Blue Ribbon Committee for the Rehabilitation of Clear Lake:

Technical Subcommittee

# TERC Update

UCDAVIS
Tahoe Environmental
Research Center

January 27th, 2022

https://terc-clearlake.wixsite.com/cldashboard

Analysis of Long-Term Data – led by Ruth Thirkill

Data Sources (1968 – Today)

- Department of Water Resources

- Big Valley Rancheria

- Elem Indian Colony Environmental (California)

- Environmental Protection Agency

- Aquatic Pesticide Monitoring Program

- Sacramento Valley Water Quality Coalition

- Surface Water Ambient Monitoring Program

- United Sates Geological Survey

- CDFA National Discharge Pollution Elimination System

- University of California Davis
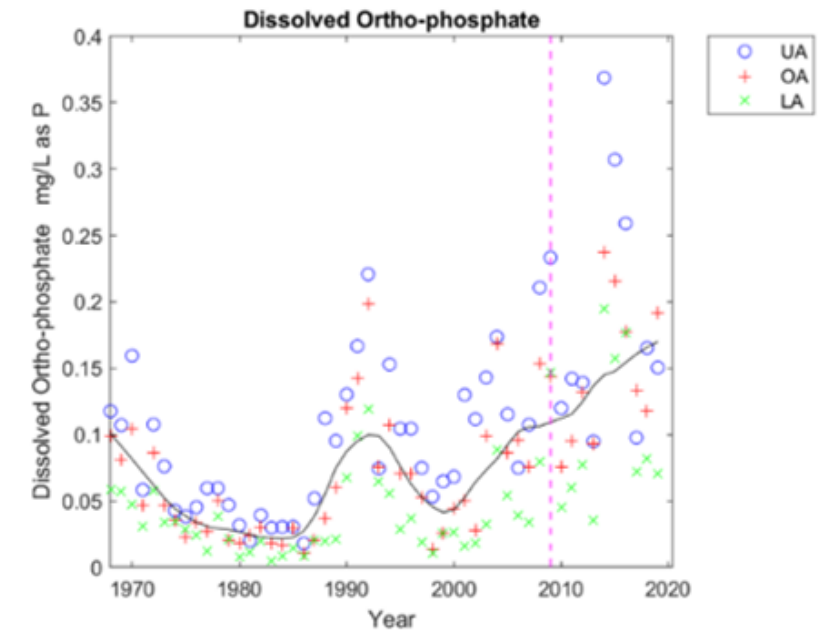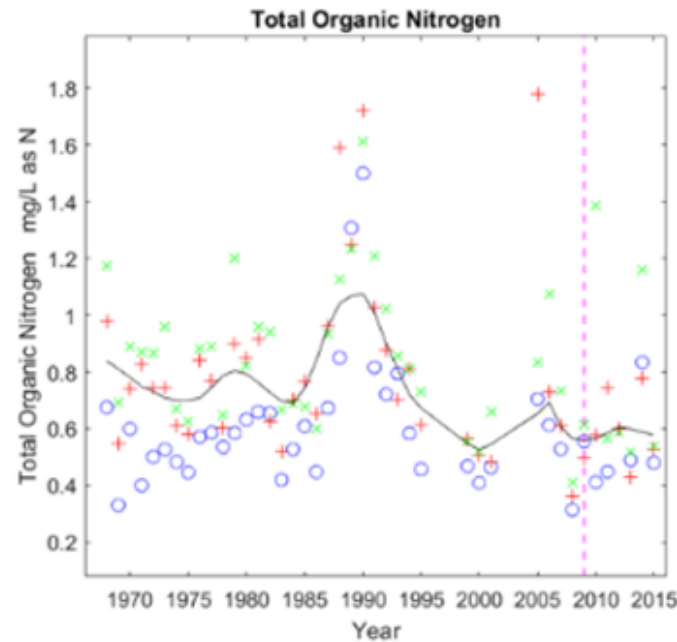
Clear Lake is becoming more frequently nitrogen limited while bioavailable phosphorus (dissolved orthoP) is increasing

Phosphorus Cycle and Cyanobacteria – led by Micah Swann

What drives the severity in cyanobacteria blooms?

- Cyanobacteria tend to be favored in P enriched waters with **low N:P ratios**

- In Clear Lake ~90% of the P in the water column is added to the system due to **internal loading,** which mainly occurs under **anoxic conditions next to the sediments**
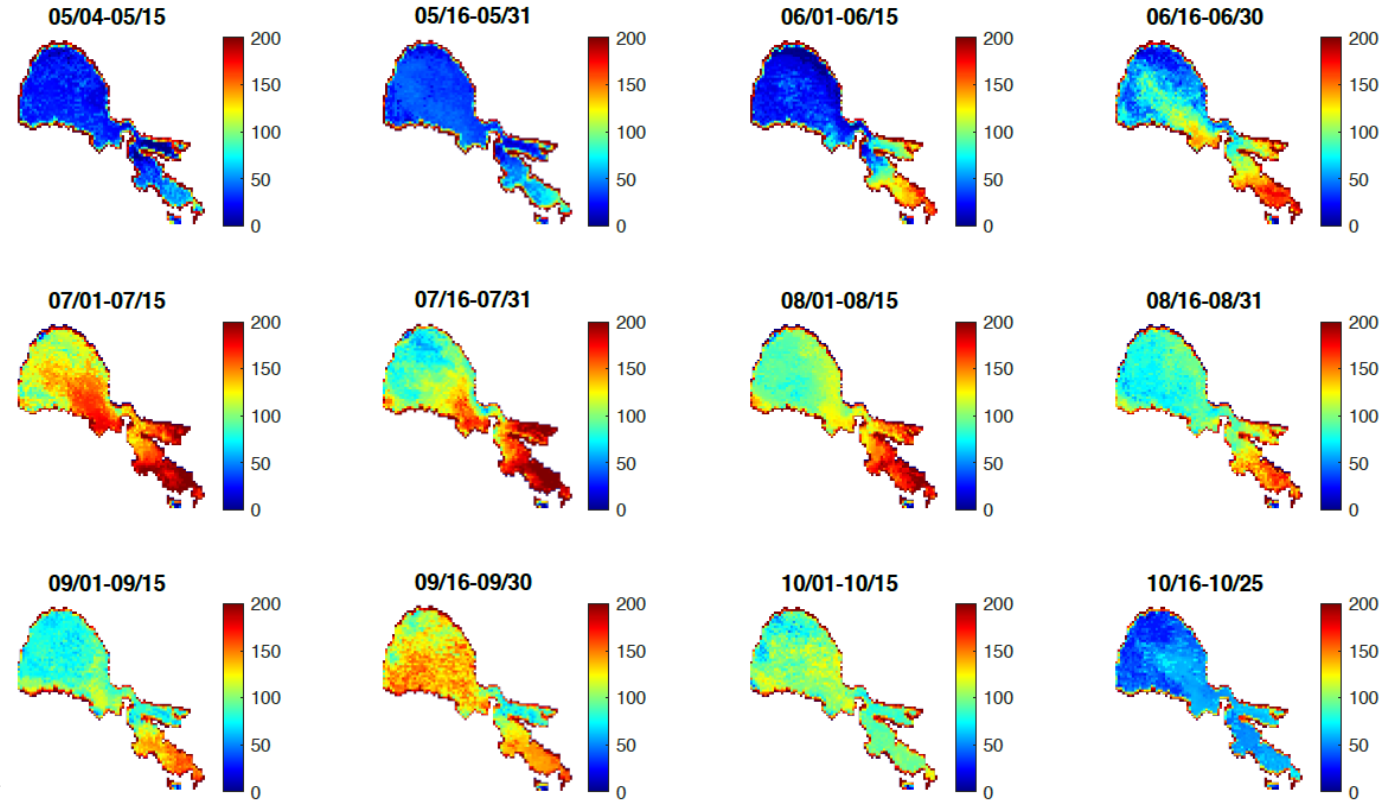
Bi-weekly averaged modified Cyanobacteria Index across Clear Lake from May to October, 2003-2021 (SFI)

# Design Rehabilitation Pilot Project for 2024:
Goal: Reduce internal release of Phosphorus
Method: Hypolimnetic Oxygenation

Validated 3D numerical model will be used to decide:

- **Where** should be the system installed? E.g. Oaks Arm

- **How much oxygen and how many diffusers** to be effective? For **how long**?

- Location, type and frequency of **monitoring** to evaluate the efficacy?

e.g. nutrient concentration, Chl and Phycoc. Concentration, DO concentration, currents, zooplankton, fish... Collaborate with ongoing HAB monitoring, water intake plant monitoring, RS data acquisition
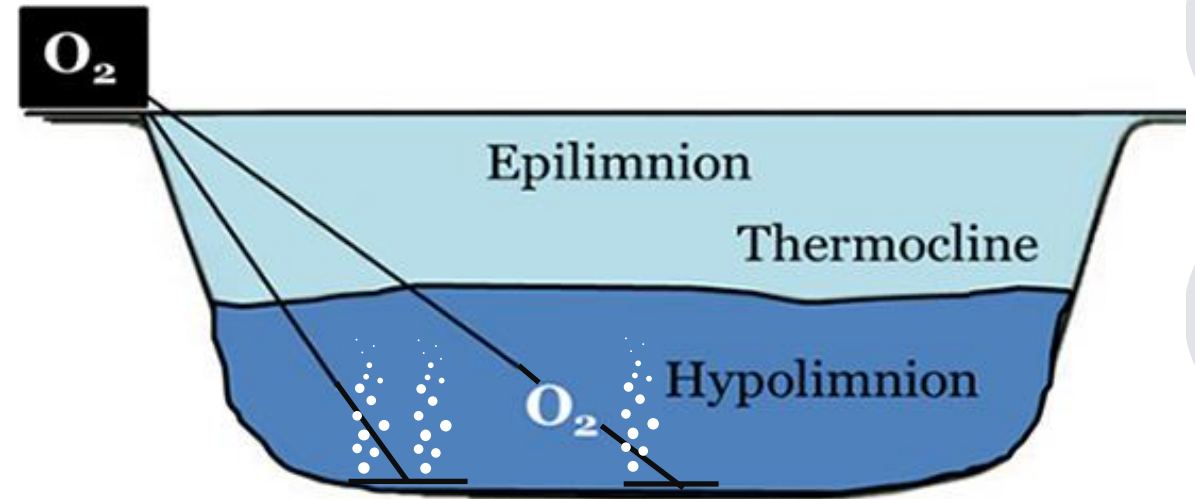
Design a Pilot Project: Hypolimnetic Oxygenation System

Timeline

- *Proposal* for the BRC consideration in <u>summer 2022</u>

- *Revisions* by <u>fall 2022</u>. If accepted, it could be considered as a remediation strategy for the next funding cycle

- <u>*If funded*</u>, the *implementation* phase (contacting contractors, public outreach, permits) will get started in <u>summer 2023</u>

- Construction should be completed in spring 2024, and the *first oxygen injection(s)* will occur in <u>summer 2024</u>

Oxygen Generator from Indian Creek Reservoir
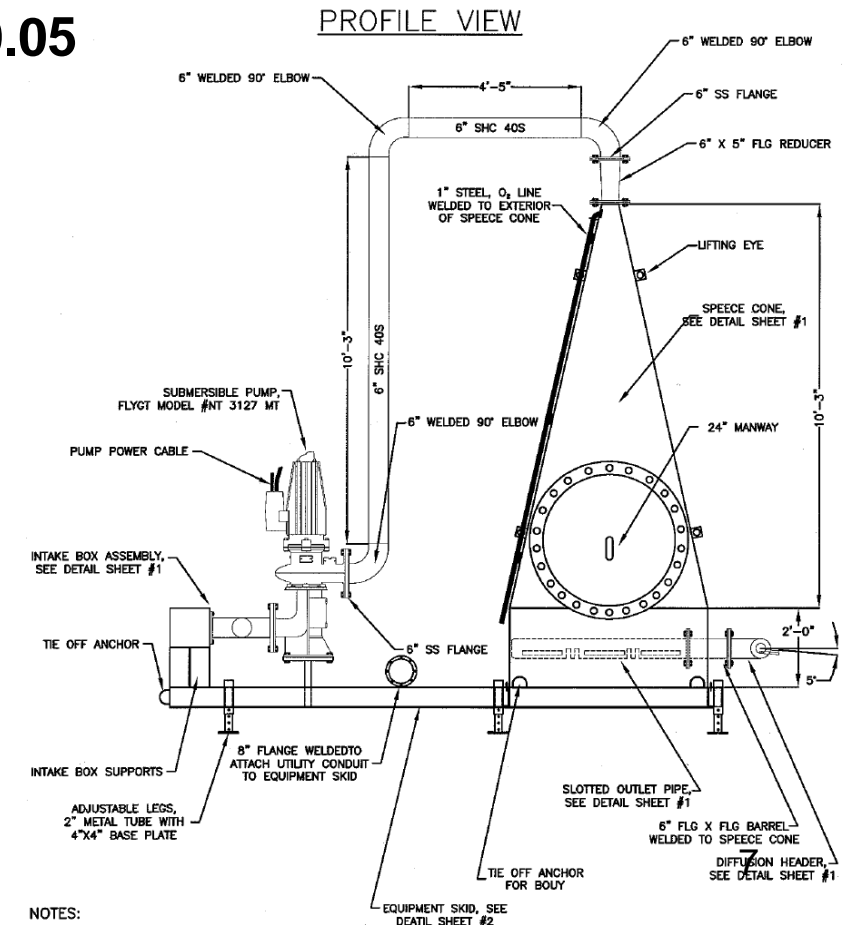
➢ **880 lbs/day at 450 scfh**
➢ **15- 25 psig delivery pressure**

SPEECE CONE
(a specific type of diffuser)
- 10.25' H x 5' D Cone +
  2' H x 5' D Skirt
- Volume = 106 cf
- HRT = 50 seconds
- A:W = 0.05

PROFILE VIEW

6" WELDED 90° ELBOW
6" WELDED 90° ELBOW
6" SS FLANGE
6" SHC 40S
6" X 5" FLG REDUCER
1" STEEL, O₂ LINE WELDED TO EXTERIOR OF SPEECE CONE
LIFTING EYE
SPEECE CONE, SEE DETAIL SHEET #1
SUBMERSIBLE PUMP, FLYGT MODEL #NT 3127 MT
6" SHC 40S
6" WELDED 90° ELBOW
24" MANWAY
PUMP POWER CABLE
INTAKE BOX ASSEMBLY, SEE DETAIL SHEET #1
TIE OFF ANCHOR
6" SS FLANGE
8" FLANGE WELDED TO ATTACH UTILITY CONDUIT TO EQUIPMENT SKID
INTAKE BOX SUPPORTS
SLOTTED OUTLET PIPE, SEE DETAIL SHEET #1
ADJUSTABLE LEGS, 2" METAL TUBE WITH 4"X4" BASE PLATE
6" FLG X FLG BARREL WELDED TO SPEECE CONE
DIFFUSION HEADER, SEE DETAIL SHEET #1
TIE OFF ANCHOR FOR BOUY
EQUIPMENT SKID, SEE DETAIL SHEET #2

NOTES:
1) ALL PIPE SIX INCH (6") DIAMETER SCH 40S STAINLESS STEEL, WELDED JOINTS OR FLANGES WHERE SPECIFIED.

UTILITY CONNECTIONS

➢ O_2 Line: 1" IPS DR 11 HDPE
➢ Power Cable: 4 Conductor- Type G – 600/2000 V
➢ Conduit: 8" IPS DR 17 HDPE

ICR-1:PRE & POST START-UP

ICR-1
July 9, 2008

ICR-1
July 24, 2009
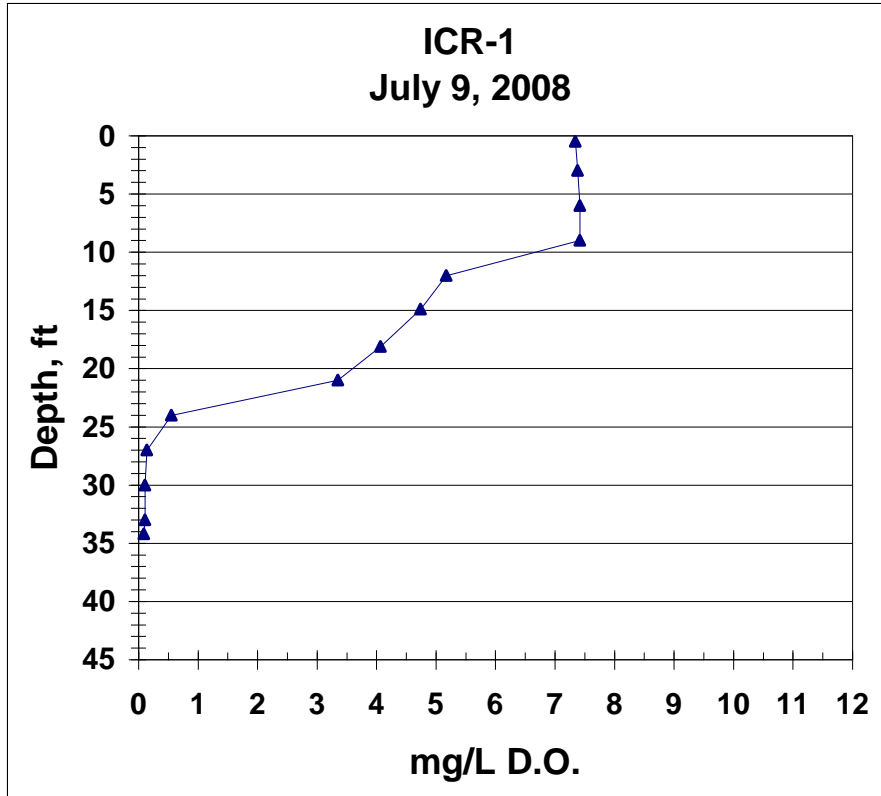
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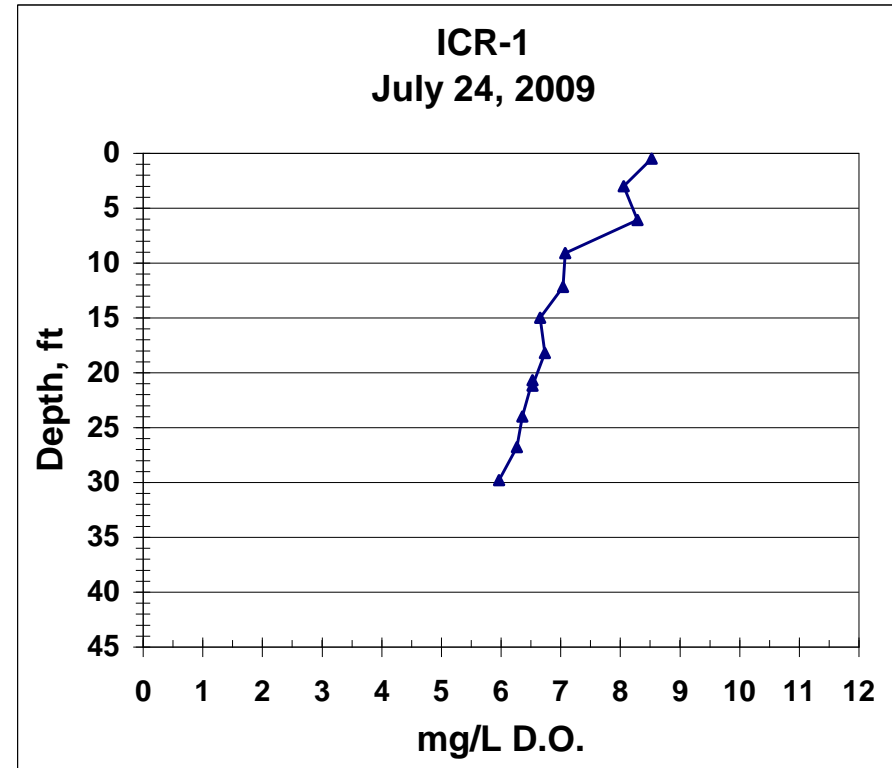
WITH HOS

Website Upgrade: Data Visualization and Data Query

- Current Website has **<u>fixed</u>** figures and files with TERC's data at Clear Lake

- Four **Senior Computer Science Students** at UC Davis will design and implement:

1. Dynamic display of data

2. Interactive data query

3. Official UC Davis website for TERC's Clear Lake project

https://terc-clearlake.wixsite.com/cldashboard
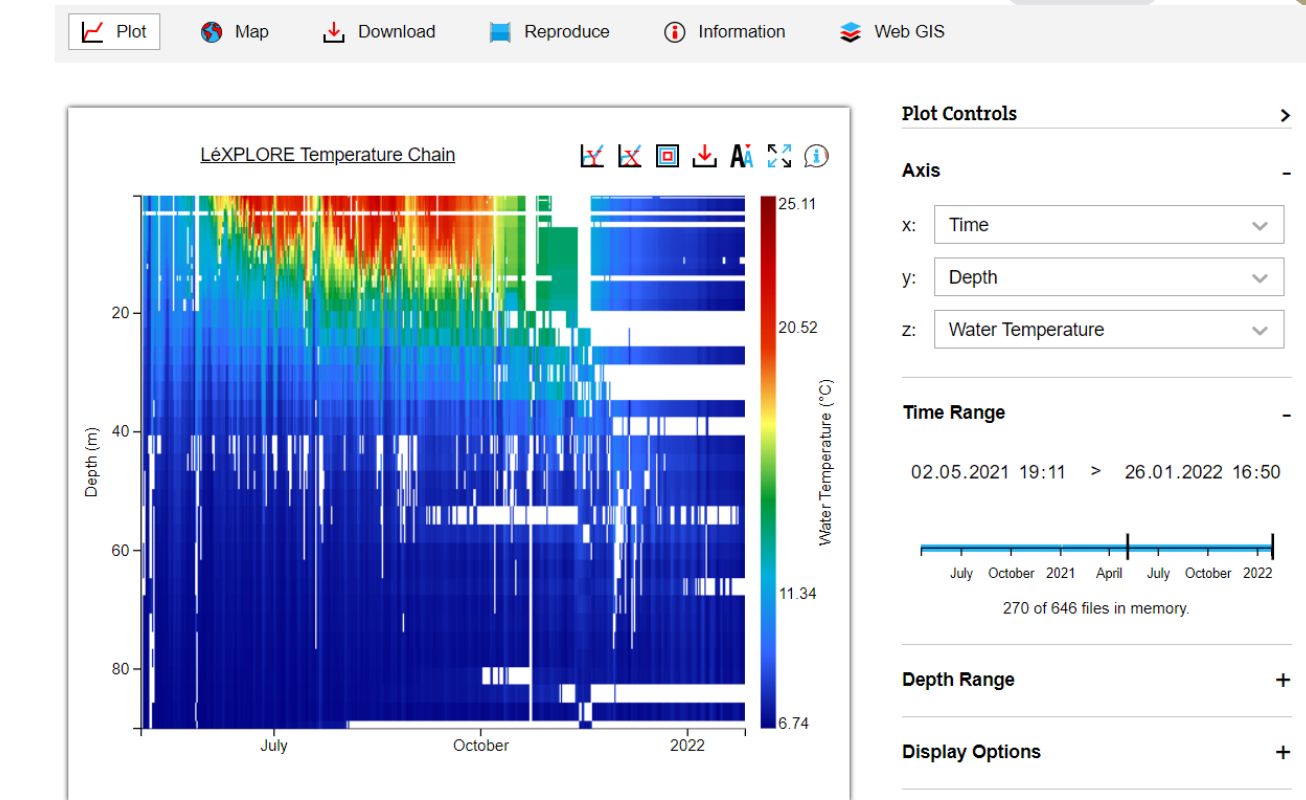
Welcome to the Clear Lake Team, Erik and Helen!

Name	Position
Geoff Schladow	Principal Investigator (PI)
Alex Forrest	Co-PI
Steve Sadro	Co-PI
Alicia Cortes	Project Scientist
Lidia Tanaka	Project Scientist (Phycologist)
Shohei Watanabe	Data manager & Project Scientist
Anne Liston	Research Associate (Chemistry)
Steven Sesma	Research Associate (Chemistry)
Helen Fillmore	**Research Associate (Chemistry)**
Erik Young	**Research Associate (Field)**
Katie Senft	Research Associate (scuba & field)
Brandon Berry	Research Associate (scuba & field)
Samantha Sharp	Graduate Student
Micah Swann	Graduate Student
Ruth Thirkill	Graduate Student
Kanarat (Job) Pinkanjananavee	Graduate Student
Carmen Woods	Project administration
Lindsay Vaughan	Undergraduate