



# Colorado Science and Engineering Fair

## 2024 Team 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: Application of eDNA and qPCR Techniques for Detecting Northern Redbelly Dace (*Phoxinus eos*) in Aquatic Environments

Team Leader's Name: Anya Wieder

Team Member 1: Taryn McDermid

Team Member 2:

School and City: SWSD Innovation Center, Longmont

Sponsor's Name: Jayme Sneider

Category: Earth & Environmental Sciences (EAEV)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

With so many freshwater ecosystems being negatively impacted by humans globally, the need for non-invasive monitoring tools is of utmost importance. We sought to explore the application of environmental DNA (eDNA) and quantitative polymerase chain reaction (qPCR) techniques to detect the presence of the Northern Redbelly Dace (*Phoxinus eos*), a native and endangered fish species that is vital to the biodiversity and health of Colorado ecosystems.

15 eDNA samples were collected at three ponds across Boulder County. One pond had a known presence of Northern Redbelly Dace and two were unknown. DNA extracted from these samples was then analyzed with qPCR techniques with primers targeting the specific genetic markers unique to Northern Redbelly Dace. qPCR enables the quantification of target DNA and allows for precise determination of species presence, allowing us to non-invasively and accurately identify whether or not Northern Redbelly Dace were present. We predicted that we could identify Northern Redbelly Dace presence in all samples.

Our results did not align with our hypothesis and cannot be deemed as significant. Our positive and negative controls yielded highly inconsistent and inconclusive results, preventing us from evaluating Northern Redbelly Dace presence in the study of the ponds. Going forward, we hope to improve our lab techniques and produce valid analytical controls, allowing us to run eDNA samples and more confidently identify Northern Redbelly Dace presence.

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

Team Leader's Signature: Anya Wieder

Date: 3/1/24

Team Member 1's Signature: Taryn McDermid

Date: 3-1-24

Team Member 2'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 your Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.