In Situ Evaluation of Peroxide Treatments Applied to Harmful Cyanobacteria Blooms

USACE Harmful Algal Bloom Research & Development Initiative

Delivering scalable freshwater HAB prevention, detection and management technologies through collaboration, partnership and cutting-edge science

Lead PI: Richard Johansen, ERDC, Richard.A.Johansen@usace.army.mil
Co-PI: Alan Katzenmeyer, ERDC, Alan.W.Katzenmeyer@usace.army.mil

Problem Improved monitoring of rapid-response HAB treatments (i.e. peroxide-base algaecides) is needed because traditional methods do not provide the spatio-temporal coverage to evaluate the efficacy of these applications.

Objective Demonstrate a suite of complementary monitoring approaches for districts to incorporate into their HAB treatment efforts. Evaluate the efficacy and longevity (up to 72 hours) of singular peroxide-based treatment for rapid response to HABs.

Approach Develop approaches for rapid response monitoring and treatments by applying multiple sensors with varying spatial and temporal resolutions (satellite imagery, sondes, grab samples, etc.) to better serve district personnel with varying expertise levels or financial limitations. Additionally, this work will evaluate the efficacy and longevity (up to 72 hours) of singular peroxide-based treatment for rapid response to HABs.
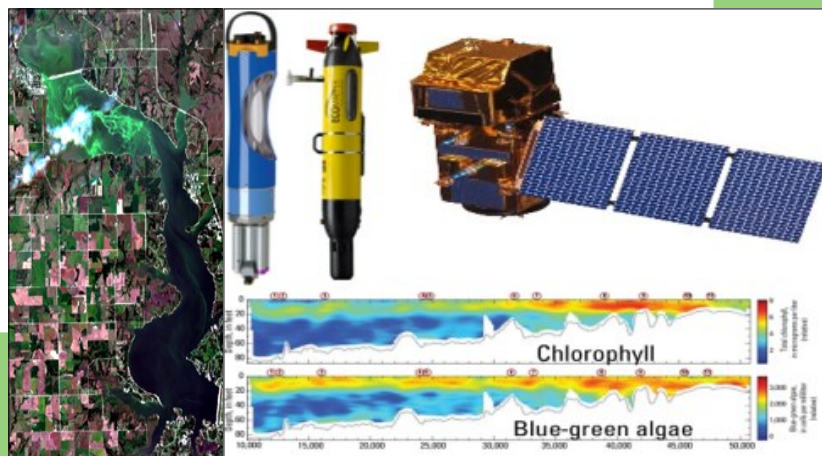

Figure 1: *Numerous technologies and approaches were utilized to intensively monitor the efficiency and longevity of a peroxide-based treatment of a swim beach routinely impacted by harmful algal blooms.*
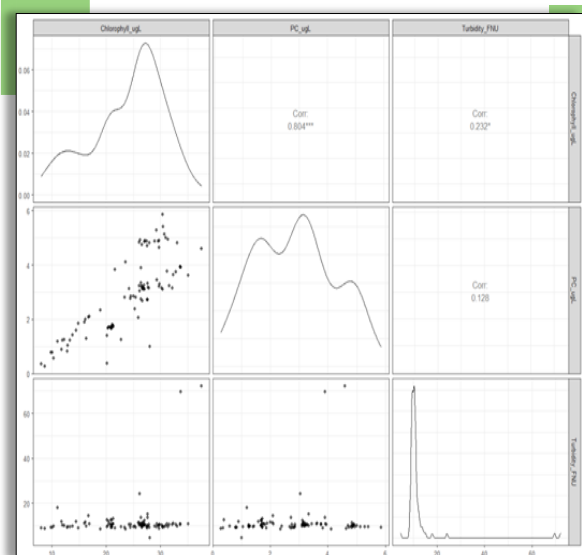
Results

Figure 2: *Sample results showing the comparison and correlation between lab derived pigments, and total cell counts of each algae genera. Initial lab results show a strong correlation between chl-a and phycocyanin which is confirmed by the cyanobacterial dominance of the samples. However, an inter-method comparison revealed conflicting results.*

EL ENVIRONMENTAL LABORATORY

ERDC ENGINEER RESEARCH & DEVELOPMENT CENTER

1

In-situ Evaluation of Peroxide Treatments Applied to Harmful Cyanobacteria Blooms

Lead PI: Richard Johansen, ERDC, Richard.A.Johansen@usace.army.mil
Co-PI: Alan Katzenmeyer, ERDC, Alan.W.Katzenmeyer@usace.army.mil

USACE Harmful Algal Bloom Research & Development Initiative

Delivering scalable freshwater HAB prevention, detection and management technologies through collaboration, partnership and cutting-edge science

Major Milestones

Date	Milestone
FY20	Initial Start
FY21, Q3	Literature Review: Comprehensive review of data collection strategies for monitoring HABs (complete)
FY21, Q4	Developing conceptual workflow for data collection and field plan for deployment of scaled *in-situ* sensors
FY22, Q3	Marketing video to highlight field-based sensors (In Progress)
FY22, Q4	Internal document capturing the data pre-processing and analysis
FY22, Q4	Presentation at 2022 US HAB symposium (Postponed)
FY23, Q4	USACE-wide webinar (Recorded): Evaluation of spatio-temporal effects of peroxide treatment of HABs (Not Started)
FY23, Q4	Journal Article: NALMS "LakeLine" on the evaluation of barricade systems effectiveness to mitigate adverse impacts of cyanoHABs in recreational waterways (In Progress)
FY23, Q4	Technical Report/Journal Article: A multi-scale approach to monitoring for management of HAB treatment options for USACE lakes (In Progress)
Costs	**FY20:**$188K **FY21:**$206K **FY22:**$80K **FY23:**$60K **TOTAL:**$534K

Partnership/Leveraging Opportunities   This work will leverage multiple collaborations and other work units including: the Kansas Department of Health & Environment (KDHE) and USACE district partners (Tulsa and Kansas City) will assist in peroxide-based treatment as well as provide complementary species and toxins data collection. There is potential to collaborate with the project "UAS Survey to Support EPA Region 7 HAB Monitoring" (PI: Reif), as UAS imagery collected at the same time/location could benefit both projects. Lastly, there is potential to leverage work done for the project "Comprehensive satellite-based algorithms for broadscale cyanoHAB detection and monitoring" (PI: Johansen) as water quality data and image products from the peroxide treatment monitoring work unit could be used to support regional algorithm assessment.

Value to USACE Mission   This project is intended to lead to the development of improved monitoring for rapid-response HAB treatments as well as a singular peroxide-based treatment for HABs, which will better serve district personnel with varying expertise levels or financial limitations.

USACE District Liaisons: Gerard (Tony) Clyde of Tulsa District and Marvin Boyer of Kansas City District

Figure 3: *Researcher in the field*

Learn about other EL Research Areas including:
Aquatic Nuisance Species
Aquatic Plant Control
Ecosystem Management and Restoration

Find ERDC on the web at: