



**CALIFORNIA STATE SCIENCE FAIR
2006 PROJECT SUMMARY**

Name(s) Swati Yanamadala	Project Number S0613
Project Title Sourcing and Quantification of Fecal Indicator Bacteria (FIB) in Aquatic Ecosystems: A Three Year Study	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The first of three objectives of this study is to compare fecal indicator bacteria levels in two aquatic ecosystems, one with a high bird density and one with a low bird density. The second objective is to see if the API system, a system currently used in hospitals for bacterial identification in patients, can be applied to environmental studies to identify bacterial strains in aquatic ecosystems. The third objective is to create a mathematical model relating turbidity, dissolved oxygen, pH, salinity, time from high tide, bird counts, and levels of fecal indicator bacteria.</p> <p>Methods/Materials On four sampling dates, five samples were collected from each station. In the field samples were tested for salinity, dissolved oxygen, pH, and temperature using the YSI 600R Sonde Electronic Probe. In the lab samples were tested for turbidity levels using the HACH 2100N Turbidimeter and for levels of indicator bacteria using the IDEXX system. Then bacterial samples were identified using the API 20E for Enterobacteriaceae system.</p> <p>Results Higher bacterial concentrations were associated with higher turbidity levels, lower dissolved oxygen levels, lower salinity levels, a pH closer to 7.4, high tide, and higher bird counts. These factors were related through a mathematical model, and to test the accuracy of this model, hundreds of data points from years one and two of this study were entered into the equation. The formula proved an excellent fit for this data. The API system was successful in identifying bacterial strains in the ecosystems. All of the strains identified are from human sources.</p> <p>Conclusions/Discussion This study establishes two new scientific methods. The first of these is the use of mathematical models in environmental research to describe physical environments, which is rarely, if ever, done. This study shows that these models are an extremely useful, accurate, and predictive tool for environmental research. The other new method developed in this study is the application of medical technology, the API system, to environmental research, which is another tool with the potential to greatly improve the understanding of aquatic microenvironments. Furthermore, this study proves that the fecal contamination in aquatic ecosystems is derived not only from naturally occurring factors including birds but also largely from human sources, a problem which must be understood and combated for the betterment of public health.</p>	
Summary Statement The purpose of this study is to identify the sources of fecal contamination in aquatic ecosystems and to create a mathematical model to accurately describe the complex interactions of these systems.	
Help Received Used lab equipment at Loyola Marymount University under the supervision of Dr. John Dorsey	