Rehabilitation Project in Clear Lake: Hypolimnentic Oxygenation Pilot Project in the Oaks Arm

Blue Ribbon Committee Meeting
March 10th, 2022

UCDAVIS
Tahoe Environmental Research Center
There was no more than ~7 consecutive days of hypoxia in summer 2019 and 2020. But almost ~3 consecutive weeks of hypoxia in summer 2021.
Rehabilitation Pilot Project in the Oaks Arm: Hypolimnetic Oxygenation

Direct addition of pure oxygen to the lake’s hypolimnion, that is, the lower stratum of the lake, next to the sediments

- **Goal:** Reduce Hypoxia next to the sediments (hence, reduce HABs)

- **Challenges:**
  - Large lake surface (150 km\(^2\)) > Pilot (testing) Project in the smallest Arm (Oaks Arm ~ 14 km\(^2\))
  - Large Sediment Oxygen Demand (-0.9 gO\(_2\)/m\(^2\)/day)

- **Advantages:**
  - Strong currents which can transport oxygen injected in one location to a larger area
Version 1 of TERC Lake Model
Simulating Oxygen Dynamics in the Oaks Arm

Mean bottom Concentration (Max 10 mg/L)
Time = 7/5/2021 at 4 h

Without DO Injection

With DO Injection
Version 1 of TERC Lake Model Simulating Oxygen Dynamics in the Oaks Arm
Comparison of Preliminary Model Results With and with DO Injection

These results will improve due to:

1. Refine DO model including the phytoplankton dynamics. Currently, it only uses fixed parameterizations
2. Refine bathymetry from the upcoming bathymetrical survey
Hypolimnnetic Oxygenation Project: Short and Long Term

**Pilot (Testing) Project: Oaks Arm**

**What?**
- Permitting
  - Site location
  - Road access
  - CEQA
- Design & Outreach
  - 3D Lake model
    - System dimensions
    - Monitoring
- Construction
- First Dissolved Oxygen Injection and Monitoring
  - Four months
  - Intensive Monitoring

**Who?**
- Broad Team
- TERC & Contractor
- Contractor
- TERC & Contractor

**When?**
- July 2023 – Dec 2023
- Jan 2024 – June 2024
- July 2024 – Oct 2024

**How much?**
- TBD
- ~2 M

**Long-Term Project: Whole Lake**

If positive results, submit a proposal in June 2025 for funding to implement Hypolimnnetic Oxygen Systems in the other two Arms

**When?**
- Start June 2026

**How much?**
- ~10 M
  - ~1M/year
# Research Team

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

Thank you!

Questions?

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