Clear Lake Remediation

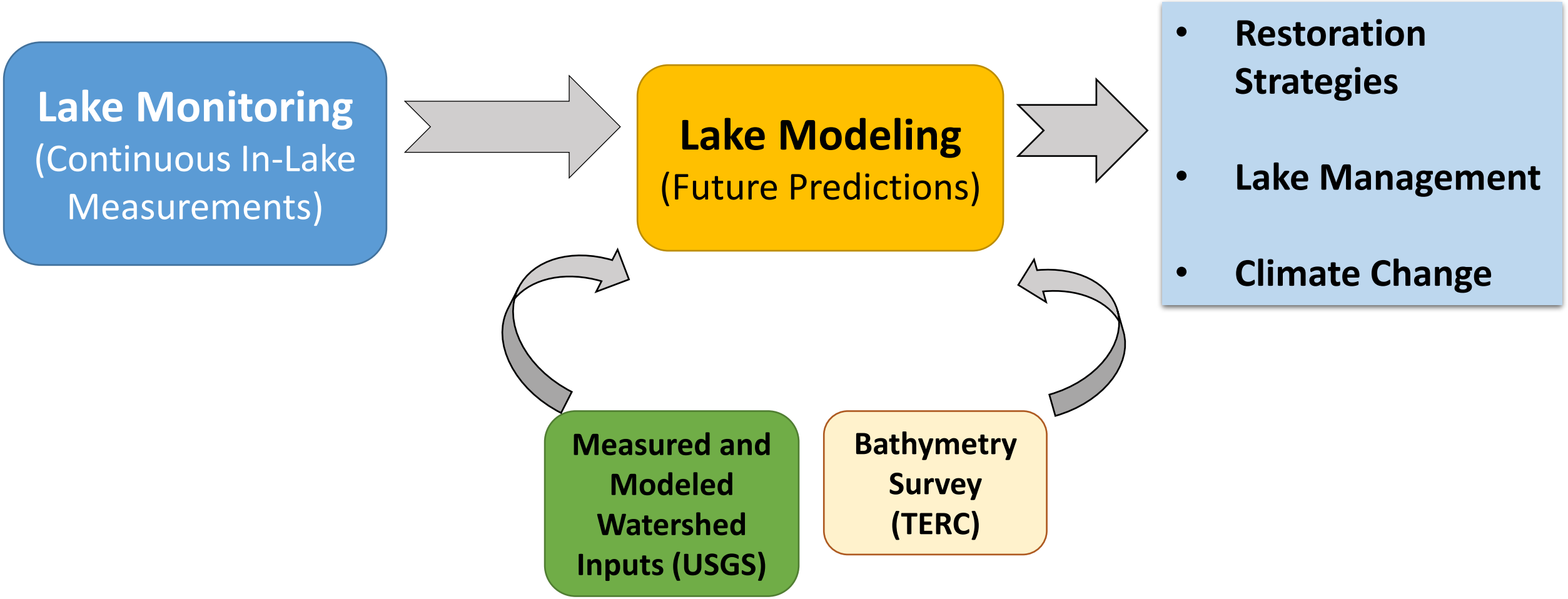
Update on Lake Monitoring and Modeling

UCDAVIS
Tahoe Environmental
Research Center

Blue Ribbon Committee Meeting

14th September 2023

Watershed and Lake Remediation Workflow



Findings from Lake Monitoring

Summer Hypoxia

Low Dissolved oxygen at the lake bottom

Internal Phosphorus from the Sediments

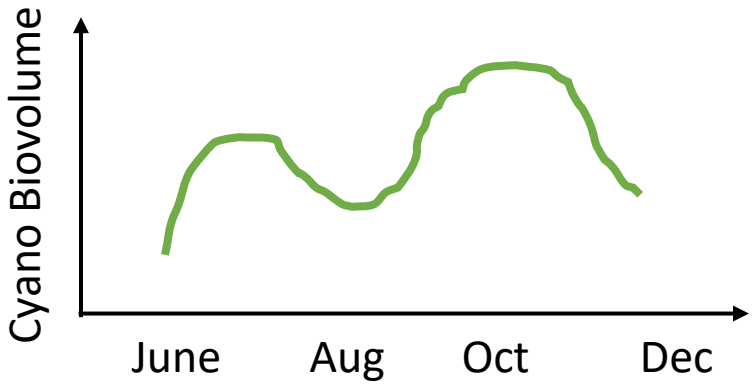
70 - 95% of the total P input

Low N:P (<16)

Warmer Summer Lake Temperatures

+1.5degC in last 50 years

Predictors of the Magnitude of Cyanobacteria Blooms

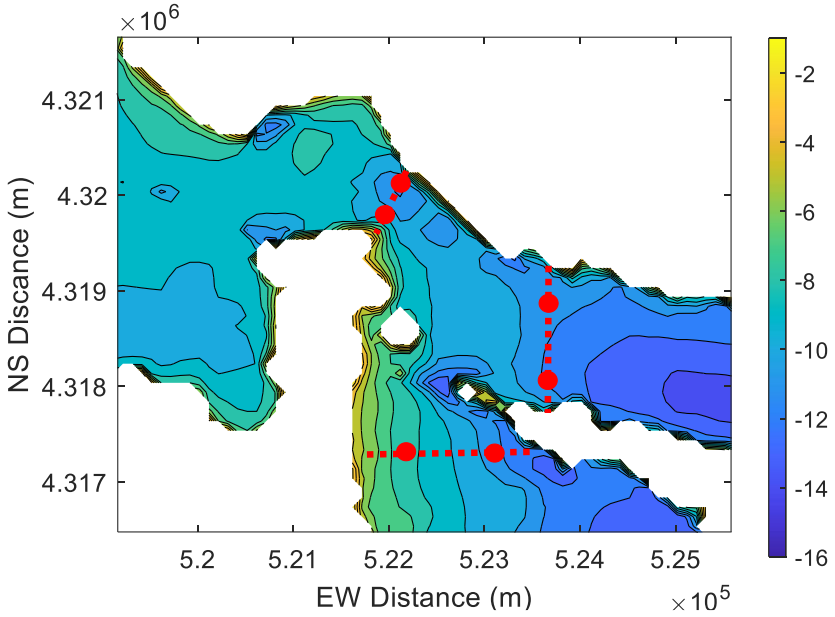


Outcomes

- Annual Reports
- One Remediation Strategy: Hypolimnetic Oxygenation System (HOS)
- Prediction of Hypoxia to Optimize Management of HOS

Supplemental Studies: Transport of Contaminants, Nutrients, HABs and DO between Arms

- **Key Questions:**
  - How rapidly <u>Summer Currents</u> move contaminants, nutrients, HABs, and DO between Arms?
  - Where are the <u>Best Locations</u> of HOS diffusers to minimize costs?
- **Happening Now!** Field experiment to quantify the *Flow Exchange* between the three basins in Clear Lake
- **What are we using?**
  - 6 In-situ *Velocity* sensors
  - 48 *Temperature* sensors



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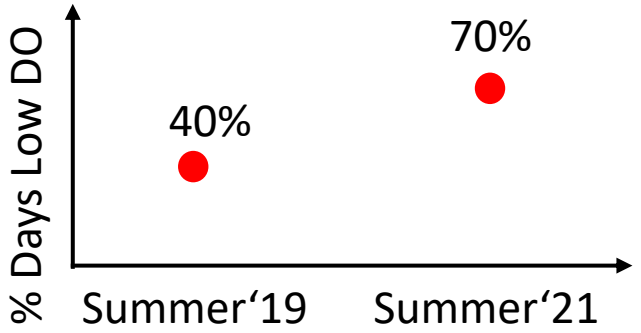
Outcomes from Lake Modeling

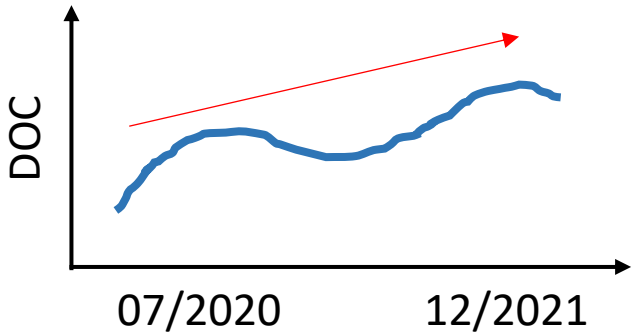
Tool to **Evaluate Future Restoration Strategies**

Why?

Lake keeps changing!



Drought years amplify the frequency of hypoxic days

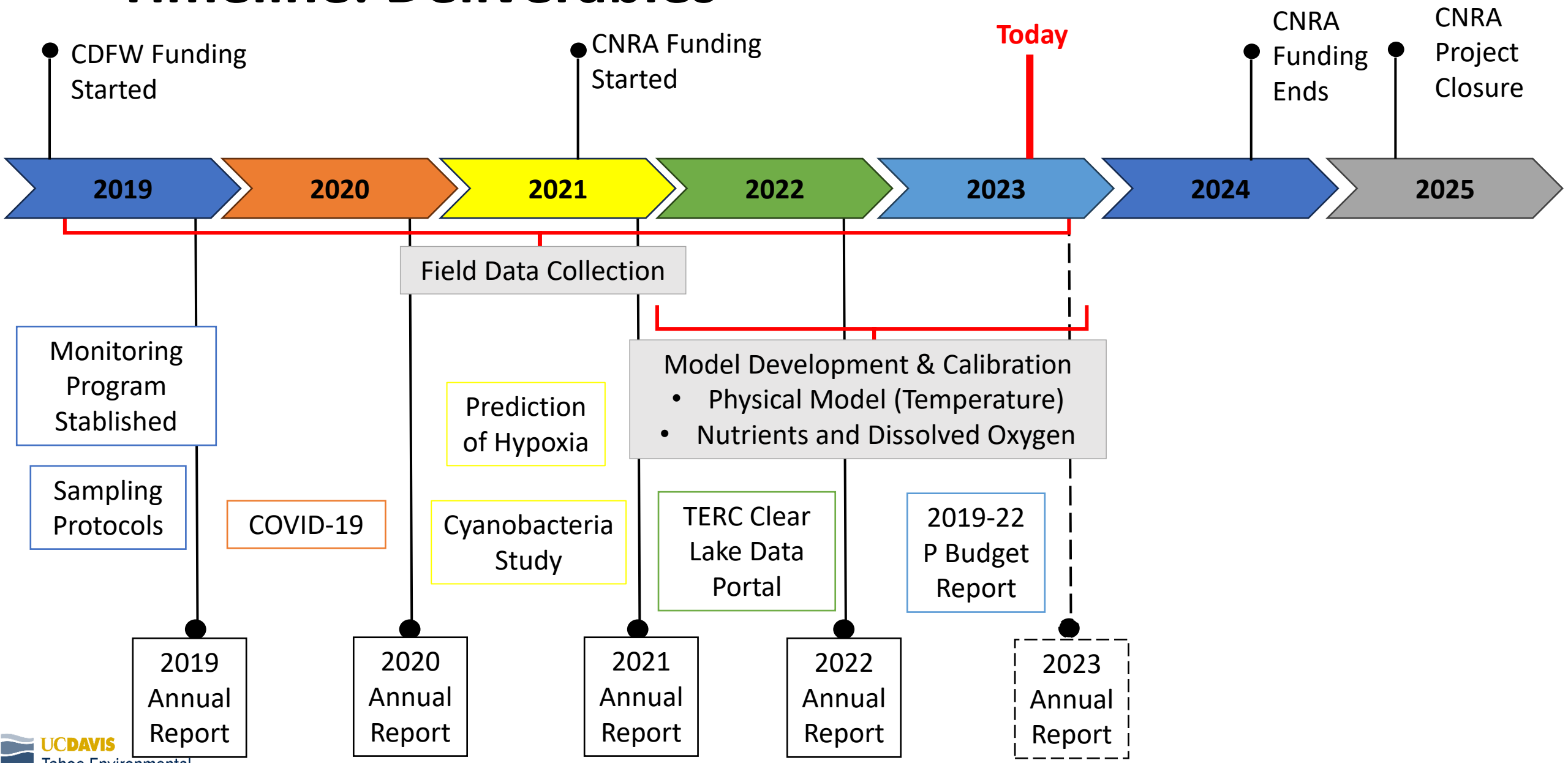


Drought years also lead to an increased dissolved organic carbon in the lake

Suggested Plan moving forward:

- Continue with Monitoring and Modeling Program
- UCD & USGS have set up the *Infrastructure* and the *Fundamental Tools*
- *Local Communities* should participate in the *Monitoring* and suggest *Scenarios* to *Explore* with the *Model* due to ongoing lake changes

Timeline: Deliverables



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Timeline: Next Steps

CDFW Funding Started

CNRA Funding Started

Today

CNRA Funding Ends

CNRA Project Closure

2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025

- Refinement of Phytoplankton Model
- Coupling Lake Model with Watershed Inputs (USGS)

- **05/2024**: Draft of Lake **Monitoring** Report
- **07/2024**: Draft of Lake **Modeling** Report

- **09/2024**: Final Lake **Monitoring** Report & Data uploaded in **CEDEN**
- **11/2024**: Final Lake **Modeling** Report

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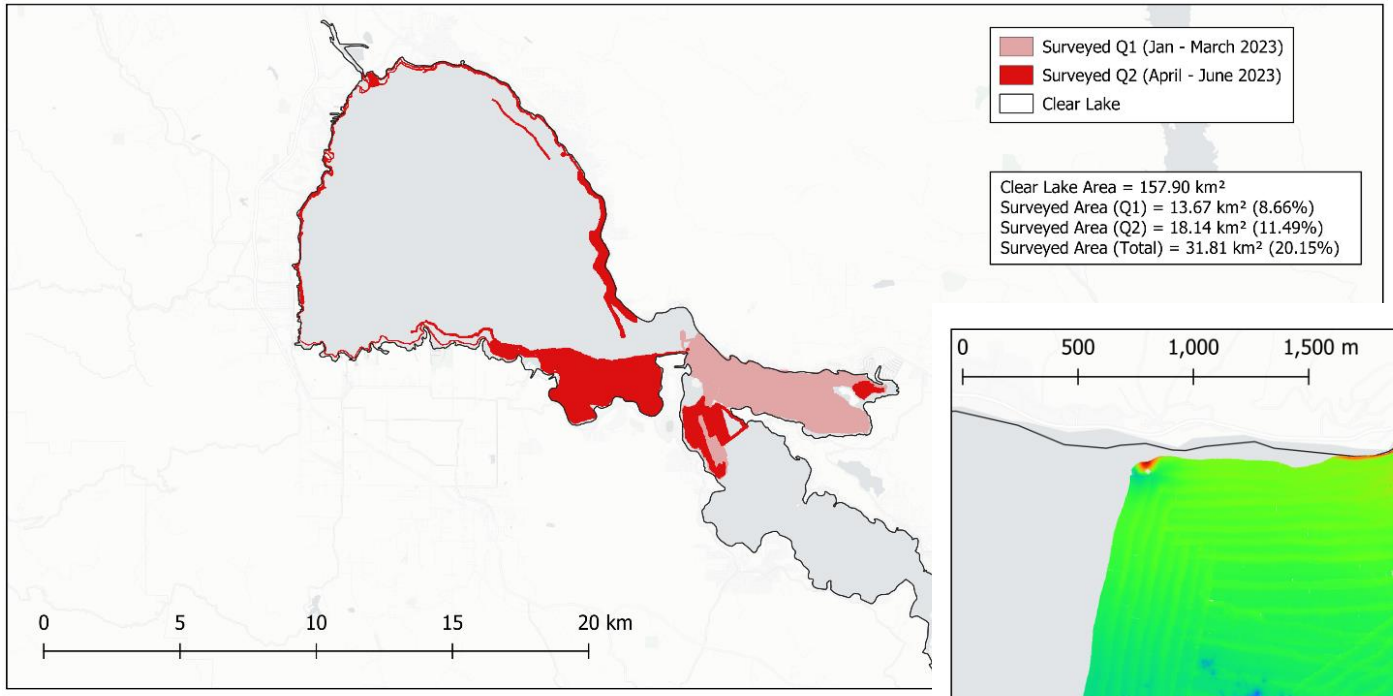
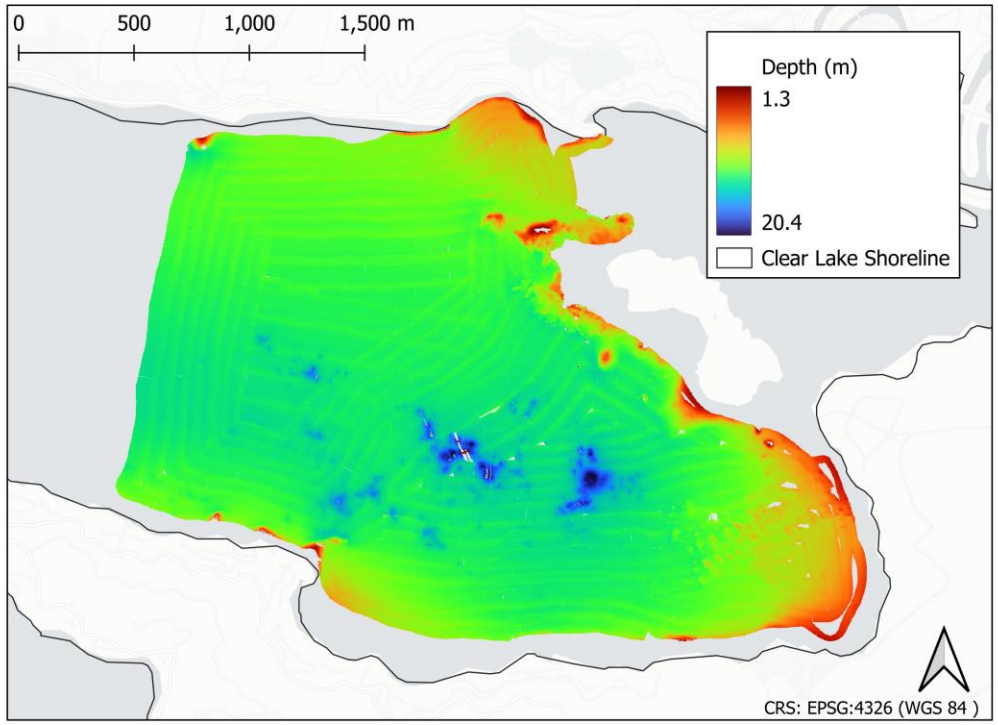
In-Lake Bathymetric Measurements

- **20% of lake surface surveyed**
- Low lake level and equipment failure have impacted timeline
- <u>One year no-cost extension</u> to finish this task
- All **data** should be collected in **spring 2024**



Surveyed Area 2023, Clear Lake, CA



Oak's Arm Preliminary Bathymetry, Clear Lake, CA

Thank you for letting us do this work!

Access our Data!

clearlakerehabilitation.ucdavis.edu

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