



CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s) Oliver W. LaCapria	Project Number 36877
Project Title Removing Nitrogenous Waste from an Ecosystem	
Objectives/Goals In my experiment, I set out to find the most efficient way of removing nitrogenous waste from an ecosystem. Abstract Methods/Materials I set up 7 jars: the first was a control, with neither nitrifying bacteria nor plants, the second and third had nitrifying bacteria only, the fourth and fifth had both plants and bacteria, and the sixth and seventh had only plants. Each day, I added .5 mL of ammonium hydroxide. Then, 24 hours later I would measure the pH, ammonia, nitrite, and nitrate levels. This experimentation lasted 12 days. Results All jars, except for the control, were able to remove all forms of nitrogenous waste. This was unexpected in the jar with plants only and in the jar with bacteria only, but I attribute this to contamination of nitrifying bacteria and algae/cyanobacteria, respectively. Conclusions/Discussion I found the most effective way to remove nitrogenous waste from an ecosystem. By using a combination of plants and nitrifying bacteria, ammonia, a toxic compound produced by aquatic organisms, can be completely removed from water. This is applicable directly to the aquaculture industry, accounting for 50% or more of seafood consumed annually. By establishing a biological filtration system based on the model ecosystems I designed, one can keep the levels of nitrogenous waste in the water nontoxic to the organisms living there.	
Summary Statement I found the most effective combination of organisms in the nitrogen cycle to remove nitrogenous waste from an ecosystem, which was through an ecosystem with both a nitrate-absorbing autotroph and nitrifying bacteria present.	
Help Received I designed the ecosystems, routine of experimentation, and performed calculations myself. However, Mrs. Corbett, the AP Chemistry teacher at Villa Park High School, and Mr. Hunt, the AP Biology teacher at Villa Park High School, were both very helpful by explaining concepts critical to my experiment.	