

Ohio EPA's Harmful Algal Bloom Program

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**Environmental
Protection
Agency**

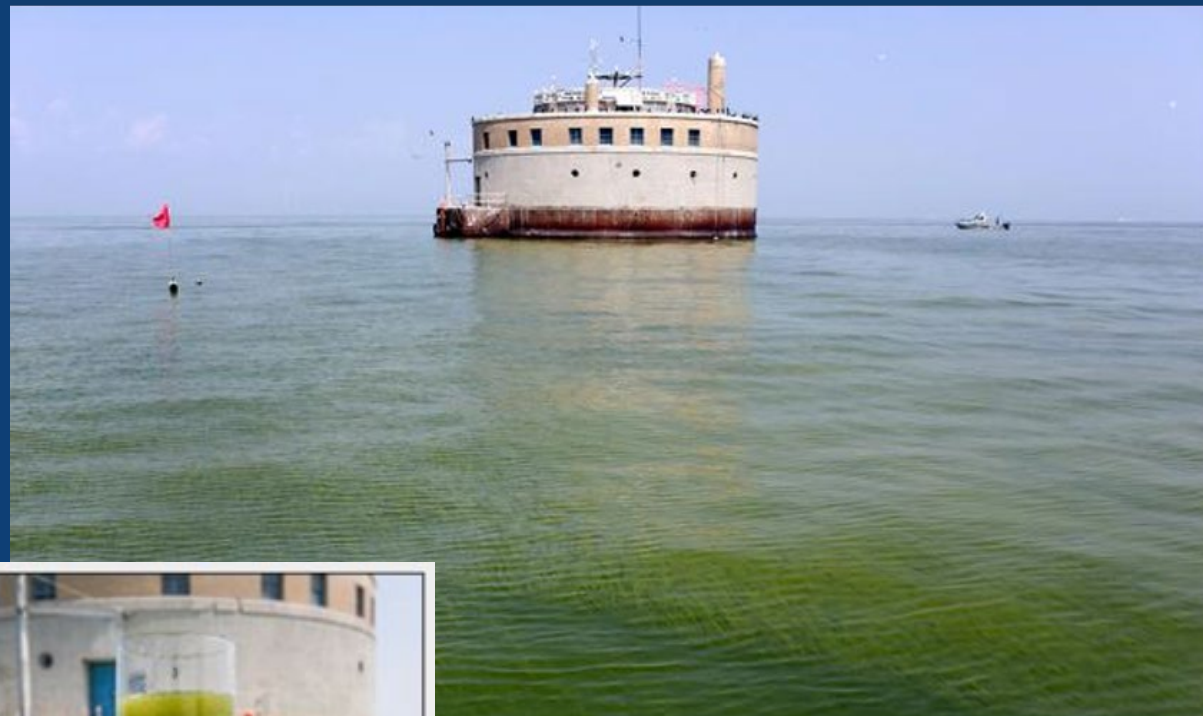
History of Ohio EPA's HAB Program

- **2009:** Results from National Lakes Assessment spurred development of State program
- **2010:** Ohio EPA began incident-response sampling for HABs
- **2010:** Lab established ELISA method
- **2011:** First Ohio HAB Response Strategy (ODNR/ODH)
- **2012:** Separated Strategy for Recreational and PWS use



2013-2014

- First “Do Not Drink” in 2013 for finished water microcystin at Carroll Township
- First finished water saxitoxin detection
- Toledo’s August 2014 “Do Not Drink” advisory for microcystin



BREAKING: Toledoans asked not to drink or boil water

Posted: Aug 02, 2014 2:06 AM EDT
Updated: Aug 02, 2014 2:29 AM EDT
Posted by WTOL Staff - email

TOLEDO, OH (Toledo News Now) - The city of Toledo has sent out a urgent notice to residents of Toledo and



Microcystis fills a glass of Lake Erie water near the Toledo water intake crib.

THE BLADE



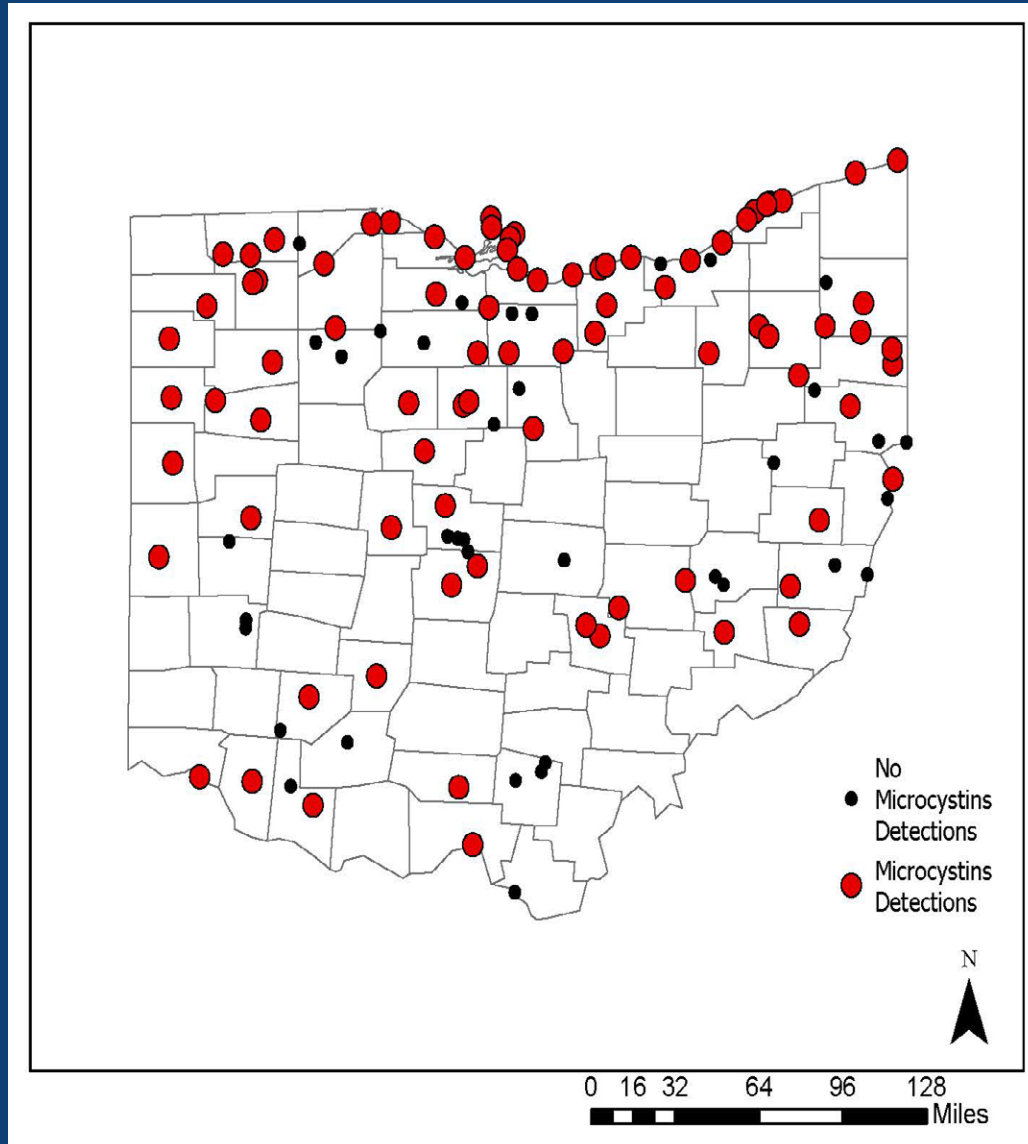
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2015-today

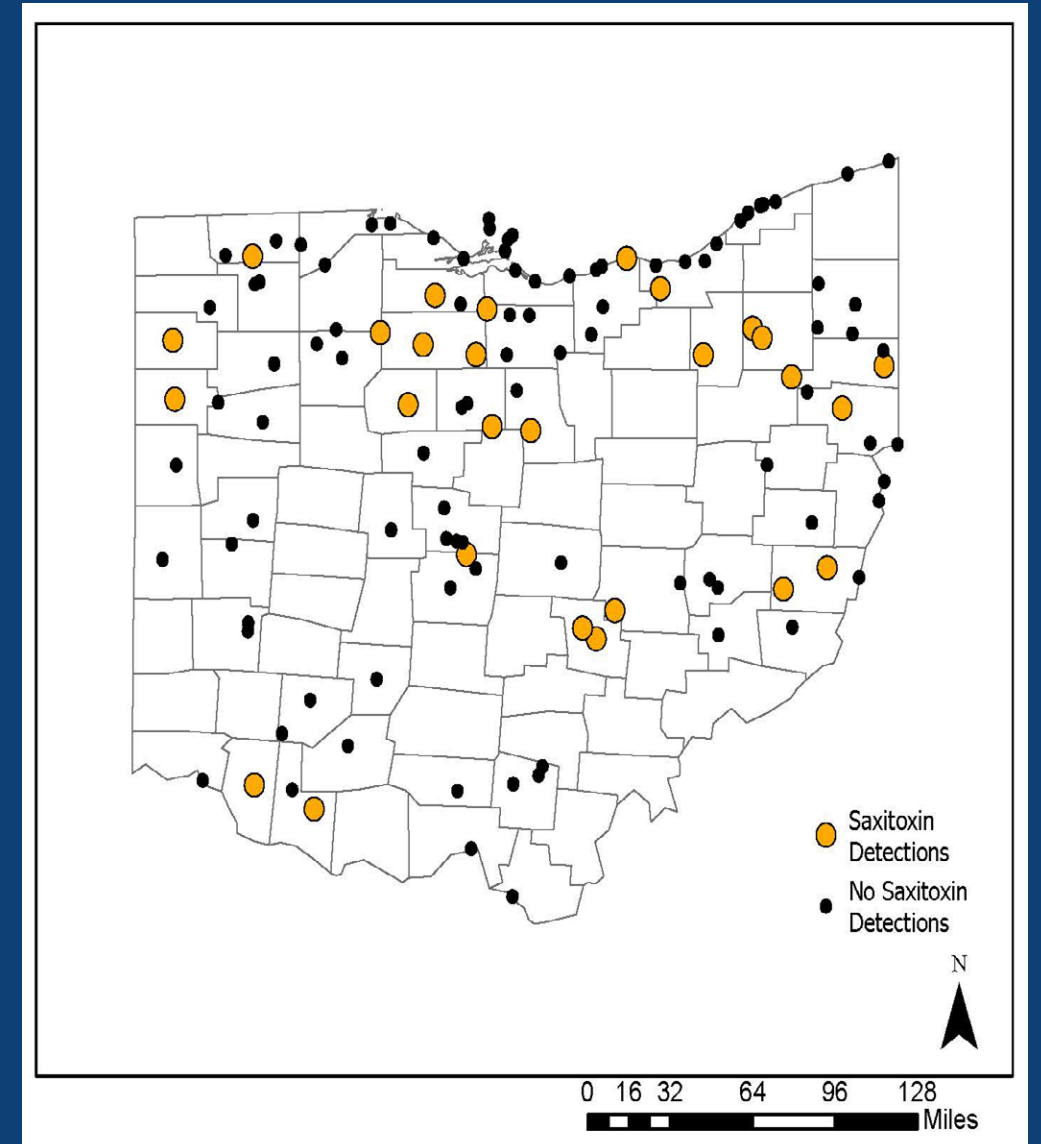
- **2015:**
 - Incorporated US EPA's HAL's for microcystin and cylindrospermopsin into HAB response strategy.
 - Ohio River Microcystis Bloom and Second Largest Lake Erie Bloom on record
 - Finished Water MC detections at 5 PWS's, but no DW Advisories
 - Senate Bill 1 passed; OEPA coordinates HAB management and response
- **June 2016:** HAB Rules for PWS effective
- **2018:** First finished water cylindrospermopsin and anatoxin-a detections
- **November 2022:** Revised HAB rules for PWS



SW PWS and Microcystin Detections



SW PWS and Saxitoxin Detections



Harmful Algal Bloom Program Structure (DDAGW)

Central Office

- Rule review, strategy updates and provide guidelines on HAB monitoring
- Coordinates follow-up sampling. Daily check of results and distribution to field offices
- HAB Season - Bloom Reports, Weekly Satellite Imagery and Weekly HAB Updates
- Collaborates with Ohio Department of Health (ODH) and Ohio Department of Natural Resources (ODNR) for recreational strategy and response
- Assist with database management and public outreach

Field Offices

- Communication with PWSs
 - Technical Assistance/Outreach
 - Sampling Status updates
 - Screening or sampling results to PWS
- Collection of follow-up samples

DES Lab

- Analyze PWS HAB Samples (SXT, Anatoxin-a)
- Communicate Results



HAB Rules - Overview

- Applicable to all public water systems with a surface water source
- **OAC 3745-90: PWS Requirements**
 - Microcystin Action Levels in DW
 - Monitoring and Treatment Technique
 - Public Notice and CCR
 - Recordkeeping
- **OAC 3745-90-04 and 3745-89: Laboratory Certification**
 - Laboratory Certification
 - Analytical Techniques
 - Reporting Deadlines



Three Main Changes with the 2022 HAB Rules

- HAB monitoring season and HAB off-season will have a new monitoring period and requirements.
- All surface water systems, except for consecutive water systems, will be required to submit a **Treatment Optimization Protocol (TOP)**.
- Laboratories analyzing microcystins must be certified to run the updated version of the **Ohio EPA Method 701.0 - Total (Extracellular and Intracellular) Microcystins - ADDA by ELISA Version 2.4** (November 2021).



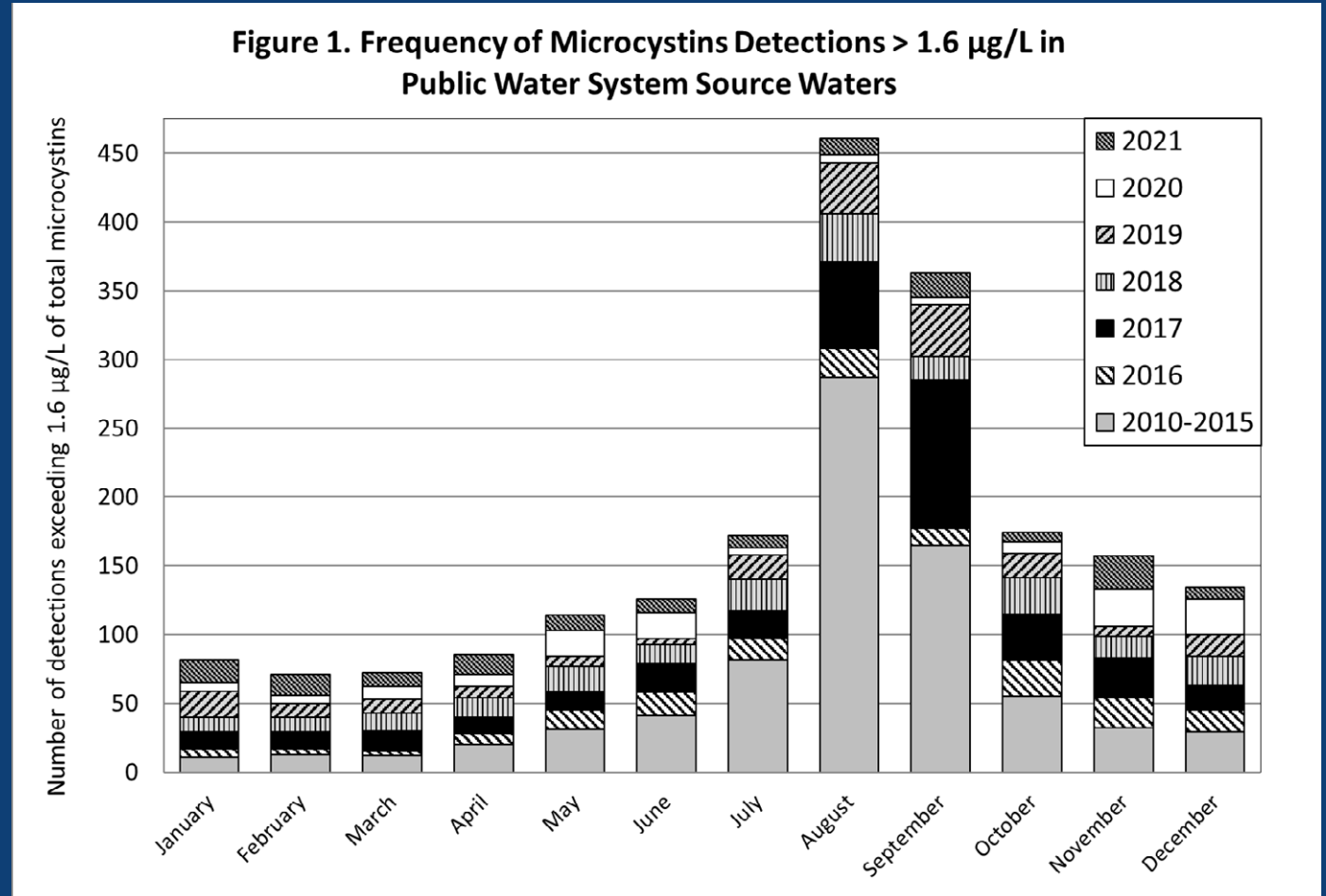
Ohio EPA Drinking Water Action Levels

Drinking Water Thresholds	Microcystins (µg/L)	Anatoxin-a (µg/L)	Cylindrospermopsin (µg/L)	Saxitoxins (µg/L)
Do Not Drink – children under 6 and sensitive populations	0.3	0.3	0.7	0.3
Do Not Drink – children 6 and older and adults	1.6	1.6	3.0	1.6



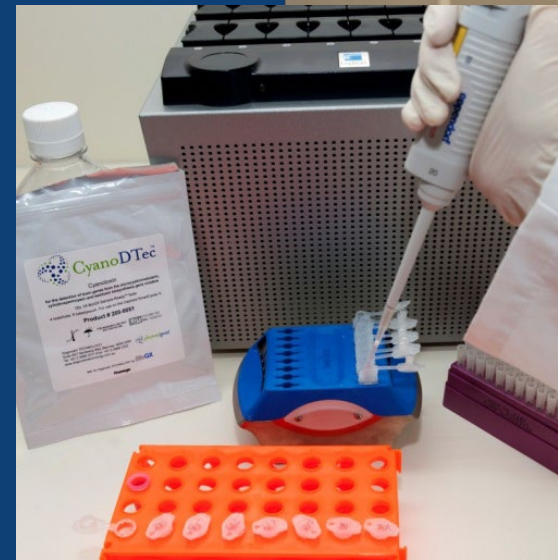
PWS Monitoring – When do we monitor?

- **HAB Season**
 - Begins first full week of June (previously first full week of May)
 - Microcystins typically peak in August and September
- **Off-season**
 - Begins first full week of December (previously first full week of November)



What constituents are monitored?

- Total Microcystins (ELISA) (raw and/or finished)
 - Finished water detections and elevated raw water detections trigger additional sampling
- Cyanobacteria Screening (qPCR) (raw only by method)
 - Genetic test that triggers follow-up sampling by Ohio EPA for microcystins, saxitoxins, and cylindrospermopsin



PWS Monitoring Schedules

	HAB Season Monitoring Requirements	Off Season Monitoring Requirements
Routine Monitoring	Biweekly raw water cyanobacteria screening AND Biweekly raw water microcystins (collected on alternate week of screening sample, not paired)	Biweekly FINISHED water microcystins
GUI system	Monthly raw water cyanobacteria screening	Monthly FINISHED water microcystin
Out-of-state consecutive	Weekly finished water microcystins	Biweekly FINISHED water microcystins



Response to Detections - Raw

- Microcystins detected in raw water
 - Collect raw/finished within 24 hours/Analyze within 5 days
 - Continue weekly paired until non-detect for two weeks
- mycE detected in raw greater than 5 gc/uL
 - Collect raw/finished within 24 hours/Analyze within 5 days
 - Continues with weekly paired microcystins until non-detect for two weeks
- If qPCR screening indicates the presence of saxitoxin or cylindrospermopsin genes (sxtA or cyrA)
 - PWS must notify Ohio EPA no later than the end of the next business day
 - Ohio EPA will conduct or facilitate sampling



Response to Microcystin Detections - Finished

- If microcystins are detected in finished water $> 0.3 \mu\text{g/L}$:
 - Collect resample of raw/finished water within 24 hours. Then, collect an additional repeat sample of raw/finished water within 24 hours of resample. Complete analysis within 24 hours.
 - If microcystins $>0.3 \mu\text{g/L}$ in either resample or repeat, consecutive systems must be notified within three hours.
 - PWS will sample raw water once per week and increase sampling to three times per week at finished water sampling point.
 - PWS can resume routine monitoring when microcystins are non-detect in finished water for two consecutive samples



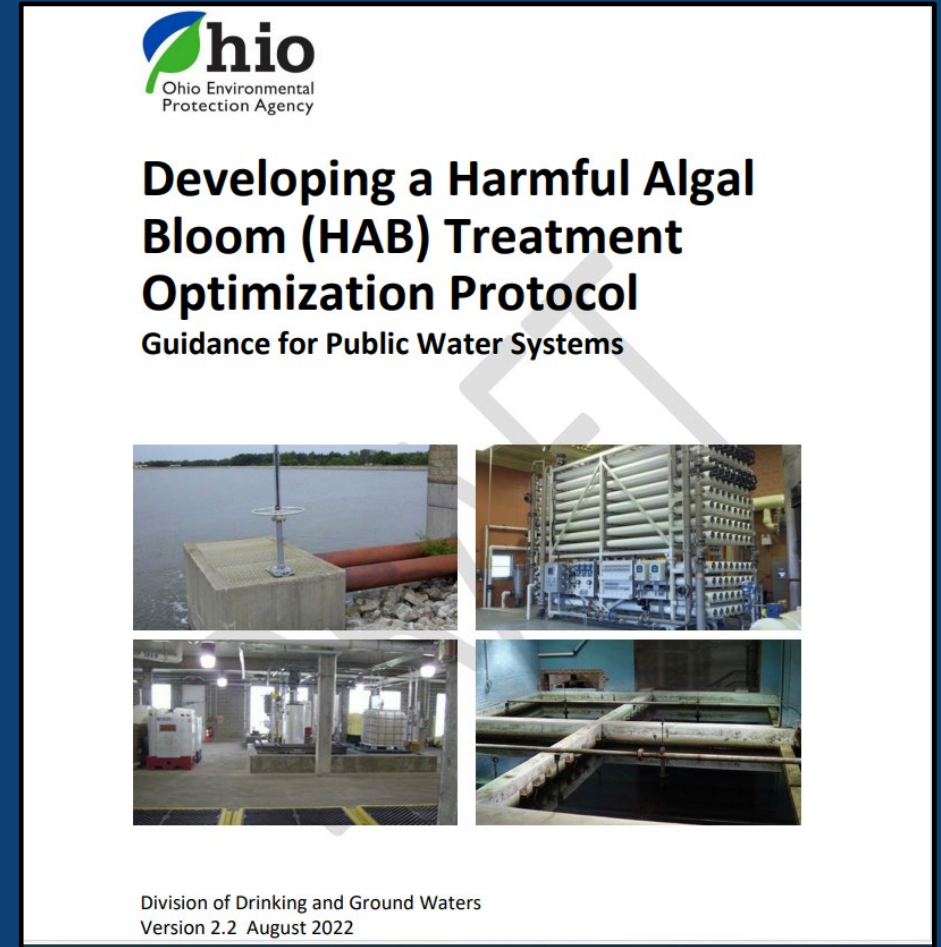
DW Use Advisories and Public Notification

- Tier 3 PN issued (most common)
 - Monitoring/Testing
 - Reporting/Recordkeeping
- Tier 2 PN issued
 - Treatment Technique
 - Failure to implement General Plan
- Tier 1 PN issued
 - **Repeat** finished water sample exceeds an action level
 - Failure to collect repeat samples
 - May limit extent of distribution of public notice



Treatment Optimization Protocol

- Every SW PWS must have one; required in OAC 3745-90-05
- Provides details on how a PWS will optimize treatment for HABs
- Protocols must include:
 - detailed information on the PWS
 - source waters
 - existing treatment processes with schematic
 - description of treatment adjustments that will be made under various water quality conditions
- **TOP must focus on optimization of existing treatment for microcystins removal.**



HAB General Plans

- Triggered by finished water microcystins detection or two raw water detections each >1.6 ug/L within twelve months.
- Short-Term and Long-Term actions to address microcystins in raw water and prevent finished water exceedances
- Focuses on multi-barrier approach
- Comprehensive approach / Consideration of Impacts of source and treatment changes
- Schedule for Implementation
- Registered Engineer



Multiple-Barrier Approach - Source Water

- Source Water Protection Activities
 - SWAP Protection Plan
 - Long-term approach
 - Watershed Mgmt to reduce nutrient loading
- Avoidance Strategies
 - Pumping and intake management
 - Alternate sources
- Reservoir Management
 - Monitoring (sonde, water quality testing)
 - Treatment (algaecide, phosphorus inactivation treatment)



Multi-Barrier Approach - Treatment

- Evaluate Conventional Treatment and Optimization for removal of cyanobacteria cells and intracellular Toxins
- Evaluate additional chemical or physical processes (adsorption, destruction or rejection) for removal of extracellular toxins
- Perform Jar/Bench scale testing to determine conditions and optimize dosing, contact time, and filter aids.
- Use OEPA's TOP Guidance and OEPA/AWWA White Paper on Cyanotoxin Treatment



Recreational Monitoring

- OEPA, ODNR and ODH collaborated to develop the Ohio HAB Response Strategy for Recreational Waters (2020)
- Unified approach for addressing HABs at publicly owned, recreational lakes with public beaches and boat ramps
- Defines:
 - Recreational cyanotoxin thresholds
 - Signage and advisory language
 - Agency responsibilities
 - More information can be found at Ohioalgaeinfo.com



Cyanotoxins Thresholds for Recreational Waters

Threshold (µg/L)	Microcystins	Anatoxin-a	Cylindrospermopsin	Saxitoxins*
2020 Recreational Public Health Advisory	8*	8	15*	0.8

*Based on USEPA's 2019 recreational swimming advisories for microcystins and cylindrospermopsin.



Signage

Have fun on the water, but know that blue-green algae are in many Ohio lakes. Their toxins may be, too.

Be Alert! Avoid water that:

- looks like spilled paint
- has surface scums, mats or films
- is discolored or has colored streaks
- has green globs floating below the surface

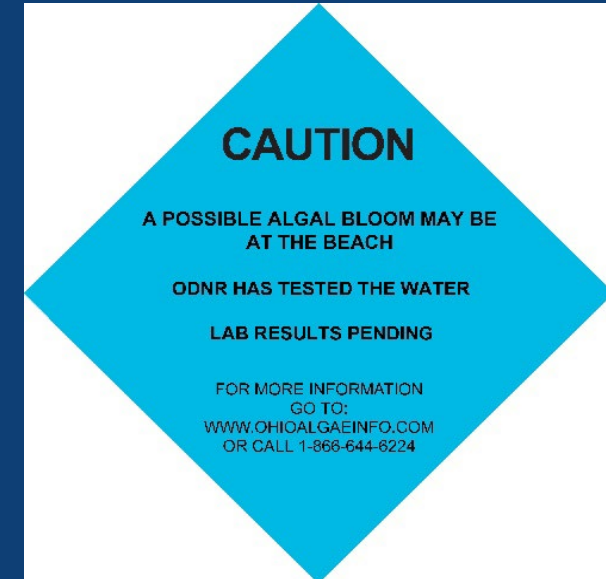


Avoid swallowing lake water.

For more information, visit ohioalgaefinfo.com or call 1-866-644-6224.



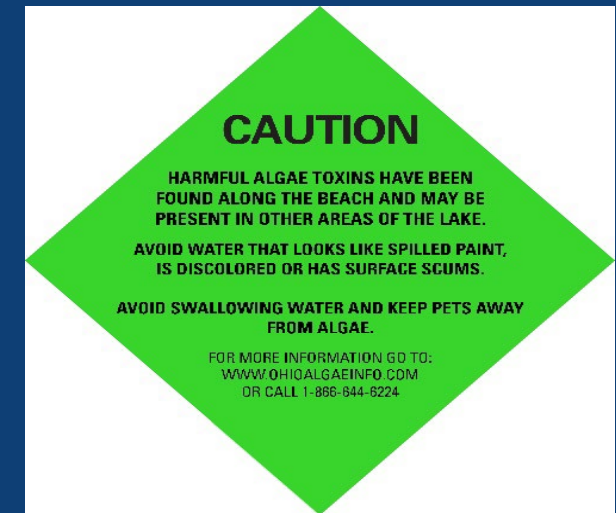
Posted for recreational waters at all public state park beaches and boat ramps



Caution (Visual):
Beach

ADVISORY: Beach

Caution: Boat Ramp



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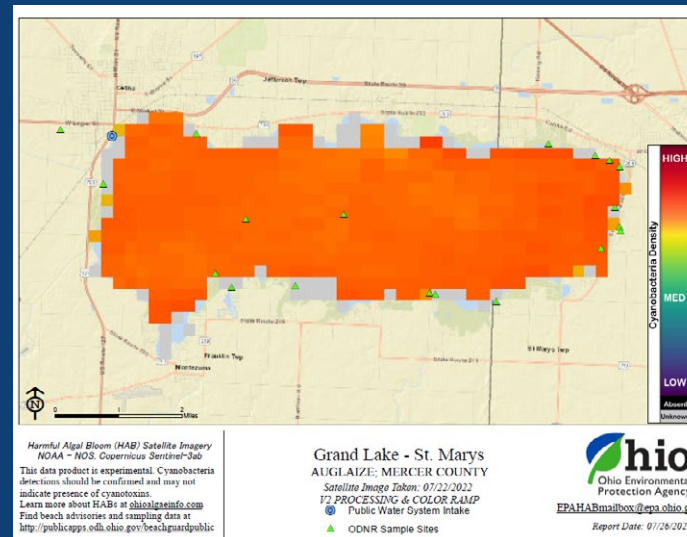
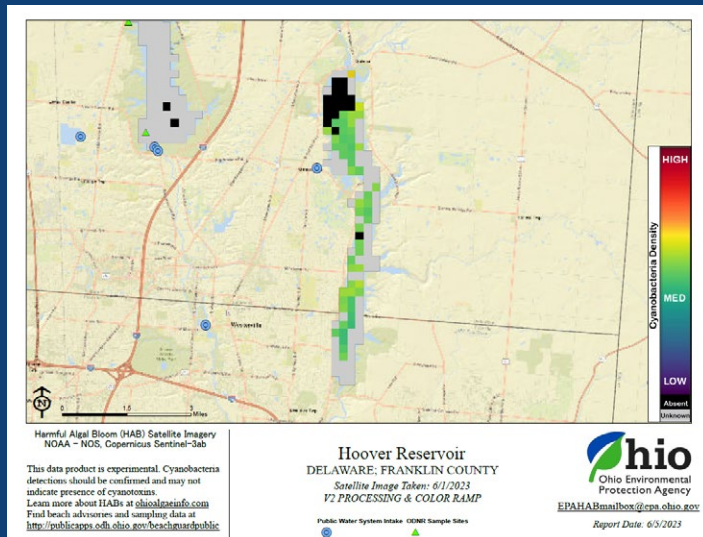
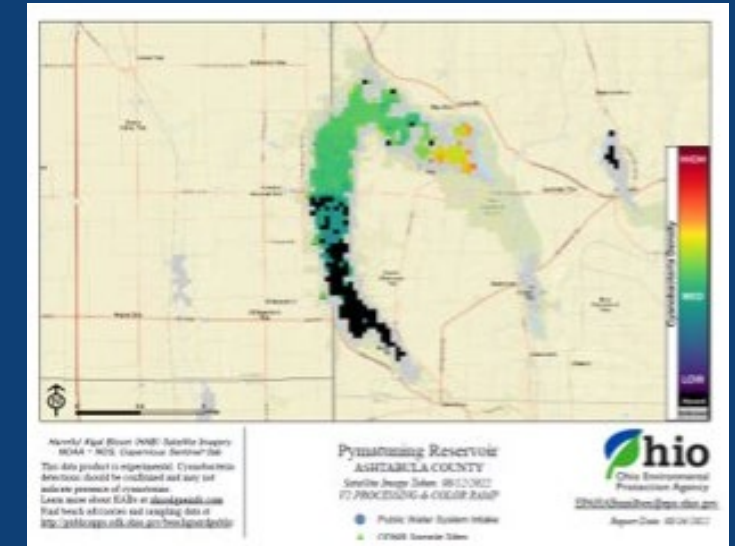
Bloom Reports

- Individuals that observe HABs are encouraged to complete an Algal Bloom Report Form:
- <https://survey123.arcgis.com/share/ac459f1f0b344bfa93c0486b028fbba6>
- Includes questions like date of observation, location, waterbody location/use, and can add pictures
- OEPA receives reports and communicate information to ODNR and ODH for follow-up.
 - Additional coordination with local beach/lake managers and health districts
- Reports may include surface water sources for PWSs



Ohio Inland Lakes Satellite Imagery

- Ohio EPA evaluates daily NOAA-NOS Copernicus Sentinel-3 Satellite Imagery for inland lakes across the state
- Maps are shared with ODNR, ODH, PWSs, and local managers/health districts
- Helps with identifying potential bloom formation and risks
 - Recreational exposure
 - Drinking water intakes, PWS reservoirs



Collaboration with OEPA Div. of Surface Water

- DDAGW/DSW collaboration on sampling locations
- DSW collects samples through their inland lakes programs targeted to PWS intakes
- **Clean Water Act Integration: Public Water Supply Beneficial Use**
 - Established cyanotoxin indicators of impairment for determining public drinking water supply beneficial use attainment
 - DDAGW provides information to DSW for integrated report/ATTAINS on status of source water/watershed impairment



HABs and Source Water Protection

- Develop ways to integrate HAB program and SWAP program
- Hiring a HAB/SWAP position
- Focus on outreach to SW PWS in impaired watersheds
- Increase number of SW PWS's with endorsed plans



Questions?

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Ohio EPA

Division of Drinking and Ground Waters

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Thank You!