



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: Photosynthesis Through Thick and Thin: Development of a Light Collecting Device to Prevent Winterkill in Ice Covered Lakes

Finalist's Name: Kayla Melby

School and City: Yuma Middle School, Yuma

Sponsor's Name: Amy Melby

Category: Earth & Environmental Sciences

Division: Junior (grades 6 - 8)

Abstract (250 words or less):

Winterkill, when fish die during the winter, occurs when ice/snow remains on the lake for an extended time, limiting sunlight, and resulting in a decrease in photosynthesis and dissolved oxygen levels. Four light collecting devices/prototypes were designed that would allow light to go through an ice-covered lake so plants could continue photosynthesis and produce oxygen. Prototype-1 used bundles of fiber optics. Prototype-2 used a Fresnel lens placed in a funnel that was designed and 3D printed. Prototype-3 used a new funnel that was designed and 3D printed and had fiber optics placed inside the funnel. Prototype-4 featured a 3D printed ring that held fiber optics, and had a groove to hold the Fresnel lens. It was hypothesized that the prototypes would maintain an average pH levels of 8.8 for 5 days. Each prototype was tested by inserting the prototype into a board on top of an aquarium, which simulated no light getting through to the plants below. Beneath the board, algae bead vials were placed on the surface and on the bottom of the aquarium. By monitoring the pH level of the algae bead vials, photosynthesis and performance was determined. The hypothesis was partially achieved for Prototype 1, since Prototype-1 had the highest pH after 5 days: 8.5 for algae beads on the surface and 8.8 for the bottom. A second round of testing is underway.

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.**