



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

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Project Title The Response of a Coastal Phytoplankton Community to Hyperion Treatment Plant's Effluent: An Environmental Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In 2014, the Hyperion Treatment Plant will divert its effluent from the 5-mile outfall to the 1-mile outfall. This diversion may cause increased phytoplankton growth, therefore disrupting the surrounding environment. So, our experiment will test whether it is best to divert in the spring or in the fall to minimize the potentially negative effects of harmful phytoplankton growth.</p> <p>Methods/Materials In both our spring and fall trials, seawater was collected and different dilutions of seawater and effluent were made. Our dilutions included a true control consisting of only natural seawater, a dilution control consisting of deionized water and natural seawater, and 1:1000, 1:84, and 1:13 effluent dilutions. After 6 days of incubation, the phytoplankton were preserved and counted and samples were taken for chlorophyll and domoic acid analysis.</p> <p>Results We hypothesized that a certain harmful species, <i>Pseudo-nitzschia seriata</i>, would be more prevalent in the spring. However, our results showed that <i>Pseudo-nitzschia seriata</i> was more abundant in the fall, while the less harmful species <i>Pseudo-nitzschia delicatissima</i> was more abundant in the spring. In the 1:13 dilution, which mimics the concentration of effluent to seawater during the diversion to the one-mile outfall, <i>Pseudo-nitzschia seriata</i> made up 5.69% of total cells in October while making up 0% of total cells in June. Also, in the October 1:13 dilution, <i>Chaetoceros</i> spp. and <i>Cylindrotheca</i> spp. increased significantly in number compared to June, together comprising over 50% of the phytoplankton abundance. In addition, the domoic acid and chlorophyll levels were higher in the October trial than in the June trial.</p> <p>Conclusions/Discussion <i>Pseudo-nitzschia seriata</i> produces a toxin called domoic acid, which can lead to amnesic shellfish poisoning and death of large mammals, such as humans. So, its significant presence in the October trial leads us to conclude that Hyperion Treatment Plant should divert its effluent in June of 2014 rather than October to minimize the negative effects on the environment. Our results will also be compared to USC's in-situ experiment so we can form a final conclusion together. Furthermore, our results will be compared to a field study done in 2014 to see if this experiment's results were predictive of what happens to the environment during the actual diversion.</p>	
Summary Statement Based on the results of our project, the planned 2014 diversion of Hyperion Treatment Plant's effluent from the 5 mile to the 1 mile outfall should occur in June to minimize harmful effects on the coastal environment.	
Help Received Used lab equipment at Hyperion Treatment Plant; Dr. Masahiro Dojiri helped organize project; Dr. Caron and Erica Seubert provided information on phytoplankton and experiment setup; Hyperion Treatment Plant boat crew drove the boat	