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

UCDAVIS
Tahoe Environmental Research Center

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
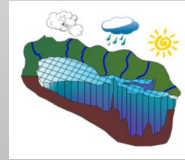
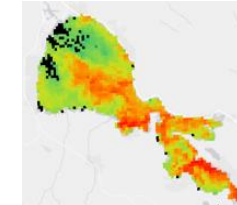Mathematical Lake Model
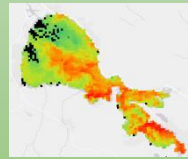
Remote Sensing (SFEI HAB Tool)

Measured and Forecasted Meteorological data

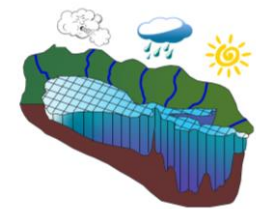Model Validation (HABs sampling by Tribes and in-situ sensors)
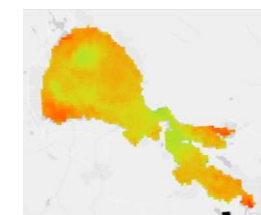
HAB distribution

Future Met. Data

+

Future HAB distribution

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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

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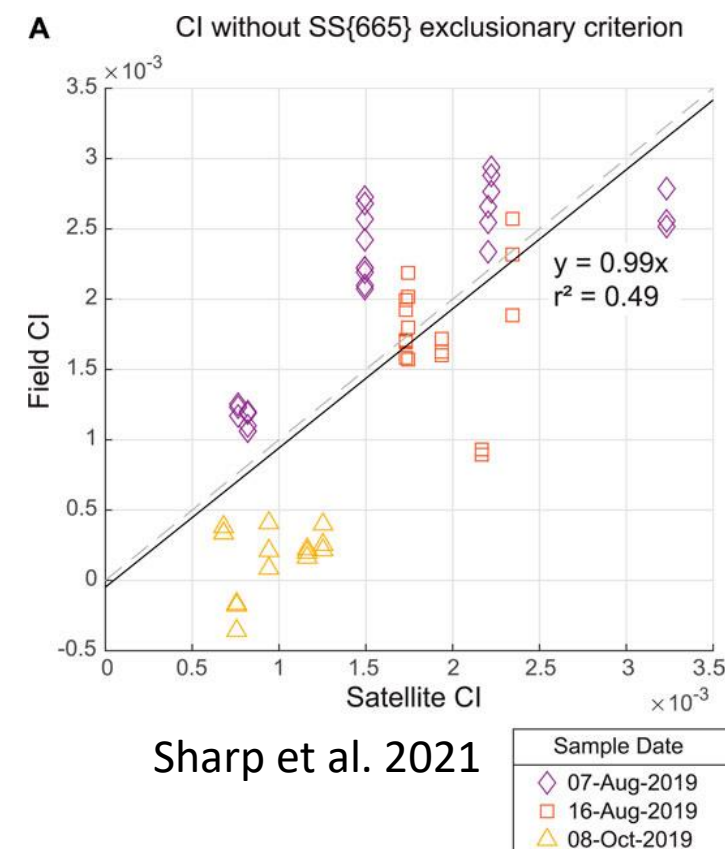
UC Davis graduate student has **revised the equation** to calculate the satellite **cyanobacteria index (CI)**

Strong match between the field CI and satellite CI

We trust HABs estimates from remote sensing tools

A   CI without SS{665} exclusionary criterion

$y = 0.99x$
$r^2 = 0.49$

Field CI

Satellite CI

Sharp et al. 2021

Sample Date
◇ 07-Aug-2019
□ 16-Aug-2019
△ 08-Oct-2019

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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 <u>**only when needed**</u> → <u>**It Saves Money!**</u>

- Identify areas of the lake **not impacted** by the blooms → Will help <u>**tourist industry and recreational users**</u>

- Clear Lake community **working group to design the public-facing part of the forecasting tool**