

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

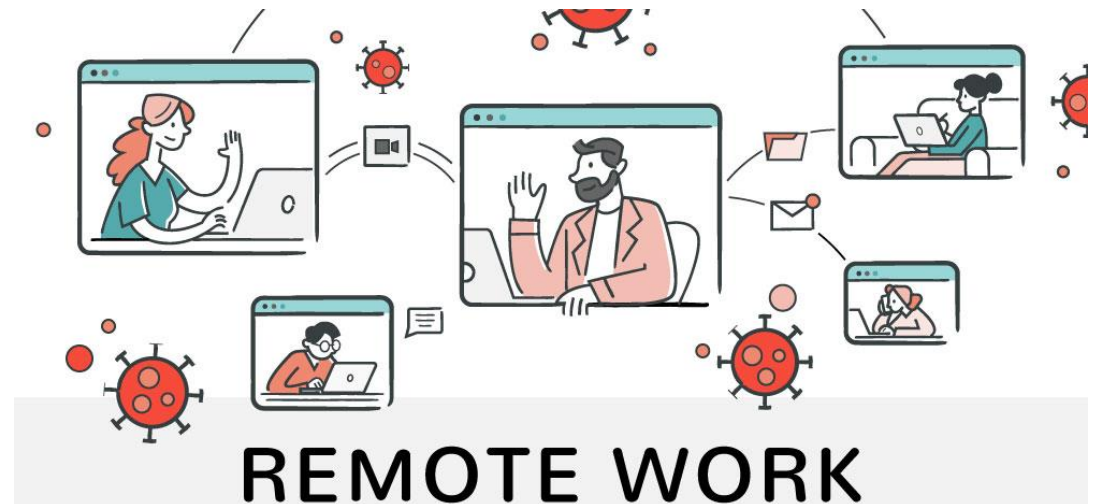


Blue Ribbon Committee Meeting #10
June 18th, 2020

Water Quality and Ecological Health Updates in Clear Lake

Activities of TERC Team Since March

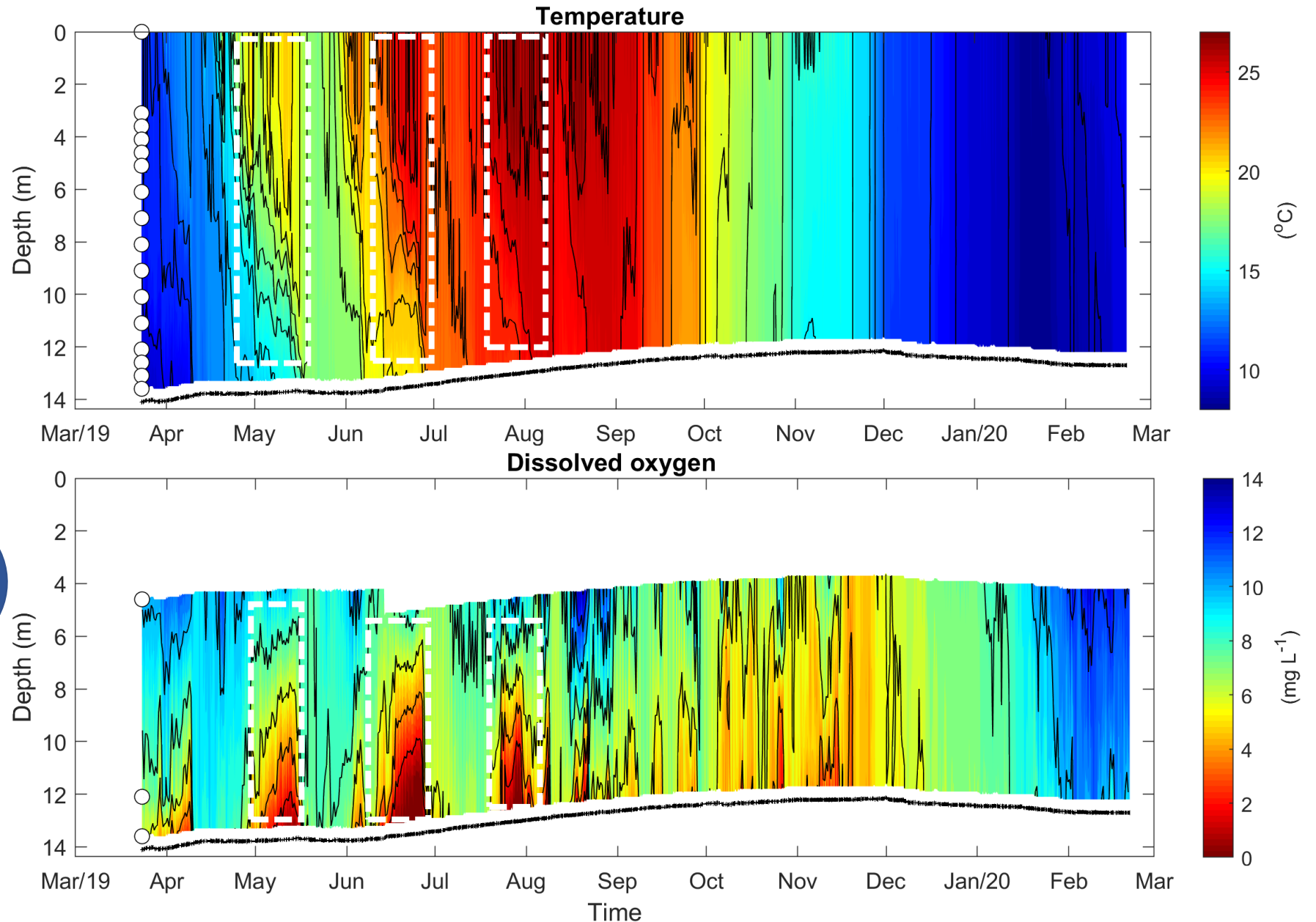
- We continued **High-Resolution Measurements** (Lake and Streams) but paused **Lake Water Chemistry** sampling (3-month gap)
 - Personnel safety
 - Permit request
 - Development of SOP for the Ramp-up Phase
- **Data Processing** during the Shelter-in-Place
 - One-Year of **Lake, Stream, and Meteorological** data
 - **Fish Abundance** in the Lower Arm
 - Correction of results from **Lab Experiments** quantifying **Internal Loading**
 - **Cyanobacterial Studies**



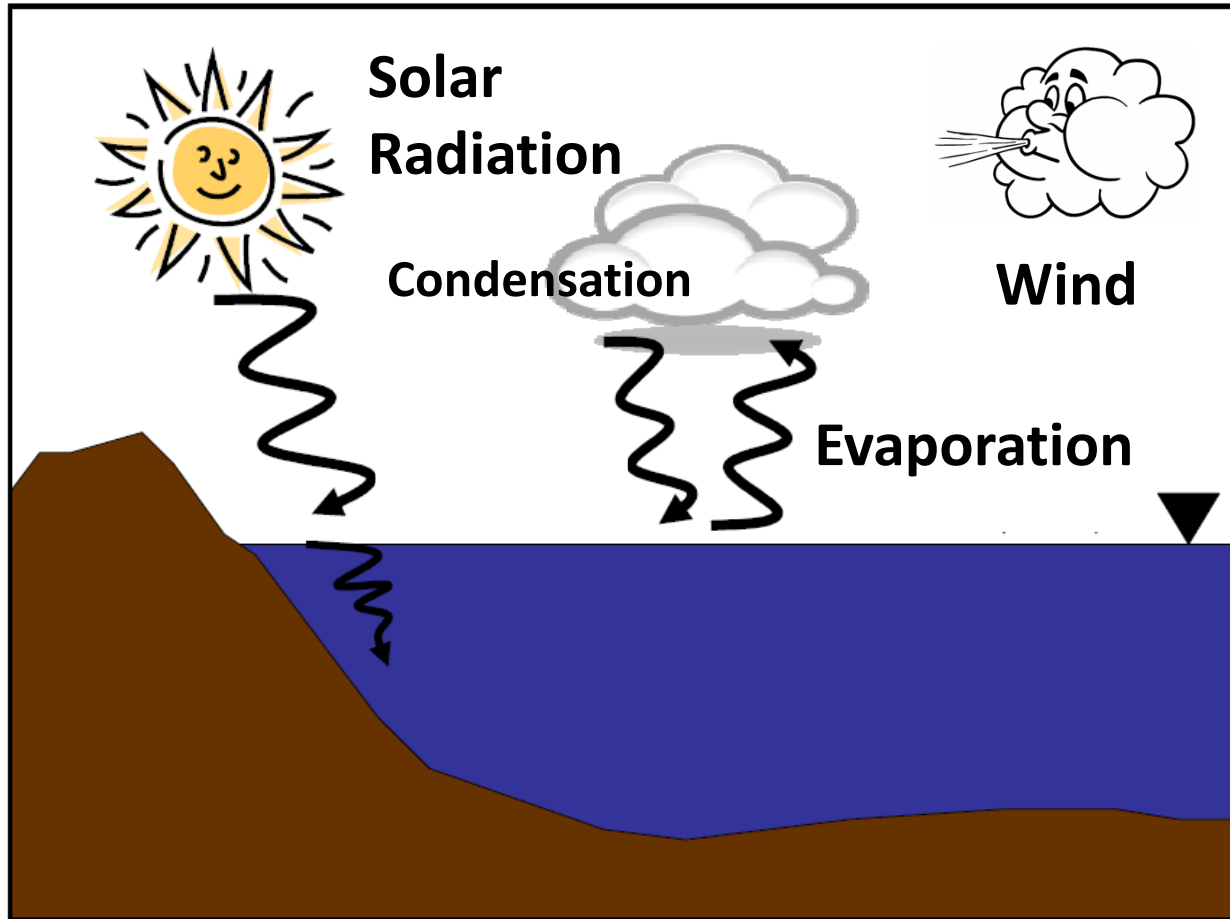
Lake Temperature Stratification and Anoxia



How can we
link Lake
Temperature
Stratification
and Anoxia?



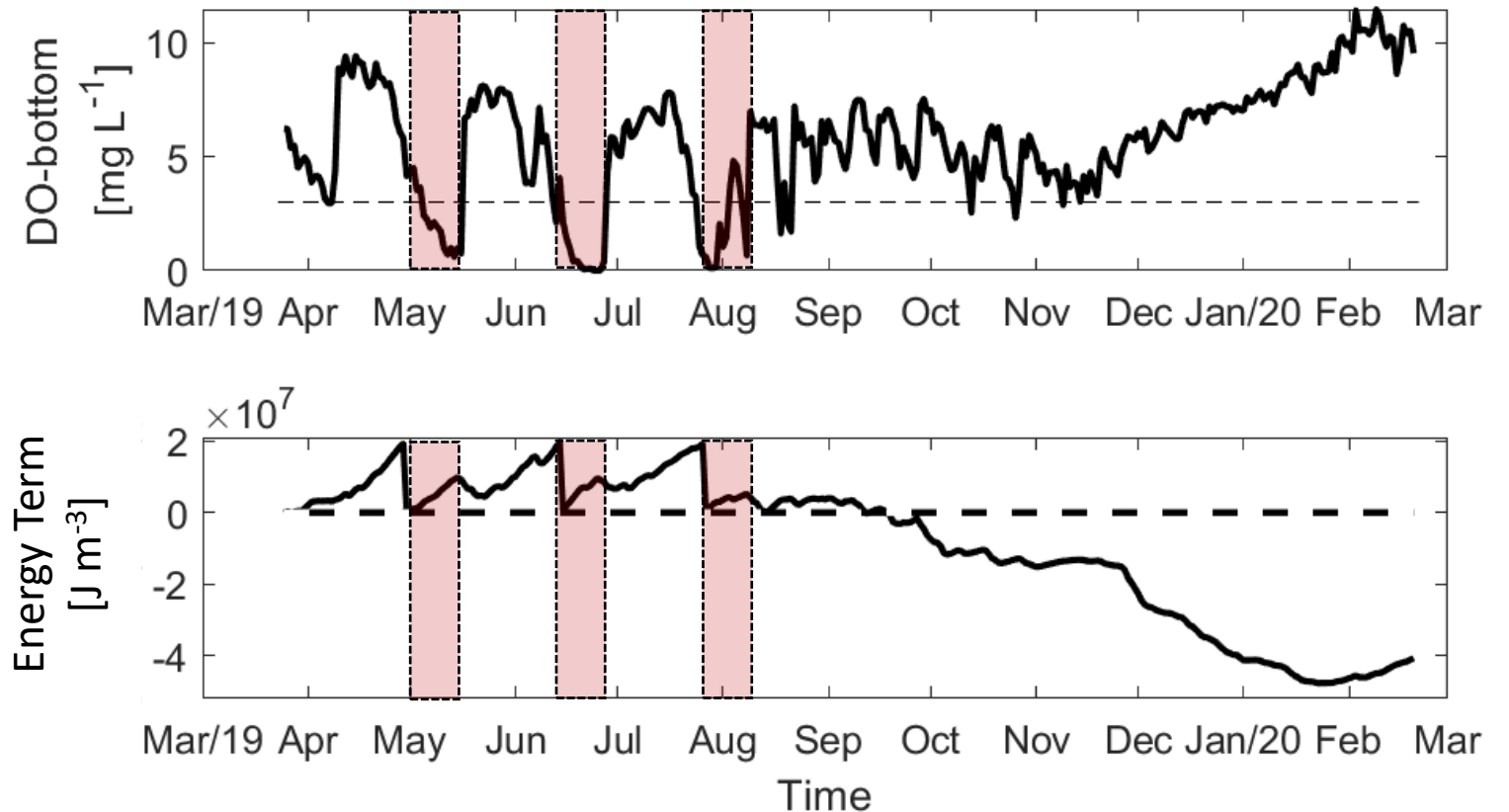
Meteorological Forcing



Predictive Tool of
Anoxic Events based on
How Much the Lake
Heats and Cools

Prediction of Anoxia from Meteorological Forcing

Lake Data



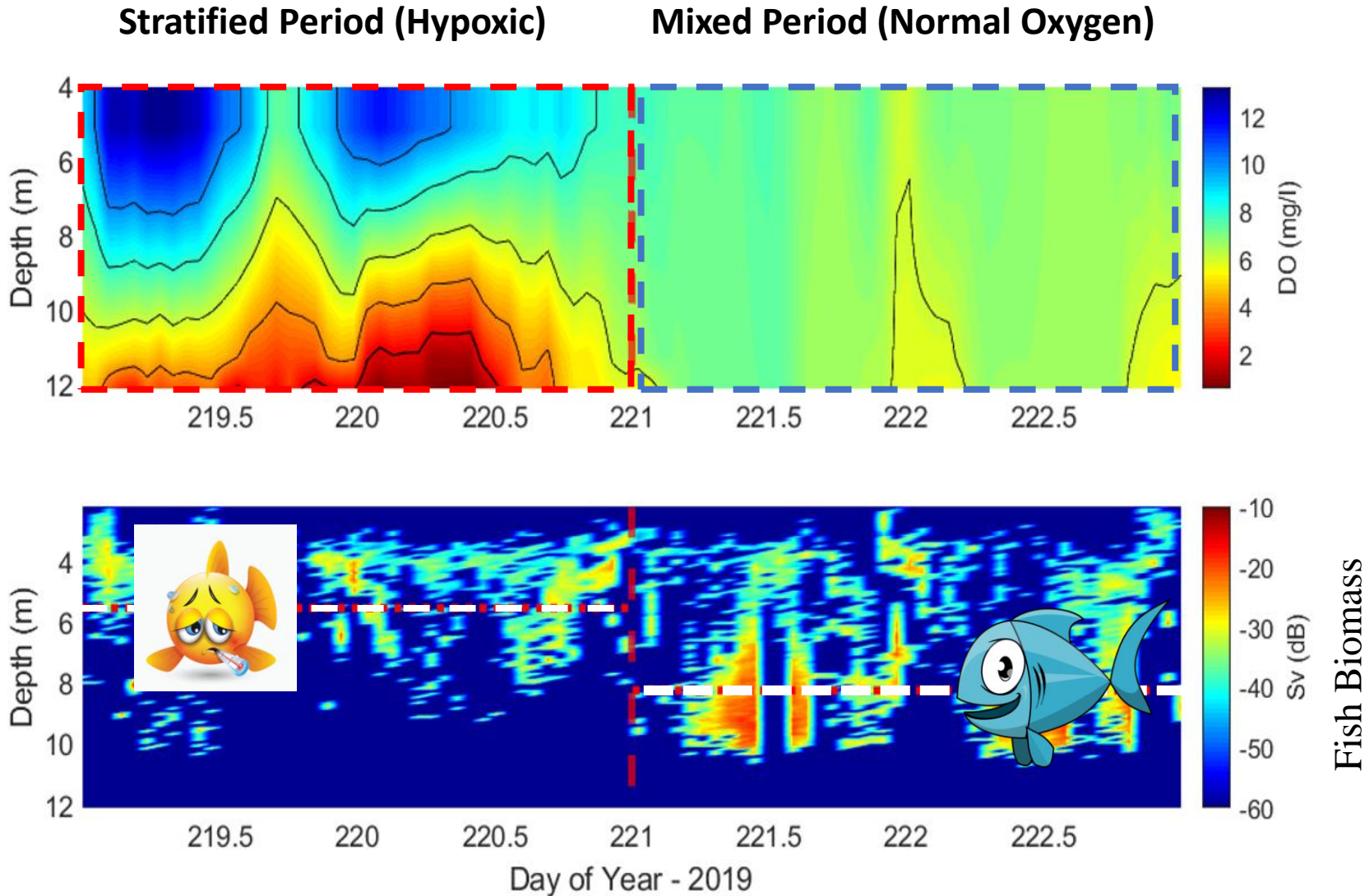
Prediction of Anoxia

- When does it start?
- How long does it last?

Warning Tool for Water Purveyors, Cyanobacterial Sampling, Oxygenation Systems, among others

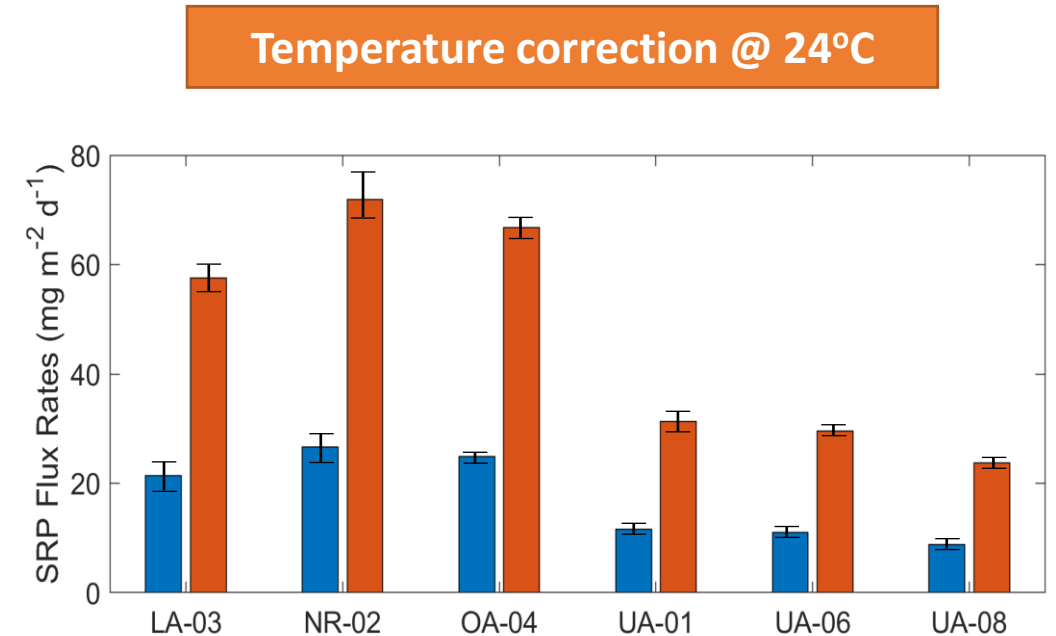
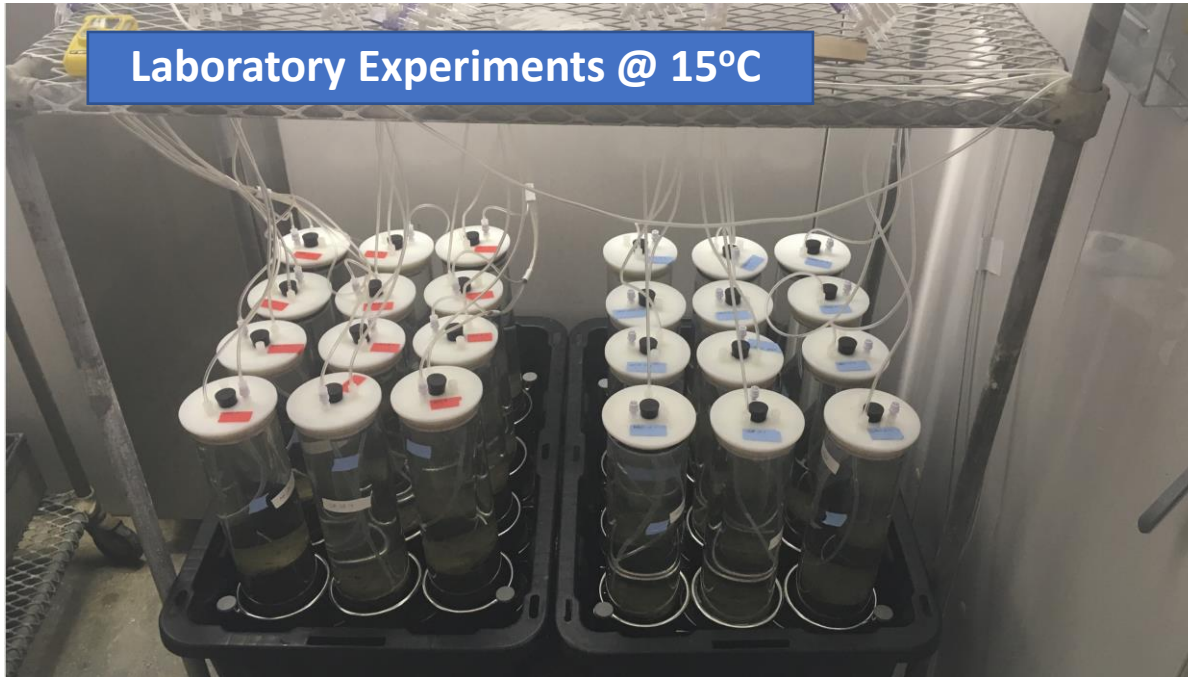
Fish Avoidance due to Anoxia

(Drew Stang, MS Student)



**Under Anoxic
Conditions Fish are
Changing Vertical
Distribution**

Magnitude of Phosphorous Flux from the Sediments (Internal Loading during Anoxic Conditions)



Annual Internal Load			
P-Loading Source	P-Species	Annual Load (MT yr ⁻¹)	% Annual SRP load
External	SRP	37.1 - 51.4 ¹	59-67% 35-43 %
Internal	SRP	25.6 68.9	33-41% 57-65 %

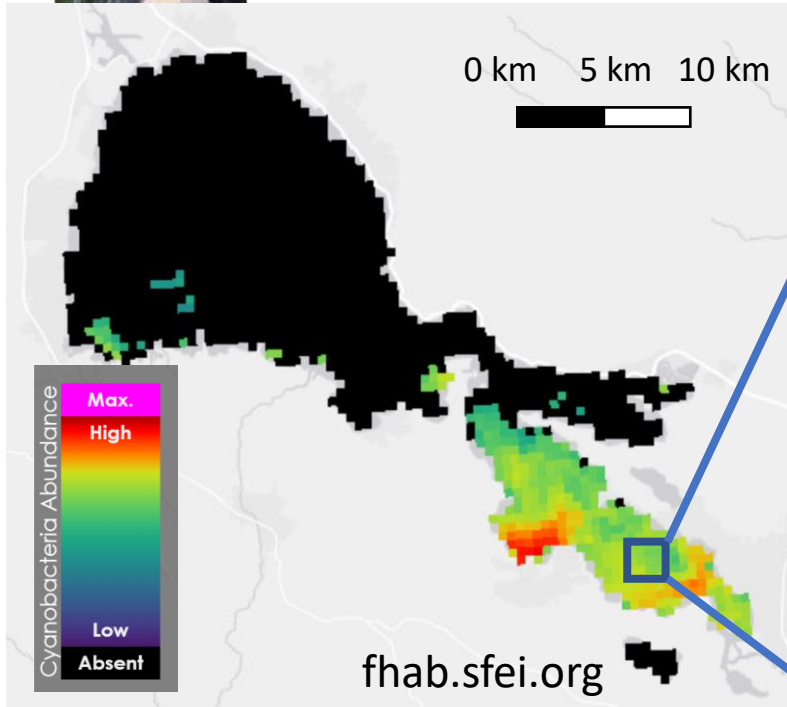
(Nick Framsted, MS Student)

Cyanobacterial Studies

Discrete Sampling



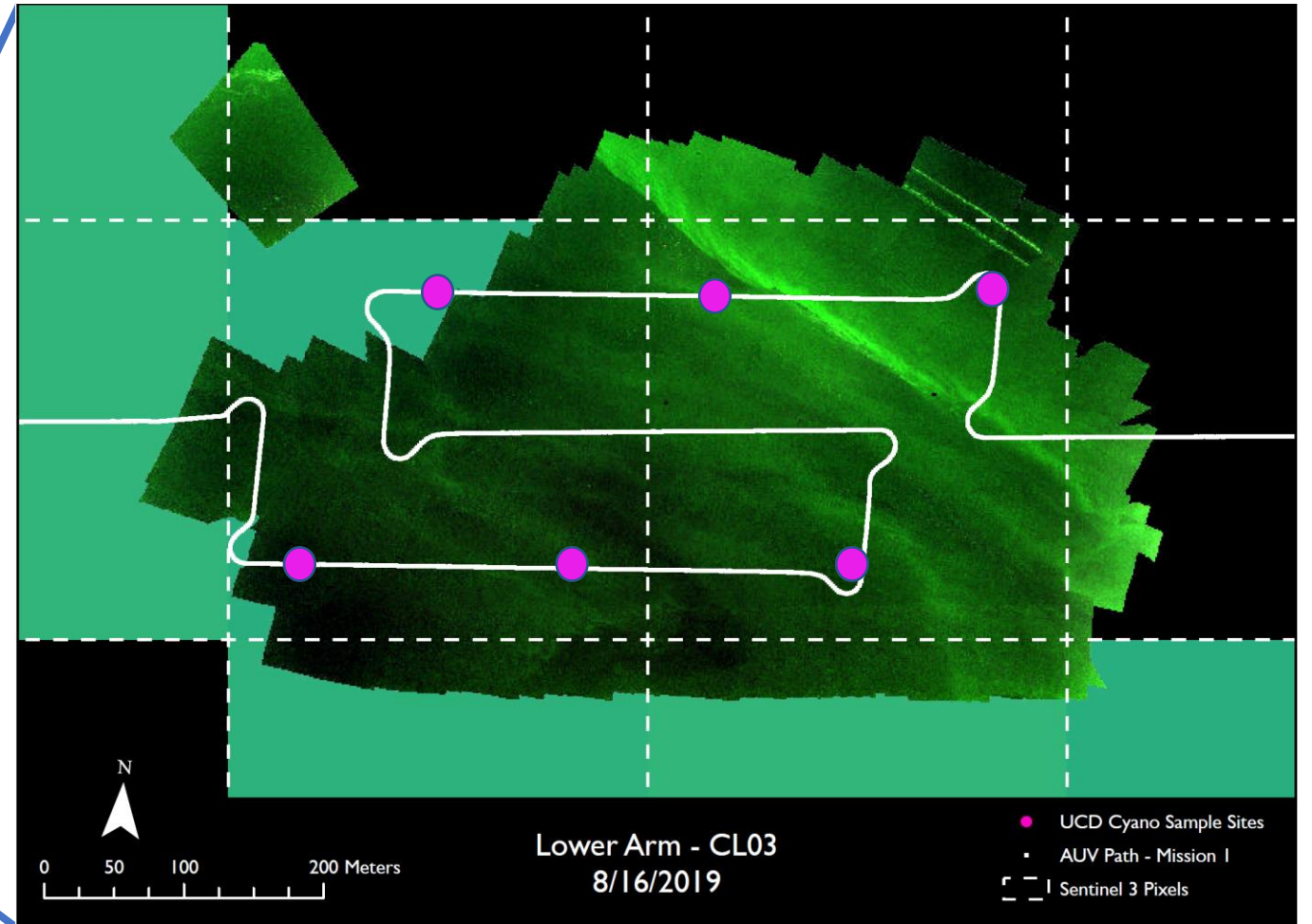
Radiometer



AUV

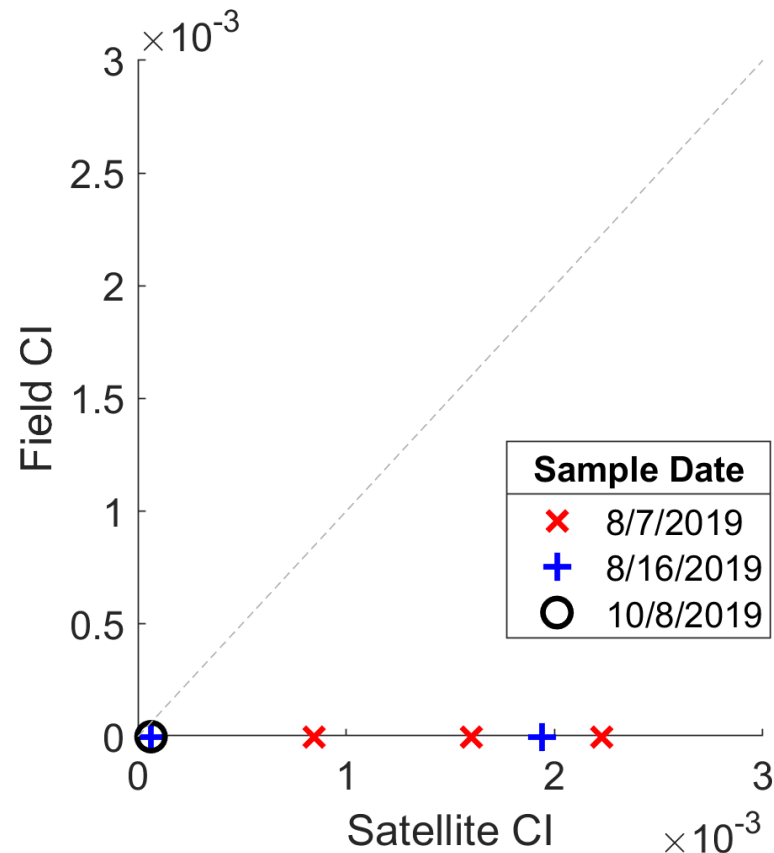


UAV

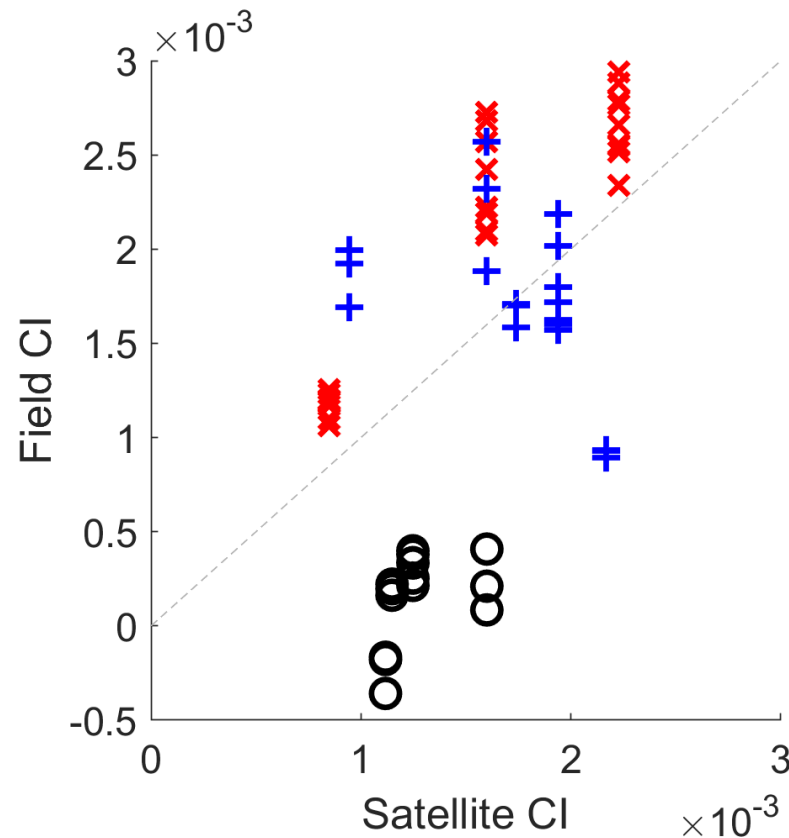


Quantifying Spatial Heterogeneity of Cyanobacterial Blooms

Calibration of SFEI/NOAA HAB Remote Sensing Tool



Calibration using
SFEI/NOAA algorithm



Calibration using TERC algorithms
(under development)

The Current Remote Sensing Tool
Does Not Show Blooms in Clear
Lake when They are Happening

We are Developing New
Algorithms to Make the Tool
Suitable for Clear Lake

CI = Cyanobacteria Index

Collaboration with Keith Bouma-Gregson
(State Water Resources Control Board)

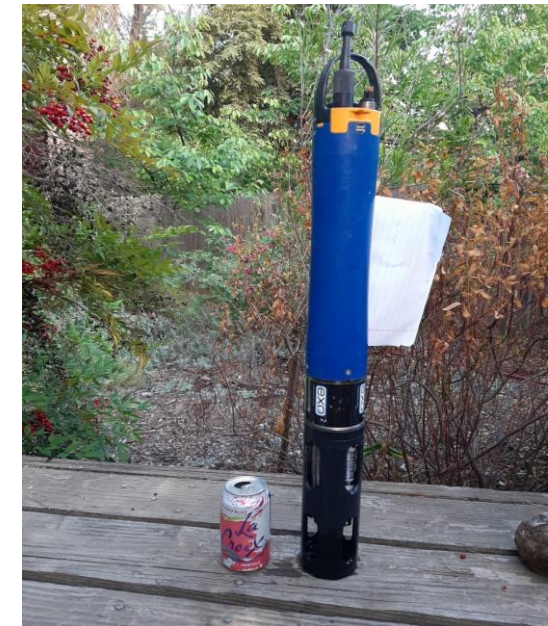
Happening Now!

➤ Back to the Field!

- Collaboration with the **USGS-EPA** (Mercury cycling)
 - Install **Multiparameter** (EXO2-YSI) **Sondes** on moorings (**fDOM**)
 - Analysis of **Hg and non-Hg species** using **Sediment Samples** from the Incubation Experiment
- Continuing our effort on the **calibration of the Three-Dimensional Model for the Lake**
- Promoting **Technical Engagement with Stakeholders**
 - What remediations are worth pursuing and testing?
- **CRC-TERC** collaboration on **Public Engagement**



Clear Lake TERC Team on June 8th 2020



*USGS
EXO2-YSI*



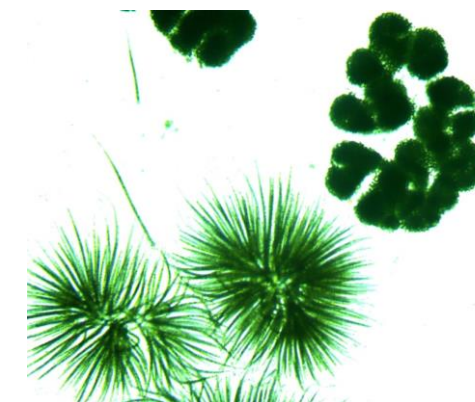
Aeration System

Long-Term Projects

- Model **DO Enhancement Techniques**
- Model **Fate of Stream and Culvert Loads**
- **Cyanobacterial studies** (funding dependent – NIWR, CSIRO)
- **Watershed Modeling** (funding dependent – BRC)
- **Lake Bathymetry** (funding dependent – BRC)
- Use 3-D Model for **management scenarios** (funding dependent - CA)
- Link 3-D Model to **Mercury Model** with USGS (EPA funding dependent)
- **Climate Change Impacts**



River Rhone into Lake Geneva



Microcystis

Research Team

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

Thank you!
Questions?

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
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Tina Hammell	Research Associate (Chemistry)
Anne Liston	Research Associate (Chemistry)
Steven Sesma	Research Associate (Chemistry)
Katie Senft	Research Associate (scuba & field)
Brandon Berry	Research Associate (scuba & field)
Drew Stang	Graduate Student
Micah Swann	Graduate Student
Nicholas Framsted	Graduate Student
Ruth Thirkill	Graduate Student
Samantha Sharp	Graduate Student
Carmen Woods	Project administration
Lindsay Vaughan	Technical Staff
Niella McWeeney	Undergraduate Student
Jhonatan Romero	Undergraduate Student
Taylor Lander	Undergraduate Student
Eda Ceviker	Undergraduate Student
Siobhan Sher	Undergraduate Student