

Ocean First Institute's Report on Grant Funding from The Lois Webster Fund Committee:

Ocean First Institute (OFI) is honored to be a grant recipient of the Lois Webster Fund. OFI used the funding to purchase a YSI, which is a critical tool in our species and habitat conservation work and educational outreach. The YSI is a professional high quality and high-resolution scientific tool that helps scientists better understand and manage water resources.

OFI's work is focused on educational outreach, but also centers around substantive scientific research, and real-life conservation. As such, having a high-quality tool like the YSI enables us to do significant scientific analysis and increases our ability to do quality work and to teach students scientific method through hands on field research and true conservation. OFI needed the YSI for aquaculture and source water safety analysis for the Northern Redbelly Dace Recovery and Restoration project in 2021/2022. The Northern Redbelly Dace are an endangered species of minnow in Colorado that came to OFI's attention in 2020 and they immediately began working to recover and restore this tiny native fish to it natural habitat.

The Northern red belly dace ranked as endangered or threatened in Colorado (S1 State endangered) ...where populations occur as small, isolated demes that have been declining steadily since European settlement over 100 years ago...The two primary threats to northern redbelly dace in region 2 include habitat alteration and the introduction of non-native fishes. These dace occur in small, confined places of permanent spring seeps, usually at the extreme headwaters of small streams. Members of the natural fish community in these habitats are highly adapted to the special conditions found there. Water development activities that change natural spring flow (e.g., reservoir construction, groundwater pumping, stream diversions, channelization) lead to habitat degradation and stream fragmentation.¹

OFI in partnership with the Boulder County Parks and Open Space Foundation, Colorado Parks and Wildlife, the Denver Zoo, and the St. Vrain Valley Innovation Center in a recovery and restoration project to work with multiple schools from the St. Vrain Valley and Boulder Valley area. Several classes of middle and high school student spent months learning aquaculture techniques to breed, grow and release thousands of Northern redbelly dace back into the wild.

¹ Stasiak, 1, Northern Redbelly Dace (*Phoxinus eos*): A Technical Conservation Assessment, https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5206788.pdf

This endeavor led by OFI, was enjoined to engage approximately 200 students and community members in substantive species conservation in Boulder County.

In 2021, after the first successful grow of the dace, OFI began monitoring the eDNA and the water quality of the ponds where the dace fish were released. In order to succeed in this effort, it became necessary to purchase a high quality, scientific tool that was beyond our budget to purchase and we borrowed a tool from Boulder County Parks and Open Space. The scientific YSI enables us to monitor water quality and determine the safety of the water for species release and restoration. OFI needed the YSI for our on-going, award-winning species conservation efforts with the endangered northern redbelly dace.

Thus, OFI applied for the funding from the Lois Webster Fund. Upon receiving the grant funding and purchasing the YSI, we were able to increase the quantity and quality of our work through scientific analysis of the ponds and surrounding water sources where the first release of the dace took place. In 2021 over 600 fish were released at Pella Crossing, where students are still monitoring the dace, who appear to have successfully navigated environmental hazards after surviving a gas spill upriver of the crossing. This year with the use of the YSI the students were also able to monitor the new release site for the safety of the next round of dace. Understanding the water quality of the release site for the redbelly dace is critical for monitoring the survival of our reintroduced native fish. The students worked hard to find just the right release site to bolster the dace's chance of survival. After extensive testing, the students identified a healthy, predator free site. Over 800 fish were successfully released into Hepp Pond in Boulder County in the summer of 2022 and appear, after continuous bi-weekly monitoring, to be thriving!

The YSI instrument collects many kinds of water quality parameters that directly affect fish survival. Temperature is a unique factor for fish because they are cold-blooded and only breed at a certain temperature range. Dissolved Oxygen is critical for fish survival and many fish cannot tolerate levels below 3.0 mg/L. We also measure conductivity, which can influence the stress on the body of fish, as well as survivorship of their eggs and young. Finally, we measure pH, and most fish prefer to live in a neutral environment, and so acidic or alkaline waters can preclude survivorship of redbelly dace. School students use this instrument to monitor the release locations of dace up to two times per month. Having the ability to track water quality is important in the rewilding success of the northern redbelly dace. (More information about the project can be found at: <u>www.redbellydacerecovery.org</u>, where there are links to our awards and several articles about the project.)

The Northern Redbelly Dace Recovery and Restoration project has enjoyed significant success and recognition. To date, it has won multiple prestigious International, National, State and Local awards. The awards that the project and the OFI team has received include: The St. Vrain Students being awarded the World Challenge Award, Outstanding Achievement in Ecological Restoration from the Colorado Open Space Alliance, the 2021 Lauren Townsend Memorial Wildlife Fund grant, The National Association of Counties Achievement Award in the Parks, and Recreation category. Also, just this past month, we received the 2022 innovation award from the Colorado Alliance of Environmental Educators for our significant and innovative work with Colorado middle and high school students. One of the lead educators on the Dace project, Jayme Schneider from the St. Vrain Valley Innovation Center, stated the following regarding the project and its impact on students:

"Some of the most significant growth/benefit/experience from the NRD project for the students includes all of the hands-on work and large-scale collaboration. This project involves over six different project teams at the Innovation Center. The students from the various teams need to communicate needs and goals for the final aquatic robot to be successful. In addition to building our own sensors, the data science team is also working with many professionals and community partners to help run their own in-house fish hatchery and monitor the field release sites for these endangered fish.

The students have learned about what kind of data to collect, how to collect this data, how to analyze the data, and finally how to tell our story based on the data. The students really understand quality control and quality with breeding and raising the fry successfully, as well as following River Watch and industry protocol for field sampling. Some of these students were not comfortable out in the field when they first went out to the ponds, but now they love our field days!"

OFI's mission with educational outreach locally and abroad is to inspire a new generation to become conservationists by understanding and becoming passionate about scientific research and the environment through hands on field learning. We are proud that so many students were inspired to work with us in species conservation, and that several of the older students that worked on the project went on to receive admission and scholarships to prestigious science programs at California State at Berkeley, University of Florida, University of Oregon, University of California at Santa Cruz and Montana State University, just to name a few.

As we grow our organization and expand our outreach, we look forward to continuing to inspire youth with dynamic, interactive field research, conservation, and education. OFI will be continuing to use the YSI in Colorado to monitor the success of the dace and will also use it to determine breeding and release locations for the newest 2023 Colorado project in species conservation for the Northern Leopard Frog. Outside of Colorado, we now have an opportunity to work with high school and college students in the Gulf of Mexico, where we continue to do work in water quality testing and analysis for economically and environmentally important fish, like the Snook, the Sheepshead, and the Giant Goliath Grouper. We look forward to continuing to report how the YSI will assist us in our educational outreach, species conservation, and scientific research locally, nationally, and globally for many years to come!