

Written Testimony for

The Senate Committee on Commerce, Science, and Transportation's Subcommittee on
Oceans, Atmospheres, Fisheries, and Coast Guard

Harmful Algal Blooms: The Impact on our Nation's Water

Hearing: Tuesday, August 28, 2018, 2:30pm
Room 253 of the Russell Senate Office Building

Submitted by:
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Good afternoon and thank you Mr. Chairman for holding today's hearing regarding Harmful Algal Blooms. I'm Bryan Stubbs, Executive Director of the Cleveland Water Alliance. We are a water innovation economic development cluster consisting of a coordinated group of industry, academic, research, water utility and government partners. We leverage our region's assets and resources to create a water innovation ecosystem that harnesses technology, spurs the economy and drives research.

Much of our work centers on the challenges presented by harmful algal blooms, or HABs. HABs and nutrient pollution in the Great Lakes region presents a significant and complex challenge that is directly impacting human, economic, societal, and environmental health. In particular the western and central basins of Lake Erie, which include source drinking water for millions of our citizens while driving billions in water enabled industrial economic output, are impacted by annual outbreaks of toxic algal blooms. In recent years, toxic algae blooms involving a cyanotoxin called microcystin have led to several temporary "do-not-drink" warnings around the western Lake Erie basin. If left unchecked, the economic impact of HABs on Ohio's Lake Erie businesses and drinking water utilities alone will be in excess of \$2.5b over the next two decades.

To begin to overcome this challenge the Cleveland Water Alliance, together with support from regional partners in Ohio and Michigan, is spearheading a technical approach to addressing HABs by making the Great Lakes *Smart*, starting with Lake Erie. A Smart lake is instrumented with digital and physical sensing infrastructure that transforms diverse data streams into usable tools to enable more effective management actions impacting the open waters of the Great Lakes up through the watershed. We have launched a series of initial innovation challenges to support this including the Internet of H2O challenge where we deployed five end-to-end solutions for the monitoring and analyzing of nutrient loading into Lake Erie.

In October of 2017 we begun work on a 3-year project in partnership with the Great Lakes Observing System, funded by the Integrated Ocean Observing System (IOOS), a NOAA program, to facilitate technology transition of the Lake Erie HABs early warning system from a prototype deployed rapidly beginning in 2014 on the heels of the Toledo water crisis, to a sustainable long-term program with stable funding and supported system operations and maintenance. The project includes numerous buoy and land-based sensors including NOAA's Environmental Sample Processor (ESP) for tracking the levels of dangerous toxins produced by

cyanobacteria that bloom each year, along with specialized software, web data products, digital portals and market-based solutions. The project works with more than two dozen drinking water utilities and a dozen soil and water conservation districts, and is driven to create a model to cost effectively drive near real-time feedback on harmful algal blooms including leveraging data to provide predictive analytics for more effective and efficient utility operations. This project ties into the related work of NOAA's Hypoxia Warning System.

In March of this year, in partnership with Ohio State University's Ohio Sea Grant program, Case Western Reserve University, along with other research institutions plus industry partners, the Cleveland Water Alliance submitted a \$3m proposal to the National Science Foundation (NSF) entitled 'Smart and Connected Infrastructure Nutrient Mitigation pilot' for the Sandusky Bay and Sandusky River Watershed. Submitted through the Smart and Connected Communities program, the goal of this Smart Lake pilot proposal is to leverage the urgency to address nutrient loading, non-point source nutrient loading, harmful algal blooms, and watershed management actions by building at scale Lake Erie's first demonstration "Smart Lake," a new breed of Smart & Connected Infrastructure (S&CI) that enables intelligent community water management. The proposal includes 1) distributed sensors, satellite spectrometry, unmanned vehicles (UAF/USV/UUV), real-time telemetry, and advanced algorithms, to understand water quality dynamics as it relates to nutrient loading and provide real time feedback for policy and management actions, 2) Leverage S&CI to identify hotspots, enable effective prioritization of future projects, and allow real time responses to events, and 3) Develop user-facing Smart and Connected Products (S&CP) to inform and empower the actions of institutional users and the general public.

In conclusion, solutions to the country's growing water challenges lie, in part, with the development and adoption of new tools, technologies and approaches. **Yet investment in water innovation as compared to other sectors including the electric power utility sector is extremely low.** Well managed, collaborative and directed innovation, spread out to key regional HAB hotspots such as Ohio and Florida, has a key role to play in addressing the harmful algal bloom challenge. In addition to dedicated technology driven funding, priority solutions should include IoT based technology, new sensor development (in particular new and cost-effective electro/chemical phosphorous and microcystin sensors), advance networking solutions, Data as a Service market driven solutions, along with appropriate use of data and data analytics...all leading to a real-time feedback loop systems for nutrient management actions, along with creating tools that will serve to educate and inform citizens and policy makers. A dedicated, organized and funded effort will:

1. **Improve Outcomes and Reduce Cost** – Innovation leverages the cutting-edge. The commercial and research-driven technologies activated by this investment will improve outcomes at lower costs. Enabling the inception, development, and implementation of these new tools will ultimately bring greater value and return on investment than an exclusive focus on maintaining or bolstering traditional and localized practices;
2. **Drive Collaborative Investment** – Innovation activates ecosystems. The excitement and opportunity created by new solutions attract private sector and research partners looking to get in on the ground floor and constituents looking to improve intractable issues. Investments to water innovation will create a situation where companies, institutions, and organizations can easily share ideas and solutions. In this way, promising innovations can serve as platforms that enable the construction of diverse coalitions of companies, institutions, and residents with the capacity to effect real change;

3. **Accelerate Economic Development** – Innovation begets commercialization. Connections formed through collaborative investment will lead to substantive working partnerships between businesses, researchers, and regulators. These nodes of collaboration are perfectly positioned to match developing technologies with regulatory support, test beds for pilot studies, and anchor clients as means to facilitate transfer to the market. Additionally, a commitment to clean water improves gross regional product and water innovation will help us better tie environmental health into economic health and societal benefit; and,

4. **Transform Data into Insight** – Innovation relies on information. Without data to analyze and optimize risks and outcomes, investments in water solutions lack intelligence. It is time that we start to understand that **data IS water infrastructure** and needs to see the same investments as our pipes and pumps. Today, much of our water is not used into giving us insight into long term health and opportunities. Further, rarely is that data tied into broader big data analytics and trends that speak to broader impacts. Investment in a robust data infrastructure for our Great Lakes will help address these challenges by enabling intelligent investment targeting and improved evaluation of investment performance. Tying these insights into broader impacts will lead to additionally lead to improved articulation of Great Lakes investments and better allow policy makers to justify past and future outlays.

I thank you for this opportunity and am happy to answer any questions.