



CALIFORNIA SCIENCE & ENGINEERING FAIR 2018 PROJECT SUMMARY

Name(s) Collin M. Schneider	Project Number 38131
Project Title Documenting the Impacts of the Carlsbad Desalination Plant on Agua Hedionda Lagoon	
Abstract Objectives/Goals The Carlsbad desalination plant began operating in December of 2015. I wondered if the desalination process might have impacts on the water quality at the Agua Hedionda Lagoon. I decided to test the water at four locations in the lagoon and also test the ocean water quality north and south of the brine discharge. I believed that the salinity and levels of nitrates and nitrites in the water might exceed recommended levels. Methods/Materials I evaluated 198 water quality values from 18 water samples collected from six different locations in the vicinity of the Agua Hedionda Lagoon during multiple site visits. I used test kits from LaMotte and Hach. I also used Coliscan Easygel media and inoculated a total of 50 plates to test for coliform bacteria, including E. coli, non-coliform bacteria, and mold. Results Salinity levels were the highest at Hubbs Research center and the east junction, the hydrometer showing salinity of 38 ppt while the two ocean tests yielded only 34 and 39 ppt; however, the salinity could be even higher at greater depth due to the halocline of the lagoon. The levels of phosphates averaged 1.5 ppm, which is 15 times the state recommended limit. Nitrates, a strong indicator of brine discharge, were found in most locations to be at 2-3 times above the state standard of 1 ppm. The highest levels were found north of the discharge, at the mouth of the lagoon and the east junction. The total nitrates averaged 2.3 ppm, and all results were within 0.5 ppm of each other. Levels of dissolved oxygen averaged 2.6 ppm, an amount 2.4 ppm below state standards. The highest levels of ammonia were found north of the discharge and east of the PCH, averaging 0.15 and 0.2 ppm, which was 0.5 to 1.0 ppm above the recommended level. I found levels of coliform bacteria to be highest at the points north and south of the discharge. Levels of E. coli were found highest east of the PCH where my tests revealed levels of E. coli too numerous to count. Conclusions/Discussion Salinity levels, nitrates, phosphates, and dissolved oxygen tests showed results that could be harmful to the marine ecosystem. I believe that many of my findings were due to brine discharge and also to possible non-point-source pollution from nearby agricultural areas. I recommend that salinity levels and the water quality in the lagoon and the ocean in the vicinity of the brine discharge be monitored closely.	
Summary Statement I examined the effects of the Carlsbad Desalination Plant on water quality at the Agua Hedionda Lagoon.	
Help Received Thanks to my mother for driving me to the lagoon to collect my samples, and to my science teacher Mrs. Hunker supervising my safety in the lab and providing me with test kits and materials. I conducted and analyzed all of my tests myself.	