

Response Planning for Harmful Algal Blooms in Recreational Waters

September 20th, 2017

MALEHA Environmental Health Director's Conference –
Working Session

Jennifer Gray, Toxicologist, MDHHS

Alex Rafalski, Toxicologist, MDHHS

Harmful algal bloom concerns

- The frequency and extent of HABs are expected to increase
- MDEQ WRD tasked with assessing the nature, extent, and frequency of harmful algal blooms in Michigan's inland waters



MDEQ-WRD HAB definition

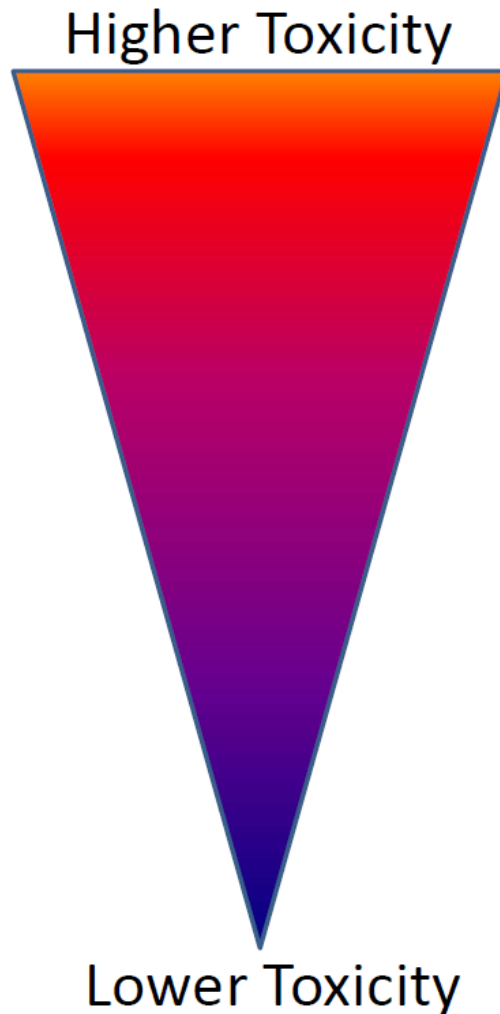
An algal bloom in recreational waters is harmful if microcystin levels are at or above the 20 ug/L WHO non-drinking water guideline, or other algal toxins are at or above appropriate guidelines that have been reviewed by MDEQ-WRD. A bloom should be considered *potentially* harmful when the chlorophyll-*a* level is greater than 30 µg/L and visible surface accumulations/scum are present, or cells are visible throughout the water column.

Harmful algal bloom concerns

- Drinking water & water quality
- Aesthetics & quality of life
- **Human and animal health risks**



Cyanotoxins



Toxin Reference Doses

Dioxin (0.000001 mg/kg-d)

Microcystin LR (0.000003 mg/kg-d)

Saxitoxin (0.000005 mg/kg-d)

PCBs (0.00002 mg/kg-d)

Cylindrospermopsin (0.00003 mg/kg-d)

Methylmercury (0.0001 mg/kg-d)

Anatoxin-A (0.0005 mg/kg-d)

DDT (0.0005 mg/kg-d)

Selenium (0.005 mg/kg-d)

Botulinum toxin A (0.001 mg/kg-d)

Cyanide (0.02 mg/kg-d)

Atrazine (0.04 mg/kg-d)

Chlorine (0.1 mg/kg-d)

Ethylene Glycol (2 mg/kg-d)

Cyanotoxins

Hepatotoxins

- Microcystin
- Cylindrospermopsin

Neurotoxins

- Anatoxin-a
- Saxitoxin

Some are possibly carcinogenic

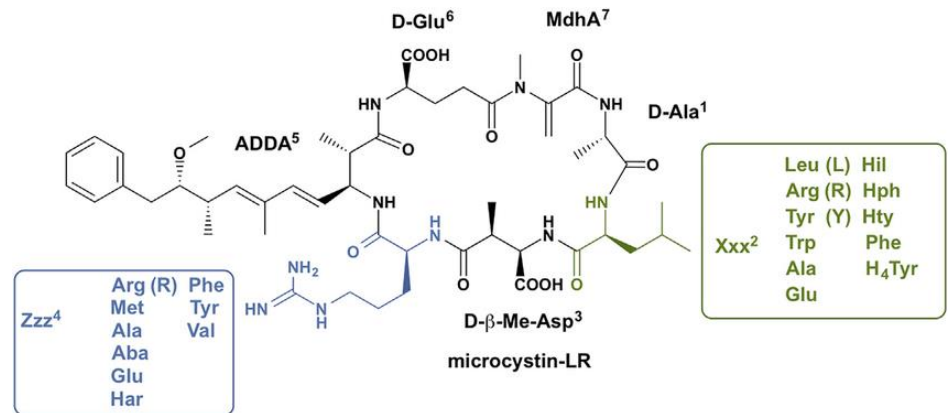
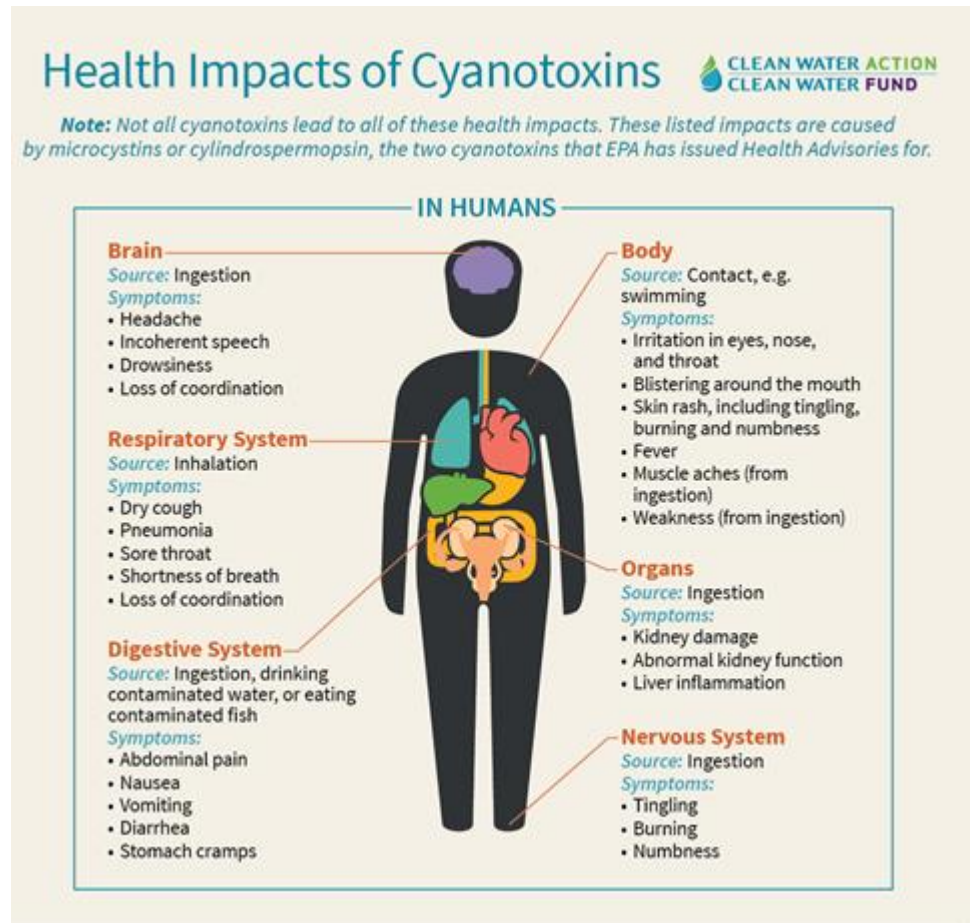


Figure 1. Over 80 congeners of microcystin exist and we are still learning about the toxicity of each.

Health effects

- Skin irritation
- Respiratory irritation
- Illness



Health effects

- Particular health concern for pets – dogs



How widespread are HABs in Michigan?

- Historic monitoring has found that microcystin concentrations in Michigan inland lakes are not typically very high across all lakes
- MDEQ 2017 primary objective was to quantify algal toxin concentrations in lakes with public complaints of algal blooms

MDEQ/MDHHS response in summer 2017

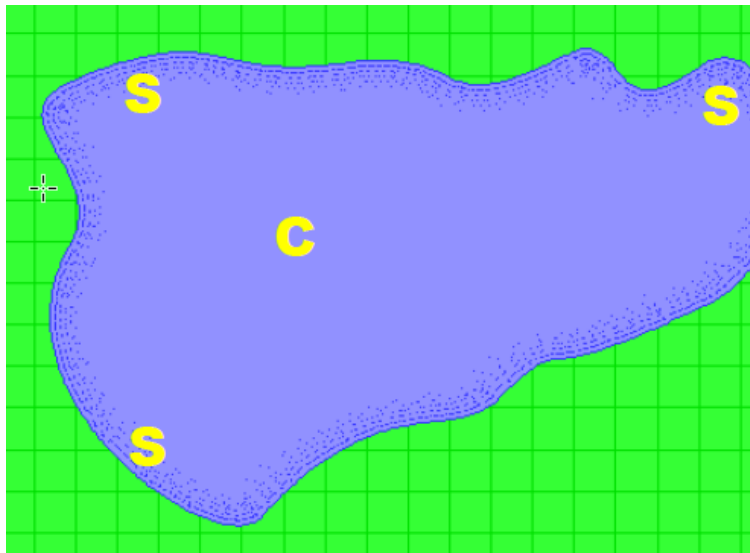
MDEQ Roles

- Conduct recreational water monitoring of targeted lakes
- Respond to HAB complaints with visual assessment and sampling
- Conduct additional follow-up sampling for waterbodies in response to elevated algal toxin samples
- Send data for surveillance lakes and complaints to MDHHS DEH for interpretation and communication with LPH
- Provide general information to the public re: HABs, (not associated with risk, closures or potential specific waterbody advisories after monitoring data is provided to DHHS)

Sampling Methods

Visual Assessment & Water Sample Collection

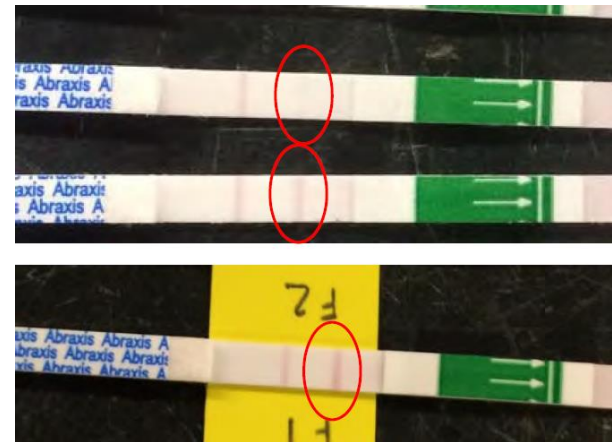
- Algal toxins collected as surface grabs at center and 3 shoreline locations when possible
- Lake visually assessed for scums or algal accumulations and these sampled when possible as “worst-case”
- Sometimes just collected as grab samples at one or two shoreline locations



Sampling Methods

Toxin Analysis

1. Abraxis Test Strips -presence-absence screening of Microcystin *only*
2. MDHHS Laboratory conduct HPLC-MS/MS analysis for confirmation:
 - 13 Microcystin congeners
 - Anatoxin-a
 - Cylindrospermopsin



MDEQ/MDHHS response in summer 2017

MDHHS Roles

- Review cyanotoxin data from MDEQ and provide technical assistance to LPH in evaluating the data
- Provide technical assistance to LPH or others in their efforts to issue advisories and notify public when conditions indicate potential harm possible to humans and pets
- Communicate with MDEQ, others when advisories will be posted by LPH
- Provide information to the public re: HABs through calls on Toxics Hotline

Response in summer 2017- Advisory Criteria

	Recreational Use Warnings (ug/L)		
	Microcystin	Anatoxin-a	Cylindrospermopsin
World Health Organization	20 ¹	na	na
US EPA	4 ²	na	8 ²
Ohio EPA (Two-tiered)	6/20	80/300	5/20
Illinois EPA	10 ¹	na	na
Oregon	10	20	6
California	0.8	90	4
MI DEQ & DHHS (Two-tiered)	6/20 ³	80/300 ³	5/20 ³
2017 MI Lakes Maximum	1450	2.5	n.d.
# of quantified results	118	118	118

¹ For amount of Microcystin congener LR only

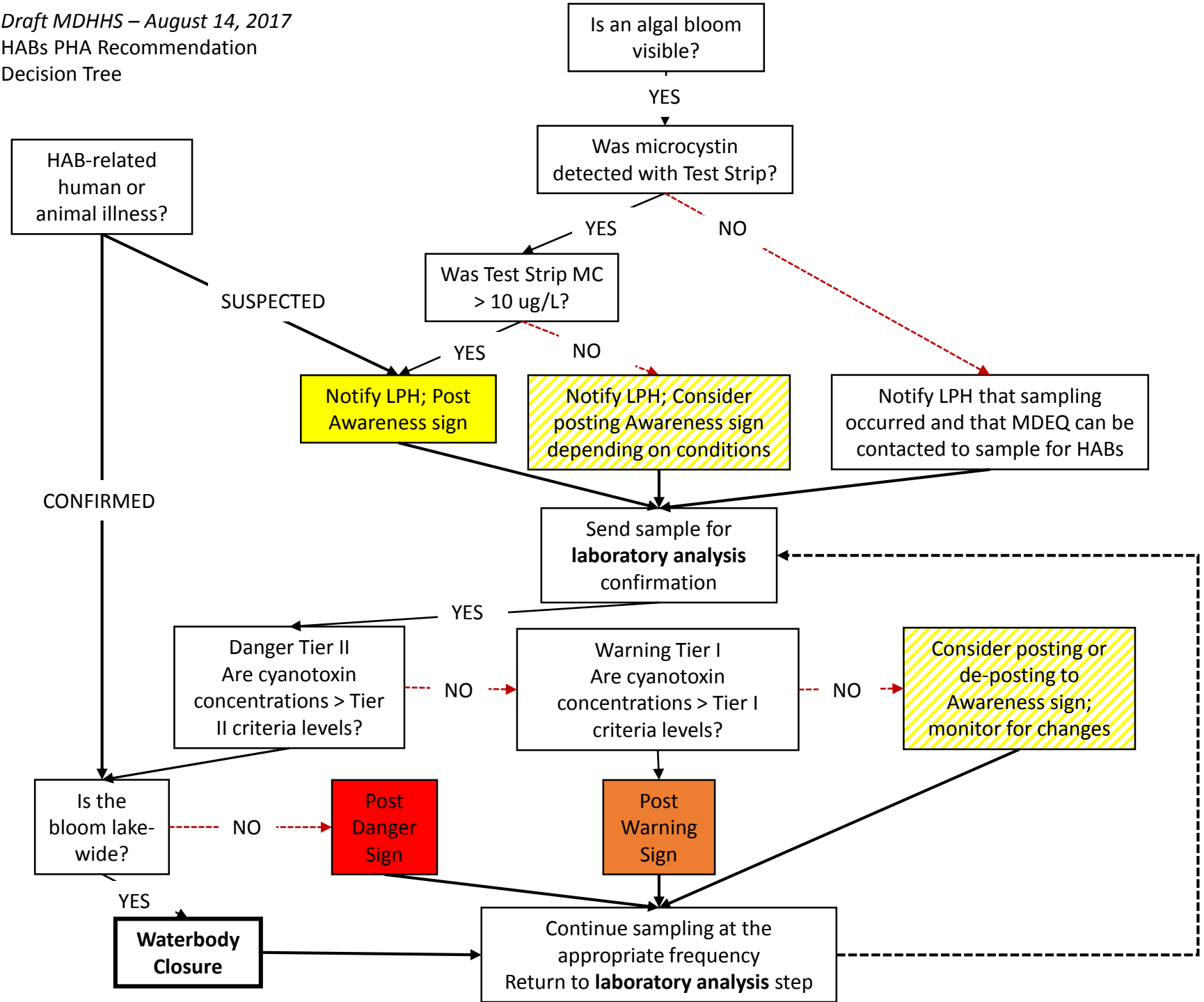
² Draft – December 2016

³ Adopted for 2017 season response

*** Finished Drinking Water Criteria are lower ***

Advisory Criteria - Tiers

Criteria (ug/L)	Microcystin	Anatoxin-a	Cylindrospermopsin
Awareness sign	< 6	< 80	< 5
Tier I – Recreational Public Health Advisory	6	80	5
Tier II – Elevated Recreational Public Health Advisory	20	300	20



Recommendations & Actions

- Quantitative toxin analysis is the best measure of potential cyanotoxin exposure and risk and is what the state of Ohio uses to determine its HABs advisories.
- However, other indicators of potential HABs may need to be evaluated and used to recommend public health action, including:
 - Visual assessment for scums
 - Report of wildlife/fish kills associated with algal scums
 - Report of pet/livestock illness/death
 - Report of human health illness/death
 - In-situ water quality measurement of pigments associated with cyanobacteria
 - Presence/absence of microcystin via Abraxis Test Strips

Informational or Awareness Sign

Have fun on the water, but know that this water may contain blue-green algae that can be harmful to humans and pets.

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



Protect Your Pets, Too!

Dogs are often attracted to water with algae. If the algae is the kind that is harmful, and they drink the water or lick the algae off their coat, it can make them very sick or even kill them.

When in doubt, keep them out!

Avoid swallowing lake water and rinse off after swimming.

If you, your children, or your animals become sick after contact, call your doctor or veterinarian.

For more information:

[Contact]

Recreational Public Health Advisory

CAUTION

Harmful algae may be present in this lake. For your family's safety:



You can swim in this water, but **stay away from algae and scum** in the water.



Do not let pets and other animals go into or drink the water, or eat scum on the shore.



Keep children away from algae in the water or on the shore.



Do not drink this water or use it for cooking.



For fish caught here, **throw away guts and clean fillets** with tap water or bottled water before cooking.

Call your doctor or veterinarian if you or your pet get sick after going in the water.

For more information, contact:

Elevated Recreational Public Health Advisory

CAUTION: **Harmful Algal Bloom**

Toxic algae has been found in the water.

-  Do not swim or wade.
-  Do not drink the water.
-  Do not let your pets play in or drink the water.
-  Do not fish.
-  Wash your hands well after touching the water.

If you have touched or swallowed the water and are having health problems, like trouble breathing, upset stomach, or skin rashes, please contact your doctor.

If you have questions or would like to learn what you can do to help prevent algae blooms, contact the Monroe County Health Department at (734) 240-7900.

Healthy
MONROE
COUNTY HEALTH DEPARTMENT

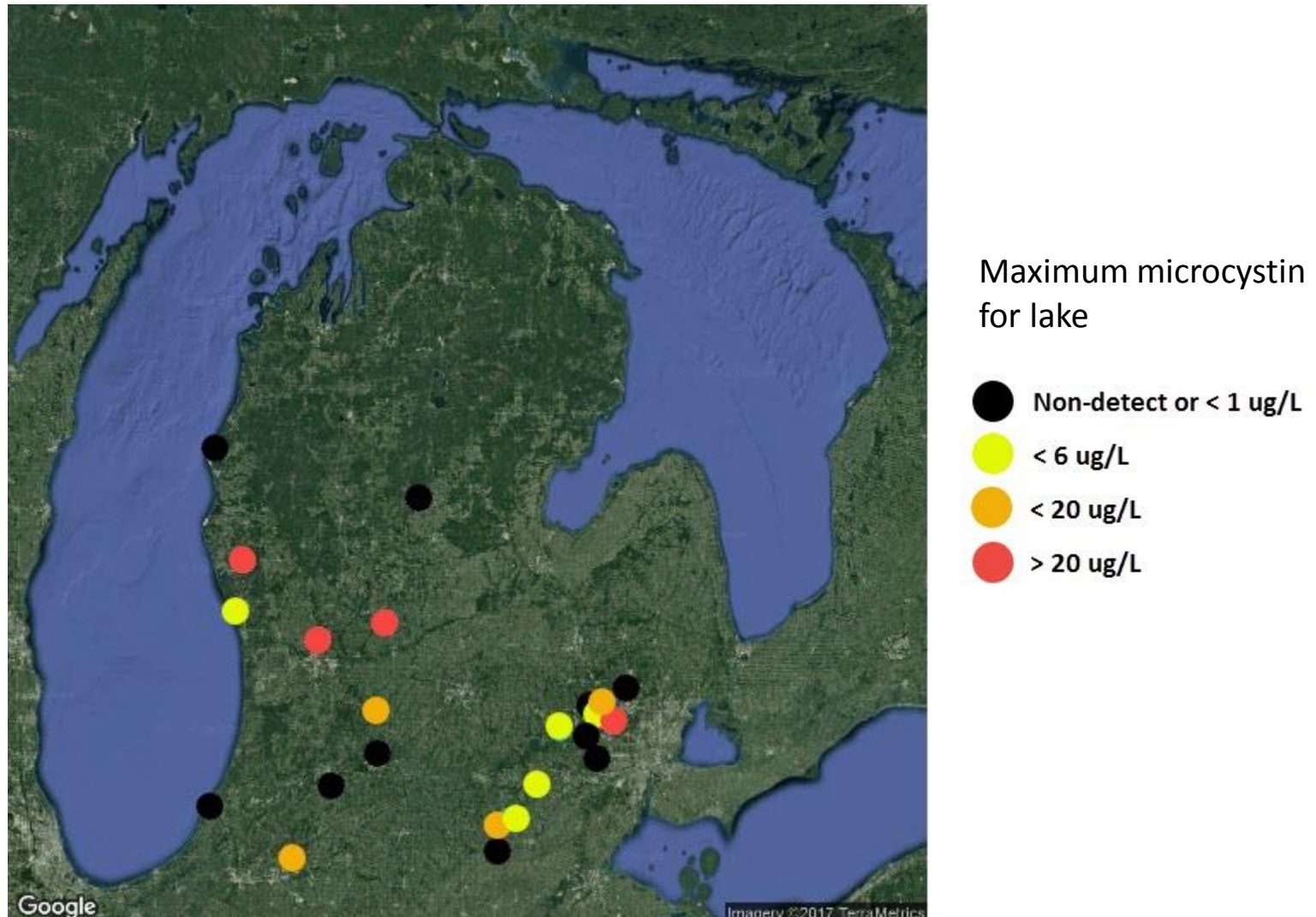
Algal Toxin Results in 2017

- 4 targeted lakes with history of complaints
- 21 new complaint lakes

Other Targeted Lakes

- Status and Trend
- Oakland University

Algal Toxin Results in 2017



Complex Public Health Issue

Generally -

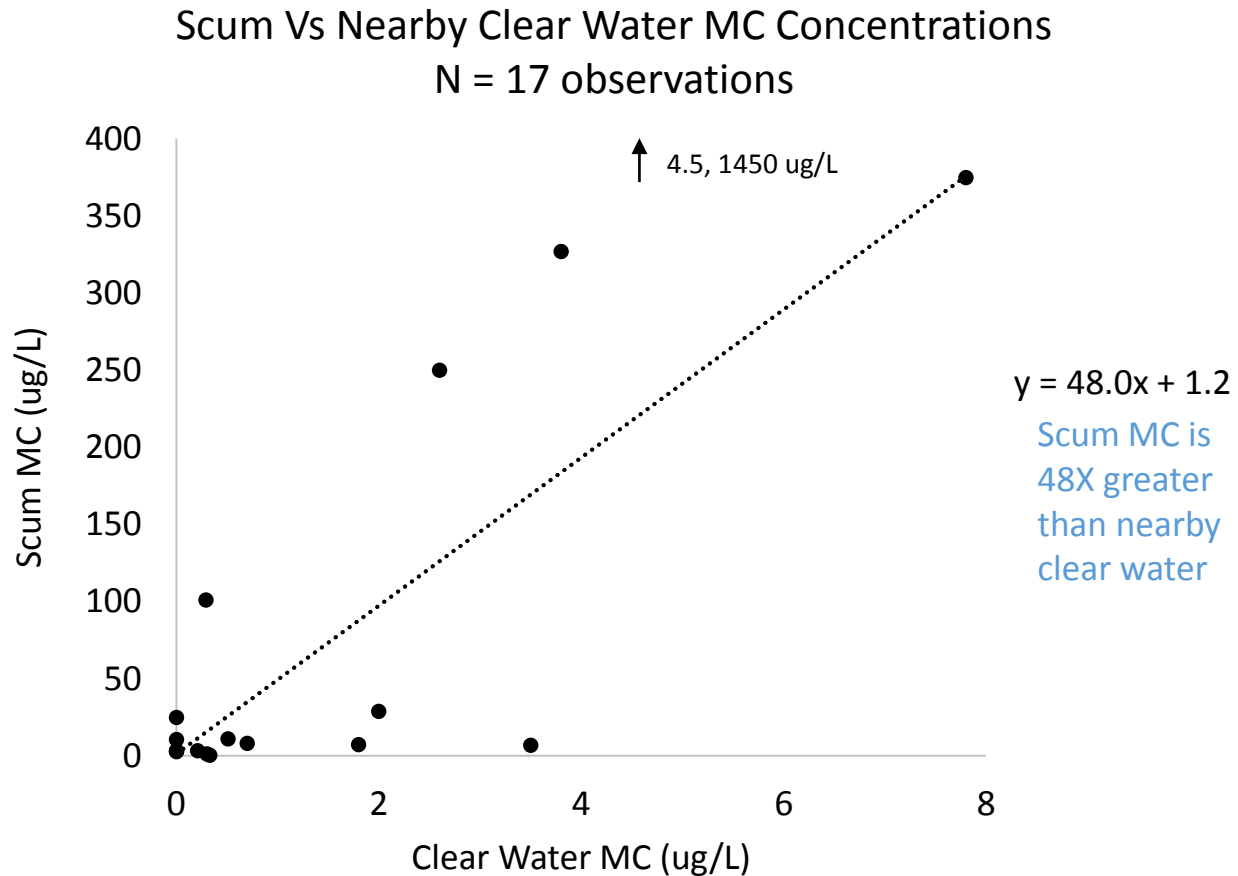
- Bloom extent and toxicity are unpredictable and intermittent
- Impossible to sample and monitor all lakes across the state

State Resources -

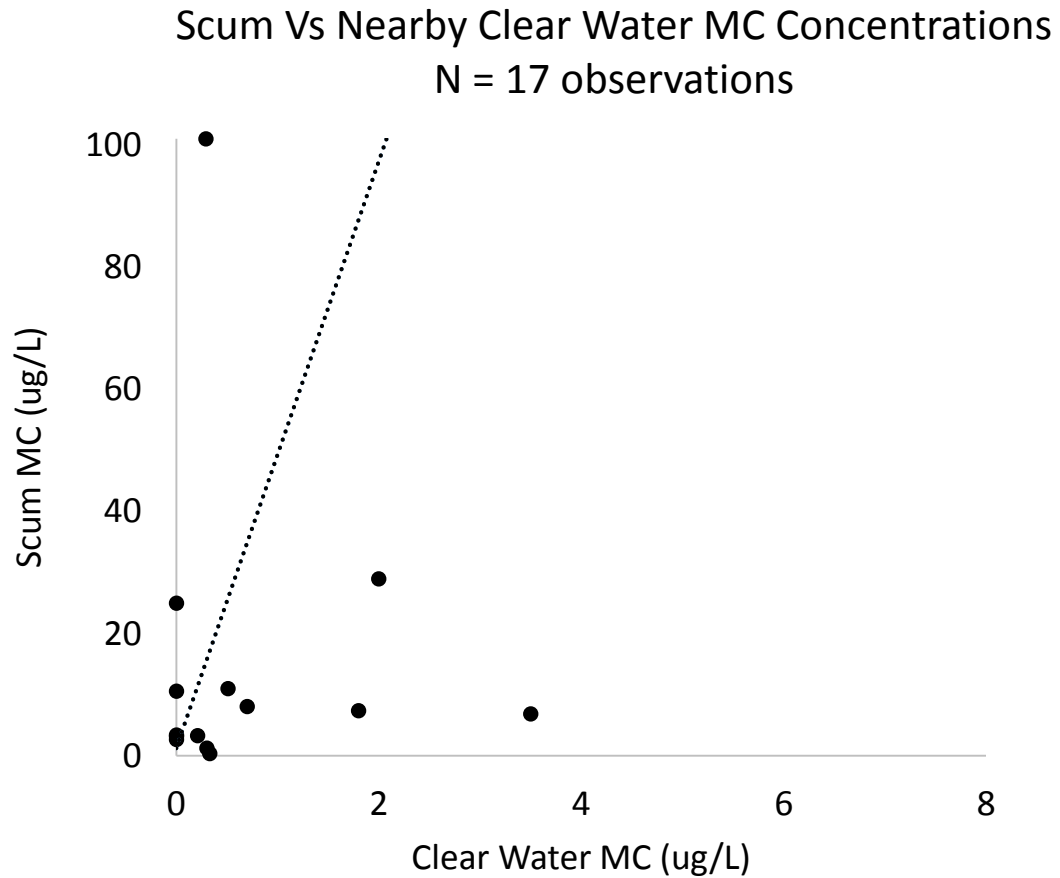
- Number of samples and sampling locations can be limited by lake access and DEQ resources
- Laboratory analysis - time and money

But – the data suggests – Avoiding scums will minimize the danger of most exposures

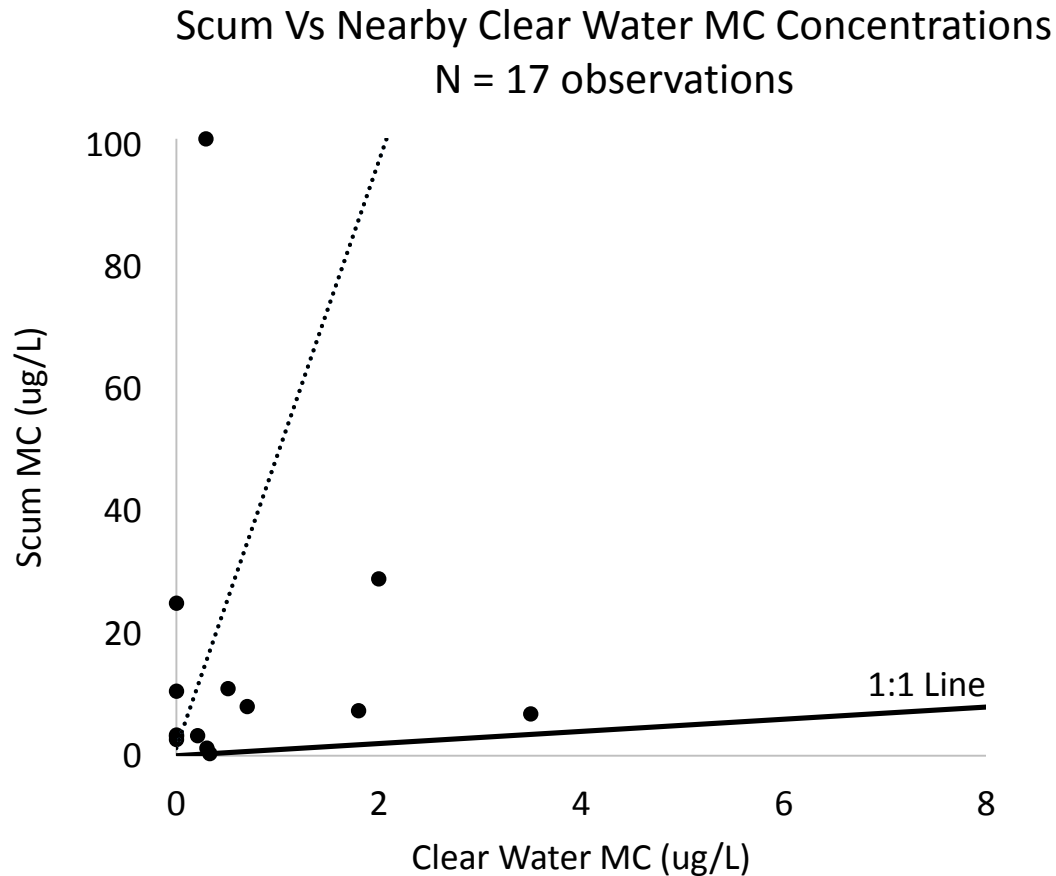
Avoid Scums



Avoid Scums



Key message: Avoiding scums minimizes risk of exposure to cyanotoxins



Messages for the public provided this summer

- While state and local agencies are doing some sampling for HABs in waterbodies across Michigan, many areas affected by HABs will go undetected.
- People and their pets should **AVOID** contact with scums in the water, water that looks like spilled paint, or water that looks green.
- Green isn't always healthy – lookout for harmful algae in **any lake**. **REPORT** suspicious-looking algae to MDEQ at AlgaeBloom@mi.gov.
- People and pets should rinse off after contact with any lake water.
- When in doubt, keep yourself and pets out.

Additional messages for the public provided this summer

Bloom Variability

- There may not be a bloom of toxic algae occurring right now, but a bloom could occur again on any portion of the lake.
- Unless the bloom covers a large portion of the lake, people can limit their exposure by using an unaffected part of the lake.

Fishing

- Unless a “No Contact Advisory” is issued or there is a large bloom visible, fish caught in areas affected by HABs should be safe to eat, though fish filets may have small amounts of toxins along with other chemicals that are regularly found in them.
- Following the Eat Safe Fish waterbody-specific guidelines or Statewide Safe Fish Guidelines and eating only the filets (and not the guts) minimizes the danger of eating fish from areas affected by HABs.

Local Public Health Roles

- Identify best notification strategy for HAB incidents in county.
- Issue advisories through positing of signs and/or other communications with residents.
- Provide information to the public about potential harm due to specific conditions based upon data.

MDARD Roles

- Provide information regarding any algal toxin poisoning reports to MDEQ & MDHHS
- Provide outreach to vets
- Coordinate acquisition and analysis of samples from pets

Case Studies



Case Study – Pleasant Lake, Washtenaw County

Public Health Advisory - Algae in Pleasant Lake

Have fun on the water, but avoid the following.

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:
Jeff Krcmarik
Washtenaw County Water Resources
Commissioner's Office
(734) 222-6865 or krcmarij@ewashtenaw.org



*Public Health Advisory Update: For distribution to residents of Pleasant Lake, Manchester, Michigan.
Thank you to the Pleasant Lake Property Owners Association for sharing this information.*

Public Health Advisory Update on Toxic Algae in Pleasant Lake

Advisory lifted; Residents should remain alert

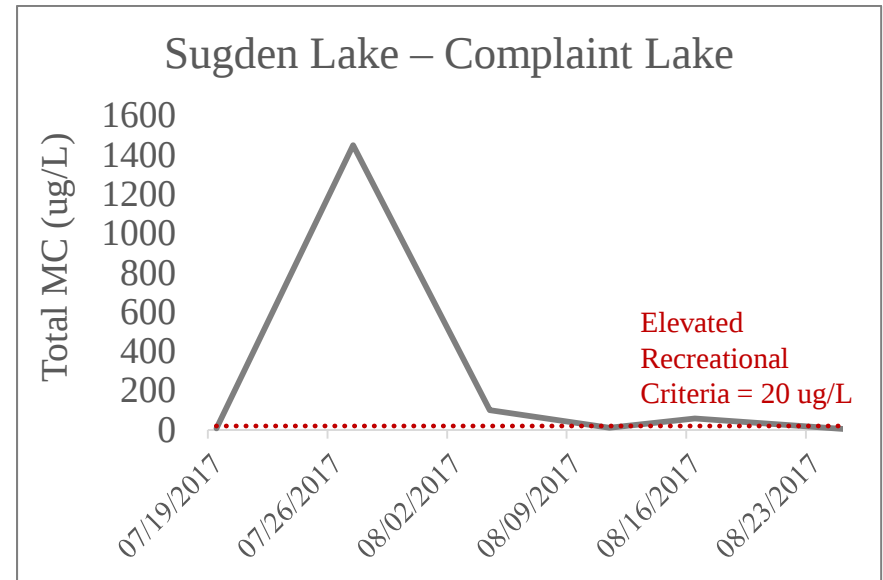
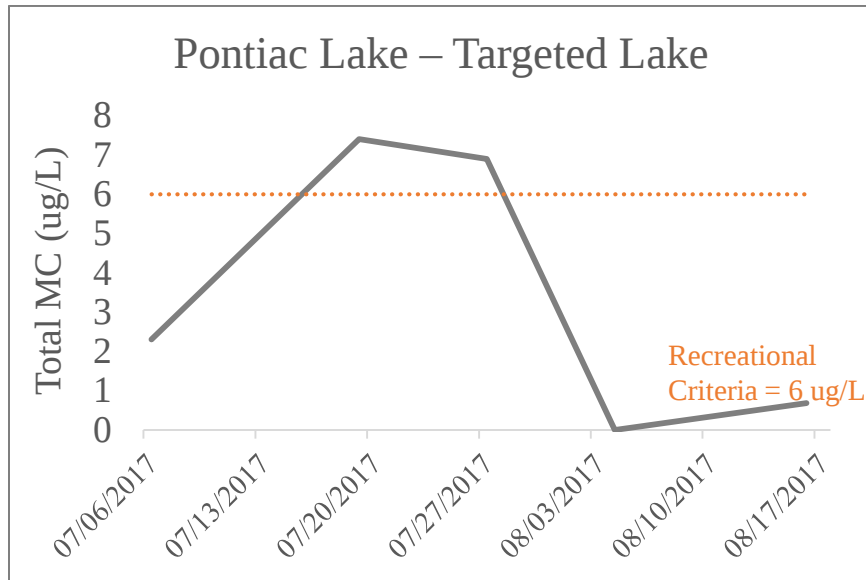
ANN ARBOR, Mich., June 20, 2017 – Washtenaw County Public Health, in consultation with the Michigan Department of Health and Human Services, is lifting the Public Health Advisory for toxic algae in Pleasant Lake in Manchester, Michigan.

Final laboratory analysis of the water samples taken from Pleasant Lake on June 9, 2017 has been completed. No algal toxins (microcystins) were detected in the samples. The algal bloom reported in May has dissipated. The exact cause of the initial algal bloom is unknown. However, it is thought a mild winter and more than usual spring rain were contributors to the condition. Follow-up testing for toxic algae in Pleasant Lake is not scheduled to take place unless further evidence of a harmful algal bloom (HAB) occurs.

Normal recreation activities on Pleasant Lake are currently considered safe, including boating, fishing and swimming. As a general precaution, people and pets should avoid direct body contact with scummy water in the lake or with water that looks like spilled paint or has a green sheen to it. These scums may contain flecks, foam or clumps. People and pets should also avoid swallowing lake water.

If evidence of a HAB occurs, please do not allow humans or pets to contact it. Contact the Office of the Washtenaw County Water Resources Commissioner's Division of Public Works at 734-222-6865 or publicworks@ewashtenaw.org to report the bloom.

Case Study – Pontiac & Sugden Lakes, Oakland County



Case Study – Pontiac & Sugden Lakes, Oakland County



News

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Public Health Advisory - Conditions Conducive to Harmful Algal Blooms in Lakes

Pontiac, Michigan – Oakland County Health Division has issued a public health advisory that harmful algal blooms (HABs) may be present in lakes because of recent weather conditions. People and pets should exercise caution and avoid direct contact with water that appears scummy, looks like spilled paint, or has a green sheen to it. The scum may contain flecks, foam, or clumps.

The Michigan Department of Environmental Quality (MDEQ) has notified the Health Division that it has identified HABs in White Lake Township's Sugden Lake and Pontiac Lake in Waterford and White Lake townships. The Health Division is posting caution signs at both lakes. Individuals should exercise caution even at lakes that do not have a posted advisory. For questions or to report potential HABs, call the MDEQ's Environmental Assistance Center at 800-662-9278.

"If you see algae, avoid direct contact with it and keep pets away as well," said Leigh-Anne Stafford, health officer for Oakland County Health Division. "Although algae are a natural presence in waterways, special precautions need to be followed to prevent illness."

Dense populations of algae are called a bloom. Some blooms are harmless, but when the blooming organisms contain toxins it is known as HABs. HABs can produce conditions harmful to humans, pets, and aquatic life.

Take the following actions if a HAB is present:

Pontiac Lake

Sugden Lake

For immediate release

Aug 9, 2017, 3:40 PM

Contact

Leigh-Anne Stafford

health officer for Oakland County Health Division

248-858-1380

staffordl@oakgov.com

Planning for next season

Options for discussion

Purpose: to make improvements on the response and

No guarantee on implementation or timeline

Ideal vs practical?

Option 1: Same response as this year

- MDEQ will sample some targeted lakes and respond to complaints
 - Do you or another agency in your county/district want to provide a list of lakes for MDEQ to consider?
- MDHHS will review data and provide recommendations
 - What results do you want?
 - What materials/messages are needed?
 - What, if any, differences should occur between public vs. private-access lakes?

Option 1: Same response as this year, continued

- Local health agencies will set and communicate advisories to public
 - Should information be gathered shared on how and when stakeholder groups have been identified for each lake?
 - Should data (and what data) be hosted on Beachguard or other State website?

Timeline for Option 1

Action	Who?	Time
Generate report of 2017 sampling	MDEQ	Winter 2017
Gather material and possibly create material templates/draft messages	MDHHS	Winter 2017
Choose 2018 targeted lakes and sampling plan	MDEQ	March 2017
Present response plan updates to MALEHA	MDHHS/MDEQ	March 2017
Provide written notification of response plan updates to LPH	MDHHS/MDEQ	April 2017

Outreach materials for Option 1

- Currently have:
 - Sign templates
 - Press release templates/examples
 - Technical support for local agency-produced products, if requested
- Work toward:
 - Repository of other agencies' and states' HAB information sheets (ie drinking water, pet exposure)?
 - State-hosted website for data?

Option 2: Expanded role for local agencies

- Change to the sampling/monitoring of HABs
- Proposing local health or other agencies collect water samples for HABs when monitoring for E. coli
 - Use test strips and send water samples to laboratory to confirm toxin presence
 - MDEQ provided test strips – microcystin, anatoxin, others?
 - Continue to use MDHHS analytical lab
 - Could directly enter results (test strip and/or lab results) into Beachguard

Option 2: Expanded role for local agencies

- MDEQ would follow-up on complaints received for lakes with private access only
- MDHHS would review MDEQ collected results

Timeline for Option 2

- Uncertain, would have to start discussion with MDEQ on test strips and laboratory sample analysis
 - Logistics and funding
- Procedures to incorporate cyanotoxin test strip analysis into regular beach monitoring

Outreach materials for Option 2

- Currently have:
 - Sign templates
 - Press release templates/examples
 - Technical support for local agency-produced products, if requested
- Work toward:
 - Repository of other agencies' and states' HAB information sheets (ie drinking water, pet exposure)?

Option 3: Statewide campaign

- Move towards statewide information campaign
- Messages would be:
 - HABs could exist on any lake
 - Keep pets out of and avoid scums and algal accumulations on any lake
 - Rinse yourself and pets off after contacting any lake water

Option 3: Statewide campaign

- Work with existing MDEQ monitoring program
- Standard awareness signs (and fact sheets) providing ways for people to minimize exposure

Timeline for Option 3

- Uncertain, would have to work on local agency needs for materials
- Would have to work statewide material development into MDHHS work

Outreach materials for Option 3

- Website with results from Statewide HABs sampling
 - Ownership and maintenance?
- Currently have:
 - Sign templates
 - Press release templates/examples
 - Technical support for local agency-produced products, if requested
- Work toward:
 - MDHHS fact sheets that could be used statewide and adapted by local agencies

Thoughts on the options?

- Option 1: Same response as this year
- Option 2: Expanded role for local agencies
- Option 3: Statewide campaign
- Others?

Comments/questions

To provide comments later, please visit:

<https://www.surveymonkey.com/r/MALEHA-HABs>