



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Mary Travis H. Doepner	Project Number 31569
Project Title Salt vs. Bacteria: The Effects of Salt Concentrations on Bacteria in Santa Ana River Water	
<p align="center">Abstract</p> <p>Objectives/Goals The purpose of this project is to see if the salinity level of Santa Ana River water samples has an effect on bacterial growth, particularly to see if a lower salinity level increases the level of bacteria (esp. potentially harmful E.coli & other coliforms).</p> <p>Methods/Materials Collect samples from 2 locations of the Santa Ana River & mix equal parts for standard river water. Keep 1 standard 100ml sample. Dilute 1 sample by 1/2 & one by 1/4 using distilled water. Concentrate samples by 3X, 11X, & 31X by adding NaCl to standard samples. Measure all samples for TDS (salinity proxy) using a multi-parameter tester. In a lab add Colilert media to each sample & shake. Pour samples into Quanti-tray & incubate for 24 hrs. Count total coliform & fluorescing E.coli using a black light. Calculate results using IDEXX Quanti-tray MPN table.</p> <p>Results All samples were positive for coliform bacteria & E.coli bacteria. All samples had very high levels of coliform bacteria with the 1/4 dilution being 2400MPN/100ml (MPN=most probable #) & all other samples being >2400MPN/100ml. The sample diluted by 1/4 had the least amount of E.coli, 1/4 the amount found in the standard river sample. The E.coli found in the 1/2 dilution through the 11X concentration remained within a range of 60MPN/100ml. The bacterial level at the 11X concentration began to decline slightly while the 31X concentration had an even greater decrease. If the bacterial concentrations for the 1/4 & 1/2 dilution samples were multiplied (adjusted) by 4 (for the 1/4 dilution) & by 2 (for the 1/2 dilution), then the 1/4 sample's bacterial concentration would be 384MPN (4 X 96MPN) (close to the standard river water concentration, 378MPN) & the 1/2 sample would be higher, 656MPN (2 X 328MPN).</p> <p>Conclusions/Discussion Because there is little difference in the amount of bacteria from the 1/2 dilution to the 11X concentration of NaCl, it appears that the E.coli bacteria can tolerate salinity levels within a broad range above & below the standard river sample. It appears that NaCl is necessary in some concentration to promote bacterial growth & that in the 1/2 concentration [151.7ppm] the NaCl is closer to being optimal for coliform growth. By repeating the experiment with the 31X concentration of NaCl, I found that the increasing salinity levels do appear to have negative effects on bacteria. I believe an even greater increase would result in a greater decrease in bacteria.</p>	
Summary Statement My project is intended to illustrate the relationship between salt (NaCl) concentrations and the presence of various bacteria using the Santa Ana River as the base line.	
Help Received Used materials & equipment at Babcock Labs under supervision of Carol Kase; Used multi-parameter tester at UCR with Dr. Michael Anderson; Used measuring equipment at SIHS; Dr. Kay Mukergee & Raincross donated sterile bottles; Riv. Co. Parks & Rec. gave permission to collect samples	