U.S. Army Corps of Engineers
Great Lakes & Ohio River Division
Nashville District

Harmful Algal Bloom (HAB) Response Plan

07 March 2023

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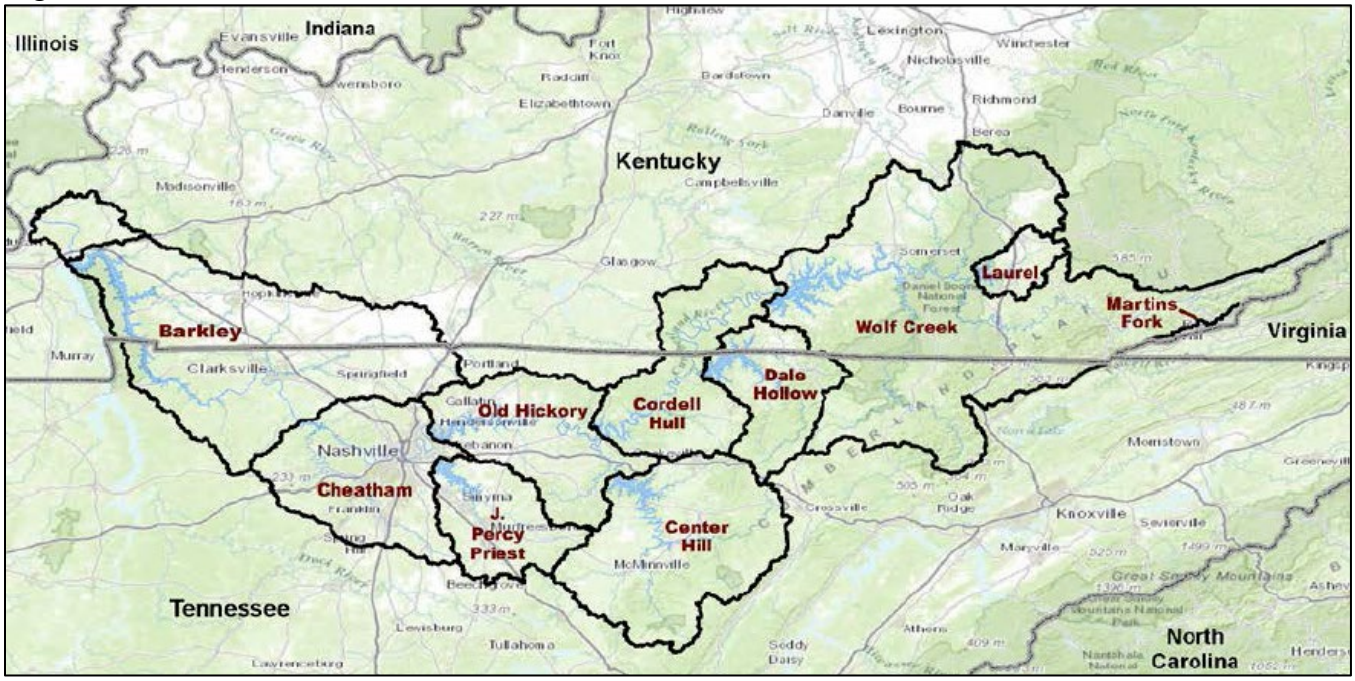
Introduction

Harmful Algal Blooms (HABs) are blooms of cyanobacteria (often called blue-green algae) that produce cyanotoxins. These toxins can occur in any body of water throughout the year, but generally occur in waters affected by nutrient pollution, stagnation, and warm temperatures. Favorable water quality conditions have been noted where there are declines in dissolved oxygen, low specific conductance levels, and a pH between 10 and 11 units.

There are three types of cyanotoxins: (1) neurotoxins which are harmful to the nervous system, (2) dermatoxins which affect the skin, and (3) hepatotoxins which affect the liver. These toxins can cause serious illness and lead to death of people and animals. Microcystin, a type of hepatotoxin, has been detected in low levels within Nashville District (LRN) reservoirs, but blooms and/or hazardous levels of the toxin have not been recorded.

On 29 June 2012, the Great Lakes and Ohio River Division (LRD) Commander, BG Margaret Burcham, issued a memorandum directing districts to develop HAB Response Plans and coordinate with appropriate state agencies; the Nashville District has responsibility over ten reservoirs that fall within the States of Kentucky and Tennessee (Figure 1). This document has been coordinated with the Kentucky Division of Water (KDOW), the Tennessee Department of Health (TDH), and the Tennessee Department of Environment and Conservation (TDEC).

Figure 1:



USACE Personnel Response Plan

To assist the Water Quality Team, Natural Resource Specialists at each of the ten projects within the Nashville District will familiarize themselves with the differences between non-toxic algae and plants and cyanobacteria/HABs (Appendix A). In addition, information and guidance will be provided at forums like the Ranger Conference and a PowerPoint presentation will be available to the USACE personnel upon request to the Water Quality Team.

If HAB-like conditions are observed by Natural Resource Specialists, personnel will utilize Survey123 and complete the "Algal Bloom Reporting Survey". If Survey123 is unavailable, the USACE LRN Algal Bloom Reporting Form (Appendix B), as well as pictures, will be submitted to DLL-CELRN-Algal-Bloom@usace.army.mil as soon as possible. The following USACE personnel will receive notification:

- Water Quality Team
    - Primary POC: Sarah Pedrick, sarah.d.pedrick@usace.army.mil, 615-390-2146
    - Secondary POC: Mark Campbell, mark.d.campbell@usace.army.mil, 615-390-2173
- District Operations Section (Natural Resources) Coordinators
    - Primary POC: Scott Fanning, scott.fanning@usace.army.mil, 615-736-7831
    - Secondary POC: Daniel Clark, daniel.r.clark@usace.army.mil, 615-736-5116

Upon receipt of the information, the above listed personnel will determine if conditions warrant notification of either the KDOW or the TDH and the TDEC, then forward information to the appropriate contacts for Kentucky and/or Tennessee, if necessary. Additional information for each state can be found in this document under 'HAB Response at Kentucky Reservoirs' on page 5 and 'HAB Response at Tennessee Reservoirs' on page 6.

Reporting HAB conditions via email concludes the District's official responsibilities; however, the KDOW, TDH, and/or TDEC may request the USACE assistance in collecting and shipping samples to state laboratories for analysis. USACE personnel will assist, as deemed appropriate and when possible. Sampling procedures are in Appendix C.

Frequently asked questions from the public can be found in Appendix D. Additionally, if the public reports potential HAB related illnesses to District personnel, they should be advised to contact the Poison Control Center at 1-800-222-1222 and/or seek immediate medical attention from a licensed medical provider. The USACE is not licensed, nor permitted, to provide medical advice.

HAB Response at Kentucky Reservoirs

If HAB-like conditions are observed at a Kentucky reservoir (Barkley, Dale Hollow, Laurel, Martins Fork, Wolf Creek), the Water Quality Team or District Operations Section Coordinators will notify the following personnel at the KDOW and the USACE:

- Melanie Arnold, KDOW: melanie.arnold@ky.gov
- Robbie Johnson, KDOW: robertc.johnson@ky.gov
- James Bevins, KDOW: james.bevins@ky.gov
- USACE: DLL-CELRN-Algal-Bloom@usace.army.mil
    - Sarah Pedrick, USACE: sarah.d.pedrick@usace.army.mil
    - Mark Campbell, USACE: mark.d.campbell@usace.army.mil
    - Scott Fanning, USACE: scott.fanning@usace.army.mil
    - Daniel Clark, USACE: daniel.r.clark@usace.army.mil

The email should contain the following information:

- Algal Bloom Reporting Survey or USACE LRN Algal Bloom Reporting Form and pictures

If a bloom needs to be reported after hours or on the weekends, the following 24-hour hotline numbers can be called: 502-564-2380 or 1-800-928-2380.

Reporting HAB conditions via email concludes the District's official responsibilities; however, the KDOW may request the USACE assistance in collecting and shipping samples to the State laboratory for analysis.

For more information, contact the KDOW at 502-564-3410 or visit their websites at:

- https://eec.ky.gov/Environmental-Protection/Water/Monitor/Pages/HABS.aspx
- http://www.watermaps.ky.gov/HABS

HAB Response at Tennessee Reservoirs

If HAB-like conditions are observed at a Tennessee Reservoir (Barkley, Center Hill, Cheatham, Cordell Hull, Dale Hollow, J. Percy Priest, Old Hickory), the Water Quality Team or District Operations Section Coordinators will notify the following personnel at the TDH, the TDEC, and the USACE:

- Judy Manners, TDH: judy.manners@tn.gov
- David Money, TDEC: david.money@tn.gov
- USACE: DLL-CELRN-Algal-Bloom@usace.army.mil
    - Sarah Pedrick, USACE: sarah.d.pedrick@usace.army.mil
    - Mark Campbell, USACE: mark.d.campbell@usace.army.mil
    - Scott Fanning, USACE: scott.fanning@usace.army.mil
    - Daniel Clark, USACE: daniel.r.clark@usace.army.mil

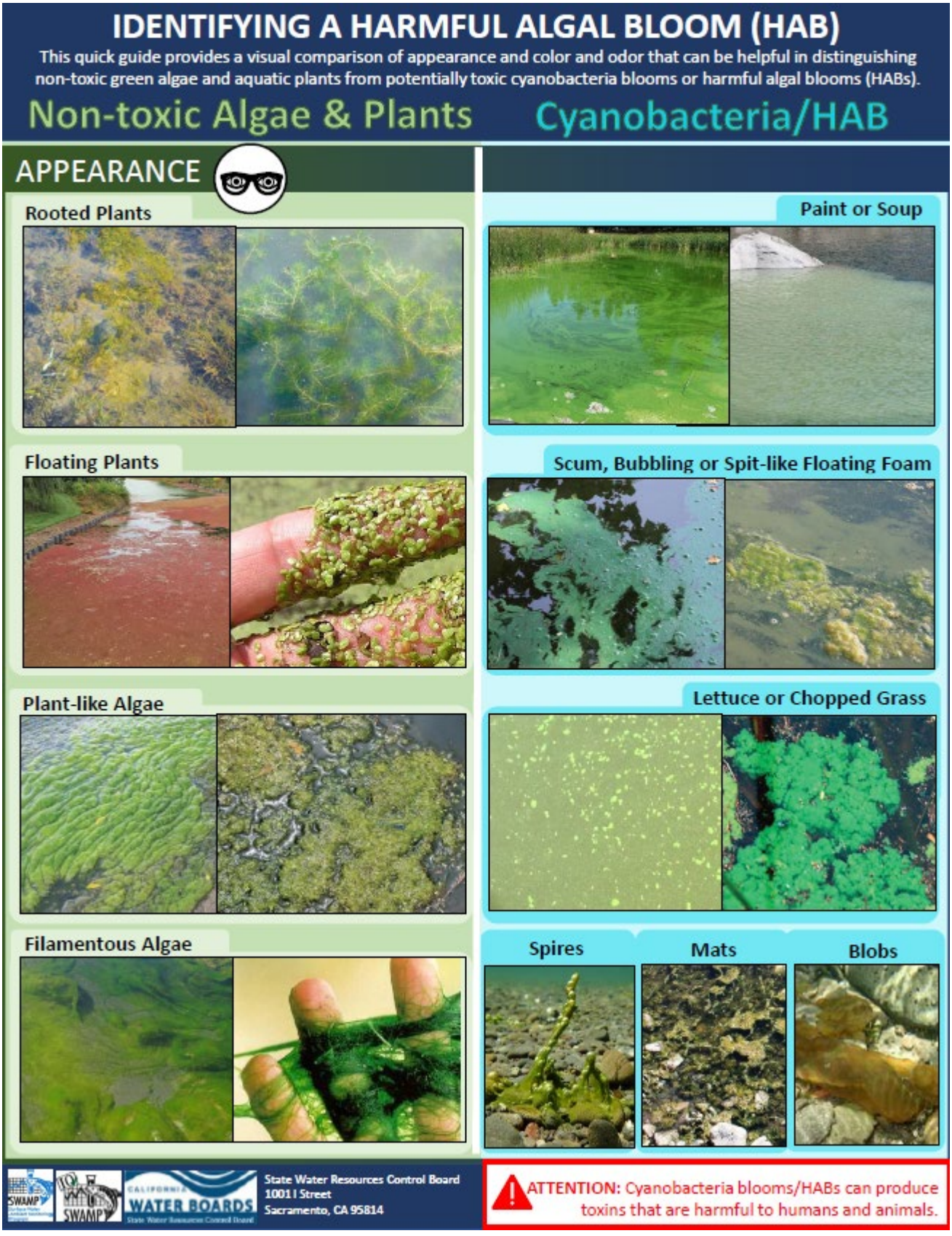
The email should contain the following information:

- Algal Bloom Reporting Survey or USACE LRN Algal Bloom Reporting Form and pictures

Reporting HAB conditions via email concludes the District's official responsibilities; however, the TDH and the TDEC may request the USACE assistance in collecting and shipping samples to the State laboratory for analysis.

For more information, contact the TDH at 615-741-7247 or visit their website at https://www.tn.gov/health/cedep/waterborne-diseases/harmful-algal-blooms.html.

Appendix A: Identifying a Harmful Algal Bloom



Non-toxic Algae & Plants

Cyanobacteria/HAB

COLOR

Algae and aquatic plants are usually green but can appear yellow or brown as they die down.

Cyanobacteria get their name from their blue-green pigment but blooms can often look green, blue-green, green-brown, or red.

ODOR

Algae and aquatic plants are usually neutral or leafy in scent, but when dying or dead smell musty/rotting.

Cyanobacteria blooms can have a distinctive smell, sometimes described as gasoline, septic or fishy.

Have you seen a HAB?

Find out more on the California HABs Portal
http://mywaterquality.ca.gov/habs

Need more help with identification?
http://mywaterquality.ca.gov/habs/resources/field.html

State Water Resources Control Board
1001 I Street
Sacramento, CA 95814

Surface Water Ambient Monitoring Program
Information Management and Quality Assurance Center

Appendix B: USACE LRN Algal Bloom Reporting Form

Submit

USACE LRN Algal Bloom Reporting Form

Please provide information about the potential cyanobacteria algae bloom that you observed. Information can be entered into this electronic form or printed and filled out.

Please save and email a completed copy of this form to DLL-CELRN-Algal-Bloom@usace.army.mil.

You are encouraged to include photographs as additional email attachments (close-ups and landscapes).

Contact Information:

Name: _____ Phone Number: _____

Email Address: _____

Algal Bloom Information:

Date of Observation: _____ Time of Observation: _____

Waterbody: _____ Coordinates (DD): Lat: _____ Long: _____

Approximate Square Feet: _____ Color: _____

Description (Was a sample collected? Is the potential bloom near a dock, beach, center of lake, embayment, etc.? What does it look like (paint spill, bubbles, mats, blobs, etc.?)

Appendix C: Sampling Protocol

This sampling protocol outlines how to collect algal samples when a suspected bloom is occurring. It does not address sample collection for site specific monitoring plans. Consult with the USACE Water Quality Team if there are questions.

Recommended Supplies:

- Waterproof boots or waders
- Personal Flotation Device (PFD)
- Cubitainer- all USACE projects
- 60mL amber jar- Kentucky projects only
- Disposable gloves
- Marker
- Paper
- Tape

Sample Collection Procedure:

1. Collection can occur from a boat, shoreline, or carefully wading into the water. If collection occurs from a boat, PFDs must be worn. If collection occurs from the shoreline or wading, boots or waders may be worn depending on depth. All methods require the use of disposable gloves.
2. Sample Collection
    a. Cubitainer – if sampling is requested, a minimum of one cubitainer will be filled. Additional cubitainer will be collected under guidance from the Water Quality Team.
        i. With a marker, write the following directly onto the cubitainer: Location, Date, Time.
        ii. Unscrew the lid and gentle blow into the bottle to inflate it.
        iii. Place the open bottle just below the surface of the water and allow it to fill to the top.
        iv. Tightly screw on the lid and gently squeeze the cubitainer to ensure there are no leaks.
    b. 60mL amber jars- These jars will only be used for waters within the State Kentucky. If sampling is requested, a minimum of one jar will be filled.
        i. With a marker, write the following on a piece of paper and tape it to the jar: Location, Date, Time.
        ii. Unscrew the lid and place the bottle just below the surface to allow it to fill with water.
        iii. Once water is at the neck of the jar, remove the bottle from the water and screw the lid on tightly.
3. Sample Storage
    a. Upon collection, samples should be stored on ice or refrigerated until appropriate USACE and/or State personnel pick up the samples, or they are shipped.
4. Decontamination
    a. With clean water, rinse off all gear that came into contact with the potential harmful algal bloom.
    b. Dispose of gloves.
    c. If personnel came into direct contact with the water, immediately rinse with a mild soap.

Appendix D: Frequently Asked Questions

1. How is the water quality at Nashville District Projects?
    a. All LRN reservoirs have relatively good water quality. We have a Water Quality Team that monitors all reservoirs throughout the year.
2. Are Nashville District reservoirs safe to swim in?
    a. Generally, the answer to this is yes unless the State(s) or USACE has closed an area (E. coli, HAB, etc.).
3. What is a HAB and what causes them to form?
    a. It is a bloom of cyanobacteria (often called blue-green algae) that produce cyanotoxins. These toxins can occur in any body of water throughout the year, but generally occur in waters affected by nutrient pollution, stagnation, and warm temperatures. Favorable water quality conditions have been noted where there are declines in dissolved oxygen, low specific conductance levels, and a pH between 10 and 11 units.
4. Are HABs a concern at the LRN reservoirs?
    a. To date, the Nashville District has not detected a HAB in our waterways. While none have been detected, we recognize the growing concern over algal blooms and the Water Quality Team collects data to monitor and assess trends. Blue-green algae is naturally occurring, and most species do not produce cyanotoxins.
5. Do HABs mean that the lake will be closed to recreation?
    a. Beaches may be closed because of the presence of a HAB; however, boating may be permitted, and businesses may remain open in the case of advisories or cautions.
6. What are the risks if I am exposed to water with a HAB?
    a. Adverse health effects from exposure to cyanotoxins may range from a mild skin rash to serious illness or death. Acute illnesses caused by short-term exposure to toxins may include fever-like symptoms, skin rashes, respiratory distress, and gastrointestinal distress. If someone is experiencing health related issues due to suspected HAB exposure, please contact the Poison Control Center at 1-800-222-1222 and/or seek medical attention from a licensed medical provider. The Corps is not licensed, nor permitted, to provide medical advice.
7. What health effects in animals should I watch for?
    a. Signs and symptoms include vomiting, diarrhea, decreased appetite, weakness, and seizures.
8. If I get my water through a public utility that draws water from the reservoir, is it safe to drink?
    a. Utility companies are notified of the HAB so that they can take precautionary measures in treating the water. For specific inquiries, please contact the utility office.
9. What are some precautionary measures I can take to avoid illness?
    a. Avoiding contact with visible algae and do not swallow water while swimming.
    b. Wash all clothing and equipment including life jackets after contact with algal blooms and scum.
    c. Wash your hands before eating if you have had contact with lake water or shore debris.
    d. When consuming fish, remove the guts, liver, and skin and rinse fillets in tap water before cooking/eating, do not consume or allow pets/animals to consume the organs or skin.
    e. Taking a shower after coming into contact with water at reservoirs.
    f. Pets and livestock should not be allowed to swim in or drink untreated water from areas where a HAB is suspected. Dogs are particularly susceptible to cyanobacteria poisoning because the scum can attach to their coats and be swallowed during self-cleaning.
10. How does a reservoir recover from a HAB?
    a. Reservoirs recover naturally with time as organic elements break down.