Early Warning System to Forecast Harmful Algal Blooms (HABs) in Clear Lake

Blue Ribbon Committee
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Early Warning System Overview

Main Goals

• Provide **lead time in responding** to episodic HABs events
• **Guide management of remediation** technologies to improve water quality
• Improve **understanding of the causes of** HABs

Strengths

• **Inclusive** of HABs monitoring programs (Big Valley Rancheria, CAL-Watch)
• Use the **baseline data** to provide forecasts of lake conditions

Components and Workflow

- Mathematical Lake Model
- Remote Sensing (SFEI HAB Tool)
- Measured and Forecasted Meteorological data
- Model Validation (HABs sampling by Tribes and in-situ sensors)

Future HAB distribution

Future Met. Data
Q1: If we know the forecasted HABs distribution, are there treatments or actions we can do to minimize HABs?

We can minimize HABs only when we have **remediation approaches in place**

If **predictions** show the bloom is being transported into the Oaks Arm →

**Increase the oxygen** flow rate to prevent the negative impacts
Q2: Previous tools such as the San Francisco Estuary Institute (SFEI) have not always lined up with on-the-ground results. How will this tool overcome those issues?

UC Davis graduate student has revised the equation to calculate the satellite cyanobacteria index (CI)

Strong match between the field CI and satellite CI

We trust HABs estimates from remote sensing tools

Sharp et al. 2021
Q3: It will be important to have some thoughts on how this model might be maintained and employed by water managers/regulators

**System maintenance**
- Software product: **Very inexpensively maintained**
- Website and model platform host by the UC Davis College of Engineering → **Long-term staff** for troubleshoot
  - Power outages (infrequent) can be set up to **automatically reboot** the system

**System use by water managers/regulators**
- Turn on any HAB mitigation systems **only when needed** → **It Saves Money!**
- Identify areas of the lake **not impacted** by the blooms → Will help **tourist industry and recreational users**
- Clear Lake community **working group to design the public-facing part of the forecasting tool**