Effect of Antifreeze on a Keystone Species

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We investigated how pollution of ethylene glycol, commonly known as antifreeze, affects the respiratory system of Crassostrea virginica (Eastern Oyster), a keystone species of the Chesapeake Bay ecosystem. We set up 10 buckets containing 16 L of bay water, an aerator, 20 mL of algae, and one 7.62 cm oyster. The experimental group had 20 mg/L of ethylene glycol. We used a logger device and a turbidity light sensor to measure the starting and ending NTU after 24 hours. A colorimetric oxygen kit measured the starting and ending dissolved oxygen levels (mg/L). For the control group, the average decrease in turbidity was 0.5 NTU. However, the group containing 20 mg/L of ethylene glycol had an average decrease of .2 NTU, significantly lower. A two-sample t-test on the turbidity data gave us a p-value of .0001. This test shows the significance of our data in comparison to the control. A p-value below .05 is significant. Additionally, the control group had a 4.4 mg/L average decline in the oxygen level. The group treated with 20 mg/L of Ethylene Glycol had an average decline of 2.4 mg/L. A two-sample t-test on the dissolved oxygen data also gave us a p-value of .0001. Data revealed water with ethylene glycol had a slower decline in turbidity and dissolved oxygen on average. This suggests ethylene glycol slows the speed of the filter-feeding process and reduces the oyster's ability to acquire dissolved oxygen. Therefore, ethylene glycol pollution could reduce oyster populations and could indirectly increase water pollution.

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