

Harmful Algal Bloom (HAB) Rules and Strategies

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Outline

- Background HAB Response in Ohio
- HAB Monitoring and Cyanotoxin Occurrence
- Rule Review and Proposed Changes to PWS HAB Rule (OAC 3745-90)
- HAB Strategy for Recreational Waters



Background: Ohio HAB Response

2010: Ohio EPA began incident-response sampling for cyanotoxins

2011: Ohio EPA/ODNR/ODH created Ohio HAB Response Strategy

2013 & 2014: Drinking water advisories due to microcystins, first finished water saxitoxins detection in 2013 (below threshold)

2015: USEPA Established Health Advisories for Microcystins and Cylindrospermopsin & Ohio Senate Bill 1 passed

2016: HAB Monitoring and Treatment Rules Effective June 2016:

- OAC Chapter 3745-90: epa.ohio.gov/ddagw/rules.aspx

2018: First finished water cylindrospermopsin and anatoxin-a detections (below HALs & Ohio EPA thresholds)

2019: USEPA Established Recreational Thresholds for Microcystins and Cylindrospermopsin

2020: Update HAB strategies for PWS* and Recreational Waters; Begin 5-year Rule Review Process for HAB Rule

**PWS HAB Strategy updated annually*



HAB Monitoring for Public Water Systems (PWS) with Surface Water Sources

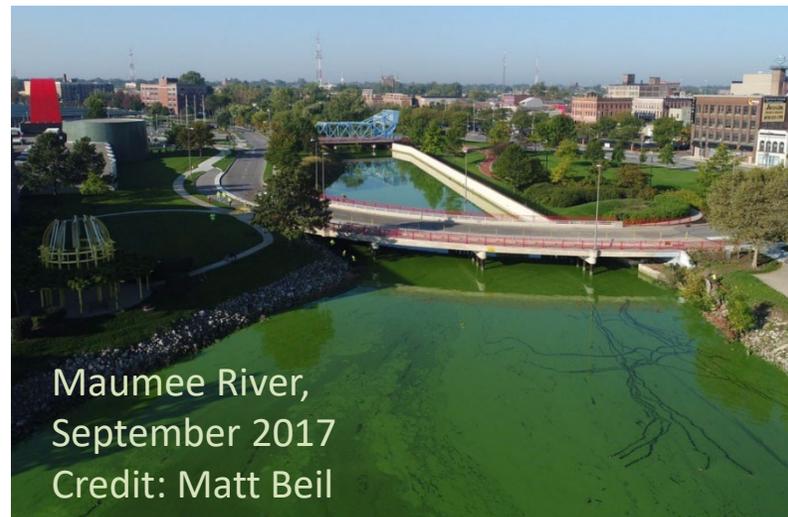
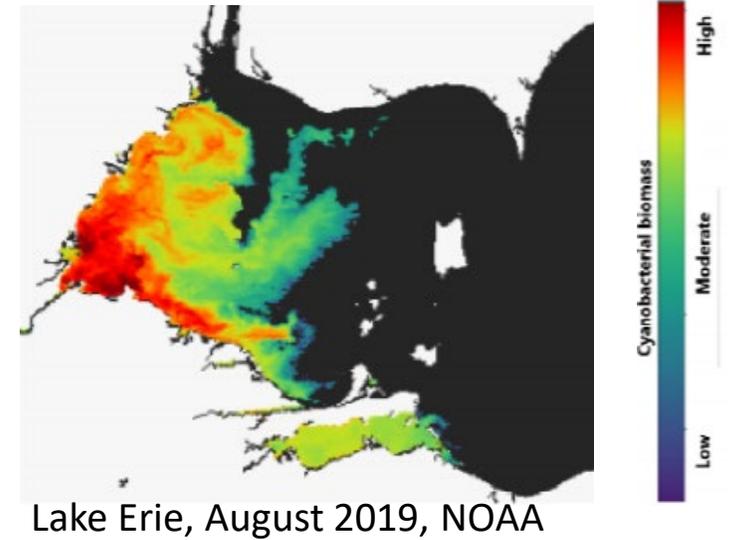
- Total Microcystins (ELISA)
 - **May – October (HAB Season)**
 - Weekly raw and finished water
 - Reduced monitoring when no microcystins detected*
 - **November – April (Off-season)**
 - Raw water only every other week when no microcystins detected*
 - Finished water detections and elevated raw water detections trigger additional sampling
- Cyanobacteria Screening (qPCR)
 - Biweekly raw water (paired with microcystins sample)
 - Genetic test that triggers follow-up sampling by Ohio EPA for saxitoxins and cylindrospermopsin



*Reduced monitoring
for eligible systems*

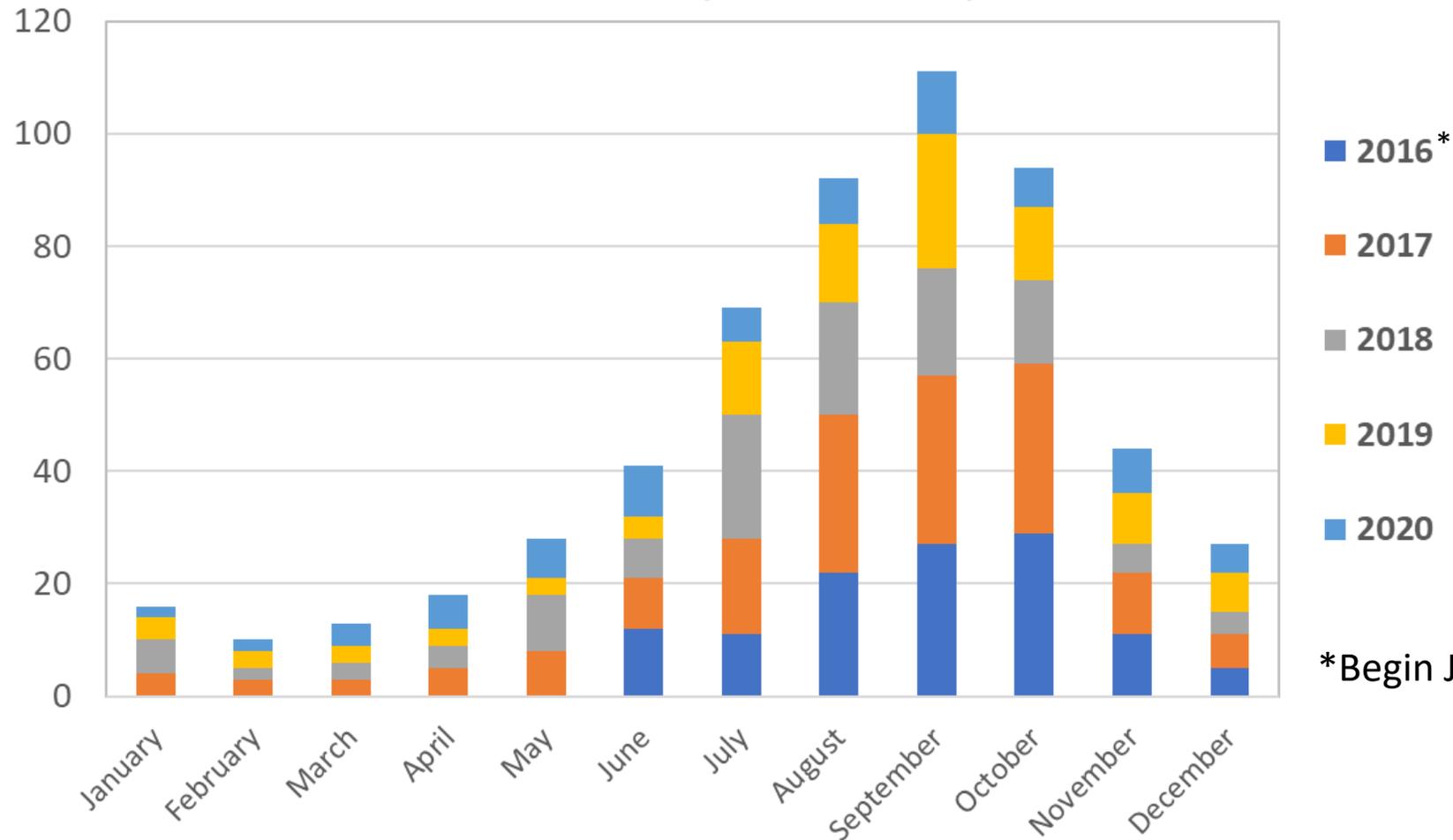
Occurrence of Total Microcystins in Ohio

- Microcystins are most common, found in a wide range of source waters
- Elevated concentrations typically during late summer, early fall but can persist throughout year
- Microcystins data (2016-2020)
 - 26,100 (raw and finished) compliance
 - 11% with detections in raw water (MC, mcyE)



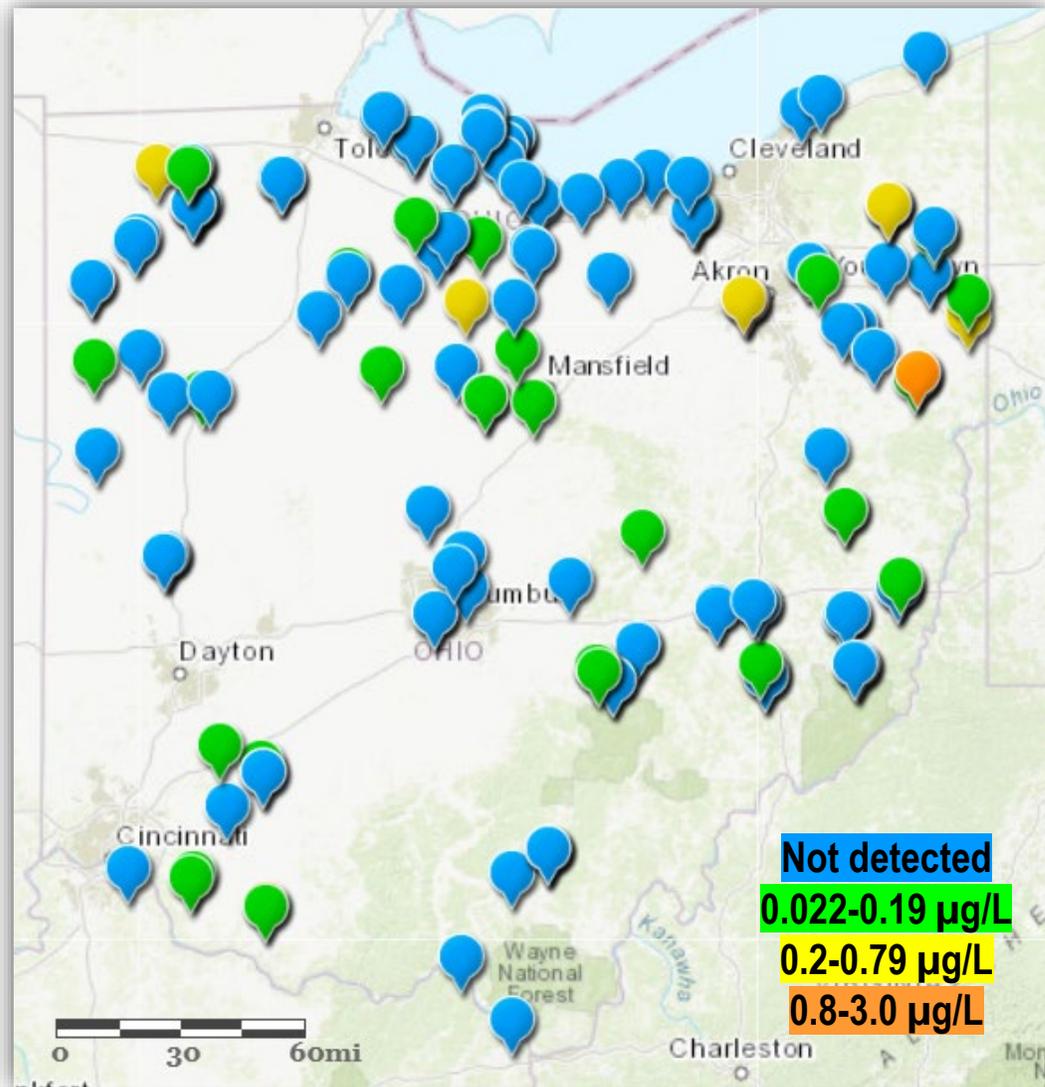
Microcystins Detections at PWS

Count of PWS facilities with microcystins detected in raw water compliance sample



*Begin June 2016

Occurrence of Saxitoxins in Ohio

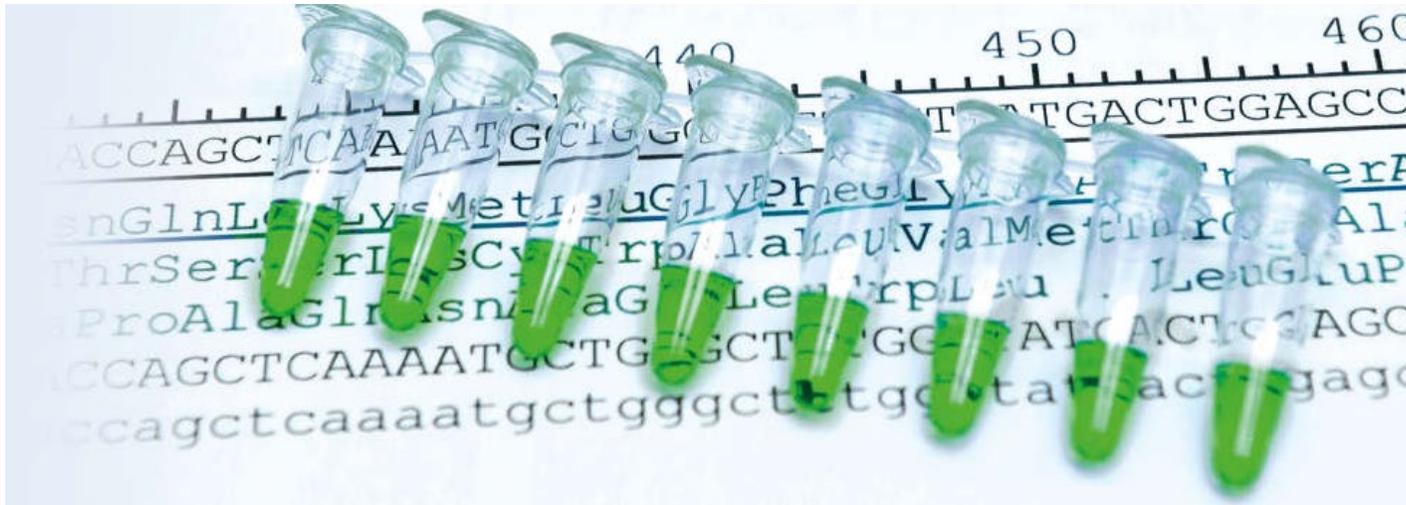


- Saxitoxin-production genes, *sxtA*, detected at 69 PWS but saxitoxins detected at only 34 in follow-up sampling
- Saxitoxin concentrations in raw water are generally lower than DW threshold
- No drinking water advisories for saxitoxins but detections (below threshold) in finished water at 13 PWS

	Saxitoxins (µg/L)
DW Threshold (child)	0.3
DW Threshold (adult)	1.6
Method Reporting Limit (ELISA)	0.0220

Summary from Cyanobacteria Screening (qPCR)

- qPCR is an effective, specific, screen for microcystins and saxitoxins
- Low occurrence of cylindrospermopsin-producing genes, *cyrA*, detected at five PWSs, one PWS detected cylindrospermopsin
- Gene for total cyanobacteria, 16S, may facilitate trend analysis of blooms
- Lab turn-around times
- Analytical and manufacturing issues



HAB Rules Overview

- **Surface Water PWS Requirements - OAC Chapter 3745-90**
 - Microcystins action levels in drinking water
 - Monitoring requirements
 - Treatment technique requirements
 - Public notification and Consumer Confidence Report (CCR) requirements
 - Recordkeeping requirements
 - Five-year rule review in 2021 and Early Stakeholder Outreach (ESO) 2020
- **Laboratory Certification Requirements – OAC rule 3745-90-04 and amended rules in Chapter 3745-89**
 - Laboratory certification
 - Analytical techniques
 - Reporting deadlines

Ohio Numerical Cyanotoxin Thresholds for Drinking Water

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

2020 Ohio PWS HAB Response Strategy

**Threshold values for anatoxin-a updated in 2020
Remove 'do not use' tier**



Timeline for Revised HAB Rule

- Finalize formatting and sign-off
- Release for Interested Party Review (IPR, 30-day comment period)
 - Proposed rule language
 - Business Impact Analysis (BIA)
 - Response to comments
- Original File (OF) June 1, 2021
- Public hearing 31-40 days after OF date
- Final file
- Effective as soon as possible (transition to off-season 2021)

Important Note

HAB Season 2021 will have same monitoring as last year

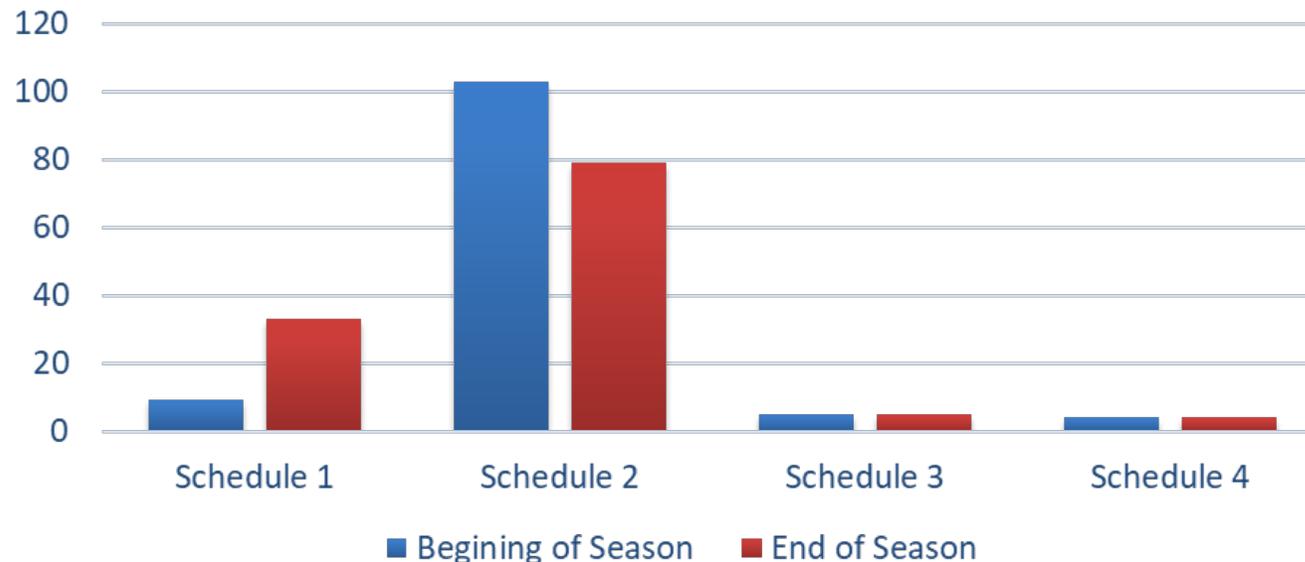
Schedule	HAB Season Monitoring Requirements (Beginning week of May 2-8, 2021)
1	Biweekly qPCR screening AND Weekly raw/finished microcystins (raw paired with biweekly screening sample)
2	Biweekly qPCR screening AND Biweekly raw water microcystins (collected on alternate week of screening sample, not paired)
3	Monthly qPCR screening
4	Weekly finished water microcystins

Proposed HAB Rule – Analytical Methods and Reporting

- Reference updated analytical methods
 - Total Microcystins ADDA by ELISA (Ohio EPA DES 701.0, Version **2.4**)
 - Revision in progress and include minor change in sample processing
 - Lower reporting limit (currently 0.3 µg/L), most certified labs/analysts meet lower detection limit
 - qPCR for Cyanobacteria Screening (Ohio EPA DES 705.0)
- Re-define ‘Cyanobacteria Screening’
 - Expand definition to include semi-quantitative alternate to qPCR
 - Allow finished water sampling point for cyanotoxin
 - ELISA based method for cylindrospermopsin and saxitoxins
 - New method with comparison to negative and single positive control
- Make reporting rule consistent with other lab reporting rules

HAB Schedule and Reduced Monitoring

- Monitoring reductions offered through HAB PWS Strategy
- PWS facilities assigned to schedule at beginning of HAB season
- MC detection(s) trigger increase, monitor per rule (schedule 1)
 - PWS may request return to reduced (schedule 2) after period of no detects

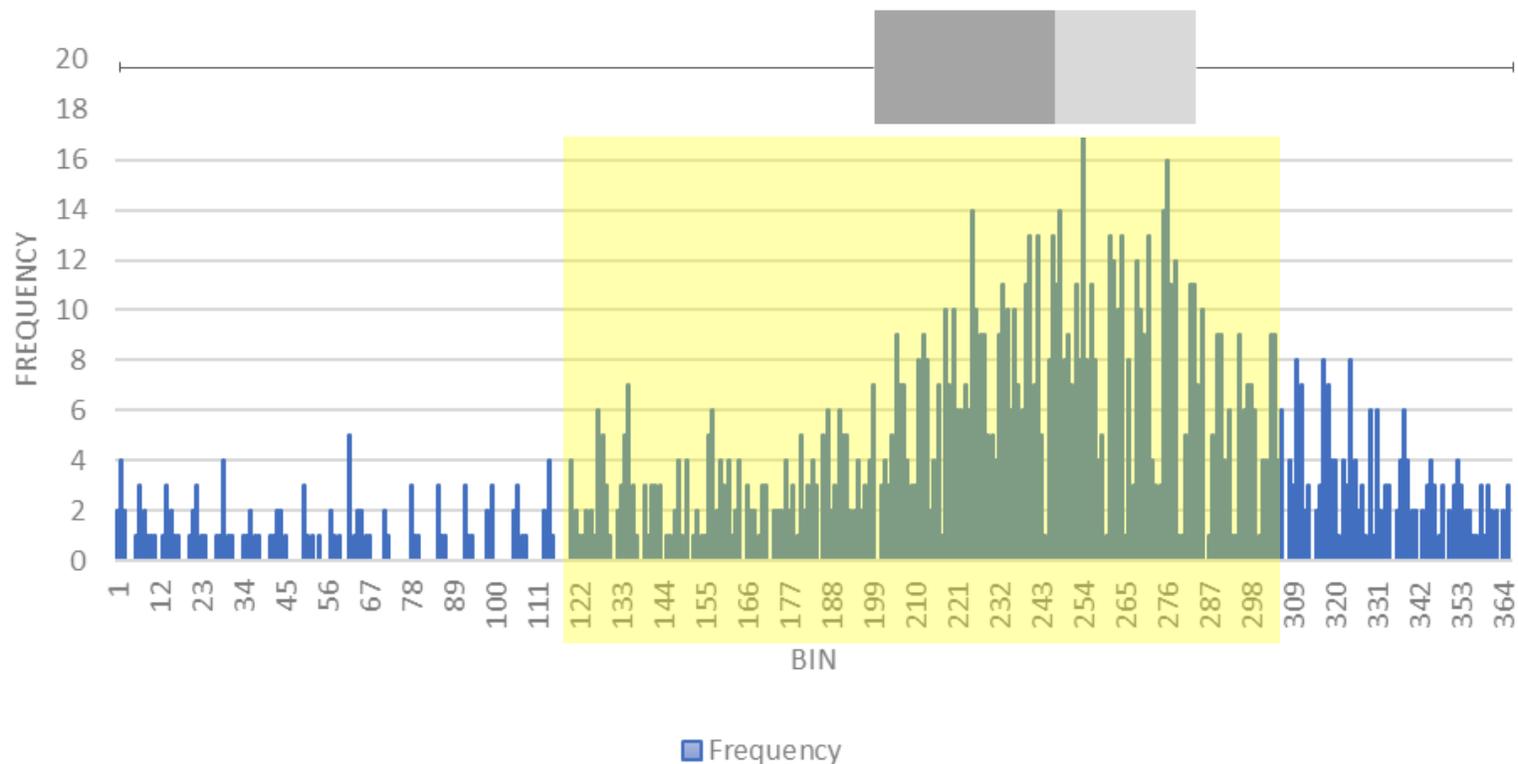


Proposed HAB Rule - Monitoring

- Codify reduced monitoring (schedule 2) in rule as routine monitoring
- Include trigger to increase monitoring upon detections in raw or finished samples
- Remove additional monitoring (3X week) when raw water microcystins exceed 5 µg/L
- Plan to begin during transition to off-season

Seasonal Occurrence of Microcystins

- Reviewed seasonal trends in raw water microcystins data
 - Mean = Day 231, Median = Day 245, and Mode = Day 254
 - 1SD inclusive of 1st and 3rd Quarters



Percent contribution of
our Late Bloomers in
Off-season

77%

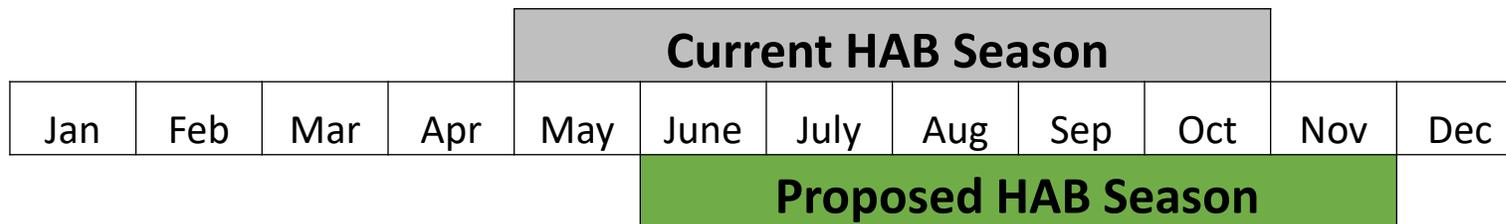
83%

63%

57%

Proposed HAB Rule – HAB Definitions

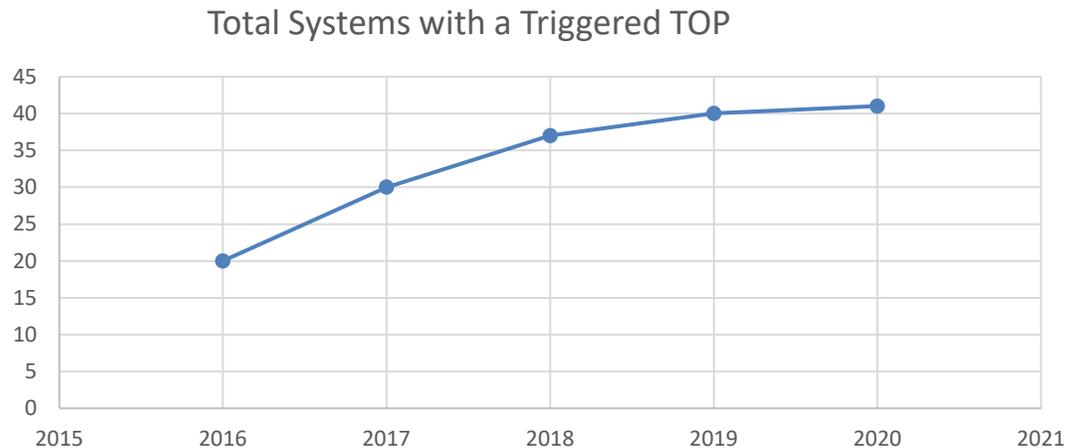
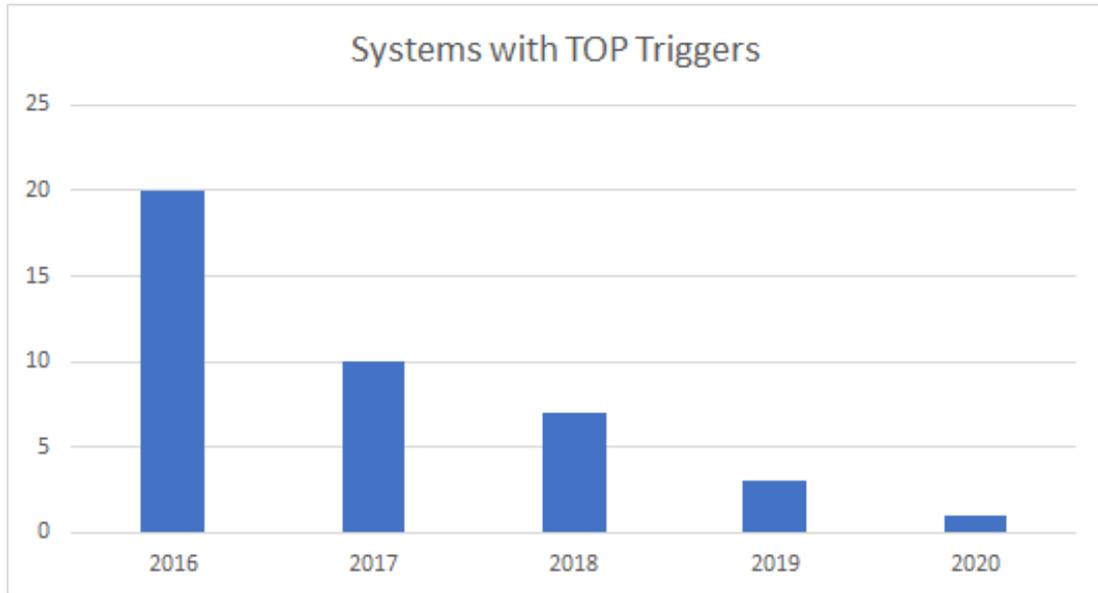
- Propose that HAB Season will be more productive and align with occurrence of microcystins if it slides by 1 month
- Redefine ‘HAB Season’
 - Proposed to start first full week of June
- Redefine ‘Off-season’
 - Proposed to start first full week of December



Proposed HAB Rule – Off-season

- Change in period (Dec-April)
- Monitor microcystins in finished water sampling point
 - Once during biweekly period
- FW detection triggers to increase to three times per week monitoring for microcystins (no longer daily)
- No cyanobacteria screening (qPCR)
 - Has been allowed per PWS HAB Strategy since January 2018

Treatment Optimization Protocols (TOP)



- TOPs are important and useful to prevent FW detections
- TOP triggered in original rule after MC detection
- Trigger rate has slowed
- ~38 PWS submitted without triggering

Proposed HAB Rule – Treatment Technique

- Success of the HAB TOP and template materials justify the following proposal:
 - Require HAB TOP from all surface water systems
 - Timeframe?
 - Annual review of HAB TOP for all surface systems
 - What does this look like?

Important Note

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HAB Strategy for Recreational Waters

- History of Strategy
 - 2011, 2012, 2014-2016, **2020**
- Establish stage agency roles and responsibilities
- Numerical thresholds for cyanotoxins
- Signage and advisory language
- Sample collection protocols
- Bloom reporting and contact information



Department of Health
Environmental Protection Agency
Department of Natural Resources

Cyanotoxin Thresholds for Recreational Waters

- Revised numerical values and assessment consistent with USEPA Guidance for Microcystins and Cylindrospermopsin
 - See appendix D of HAB Strategy for Recreational Waters
- Single-tier advisory level

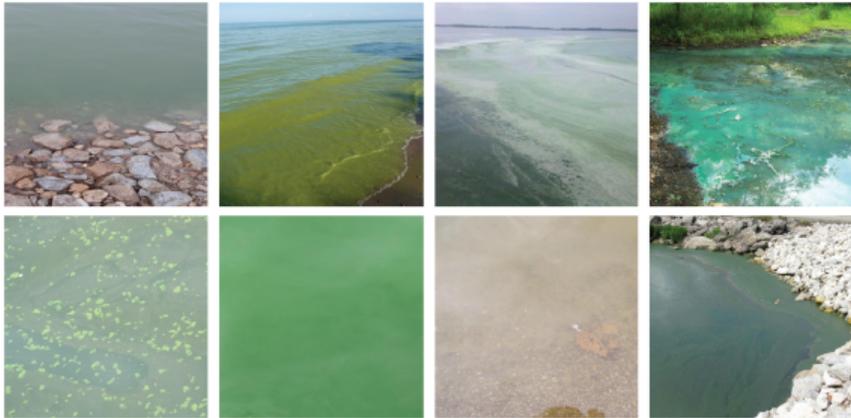
Threshold ($\mu\text{g/L}$)	Microcystins*	Anatoxin-a	Cylindrospermopsin	Saxitoxins*
Recreational Public Health Advisory	8	8	15	0.8

*Microcystins and saxitoxin thresholds are intended to be applied to total concentrations of all reported congeners, variants, or analogs of those cyanotoxins.

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
ohioalgaeinfo.com
or call 1-866-644-6224.***



General Signage for HABs

- Signage posed at all state park beaches and boat ramps.
- Describes HAB appearance and advises to avoid contact
- Provide contact information and resources
- No change in 2020 Strategy

Caution Sign (NEW) for HAB at Recreational Waters

Recreational Caution (BLUE)

- Issued, posted at public state park beach when an algal bloom is visually confirmed
- Notes date that beach was sampled for cyanotoxins, and replaced with advisory if needed
- Remove when algal bloom is gone



Recreational Public Health Advisory for HABs

When cyanotoxins reach or exceed threshold level for recreation at state park beaches:

- **Red** sign added to general (white) sign at beach. Advises to avoid contact with water
- **Safety-green** caution sign added to general (white) sign at boat ramp. Advises boaters that HAB is confirmed at beach and may be present at other areas
- Post advisory to BeachGuard website:
<http://publicapps.odh.ohio.gov/beachguardpublic/>



Resources for HAB Programs

HABs in Recreational Waters: www.ohioalgaeinfo.com

HABs in Drinking Water: <https://epa.ohio.gov/ddagw/HAB>

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Rules, Laws, Policies and Guidance

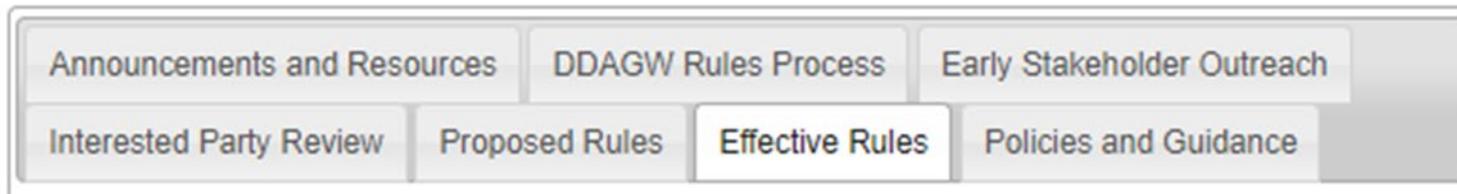


The Division of Drinking and Ground Waters (DDAGW) rules were promulgated under U.S. EPA's Safe Drinking Water Act (SDWA). Rules for Ohio public drinking water systems are adopted under Ohio Revised Code (ORC) Section 6109, and rules for Underground Injection Control, under ORC 6111.043. Ohio Administrative Code (OAC) rules administered by DDAGW are located on this page. More information about DDAGW's rule-making process is available under the "DDAGW Rules Process" section below.

rule-making and opportunities to provide commen

Electronic versions of policies and guidance may be viewed by clicking on the appropriate tab. Join a rules electronic mailing list to stay informed about current during the process.

→ Questions? Call (614) 644-2752 and ask to speak with a Rules Coordinator.



<https://epa.ohio.gov/ddagw/rules#110542563-effective-rules>

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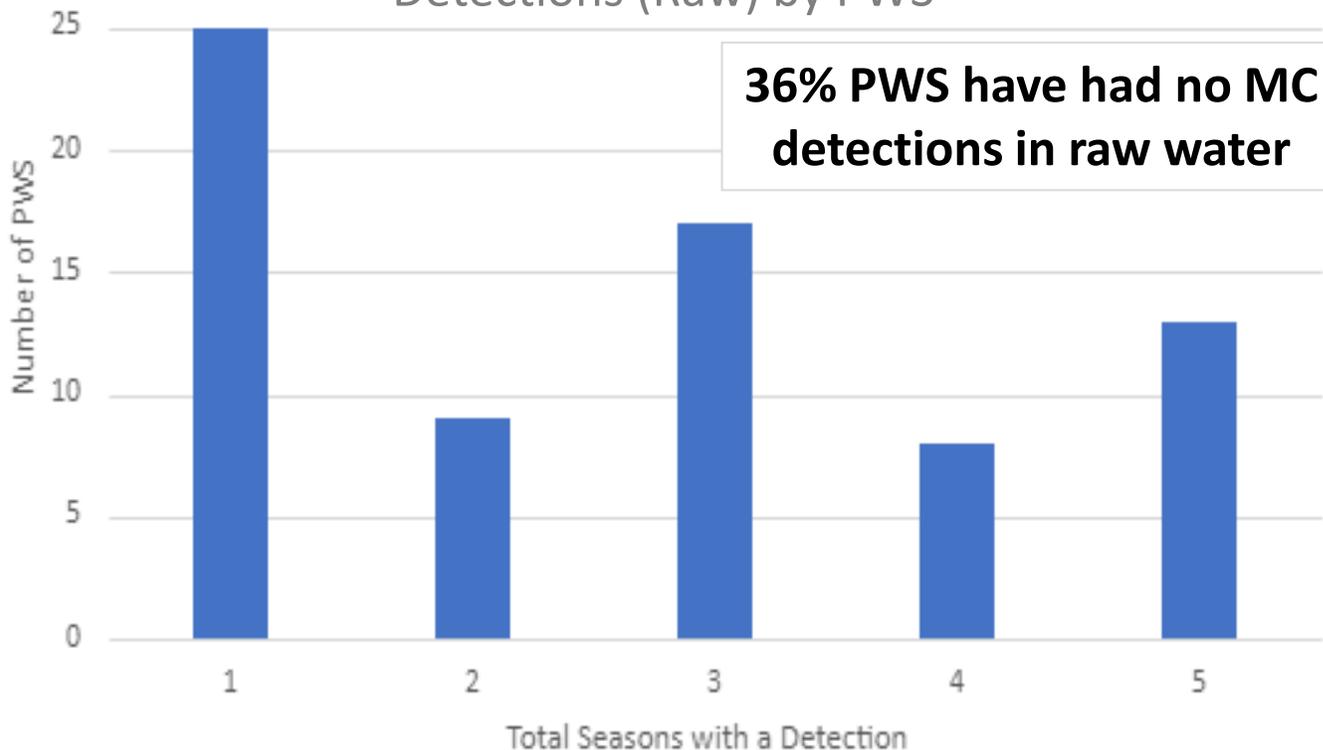
Southwest District

Brian Chitti 937-204-1199



Historical Detection of Microcystins (MC)

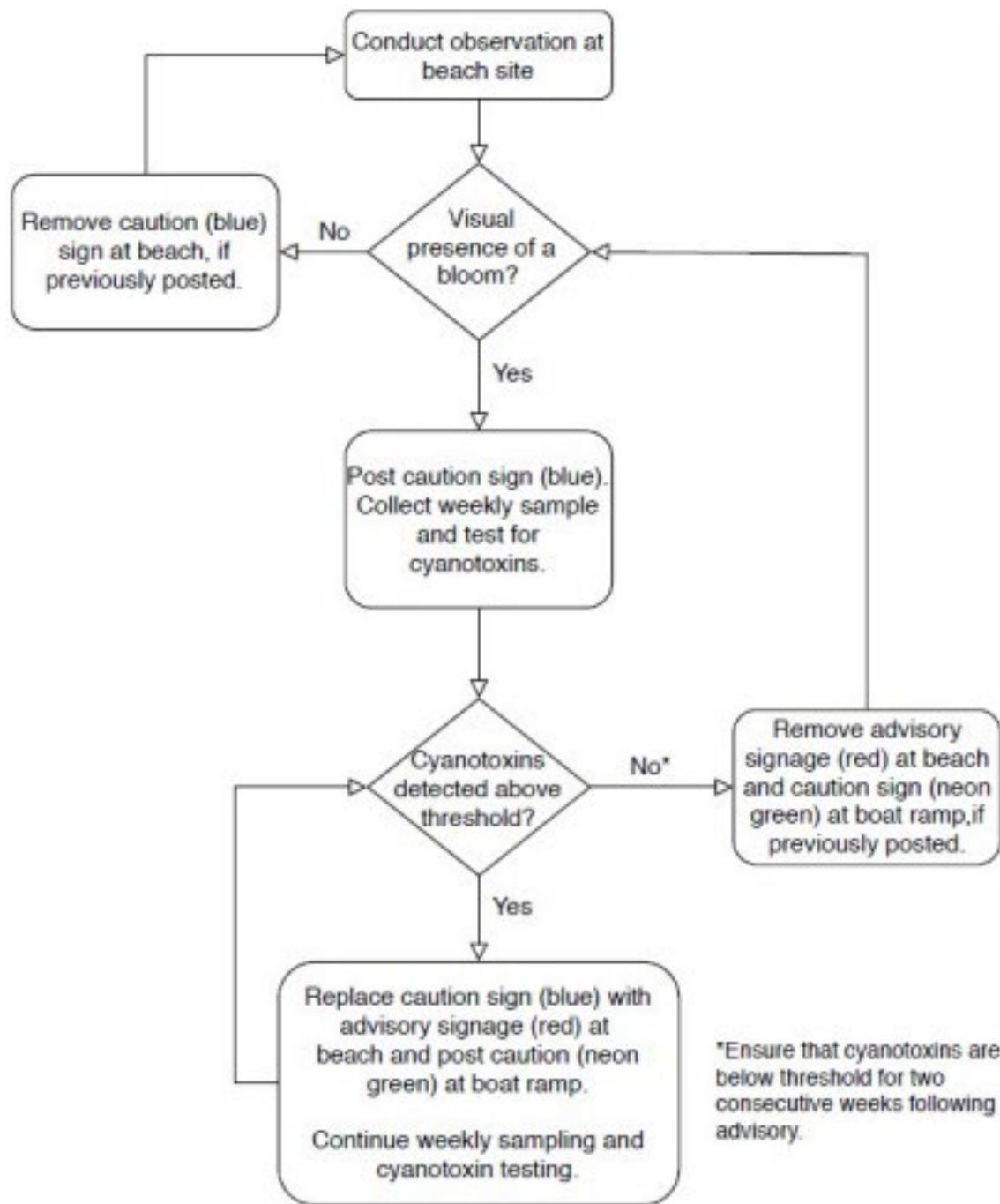
Total Seasons with Microcystins
Detections (Raw) by PWS



- 26,000+ MC compliance samples
- 1,869 with MC detection (7% of total, 11% of raw)
- 96% of raw data $<1.6 \mu\text{g/L}$

Only 4 FW detections (2016-2020)

- No advisories needed



Treatment Technique Trigger

- Most HAB TOPs triggered during June-November
- HAB General Plan triggered during off-season: 3 PWS (10%)

