

## HABs

- Rules in place since June 2016 and program going very well. No HAB advisories issued in 2016 or 2017 due to advanced warning/monitoring, treatment optimization protocols and increased PWS HAB IQ. We will have updated 2018 PWS Response and Recreational Response strategies available within next few months.
- HAB equipment grant program just ended with many PWS acquiring in-house ELISA and datasondes. OEPA looking to develop PWS guidance on reservoir management, utilizing sondes/monitoring, and engaging PWS in source water protection targeting HABs.
- Future research needs: DW treatment (microcystins and other toxins), fate/transport of toxins, qPCR screening, satellite imagery applications, real-time toxin sensors.

### **USEPA-ORD has directly assisted Ohio EPA's HAB program in several ways:**

**1. Molecular Methods.** Dr. Jorge SantoDomingo conducted an interlab validation of the phytoxiogene qPCR assay Ohio EPA is using as a screening tool. This increased Ohio EPA's confidence in the method prior to method finalization and smoothed the transition to private labs for analysis of compliance samples. Dr. SantoDomingo is also sequencing hundreds of Ohio samples to increase our understanding of potential sources of cyanotoxins in Ohio waters and phytoplankton community dynamics.

**2. Treatment Optimization.** Dr. Nick Dugan worked with Ohio EPA and Ohio public water systems to better understand cyanotoxin treatment at full scale plants on Lake Erie. He has also conducted several lab studies to help evaluate the impacts of treatment chemicals on cyanobacterial lysis and cyanotoxin removal. These results have been incorporated into Ohio's cyanotoxin treatment white paper. His work with potassium permanganate was especially useful to Ohio water systems.

Several ORD and Office of Water staff have partnered with Ohio EPA on the refinement of the national Comprehensive Performance Evaluation (CPE) protocol to address cyanobacteria and cyanotoxins. Three pilot CPEs have been conducted at Ohio PWSs to assist HAB impacted water systems, refine the CPE protocol, and transfer capacity to conduct special studies to Ohio EPA. Information from the CPEs helped water systems evaluate their existing treatment capacity, develop their general plans, and in some cases make necessary plant improvements to be able to better address future HABs. USEPA taught Ohio EPA how to conduct PAC jar tests, which Ohio EPA now routinely conducts to help plants assess their cyanotoxin treatment capacity.

**3. Analytical Methods.** Dr. Heath Mash and Dr. Toby Sanan's group did an assessment of the MMPB method for potential use as a validation method for finished water microcystins detections. The method had limitations for finished water matrix sample that Ohio EPA was unaware of prior to the study. The group is now participating in an interlab MMPB method comparison project with OSU and Greenwater labs. This study will help determine if the MMPB method (which is less expensive and more holistic than other methods) is appropriate for use in fish tissue microcystins analysis, which will benefit Ohio's fish consumption advisory program.

**4. Nutrient BMPs and HAB Monitoring.** Dr. Chris Nietch and Dr. Joel Allen have partnered with Ohio EPA and state and local ag groups to implement and evaluate nutrient reduction BMPs. They have also tested various HAB monitoring techniques and are partnering with Ohio EPA on validation of remote sensing and new satellite tools, which show great promise for use in recreational HAB monitoring.

**5. Response to Finished Water Cyanotoxin Detections.** Darren Lytle continues to be an invaluable resource during Ohio EPA's response to finished water cyanotoxin detections, especially in relation to how treatment adjustments might impact corrosion control goals. We greatly appreciate the assistance he and his staff have provided during these events.