmental Science Merit Badge and the Soil and Water Conservation Boy Scout Merit Badge. Through the course of studies required by the merit badges, I learned that the environmental conditions are just as important to sustaining life as is the food these animals need. I also have learned that humans can have a big negative impact on the delicate balance of the many abiotic factors that exist in an ecosystem. Madrona Marsh is located within an urban setting and the water quality there is especially sensitive to nonpoint source pollution in the runoff from local lawns, gardens and gutters. The sudden surge of phosphates is a challenge to the delicate balance of life as it leads to algal blooms that in turn can crash the ecosystem's balance. Because the runoff is as unpredictable as the weather, the Marsh needs a way to increase the oxygen levels above normal in the system such that the ecosystem could endure the sudden increase of biochemical oxygen demand from an algal bloom.</p>	
Summary Statement To test whether the use of a bio-remediation unit can raise the dissolved oxygen levels high enough to sustain an aquatic ecosystem through an algal bloom and the resulting spike in the biochemical oxygen demand.	
Help Received I used the laboratory equipment at the Madrona Marsh, but I did all sampling, testing and recording involved in the project.	