

2025 Contra Costa County Fish & Wildlife Propagation Grant 25-3401

Final Report from the John Muir Chapter of Trout Unlimited

Wildcat Creek Fish Habitat And Fish Barrier Assessment Study

Trout Unlimited is conducting a multi-year project on Upper Wildcat Creek, in collaboration with The Watershed Project, and under the supervision of the East Bay Regional Park District. The original Research Proposal was accepted by the EBRPD, and a Research Permit was approved for a 3 year period May 18, 2023 to May 18, 2026. The project focus initially was on fish habitat suitability with an emphasis on water quality, but that evolved over time to include restoration work and public involvement.

As TU and TWP conducted this work it became apparent that a limiting condition affecting cold water fish populations in Upper Wildcat was fish mobility and access to high quality habitat, so we requested from EBRPD a research permit extension to include fish passage barrier assessment. EBRPD extended the TU research permit to Nov. 30, 2027.

Background

The rainbow trout (*Oncorhynchus mykiss*) is an iconic and charismatic native fish species found in Northern California's coastal areas, making it a compelling tool for public engagement and environmental education. Resident rainbow trout are not state or federally protected but maintaining and enhancing their populations are natural resource management priorities because of the species' current limited distribution and their important ecological functions. In addition, resident populations are adapted to local conditions and may provide the gene pool for re-establishing populations in other local streams as they are restored.

The EBRPD Fisheries Management Unit conducts annual fisheries surveys using electroshocking to document and track population trends and utilizes that data to assist in evaluating species health and to develop management and restoration strategies (**Figure 1**).

Goals and Objectives

Given this background, the goal of the 2025 study was to characterize the habitat discussed above, and to add a fish barrier assessment component to the study.

The objectives of the project are:

- Build on the monitoring work conducted by The Watershed Project in lower Wildcat Creek to create a whole-watershed water quality baseline, and create a sustainable monitoring program to identify trends that will help guide future restoration efforts.
- Characterize the water quality and habitat conditions in the upper watershed where there is a resident population of rainbow trout, and where trout can spawn and rear, and also for the potential population of steelhead trout that is envisioned as fish passage barriers in the watershed are mitigated.
- Identify habitat needs that are not currently served, especially in light of climate change, and plan climate resilient restoration of habitat (riparian vegetation, woody debris, refugia pools, etc) needed to sustain and grow the native trout population.
- Identify opportunities for expanding habitat through fish passage barrier restoration.

Collaboration

The study is a collaborative effort with the East Bay Regional Park District and The Watershed Project (TWP) which has conducted water quality monitoring at 4 stations in the lower portion of the watershed between Verde School and Alvarado Park. Trout Unlimited and TWP applied for and received approval of a research proposal from the EBRPD that extends from May 2023 to Nov. 30 2027. Staff from The Watershed Project provide training to TU volunteers and expertise in data quality and management.

Sampling Plan

Sampling is being conducted at 6 stations, with 4 stations in Tilden Park and 2 stations in Wildcat Canyon (**Figure 2**). The stations in Tilden Park are located between Lake Anza and the EBRPD Environmental Center, and are typically in a low gradient environment with stable substrate of gravel and rocks. In general there is a healthy riparian corridor. There is a trail adjacent to the stream that is popular with visitors, some of which have dogs which are encouraged to stay out of the stream. By contrast

the two stations in Wildcat Canyon are more remote, and the reach is steep and subject to significant sediment transport and streambed alteration.

Two types of monitoring equipment are employed: spot measurements using portable instruments and continuous measurements using instruments placed in the stream. Monthly measurements of dissolved oxygen and temperature are taken at each station with a YSI PROi 20 DO/T meter, and pH, conductivity, total dissolved solids and salinity are obtained with an Oaktan PCTS Testr30 unit. Quasi continuous (2 hour interval) dissolved oxygen and temperature is obtained using Onset Hobo Unit U26-001 sensor and dataloggers that are fixed to the stream bottom with rebar.

In addition to the water quality data, the following data are obtained primarily through visual means:

- weather observations
- hydrology (water depth, velocity and flow)
- observations of algae and other aquatic plants
- macro-invertebrate species
- streambed materials (mud, sand, gravel, etc)

The fish passage assessment element is being conducted in conformance with California Fish Passage Forum Guidance on rapid assessment methods. <https://www.cafishpassageforum.org/methods-protocols-guidelines/> Members of the TU and TWP monitoring team have been trained by CDFW staff on this guidance.

Data Management and Reporting

All monthly data is submitted into the California Environmental Data Exchange Network (CEDEN) program and the online water quality database maintained by The Watershed Project (<https://thewatershedproject.org/our-programs/healthy-watersheds/>). The Watershed Project Data Base contains the monthly data for all stations. Selected DO and temperature data obtained from the Hobo Units can also be found in The Watershed Project website.

Fish Passage Assessment data are being conveyed to the CDFW Biogeographic Information and Observation System (BIOS), and ultimately will be input to the California Fish Passage Assessment Database. <https://www.calfish.org/ProgramsData/HabitatandBarriers/CaliforniaFishPassageAssessmentDatabase.aspx>

Quality Assurance

Quality Assurance/quality control measures are those activities undertaken to demonstrate the accuracy (how close to the real result the data are) and precision (how reproducible the results are) of the monitoring. The Watershed Project assisted in this aspect of the project through: 1) training of TU monitoring staff in the field, 2) training to fill out data forms, and 3) training on calibration before and after each monthly sampling event according to manufacturer's' instructions. All monthly monitoring data were reviewed, approved, or conditioned by staff at The Watershed Project. In general these procedures followed the California Water Resources Control Board's "Clean Water Team Guidance Compendium for Watershed Monitoring and Assessment" https://www.waterboards.ca.gov/water_issues/programs/swamp/clean_water_team_guidance.html#70

Quality assurance was also addressed through routine inspections of the Hobo units installed in the streams. Problems associated with siltation of the units and algal growth on the sensors was addressed through monthly inspections. Also batteries and sensor caps were replaced as needed.

Community Outreach

The monitoring is being conducted in a popular recreation area, and it is natural that hikers are interested in what the monitoring staff is doing. To capitalize on this, Trout Unlimited created a poster describing the work, and displayed the poster in a prominent location near the sampling stations (**Figure 3**). The poster also showed how people could obtain additional information and volunteer if interested. Trout Unlimited also cooperated with the EBRPD in conducting monitoring site visits and presentations to the EBRPD Junior Rangers, Boy Scouts and other interest groups.

Example of Water Quality Data

Monthly Data

Monthly data were collected in digital form and input into The Watershed Project online data base. An example of temperature and Dissolved Oxygen from September 2023 through July 2025 as measured at the Brooks Station is shown in **Figure 4**. The DO figure shows the 5 mg/L minimum limit for trout. Water can contain more dissolved oxygen as the temperature of the water decreases. So there is an inverse relationship

between the two. When the water is colder, the dissolved oxygen is higher, when the water is warmer the dissolved oxygen is lower. So the critical condition of high temperature and low DO occurs in the late summer and early fall when the weather is hotter and streamflows are low. These data indicate that temperature and DO conditions at this station meet the requirements for a sustainable population of rainbow trout.

Continuous Data

Figure 5 shows continuous measurements of Dissolved Oxygen and Temperature collected in Tilden Park at the Nook Station from October 15, 2023 through November 10, 2025. The graph shows Dissolved Oxygen (in blue) with the scale mg/L on the left, and temperature (in red) with the scale in degrees Centigrade on the right. The band in temperature and DO represents the daily range in these conditions.

Trout prefer cold and highly oxygenated water. As a general rule, trout prefer water with dissolved oxygen over 5 mg/L and water temperature below about 60 degrees Fahrenheit (15 degrees Centigrade). Conditions become more critical during the dry season when flows are lower, and temperatures are higher. During such conditions trout seek out “hold over pools” where water is deeper and ideally shaded by vegetation. In general the data indicate that DO and temperature during the dry season at this station were suitable for trout.

The figures occasionally show a sharp drop in dissolved oxygen, which tend to occur during warm periods. This may be indicative of periods of algal growth which could accumulate around the sensor, which results in inaccurate DO measurements.

Findings Regarding Habitat in Upper Wildcat Creek

Based on the first 2 years of monitoring, the following are the initial preliminary findings regarding the overall conditions in Upper Wildcat Creek with regard to cold water habitat.

- Water Quality at all stations were generally suitable for cold water fish in that Dissolved Oxygen was generally above 5 mg/L and temperature was less than 15 deg C (60 deg F) during the hottest and driest portions of 2024 and 2025.
- Observations of macro-invertebrates on rocks are indicative of good water quality.
- There are good reaches of cobble/gravel at many stations, though some stations were depositional and covered in silt. The stations in Wildcat Canyon are steeper and

tend to have higher flows and more sediment transport which could adversely affect spawning and rearing habitat.

- Riparian coverage is very important in maintaining cooler temperatures. This observation led to a project to restore the riparian habitat at the Waterfall Pool Station pool.
- Algae was identified in some of the Tilden stations, driven by high temperature and nutrients.

Fish Observations

Fish observations conducted by EBRPD staff fish biologists in 2025 electroshocked rainbow trout at sampling stations in Tilden Park including the Waterfall Pool Station (**Figure 6**) and the station just below Brooks Road crossing. This was the first year in six years that the electroshocking found rainbow trout.

Fish Barrier Assessment

The fish barrier assessment work began in the fall of 2025 with data collected at the Brooks Station barrier (**Figure 7**.) The data have been submitted to the CDFW Biogeographic Information and Observation System (BIOS) as an initial effort at collaborating with this program. Ultimately it is anticipated that the data will be entered into the California Fish Passage Database.

The next area to be investigated will be the Havey Creek watershed which flows into Wildcat Creek at the Rifle Range Monitoring Station through an elevated culvert. Initial water quality data and flow observations indicate that this tributary has potential for providing good spawning and rearing habitat.

Restoration

The ultimate purpose of monitoring is to identify limiting factors that restrict fish populations and to restore the ecological system such that fish can thrive. Just such an opportunity occurred at the Waterfall Pool station where water temperatures were elevated, in part because of a lack of sufficient riparian vegetation and shade. This observation led to a cooperative restoration project conducted by the EBRPD and Trout Unlimited, that led to planting riparian vegetation around the periphery of the Waterfall Pool Station and the installation of additional fencing to prevent dogs from entering the pool. **Figure 8** shows volunteers from Trout Unlimited and EBRPD planting

vegetation including willows and plants that attract pollinators that can potentially add to the aquatic food chain.

Summary

This report summarizes activities and findings from a project being conducted jointly by the John Muir Chapter of Trout Unlimited and The Watershed Project under a research agreement with the East Bay Regional Park District. The project was initiated in May 2023 and under the current agreement, will extend to November 2027. The focus of the work in 2024 and 2025 was on monitoring fish habitat in Upper Wildcat Creek, and that focus has now been expanded to include fish barrier assessment. The ultimate goal of this work is to improve fish habitat through restoration, including restoring access to high quality habitat by removing fish barriers. The project also is designed to educate and encourage participation of the public who recreate in Tilden Park and Wildcat Canyon.



photo credit: Peter Mangarella

Figure 1 Fish Sampling in Wildcat Creek Conducted by EBRPD Fisheries Biology Staff



graphic credit: Satoko Mills, The Watershed Project

Figure 2 Sampling Stations in Upper Wildcat Creek

STUDY IN PROGRESS



The purpose of this study is to obtain data on the cyclical nature of Wildcat Creek hydrology and water quality throughout the watershed. We would apply the study findings to better understand the habitat conditions (with respect to the spawning and rearing seasons) that native and anadromous fish would experience in this era of global warming and drought.

Significant work is being conducted in Wildcat Creek to reconnect the watershed so as to facilitate steelhead and salmon passage between San Francisco Bay and the headwaters of Wildcat Creek in Tilden Park. For these efforts to be successful, there must be suitable spawning and rearing habitat in Wildcat Creek.

The study is a collaborative effort with the East Bay Regional Park District and The Watershed Project (TWP) which has conducted water quality monitoring at 4 stations in the lower portion of the watershed between Verde School and Alvarado Park. Trout Unlimited and TWP has applied for and received approval of a research proposal from the EBRPD that extends from May 2023 to May 2026. Staff from The Watershed Project are providing training to TU volunteers along with expertise in data management. Monitoring commenced in September 2023.

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TROUT UNLIMITED



East Bay
Regional Park District

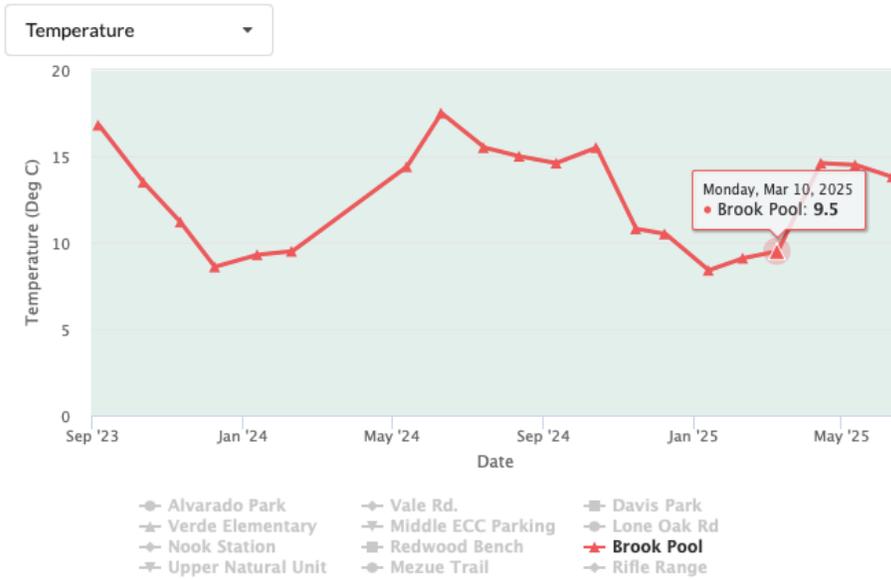


HELP US! STAY OUT OF THE WATER HERE

graphic credit: Roger Wachtler

Figure 3 Poster Placed Near Each Station Explaining Project and How to Obtain Additional Information, Including Volunteering

Select Water Quality Feature



Click and drag on the chart to zoom in

▶ more details

Plots

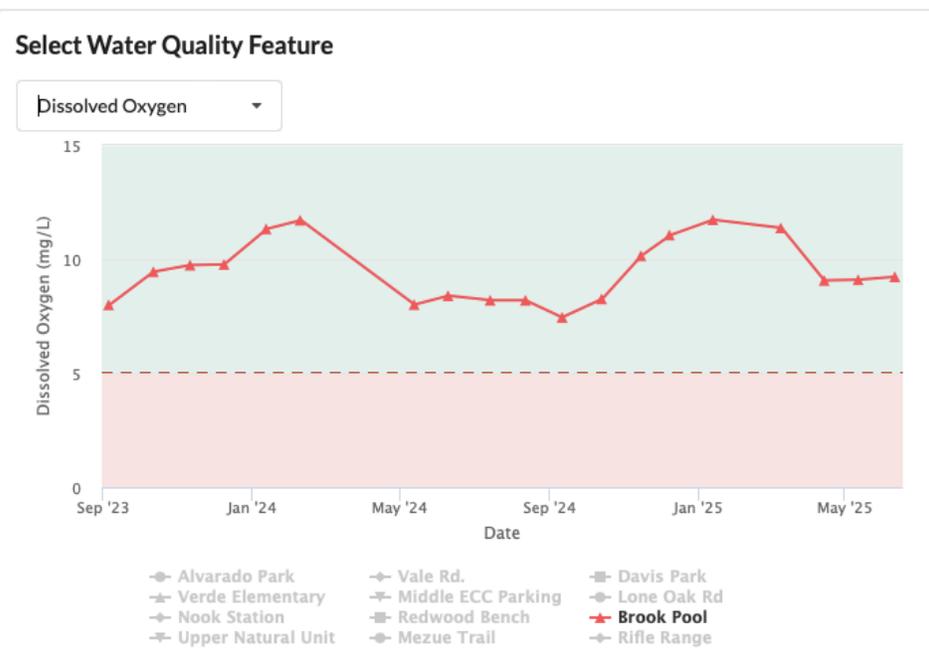


Figure 4 Monthly Temperature and Dissolved Oxygen at Brooks Station.

Temperature vs. DO at Nook Station at Wildcat Creek

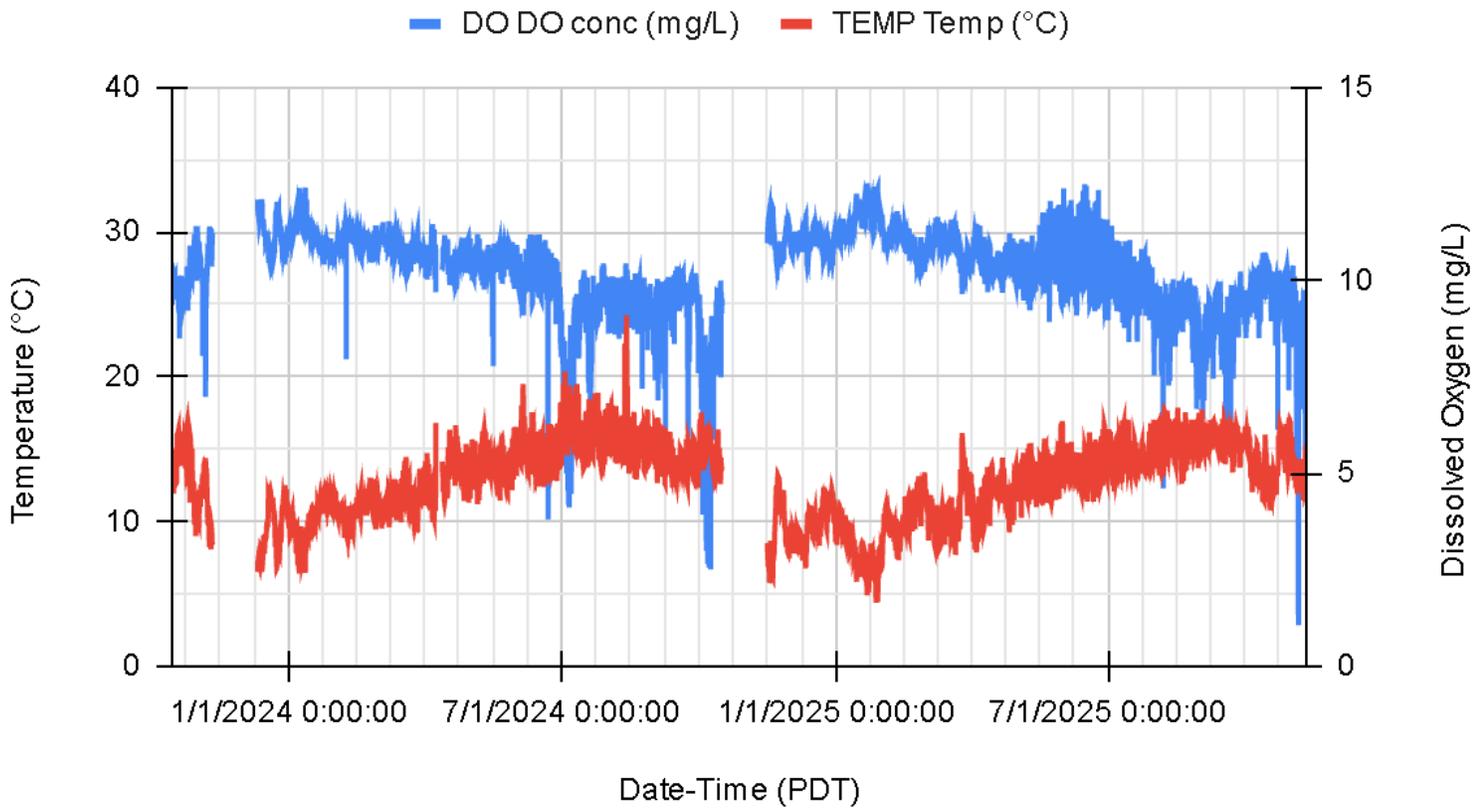


Figure 5 Continuous Dissolved Oxygen and Temperature Measured at Nook Station from October 15, 2023 to November 10, 2025. The gap in data corresponds to periods when the Hobo units are removed from the stream for maintenance.

credit: Satoko Mills The Watershed Project



photo credit: Satoko Mills The Watershed Project

Figure 6 Rainbow Trout Sampled by EBRPD during 2025 Annual Fish Survey at Waterfall Pool Station, Tilden Park.



photo credit: Roger Wachtler John Muir Chapter of Trout Unlimited

Figure 7 Brooks Road Crossing Fish Barrier in EBRPD Tilden Park



photo credit: Roger Wachtler, John Muir Chapter of Trout Unlimited

Figure 8 Riparian Vegetation Restoration at Waterfall Pool Station

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**TROUT
UNLIMITED**

c/o Richard Unger, Treasurer
5622 Oak Grove Ave.
Oakland, CA 94618

December 11, 2025

Maureen Parkes
Contra Costa County Department of Conservation and Development
30 Muir Road
Martinez, CA 94553. via email

Dear Ms. Parkes,

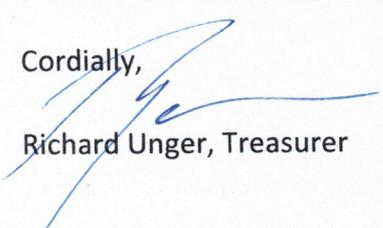
Enclosed please find our organization's financial report for the Department's 2024-2025 grant for our project "Wildcat Creek Water Quality and Fish Habitat Monitoring Study".

I have enclosed a printout of the County's requested table of our expenditures as well as a breakout second sheet indicating prices of the purchased items with sales tax and shipping recorded separately. Our budget request to the county listed shipping as a separate line item, but did not include sales tax. Additionally, we had requested a budget item for battery replacements for instream monitoring units. However in our experience towards the end of the budget cycle, we found that most of these batteries had not yet reached the end of their duty cycle, but because of the stream conditions we encountered, the units did require earlier membrane and cap replacements. One unit required a battery replacement (invoice item #4. We hope that the County will take these changes in our expenditures as made within the general requirements for flexibility in allowing us to pursue the Grant's objectives. We are not asking for any additional funds from the County beyond the \$7,030 generously granted.

Should the auditors have any questions regarding the financials, I would be pleased to respond to any questions. They should contact me directly at (510) 529-5356.

My colleague, Peter Mangarella will be submitting our report on the very fruitful activities we were able to conduct as supported by the County's generous grant.

Cordially,


Richard Unger, Treasurer

2550 9th Street, Suite 104
Berkeley, CA 94710

<http://johnmuirtu.org>
info@ebtu.org

"Wildcat Creek Water Quality and Fish Habitat Monitoring Study"

JOHN MUIR CHAPTER OF TROUT UNLIMITED

Approved Dec 11, 2024

Contact Richard Unger (Treasurer) (510) 529-5356

Invoice Page #	Description of service/item and amount allowable from grant award		Vendor	Receipt date and invoice number
1	Replacement DO sensor cap	\$ 784.03	Onset	4/16/25 WB00115933
2	YSI Pro 20i DO/T Sensor	\$ 1,193.31	Fondriest	2/12/25 151638-3
3	YSI Pro 20i DO/T Sensor	\$ 1,233.79	Fondriest	6/12/25 155613
4	Hobo Logger Battery replacements	\$ 319.00	Onset/Hok	10/28/25 316194
5	Oakton PCT tester and stds	\$ 479.60	ColeParme	2/12/25 W020250212N0218
6	Oakton PCT tester and stds	\$ 435.47	ColeParme	6/12/25 W020250612N0168
7	Hobo Dissolved Oxygen Logger	\$ 1,636.50	Onset	12/2/25 WB00123597
8	Waders	\$ 307.95	Ms Mayfly	12/2/25 5310
9	Waders	\$ 363.77	Amazon	12/2/25 112-9226937-409066
10	Replacement DO sensor cap	\$ 766.73	Onset	10/15/25 WB00122166
S1	Shipping	\$ 18.71	UPS	10/15/25 MM51VP1A91A04
S2	Shipping	\$ 30.81	UPS	11/8/25 MM1VP1K92D4R

"Wildcat Creek Water Quality and Fish Habitat Monitoring Study" BREAKOUT

JOHN MUIR CHAPTER OF TROUT UNLIMITED

Approved Dec 11, 2024

Contact Richard Unger (Treasurer) (510) 529-5356

Invoice
number

	Number	Allowed Unit price	Total Price	Purchase Date	Item Price	Sales Tax	Shipping	total	
Onset DO Sensor caps	6	115	690	4/16/25	\$ 690.30	\$ 70.73	\$ 23.00	\$ 784.03	#1
YSI Pro DO/T Sens	2	1092	2184	2/12/25	\$ 1,078.23	\$ 78.17	\$ 36.91	\$ 1,193.31	#2
				6/12/25	\$ 1,115.97	\$ 80.91	\$ 36.91	\$ 1,233.79	#3
Cap and Membran	2	81.25	162.5						
ONSET HOBO DO Battery relacement	6	250	15600	10/28/25	\$300.00		\$ 19.00	\$319.00	#4
Oakton PCTS Test	2	301.5	603	2/12/25	\$ 381.40	\$ 46.55	\$ 51.65	\$ 479.60	#5
				6/12/25	\$ 393.20	\$ 42.27		\$ 435.47	#6
Replacement for Onset Dissolved Oxygen HOBO Unit	1	1395	1395	12/2/25	\$ 1,439.00	\$147.50	\$ 33.00	\$ 1,636.50	#7
Waders	2	350	700	12/2/25	\$ 299.00		\$ 8.95	\$ 307.95	#8
				12/2/25	\$ 329.95	\$ 33.82		\$ 363.77	#9
Replacemet D/O Sensor Cap			690	10/15/25	\$ 696.00	\$ 70.73		\$ 766.73	#10
Other Shipping			500	10/15/25			\$ 18.71	\$ 18.71	s1
				11/8/25			\$ 30.81	\$ 30.81	s2
Totals					\$ 6,723.05	\$570.68	\$258.94	\$ 7,569.67	