



Colorado Science and Engineering Fair

2025 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: A Sustainable Cyanobacteria Mitigation Method for Freshwater Ecosystems in the Rocky Mountain Region

Finalist's Name: Natalie Muro

School and City: Palmer High School in Colorado Springs

Sponsor's Name: Nathaniel Lohmann

Category: Environmental Engineering

Division: Senior (grades 9 - 12)

Abstract (250 words or less):

The purpose of this project was to engineer a cyanobacteria mitigation device and test how deployed, regulated concentrations of hydrogen peroxide could kill cyanobacteria and how Great Mullein biochar held in the device could collect the cyanobacteria detritus. I hypothesized 2.5mL/500mL of 3% hydrogen peroxide in distilled water would be the most effective at killing Anabaena, and Great Mullein biochar would be effective at reducing the amount of detritus in the water.

The experiment involved two parts. The first part was to test how deployed concentrations of hydrogen peroxide [0mL (control), 0.5mL, 1.5mL, and 2.5mL] affect Anabaena death rates. The second part was to test how effectively detritus (constituted by dying and dead cells) was collected by Great Mullein biochar.

The data collected did support the original hypothesis. The findings lead to the conclusion that 2.5mL/500mL of hydrogen peroxide was most effective at killing the Anabaena and the Great Mullein biochar was effective at cleaning up the detritus. Statistical analysis suggested that 2.5mL/500mL of hydrogen peroxide after 48 hours was statistically significant compared to the control decreasing the Anabaena by 99%. Additionally, statistical analysis also suggested that when biochar was added to the water, the amount of detritus was decreased compared to water without biochar by 96%. The combination of hydrogen peroxide and Great Mullein biochar created a successful method to mitigate harmful algal blooms.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. **A signed copy of this form must be included in your notebook.**