



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Zoe Macknicki	Project Number J2111
Project Title Effects of Agricultural Pollutants on Mortality Rates of Freshwater Daphnia and Cyclops at the Arcata Marsh	
<p style="text-align: center;">Abstract</p> <p>Objectives The addition of fertilizer in controlled amounts determines the effects of agricultural pollutants on the mortality rates of freshwater Daphnia and Cyclops in varying concentrations.</p> <p>Methods Arcata Marsh water was collected from the Arcata Marsh Log Pond. A syringe was used to measure out liquid fertilizer which was then added to 100 mL samples of the marsh water to create concentrations from 1ml/100ml to 7ml/100ml fertilizer, but the fertilizer was a concentrate which led to immediate death of all organisms. A second, lower concentration fertilizer was used to create a 1ml/100ml to 7ml/100ml fertilizer solution, and both organism mortality rates increased significantly. A third, low concentration spectrum was created from .2ml/100ml to 1ml/100ml using the low concentration plant food which produced measurable results. A graduated cylinder was used to collect 25 mL of each sample which was then poured into an 80 mL beaker and observed under a dissecting scope to count Daphnia and Cyclops. Observations were completed daily for two weeks.</p> <p>Results In all concentrations using fertilizer concentrate, all Daphnia and Cyclops died immediately. In concentrations above 1ml/100ml of the lower concentration plant food, Daphnia and Cyclops mortality rates increased in proportion to the increase in concentration. In concentrations below 1ml/100ml of the lower concentration fertilizer, Daphnia and Cyclops mortality rates did not increase measurably.</p> <p>Conclusions Based on the results, Daphnia and Cyclops mortality rates are affected by increased concentrations of agricultural pollutants due to run-off. Concentrations of 1ml fertilizer/100ml water and higher affect Daphnia and Cyclops measurably and immediately. The Arcata Marsh is set alongside pasture land and in a California county known for growing cannabis. Before cannabis recently became legal, a lot of cannabis grow sites stored fertilizer in large holes in the ground, or in bags stacked on bare earth. Without regulations, the fertilizer from cannabis grows could be drawn into our freshwater watersheds through run-off. The close position of agricultural lands to watersheds also adds to the fertilizer run-off which could affect Daphnia and Cyclops and the food web and ecosystem that rely on them.</p>	
Summary Statement Based on the counts of freshwater Daphnia and Cyclops in differentiated concentrations of fertilizer over the span of two weeks, it is supported that agricultural pollutants affect the health and sustainability of freshwater ecosystems.	
Help Received Greta Turney helped me redesign my experiment when the concentrations were too high. Jill Macknicki helped me create my backboard.	