

USACE-ERDC Harmful Algal Bloom (HAB) Research Program Summary by Fiscal Year (FY) and Performing Agency

WRDA 2020 Sec 128 authorized a "demonstration program to determine the causes of, and implement measures to effectively detect, prevent, treat, and eliminate [HABs] associated with water resources development projects."

ERDC-led research project titles by research focus area		WRDA 2018 Sec 140					New Authorization Needed Close HAB R&D Gaps						
		FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30
Prevent (P)	Algal phytoremediation for HAB prevention				■								
	Cyanophage treatment for mitigating cyanoHABs				■	■	■	■	■	■	■	■	■
	USACE operational strategies for HABs management in inland reservoirs				■	■	■	■	■	■	■	■	■
	Cyanocide : a novel biological control approach for cyanobacteria				■	■	■	■	■	■	■	■	■
	Preventative treatment of overwintering cyanobacterial cells in sediments				■	■	■	■	■	■	■	■	■
Detect (D)	Remote sensing-based software tools to assist USACE WQ monitoring			●	●	●	●	●	●	●	●	●	●
	Comprehensive satellite-based algorithms for cyanoHAB detection and monitoring			●	●	●	●	●	●	●	●	●	●
	Biosensor for rapid detection of freshwater cyanotoxins in USACE waterways			●	●	●	●	●	●	●	●	●	●
	Development of molecularly imprinted polymer sensor for cyanotoxins		■	●	●	●	●	●	●	●	●	●	●
	Near real-time field test kit for detection, quantitation of high priority cyanobacteria			●	●	●	●	●	●	●	●	●	●
	Environmental genetic reconnaissance for monitoring and managing HABs: a review			■	■	■	■	■	■	■	■	■	■
Manage (M)	Unmanned aviation system (UAS) survey to support EPA Region 7 HAB monitoring			●	●	●	●	●	●	●	●	●	●
	Evaluation of a peroxide-based product for HAB control in Lake Okeechobee			■	■	■	■	■	■	■	■	■	■
	HAB Interception, Treatment and Transformation System (HABITATS) -- Lake O, FL		■	■	■	■	■	■	■	■	■	■	■
	HABITATS -- Chautauqua Lake, New York			■	■	■	■	■	■	■	■	■	■
	Mitigation of HAB toxins using 3D printed photocatalytic materials			●	●	●	●	●	●	●	●	●	●
	Flocculation of freshwater microalgae using naturally-derived biomolecules			●	●	●	●	●	●	●	●	●	●
	Bacterial remediation of microcystin -HAB toxins			●	●	●	●	●	●	●	●	●	●
	Research on Algae Flotation Techniques (RAFT)			■	■	■	■	■	■	■	■	■	■
	Light-Based Mitigation Technology (LBMT) for the reduction of HABs			●	●	●	●	●	●	●	●	●	●
	Evaluation of cavitation as a HAB control technology			●	●	●	●	●	●	●	●	●	●
	Evaluation of historic WQ data and cyanoHAB events: USACE technical guidance			●	●	●	●	●	●	●	●	●	●
Evaluation of Chitosan-graphene oxide composites for HAB management			■	■	■	■	■	■	■	■	■	■	
<i>In situ</i> evaluation of peroxide treatments applied to harmful cyanobacteria blooms			●	●	●	●	●	●	●	●	●	●	
ERDC partner-led research project titles													
P, D, M	HAB dynamics in Lake Okeechobee (USGS Caribbean Center; Nova SE University)		■	■	■	■	■	■	■	■	■	■	■
	Ultrasound as a strategy to control cyanoHABs (The Ohio State University, OSU)			■	■	■	■	■	■	■	■	■	■
	Factors critical to lake and reservoir management and cyanoHABs (Texas A&M)			■	■	■	■	■	■	■	■	■	■
	Early detection HABs with scalable biological treatment strategies (U Toledo)			■	■	■	■	■	■	■	■	■	■
	P, D, M and scalable technologies for HAB reduction (OSU)			■	■	■	■	■	■	■	■	■	■
D	Coupling Models to elucidate Freshwater Discharge Role in HAB Onset (Uflorida)			■	■	■	■	■	■	■	■	■	■
	Rapid, portable and multiplexed detection of HAB-forming genera (BGSU)			■	■	■	■	■	■	■	■	■	■
M	CyanoHAB forecasts and assessments in Lake Okeechobee (NOAA NCCOS)			■	■	■	■	■	■	■	■	■	■
	HABITATS partners (PNNL, NREL, UIUC, AECOM)			■	■	■	■	■	■	■	■	■	■

Targets

- Deliver scalable HAB solutions that minimize HAB frequency and effects to our Nation's freshwater resources.**
 - Reduce R&D risk/maximize R&D ROI through partnership, collaboration and teamwork and AOR/learning loops.**
 - Accelerate tech transfer (T2) via clear user guidance and validated cost performance data for each technology**
- Impact: >26 HAB technologies under development, poised to enter T2 pipeline by FY23 pending technical review and go/no-go evaluations**

Legend: WRDA 2018-authorized project status is shown as black (complete), hatched (in-progress), or grey (planned work pending congressional appropriation). Project deliverables are shown as ● (tech transfer activity, webinars, newly available tools), and ■ (technical reports, journal articles, patent filings). Projects are grouped by main research thrusts of HAB Prevention (P), Detection (D) or Management (M).

Acronyms defined:
 U.S. Environmental Protection Agency (EPA); Bowling Green State University (BGSU); Pacific Northwest National Lab (PNNL); National Renewable Energy Lab (NREL); University of Illinois, Urbana Champaign (UIUC); National Oceanic and Atmospheric Administration's National Centers for Coastal Ocean Sciences (NOAA NCCOS); Water Quality (WQ); The Water Resources Development Act (WRDA)