



**CALIFORNIA STATE SCIENCE FAIR  
2017 PROJECT SUMMARY**

<b>Name(s)</b> <b>Perrin J.G. Turney</b>	<b>Project Number</b> <b>S1618</b>
<b>Project Title</b> <b>Effects of Climate Change (Increase in Temperature, Salinity and Pollutants) on Freshwater Microorganism Mortality Rates</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Over the span of three years, I tested the effects of three aspects of climate change on the mortality rates of freshwater microorganisms at the Arcata Marsh: increases in salinity, increases in industrial and agricultural pollutants, and, this year, increases in temperature.</p> <p><b>Methods/Materials</b> Ten 2.5 gallon tanks were filled with Arcata Marsh water from the freshwater Log Pond and were maintained at four temperature points representative of potential environmental temperature increases should climate change not be addressed and prevented. Using adjustable aquarium heaters, two tanks were kept at 65 degrees F, two tanks were kept at 70 degrees F, and two tanks were kept at 75 degrees F. The two control tanks were not heated. Samples of each tank were taken daily for 30 days and the microorganism populations were assessed for numbers of organisms, health, and appearance.</p> <p><b>Results</b> In all temperature gradients, mortality rates for all observed microorganisms increased except for Hypotrichida, which manifested a population increase as the mortality rates of other organisms increased thereby increasing the food source for Hypotrichida. The tanks held at 10 degrees higher than the control had rapid mortality rate increases while the tanks maintained within 5 degrees of the control had a slower mortality rate increase.</p> <p><b>Conclusions/Discussion</b> Climate change continues to threaten the planet and every one of its ecosystems. This three year study provides further support that freshwater wetlands are at a very real risk of depletion as ocean temperatures increase and the sea level rises and pushes the brackish and freshwater watersheds toward the mountains, narrowing those ecosystem habitats. My hypothesis was correct that the freshwater microorganisms at the Arcata Marsh are highly susceptible to environmental changes including increases in salinity, industrial and agricultural pollutants, and temperature due to further human growth and development without environmentally responsible alternatives for energy.</p>	
<b>Summary Statement</b> This three-year study determines Arcata Marsh freshwater microorganism mortality rates in correlation with climate change: increase in temperature, increase in salinity, and increases in industrial and agricultural pollution.	
<b>Help Received</b> Greta Turney -- microbiologist and mom; helped to identify organisms, gather samples, set up tanks. Ed Woodcock, RVT -- Humboldt Veterinary Laboratory Owner and diagnostician; loaned me the counting chamber slide, gave me microscope slides and cover slips.	