



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

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Project Title Can a Natural Filter Maintain Stable and Safe Water Chemistry Levels for a Salt Water Aquarium?	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals This project was conducted to determine if a homemade, non-commercial, sump/refugium style filter system could effectively maintain safe water chemistry levels for marine fish. As well, one goal was to create an organic filter that would provide a natural way to maintain water chemistry levels, reducing the negative impact of the production of the filter on the environment, and mimicking more natural systems of filtration for the benefit of the health of the fish.</p> <p>Methods/Materials Two 55 gallon acrylic tanks held in a wooden frame were used in this project. The top tank housed up to a dozen reef fish with a sand substrate, and the bottom tank served as the filter. Filter media was completely organic, containing rocks, sand, mud, gravel, and mangrove plants. 12 fish (<i>Chrysiptera cyanea</i> and <i>Pterapogon kauderni</i>) were added and integrated into the top tank. Water chemistry levels were monitored weekly for 101 days using the API Saltwater Aquarium Master Test Kit, testing Ammonia (ppm), Nitrites (ppm), Nitrates (ppm), Salinity (ppt), Temperature (C), and pH.</p> <p>Results Over the course of four months water chemistry was monitored. pH, salinity, and temperature were consistent for the duration of the experiment (pH 8.2, salinity 32.3 ppt, and temperature at 27.8 degrees Celsius). Ammonia levels were reduced from 0.25 ppm at the beginning of the experiment to 0.00 ppm, nitrites reduced from 5 ppm to 0.00 ppm, and nitrates reduced from 60 ppm to 5 ppm. Once the filter was properly established no fish died, and all showed normal healthy signs and regular eating habits. No diseases emerged although algae growth was noted which did not harm the fish or impact water chemistry.</p> <p>Conclusions/Discussion The filter was able to maintain water chemistry levels in which no fish died and all fish remained healthy. My hypothesis that the organic filter could maintain safe water chemistry levels was strongly supported by the results. I conclude that an organic filter is a viable alternative for a commercial bought filtration system for a salt water tank of 55-gallons housing 12 marine fish.</p>	
Summary Statement I created a filter made of completely organic and natural components that effectively controlled and stabilized water chemistry levels of ammonia, nitrites, nitrates, and pH, for a 55-gallon salt water tank housing twelve reef fish.	
Help Received I designed and performed the experiment myself, but got help from my teacher in building the wooden structure that held my two tanks.	