



REPLY TO  
ATTENTION OF

**DEPARTMENT OF THE ARMY**  
HUNTINGTON DISTRICT, CORPS OF ENGINEERS  
502 EIGHTH STREET  
HUNTINGTON, WV 25701

**AUG 01 2012**


CELRH-EC-GW

MEMORANDUM FOR CELRD, ATTN: BG Margaret W. Burcham, 550 Main Street,  
Cincinnati, Ohio, 45202

SUBJECT: Hazardous Algal Bloom (HAB) Response Plan for Huntington District

1. As a result of human illnesses and animal deaths related to HABs, a HAB response plan was developed for the District by the Water Quality Team in coordination with Operations and Readiness Division.
2. Operations and Readiness staff will do the majority of the monitoring in connection with routine lake patrols. Water Quality staff will do algae identification and counts to determine the associated hazard. Depending on sample results, advisory/warning signs will be posted by Operations and Readiness Staff.
3. The District's HAB plan has been coordinated in LRH with Real Estate Division, Public Affairs Office, and Office of Counsel and in LRD with Water Management, Real Estate, and Office of Counsel.
4. The District's HAB plan has also been coordinated with Water Management Staff in LRP, LRL, and LRN.
5. In reference to the memorandum dated 29 Jun 2012, please find enclosed the District's Hazardous Algal Bloom Response Plan.

Encl

  
STEVEN T. MCGUGAN  
Colonel, Corps of Engineers  
Commanding



US Army Corps of Engineers  
Huntington District

## Harmful Algal Bloom Response Plan

17 July 2012

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## I. EXECUTIVE SUMMARY

- Harmful Algal Blooms (HABs) are concentrations of cyanobacteria (often called blue-green algae) that are capable of producing potent toxins.
- Cyanobacteria are a natural component of aquatic ecosystems and are generally present in low densities.
- Under certain conditions cyanobacteria populations can rapidly grow in number. This is called a 'bloom'. Blooms can occur quickly, without warning and are difficult to predict.
- LRH is following the guidelines published by the World Health Organization (WHO) in 2003 which lists safe cyanobacteria levels for recreational waters. These guidelines are widely accepted as the testing guidelines for determining acceptable levels in recreational waters such as the reservoirs managed by LRH.
- The WHO report indicates that exposure to cyanobacteria in cell densities greater than 20,000 cells per millimeter (cells/mL) has been shown to result in adverse human health effects such as: hay-fever-like symptoms, skin rashes, vomiting, diarrhea and respiratory distress. Additionally, freshwater cyanobacteria are capable of producing cyanotoxins capable of causing specific and severe dysfunction to the liver and/or central nervous system.
- Animal and livestock exposure to cyanobacteria blooms may result in severe health effects and possibly death.
- When a suspected bloom is reported, internal and external communication plans will be executed as described in this document and sampling will take place.
- When cyanobacteria cell densities are >20,000 cells/mL ADVISORY flyers will be posted to inform the public of risks posed by the presence of cyanobacteria.
- In the event that cell densities exceed 100,000 cells/mL, USACE will post CAUTION flyers and coordinate with local and state health departments and other agencies to determine a case appropriate course of action.
  - This action may also require a greater frequency of sample collection or may require that water samples be analyzed for toxins.
- Cyanobacterial scum formation in areas of whole-body contact and/or risk of ingestion/aspiration will require coordination with appropriate county or state health departments and other state agencies as necessary to develop a plan of action that may result in a lake or area closure.
- Posted flyers will be removed when cyanobacteria densities return to safe levels for two consecutive weeks.
- Human illnesses and dog deaths have been attributed to HABs at Burr Oak Lake and Deer Creek Lake in the summer of 2010.

## **BACKGROUND**

Though Harmful Algal Blooms (HABs) can occur on any body of water at anytime, they occur most frequently on lakes with high nutrient loads during periods of warm, sunny weather. HABs, which are blooms of cyanobacteria (often called blue-green algae), are capable of producing potent toxins known to cause specific and severe dysfunction to hepatic or central nervous systems, in addition to hay fever-like symptoms, skin rashes, vomiting, diarrhea, and respiratory distress. Exposure to these toxins most commonly occurs when persons or animals ingest or inhale contaminated water. HABs of various sizes and intensity have occurred at several LRH reservoirs in recent years and human illnesses and dog deaths were attributed to HABs at Burr Oak and Deer Creek Lakes in the summer of 2010. This plan outlines how LRH will respond to harmful algal blooms and what steps will be taken should a bloom occur and contact advisories become necessary.

Cyanobacteria can produce a variety of toxins which can cause illness and death in humans and animals. In addition, they can cause problems in recreational and drinking water sources, such as decreased dissolved oxygen concentrations resulting in fish kills, increased organic loads for public water supplies, and increase foul taste and odor compounds that affect drinking water and the taste of fish. A visually identifiable concentration of cyanobacteria that discolors the water, or has a cell count greater than 4,000 cells/mL of cyanobacteria genera is considered a HAB. Blooms can develop in the course of a few days, persist from days to months, and can dissipate or be blown across a lake leaving behind toxins. Because one cannot predict if a HAB will produce toxins, or if the bloom will be blown from another area leaving the toxins behind, it is safest to assume that if a bloom has occurred the potential for toxins always exists. Due to the sporadic nature of HAB occurrences, wind movement, and different types of toxins possible, cell counts per milliliter of cyanobacteria levels will be the trigger for actions taken according to values developed by the World Health Organization (WHO). Given the complexity and extensive number of situations in which a HAB may occur the Water Quality Team may also employ techniques such as toxin analysis, FlowCAM facial recognition software, phycocyanin presence/absence, concentration of chlorophyll-a/liter with dominance of cyanobacteria, and targeting specific molecules using antibody or oligonucleotide analysis when deemed necessary to ensure public safety.

## **II. GUIDELINE VALUES**

The most common genera of cyanobacteria are known to bloom within the area of the Huntington District. Some species and strains of these genera are capable of manufacturing various toxins, collectively referred to as cyanotoxins, which are capable of causing severe dysfunction of the hepatic and central nervous systems. In addition to the cyanotoxins produced only by certain groups of cyanobacteria, all cyanobacteria produce an additional class of toxins, collectively referred to as dermatoxins, capable of causing skin irritation and contact

dermatitis. Individual sensitivity to the dermatotoxins can vary considerably and is related to both allergic reactions and direct responses to the toxins themselves.

Because a cyanobacteria bloom can occur without warning and the intensity of the bloom can change rapidly, increasing or decreasing in severity within only a few hours to a few days, the WHO guidelines for managing cyanobacteria exposure in recreational waters is based upon direct evidence of acute, non-cumulative health effects associated with primary body contact in recreational surface waters with a cyanobacteria bloom. The epidemiological evidence indicates that activities including wading, swimming, canoeing, jet skiing and water skiing can significantly increase the risk of direct ingestion of cyanobacteria present in surface waters as well as the aspiration or inhalation of water droplets that expose individuals internally through digestive system and the nasal and pharyngeal mucous membranes. At greatest risk for ingestion are children, as well as pets, who generally wade and play in shallow near-shore areas where cyanobacteria tend to concentrate and form surface scums, if applicable (e.g., *Cylindrospermopsis* does not form surface scums, Figure 1).

World Health Organization guidelines were used to establish cyanobacteria action thresholds for public health advisories (Table 1) used by the Huntington District. The Huntington District will base public health decisions on cell counts of cyanobacteria per milliliter (Figure 2). If a HAB

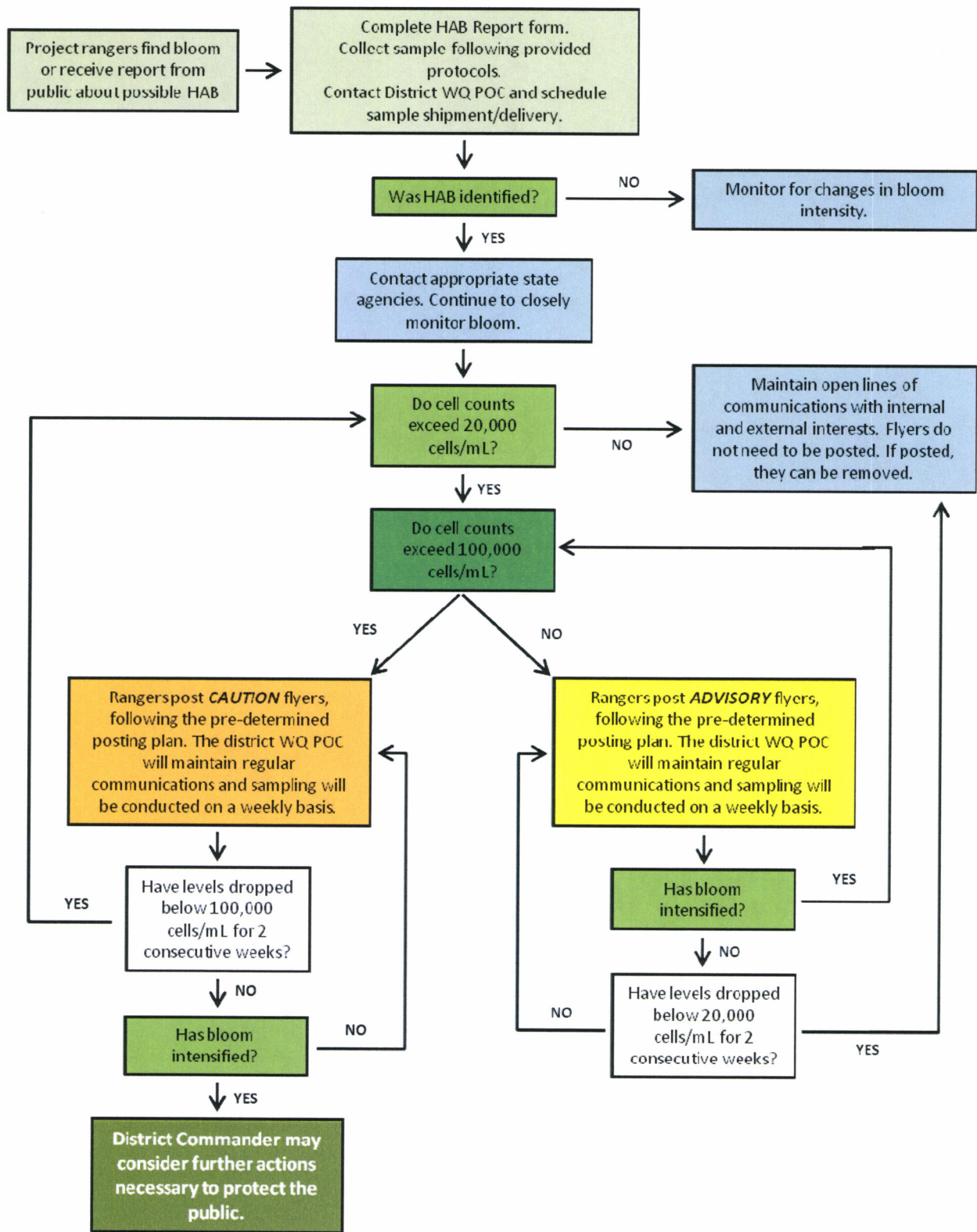


Figure 1. *Cylindrospermopsis* HAB can look like turbid water, photo by ODNR.

occurs in a size sufficient to produce toxins, the toxins may be present but not detected at the site of the bloom due to wind or current movements. To ensure public safety the Huntington District may also include toxin analysis, phycocyanin presence/absence, concentration of chlorophyll-a/liter with dominance of cyanobacteria, and targeting specific molecules using antibody or oligonucleotide analysis to support cell counts.

The WHO (2003) has concluded cyanobacteria cell concentrations below 20,000 cells/mL represent a minor risk to public health through primary body contact. When cyanobacteria cell concentrations are greater than 20,000 cells/mL but less than 100,000 cells/mL, the risk to the public health is generally limited to skin irritation, gastrointestinal illness or other allergenic effects and not from cyanotoxin toxicity. In LRH, cyanobacteria cell densities greater than

Figure 2. Huntington District USACE Harmful Algal Bloom Response Plan.



20,000 cells/mL but less than 100,000 cells/ml will trigger a cyanobacteria ADVISORY and appropriate flyers will be posted (Appendix A).

When cyanobacteria cell concentrations are greater than 100,000 cells/mL the WHO (2003) has concluded there is the potential for a greater risk of adverse health impacts due to cyanotoxin toxicity. The toxicity from an individual bloom can vary significantly and there is no way to determine, through observation alone, whether a cyanobacteria bloom has a high level of cyanotoxin toxicity. Blooms where cyanobacteria concentrations are greater than 100,000 cells/mL, including scums, have a greater probability of producing highly toxic levels of cyanotoxins. When cyanobacteria concentrations exceed 100,000 cells/mL CAUTION flyers will be posted to discourage primary body contact with water.

Cyanobacterial scum formation in areas of whole-body contact and/or risk of ingestion/aspiration will require coordination with appropriate county or state health departments and other state agencies as necessary to develop a plan of action that may result in a lake or area closure. Once a scum has been detected the Huntington District, county or state health departments and other state agencies may deem it necessary to close individual areas of the impacted reservoir. If conditions warrant and laboratory-confirmed cell counts are supportive, a lake-wide closure may be issued.

**Table 1.** Harmful Algal Bloom thresholds for public health advisories.

Cyanobacterial cell counts/ml	Health Risk	Actions Taken
Counts greater than 4000 and less than 20,000	-Low risk of short-term health outcomes	-Monitor bloom -Notify Health Department about the presence of a HAB
<b>Relatively low probability of adverse health effects</b>		
Counts between 20,000 and 100,000	-Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	-Contact Health Department -Post ADVISORY flyers at public access points.
<b>Moderate probability of adverse health effects</b>		
Counts greater than 100,000	-Potential for long-term illness with some cyanobacterial species -Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	-Post CAUTION flyers at public access points. -Watch for scums or conditions conducive to scums (winds concentrating scums). -Coordinate with Health Department and develop a plan of action, No Contact Advisory may be recommended.
<b>High probability of adverse health effects</b>		
Cyanobacterial scum formation in areas where whole-body contact and/or risk of ingestion/aspiration occur	-Potential for acute poisoning -Potential for long-term illness with some cyanobacterial species -Short-term adverse health outcomes, e.g., skin irritations, gastrointestinal illness	-Coordinate with state and local Health Departments and other state agencies to develop a plan of action, area or lake closure may be recommended.

### III. SAMPLING PROCEDURES

The Huntington district will issue and lift advisories based on cyanobacteria cell densities in accordance with the WHO (2003) guidelines for safe practice in managing recreational waters. Cell densities will be laboratory-confirmed as being above the WHO threshold values in order to issue an advisory. Once an advisory has been posted, monitoring will occur on a weekly basis. Once levels return to densities less than 20,000 cells/mL for two consecutive weeks the advisory will be lifted. Cell densities will be laboratory-confirmed as being below the WHO threshold values in order to lift an advisory.

Guidance from regulatory agencies for predicting occurrences of HABs is not available because of the high variability in conditions where blooms can occur. Huntington District lake projects were evaluated and assigned a value of high, moderate, or low risk for developing HABs (Appendix B). Lakes that have had a documented HAB are considered high risk for future HABs to occur. Lakes that have similar observed chlorophyll-a conditions to lakes where HABs have occurred but have not had a documented occurrence of a HAB are considered moderate risk. Projects that have not had a HAB and do not have conditions conducive of a HAB are considered low risk. The risk of a HAB occurrence in a lake will determine monitoring frequency at that lake during the recreation season (summer pool to winter drawdown). A recommended monitoring schedule is illustrated in Table 2.

Project rangers should attempt to monitor public access points and known recreation areas for conditions that are different than what is normally observed. Due to winds and currents HABs are likely to occur near banks and in bays. Because HABs can be almost any color and can occur in different forms from mats to paint-like layers (Figure 4), clumps, turbidity plumes, or scum, rangers will need to be vigilant for anything out of the ordinary. It should also be noted that it is next to impossible to observe an entire lake and conclude with certainty that no HABs are present, regardless of monitoring method. When an algal bloom or suspicious film or discoloration is found the following steps should be taken to sample the algal bloom.

1. You will need:
  - a. Safety goggles

**Table 2. Lake monitoring frequency**

<b>High risk</b>
Bi-weekly during May and Jun
Weekly during Jul, Aug, and Sep
Bi-Weekly during Oct and Nov
<b>Moderate</b>
Monthly during May and Jun
Bi-weekly during Jul, Aug, and Sep
Monthly during Oct and Nov
<b>Low risk</b>
Once during May and Jun
Monthly during Jul, Aug, and Sep
Once Oct and Nov

- b. Disposable latex or nitrile gloves
  - c. Two (2) plastic 250 mL sample containers (provided)
  - d. Lugol's solution (provided)
  - e. One (1) Harmful Algal Bloom Report Form (provided)
  - f. Permanent marker
  - g. Disposable paper towels
  - h. Bottled water (for rinsing in the field)
2. Caution should be taken to avoid contact with blooms, and hand contact between mouth and eyes should be avoided until hands can be thoroughly washed. **Latex gloves and goggles** should be worn during the entire sampling process to minimize contact hazard.
  3. Label two (2) of the provided 250mL plastic sample bottles with a permanent marker *before* opening them. Record the date, time, project, and specific location at which the samples will be taken, as well as the sampler's initials. Mark one bottle with an "L" for "Lugol's"; you will add Lugol's solution to this bottle after taking the sample.
  4. Fill the bottles with lake water from just under the surface of the water at the bloom site (Figure 3). **Be careful not to touch your bare skin to the lake water.** Also, if you need to set down the lids, place them thread-side up so as to prevent contamination. Leave a headspace in the container of no less than 1 inch for expansion.
  5. Add two (2) full droppers of Lugol's solution (~2 ml) to the bottle marked with an "L." Take care not to touch the solution dropper to the sample water. Adding the solution will preserve the sample and will cause it to look like weak tea. **Leave the other sample unpreserved.**
  6. Re-cap both bottles and dry them off with disposable paper towels.
  7. Remove your safety goggles and dispose of your gloves. **Rinse your hands thoroughly after taking the sample with bottled water.** In the event that excessive skin contact occurs or water is ingested document the occurrence. If sudden unexplained illness occurs seek medical attention immediately.
  8. Sample bottles should be wrapped with bubble wrap and packed to prevent breakage during shipping then stored in the refrigerator until pick up. **Do not freeze samples.**

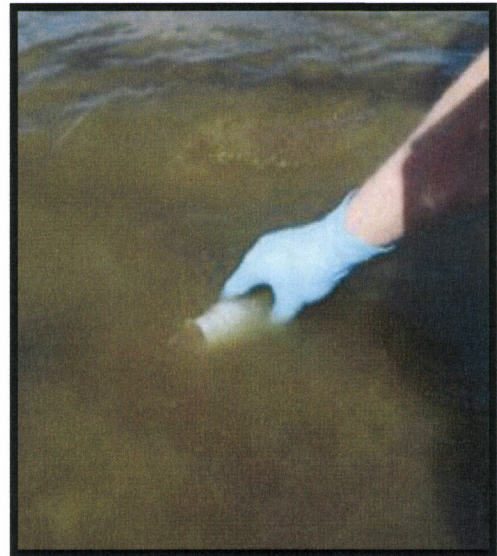


Figure3. Sample taken just below surface.

A Harmful Algal Bloom Report Form (Appendix C) should be filled out for each sampling event. Ship both sample bottles and their corresponding report form via FedEx Overnight to the Water Quality Lab at:

US Army Corps of Engineers  
R.C. Byrd Water Quality Lab  
State Route 2  
Apple Grove, WV 25502

It should be noted that HABs can occur at multiple depths and are not restricted to just below or on the surface of the water. It is difficult to detect a subsurface HAB by visual monitoring. If a subsurface HAB is suspected and a sample cannot be safely collected with available supplies contact the Water Quality Team for assistance. The Water Quality Team will determine if the suspected HAB contains cyanobacteria and can sample the subsurface bloom with a vertical whole water composite sampler.



Figure 4. HAB at Burr Oak Lake 2010, photo by ODNR.

The Water Quality Team will determine type of cyanobacteria present using Komarek, J. and K. Anagnostidis (1998, 2005) and enumerate using the Utermöhl method (UNESCO). If no cyanobacteria are present then project rangers will continue monitoring as scheduled. If cyanobacteria are present at levels greater than 4,000 cells/mL the Water Quality Team will contact the State agency and local health department (Appendix D) to notify them that a cyanobacteria bloom is occurring. Once levels exceed 20,000 cells/mL the Water Quality Team will develop a course of action based on the current situation and details of the HAB. The Water Quality Team will then contact project rangers to post appropriate flyers (Appendix E) at locations described in the Information Posting Plan until further notice. Once a course of action is developed the Water Quality Team will contact Lakes and Rivers Division (LRD), LRH Public Affairs Office, LRH Operations and Readiness Branch, and LRH Real Estate Branch to notify them of a HAB at that project and the next course of action. In the event an area or lake closure is recommended by the health department the Water Quality Team will notify the Chief of Water Resources Branch who will contact the District Engineer, Public Affairs Office, Office of Counsel, Real Estate, and Operations and Readiness Branch to discuss a course of action based on the specific situation. Sampling will occur weekly and advisory flyer will be in place. Once levels

return to below 20,000 cells/mL of cyanobacteria for two consecutive weeks all LRH advisory flyers will be removed.

#### **IV. COMMUNICATIONS PLAN**

**PURPOSE:** This plan will direct the district in carrying out an effective communication strategy regarding cyanobacteria blooms.

**SITUATION:** High levels of cyanobacteria have occurred in several Corps-managed lakes in the Huntington District. Because of the potential risks to public safety, the District will begin issuing advisories and warnings discouraging water contact at reservoirs when blooms occur.

State agencies may also issue advisories and in some instances, public beach areas may be closed until the bloom subsides.

The impacts to recreation and businesses at these lakes can cause a high level of public and media interest.

#### **COMMUNICATIONS OBJECTIVES:**

1. Communicate the HAB Response Strategy and execution plan with appropriate internal audiences to make them informed.
2. Coordinate with appropriate state and local agencies.
3. Communicate with business owners around affected lake. (Stakeholder Relations)
4. Communicate any advisories or warnings with the general public through the mass media, website, phone system, and social media. (Public Information)
5. Communicate consistently and concisely across communication platforms.

#### **ISSUES:**

1. Loss of revenue and substantial impact to businesses.
2. Impact to recreation.
3. Corps of Engineers testing methods: cell densities vs. toxin levels.

#### **POTENTIAL STAKEHOLDERS:**

1. State agencies and stakeholders.
2. Congressional delegation and elected officials.
3. Business owners around the lakes.
4. Concerned members of the public.

#### **NOTIFICATIONS:**

1. District, Division and HQ POCs
2. Appropriate state and local agencies.
3. Business owners
4. Public notification

5. News Release to local media outlets if severity warrants

#### **COMMUNICATION ROLLOUT:**

Identify district and division team leaders for communications of the cyanobacteria issue.

Spokespersons will include Public Affairs Office and any/all employees who communicate with the public. All potential spokespersons will familiarize themselves with the policy, key messages, talking points, and Q&As.

#### **KEY MESSAGES:**

1. We want to provide the safest possible recreation opportunities to the public.
2. Cyanobacteria are present in all lakes, but during certain conditions can become concentrated at levels which can cause adverse health effects to people and pets.
3. Some but not all cyanobacteria blooms produce nerve and liver toxins, which are extremely dangerous, but most produce skin toxins which may cause rash, nausea, diarrhea, vomiting, upper respiratory symptoms, and other flu-like symptoms.
4. Children, pets, and individuals susceptible to illness or rash are most likely to be affected by cyanobacteria.
5. Our goal is to provide as much information as possible so that individuals can make the best possible decision for themselves and their families.
6. Reservoirs with advisories are NOT closed. Boating and swimming are still permitted and businesses are still open. Visitors are encouraged to enjoy the lake, but be aware of the potential risk associated with primary body contact with the water.

#### **TALKING POINTS:**

1. This is not a new occurrence in LRD reservoirs. There have been reported algal blooms in several LRD reservoirs in the past.
2. Recent research has helped scientists to better understand the health risks associated with cyanobacteria. Prior to this research not much was known. In 2003, the World Health Organization (WHO) established the guidelines for safe levels of BGA in recreational waters. These guidelines are widely accepted as the testing guidelines for determining acceptable levels in recreational waters such as the reservoirs managed by LRD Districts.
3. The WHO guidelines are based on cell counts. While there are tests available that examine the amount of toxins produced, there aren't any widely accepted guidelines that establish safe levels of toxins for recreational waters. In addition, these tests can measure liver and nerve toxins but there aren't any tests that measure levels of skin toxins, which most BGA produce.
4. We will begin posting all data from all sample locations on District websites after a cyanobacteria bloom has been confirmed. We intend to provide as much information as available so that visitors can make an informed decision about recreating at a reservoir affected by BGA.

## **COORDINATION**

### **Muskingum Watershed Conservancy District**

The Muskingum Watershed Conservancy District (MWCD) will monitor Muskingum River Projects, not to include Dillon and North Branch of Kokosing. They will utilize a plan developed by the Ohio Lake Management Society (OLMS) which currently coordinates and trains existing citizen monitors to provide bloom detection. Once a bloom is reported to the OLMS through a citizen monitor, actions will be taken by the MWCD to collect samples and proceed with advisories as necessary according to the Ohio Environmental Protection Agency's HAB Monitoring Strategy. Bolivar, Dover, Mohawk, and Mohicanville Dams will not be monitored since they are dry dams and have a low risk of HAB development.

### **Ohio**

The Ohio Environmental Protection Agency (OEPA), Ohio Department of Health (ODH), and Ohio Division of Natural Resources (ODNR) have a plan in place to react to HABs at Ohio state park beaches and public water intakes (State of Ohio Harmful Algal Bloom Response Strategy, 2011). Beaches and public water intakes at Dillon Lake, Deer Creek Lake, Alum Creek Lake, and Paint Creek Lake beaches will be monitored by the ODNR. Beach No Contact Advisories at USACE lake projects will be directed by the ODH. OEPA does not have a monitoring or response plan in place for boat ramps and other public access areas. Recreation areas other than beaches will be the responsibility of LRH. Because of this, LRH lake rangers will be responsible for monitoring LRH lakes and public access points. If cyanobacteria occur at any threshold in Ohio waters the Water Quality Team will contact the OEPA and report the bloom via the Ohio HAB reporting website (Appendix D). If actions have not been taken by OEPA to post Ohio advisory flyers at public access points once cell counts exceed 20,000 cells/ml LRH will post LRH advisory flyers in accordance with this document. Monitoring Burr Oak Lake (Tom Jenkins Dam), will be the responsibility of the ODNR.

### **West Virginia**

The state of West Virginia does not have a plan in place to monitor or react to the occurrence of a HAB. In the event of a HAB in West Virginia waters the Water Quality Team will coordinate with the WV Department of Environmental Protection and the county health department of that project to determine a course of action based on the location and size of the HAB. Since West Virginia does not have legislation in place to cover closure of public water for a HAB they will have to issue emergency legislation to issue a No Contact Advisory because of a HAB.

### **Kentucky**

The state of Kentucky does not have a plan in place to monitor or react to the occurrence of a HAB. In the event of a HAB in Kentucky waters the Water Quality Team will coordinate with the

Kentucky Division of Water and the county health department of that project to determine a course of action based on the location and size of the HAB. Since Kentucky does not have legislation in place to cover closure of public water for a HAB they will have to issue emergency legislation to issue a No Contact Advisory because of a HAB.

### **Virginia**

The state of Virginia has a plan in place to respond to HABs but they do not monitor inland lakes. In the event of a HAB at North Fork of Pound or J. W. Flannagan Lakes the Water Quality Team will contact the state health department as well as the county health department to develop a plan to monitor the HAB. The health department will be responsible for issuing a No Contact Advisory at Virginia lake projects.

## **V. SUMMARY**

Harmful Algal Blooms are becoming a major threat to lake recreation within the Huntington District. As the frequency of HAB occurrences increase, so does the likelihood of human illnesses and animal deaths. Wind and waves can move and disperse HABs while the toxins remain in place undetected. Cyanobacteria can produce multiple types of toxins, each requiring a different test for detection. The Huntington District bases advisories on cell counts of cyanobacteria per milliliter of water with the assumption that if concentrations of cyanobacteria capable of producing high toxin levels are present, the toxins are likely to be present. The Water Quality Team may also employ techniques such as toxin analysis, FlowCAM facial recognition software, phycocyanin presence/absence, concentration of chlorophyll-a/liter with dominance of cyanobacteria, and targeting specific molecules using antibody or oligonucleotide analysis to support cell counts of cyanobacteria to ensure public safety.

Public information posters on HABs will be posted at all project offices. Lake projects will be monitored by project rangers based on the likelihood that a HAB may occur. If a HAB is sighted rangers will fill two bottles and ship by FedEx overnight to the Water Quality Lab. The Water Quality Lab will determine if the bloom is cyanobacteria and will enumerate. When cell counts exceed 20,000 cells/mL project rangers will be notified to post ADVISORY flyers at public access points and the Water Quality Team will develop a monitoring and action plan with the Public Health Department based on the specific project, cell counts/mL, and bloom type. The Water Quality Team will track the HAB and possible impacts. When cyanobacteria are present at levels greater than 100,000 cells/mL the District will issue a CAUTION and coordinate with appropriate county or state health departments and other state agencies as necessary to develop a plan of action. If an area or lake closure is recommended by the public health department, the Water Quality Team will notify the Chief of Water Resources Branch who will inform the District Engineer, Public Affairs Office, Office of Counsel, Real Estate, and Operations

and Readiness Branch on the course of action. Once cell count levels drop to less than 20,000 cells/mL for two consecutive weeks- Advisory flyers will be removed and rangers will resume monitoring as scheduled.

## **VI. QUESTIONS AND ANSWERS:**

Q1. What are cyanobacteria and why should I care?

*A1. Cyanobacteria are a type of bacteria present in all lakes, but during certain conditions can become concentrated at levels which can cause adverse health effects to people and pets. Some but not all cyanobacteria blooms produce nerve and liver toxins, which are extremely dangerous, but most produce skin toxins which can cause rashes, nausea, diarrhea, vomiting, upper respiratory symptoms, and other flu-like symptoms. Individuals recreating at reservoirs with elevated BGA levels should take precautions to minimize their exposure to high levels of BGA and be aware of the levels present so that they can make an informed decision.*

Q2. Why is the Corps of Engineers testing for cyanobacteria now but haven't in the past?

*A2. Cyanobacteria have been around for millions of years, but scientific research on the effects of BGA is relatively new. In fact, the World Health Organization's guidelines were only created in 2003. We have tested for BGA in several reservoirs in past years, however, the extreme heat and dry conditions seen in recent summers combined with nutrients coming into lakes from stream run-off can lead to more frequent blooms, blooms that are more persistent or of greater intensity.*

Q3. How does the Corps of Engineers determine which lakes to test?

*A3. Typically, we rely on reports from members of the public or lake staff. Once we receive a report of a possible cyanobacteria bloom, USACE staff collects samples for analysis. Once results are received, a determination is made based on the World Health Organization Guidelines as to whether an advisory or warning is needed.*

Q4. The World Health Organization's guidelines are based on cell counts not toxin levels. Aren't the toxins what should matter?

*A4. Though there are tests for liver and nerve toxin production, currently there are no tests for skin toxins, which all types of BGA are considered to produce. These skin toxins can cause rash, upper respiratory illness, gastrointestinal illness and other flu-like symptoms. These can especially impact people with preexisting health issues, children, and pets. Since the Corps of Engineers strives to provide the safest possible recreational opportunities and it is our due diligence to let the public know of ANY potential effects of BGA, advisories will be issued when appropriate. The advisory means water contact is discouraged. It doesn't mean*

*that you cannot go into the water, but based on the information provided you must make the best decision for you and your family.*

Q5. A state agency says the water is fine. Why should I listen to the Corps of Engineers?

*A5. In the absence of approved response plans by a State agency to inform the public of potential risks associated with recreating lakes affected by harmful algae blooms the Huntington District has relied upon guidelines established in 2003 by the World Health Organization. We use the World Health Organization's guidelines, which are based on cell counts per milliliter of water. These guidelines were created for recreational waters, which includes all Corps lakes in the Huntington District. States may test for liver and nerve toxin production, however, currently there are no tests for skin toxins, which all types of cyanobacteria are considered to produce. These skin toxins can cause rash, upper respiratory illness, gastrointestinal illness and other flu-like symptoms. These can especially impact people with pre-existing health issues, children, and pets. Since the Corps of Engineers strives to provide the safest possible recreational opportunities and it is our due diligence to let the public know of ANY potential effects of cyanobacteria so that members of the public can make the best decision for themselves and their family.*

Q6. Is the Corps of Engineers intentionally trying to destroy businesses?

*A6. Public safety is a top priority for the Corps of Engineers. While we understand that the advisories may have negative impacts to businesses, it is our due diligence to let the public know of ANY potential risks from cyanobacteria so that members of the public can make the best decisions for themselves and their family.*

Q7. What influences the concentration of cyanobacteria?

*A7. There are many factors that influence the cyanobacteria levels. Hot, dry conditions are just one factor. Other factors include lower lake levels, lack of inflow and nutrients in the water from stream runoff. One or more of these factors can impact the levels of cyanobacteria present at any time.*

Q8 How often does the Corps test?

*A8. Once a cyanobacteria bloom is confirmed, we test on a weekly basis.*

Q9 Where can I find updated information?

*A9. We distribute information on our website, <http://www.lrh.usace.army.mil/>, and through the local news media as well as the project offices at each lake.*

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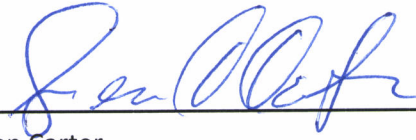
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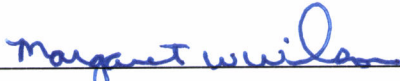
**VII. Approvals**



Timothy W. Curran  
Chief, Water Resources Engineering  
Section



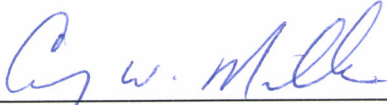
Sean Carter  
Chief, Geotechnical and Water Resources  
Engineering Branch



Margaret Wilson  
Acting Chief, Engineering and Construction  
Division



Wayne E. Budrus  
Chief, Operations and Readiness  
Division



Coy W. Miller  
Deputy District Engineer for Project  
Management



Steven T. McGugan  
Colonel, Corps of Engineers  
District Engineer

## **Appendix A: Information Posting Plan**

## **Appendix A: Information Posting Plan**

### **Information Posters / Tri-fold brochures**

General public information posters on HABs with specific project contact information will be placed at public access points (except Ohio Projects) and project offices year round. The state of Ohio will post information posters at public access points at lakes located in Ohio.

Information posters will only be posted in project offices in Ohio. These will provide general information on what HABs are, their impacts to humans and animals, where they can occur, what to look for, and who to contact if they are observed.

### **Advisory Flyers**

Advisory flyers will be posted when cyanobacteria levels are between 20,000 and 100,000 cells/ml. Advisory flyers are designed to notify the public that harmful algae are present in the lake and that water **MAY** be unsafe for people and animals. Posted flyers will be removed when cyanobacteria densities return to safe levels for two consecutive weeks.

### **Warning Flyers**

Warning flyers will be posted when cyanobacteria concentrations exceed 100,000 cells/ml. Warning flyers represent an increased risk to recreational users and **DISCOURAGE** contact with the water. Posted flyers will be removed when cyanobacteria densities return to safe levels for two consecutive weeks.

## Posting Locations

Project	Boat ramps	Beaches	Marinas	Project Office	Other
Alum Creek	New Galena	Main Beach	Hollenback	Visitor Center	
	Hollenback	Camp beach	Sailboat	St Pk Office	
	Cheshire			Camp Reg Office	
	Howard Rd				
	Campground				
Atwood					
Beach City					
Beech Fork	Upstream/Marina	Stowers Branch	Upstream Rec Area	Visitor Center	
	Beech Fork State Park				
Bluestone	Bluestone State Park - notify State Park Office		Bluestone State Park - notify State Park Office		
Bolivar				Public Use Bulletin Board (1) on Comfort Station Building	
Burnsville	Bulltown Day Use boat ramp	Beach adjacent to ramp			
	Bulltown Campground boat ramp				
	Rifle Run Day Use boat ramp		Marina behind dam	Near Dam	
Charles Mill					
Clendening					
Deer Creek	Harding Cabin Ramp	Beach on Crownover Mill Rd.	Marina off SR 207	Near Dam off Deer Creek Rd.	
	Marina/West Ramp				
Delaware	Marina	Main Beach	State Park	USACE Office	
	South West Ramp			St Pk Camp G. Station	

Project	Boat ramps	Beaches	Marinas	Project Office	Other
Delaware Cont.	Horseshoe Rd. Wildlife Area			ODNR Wildlife Office	
Dewey	Terry's			USACE Office w/in 2 mi	
	Gobel Branch			Park Attendent Office	
	Stratton Branch			KY F&W Regional Office	
	Brandy Keg		State Park	St Pk Office	
Dillon	Big Run Boat Ramp	DSP Beach	DSP Marina	DSP Office	
	Dil Sports Area				
East Lynn	Lick Creek boat ramp	Beach on Marina Rd.	Marina Rd.	Near Dam	Swimming area at overlook picnic area
	Marina Rd. boat ramp	Beach at East Fork			
	East Fork camp ground				
Fishtrap	Damsite Boat Ramp				
	Grapevine Boat Ramp				
	Lick Creek Boat Ramp				
Grayson	Marina Boat Ramp			Visitor Center	
				Dam Site Areas 1-4	
J. W. Flannagan	Junction Boat Ramp		Marina Road		
	Spillway Boat Ramp				
	Pound River Boat Ramp				
	Lower Twin Boat Ramp				
	Cranesnest Boat Ramp				
Leesville					
Mohawk					
Mohicanville					
North Branch Kokosing	MWCD				Pond ODNR WMA

Project	Boat ramps	Beaches	Marinas	Project Office	Other
North Fork Pound	****Notify US Forest Service****				
Paint Creek	Paint Creek Camp Launch	Shoemaker Beach	Deer Park Marina	Paint Creek Info Ofc	Paint Creek Camp Store
	Rattlesnake Boat Launch		Deer Park Public Launch	Little Pond RR	Handicap Fishing Pier-PCS
				Shelter 2 RR	
Paintsville	PIV Downstream Area		State Park	Paintsville	Paintsville Downstream
	State Park Boat Launch			St Pk Office	Handicap Fishing Area
	KYF&W Remote Lanches (3)			Near Dam	
Piedmont					
Pleasant Hill					(3) Private Boat ramps not MWCD
R. D. Bailey	Guyandotte Point Ramp			Near Dam	No designated swimming area
	Sugar Camp Launch Ramp				
Senecaville					
Summersville	Near Dam Site USACE Office	Day Use Near Dam		USACE Office	
	Day Use / Beach Area				
	Marina				
Sutton	South Abutment Ramp	Bee Run Day Use Beach	Bee Run Marina	At Damsite	Freeman Camp. Entrance Station
	Bee Run Day Use Ramp	South Abutment Beach	Freeman Satellite Marina		Bakers Run Camp. Entrance Station
	Freeman Camp. 2 Ramps				
	Bakers Run Camp. Ramp				
Tappan					
Tom Jenkins					

Project	Boat ramps	Beaches	Marinas	Project Office	Other
Wills Creek					
Yatesville	Barkers Run(State Park)	Lawrence County Beach	Yatesville Lake St. Park	Bulletin Boards at Office	Twin Branch Launch Ramp
	Pleasant Ridge				
	Rich Creek				
***** Project Monitored by MWCD: The Water Conservation District Owns the Lake and the Launch Ramp and the U.S. Army Corps of Engineers is not the responsible party here.					
***** Projects that are Dry Dams Generally Not Sampled					
***** Project is under lease management (Out-grant) to the State in either State Park or DNR-WMA's: The Lake and the Launch Ramps are Managed by the State and the U.S. Army Corps of Engineers is not the responsible party here. The Project will notify the State if the need arises and will offer the USACE Response Plan as an option if the State doesn't have an Agency Plan to response to these concerns.					

**Appendix B: Project Risk Assessment for Harmful Algal Blooms.**

<b>Project</b>	<b>Risk of Harmful Algal Bloom</b>	<b>Comments</b>
Alum Creek	High	
Burnsville	High	
Charles Mill	High	Monitored by MWCD
Deer Creek	High	
Delaware	High	
Dillon	High	
Paint Creek	High	
Tappan	High	Monitored by MWCD
Tom Jenkins	High	Monitored by ODNR
Atwood	Moderate	Monitored by MWCD
Beech Fork	Moderate	
Beach City	Moderate	Monitored by MWCD
Bluestone	Moderate	
Clendening	Moderate	Monitored by MWCD
Leesville	Moderate	Monitored by MWCD
North Branch Kokosing	Moderate	
Piedmont	Moderate	Monitored by MWCD
Pleasant Hill	Moderate	Monitored by MWCD
Senecaville	Moderate	Monitored by MWCD
Wills Creek	Moderate	Monitored by MWCD
Yatesville	Moderate	
Bolivar	Low	Not sampled / dry dam
Dewey	Low	
Dover	Low	Not sampled / dry dam
East Lynn	Low	
Fishtrap	Low	
Grayson	Low	
J. W. Flannagan	Low	
Mohawk	Low	Not Sampled / dry dam
Mohicanville	Low	Not Sampled / dry dam
North Fork Pound	Low	
Paintsville	Low	
R. D. Bailey	Low	
Summersville	Low	
Sutton	Low	

5 March, 2012.

Appendix C: Harmful Algal Bloom Report Form

Blue-green Algae Report Form

**General Information**

Project Name: \_\_\_\_\_ Date: \_\_\_\_\_  
Observer Name: \_\_\_\_\_ Time: \_\_\_\_\_

Were samples taken? Yes No (If YES please answer following questions)

**Sampling Information**

Detailed location description of observation (what part of lake?): \_\_\_\_\_  
\_\_\_\_\_

GPS Coordinates (if possible): Lat: \_\_\_\_\_ Lon: \_\_\_\_\_

Were pictures of the bloom and surrounding area taken? Yes No

Is observed bloom near a public access site or in a residential area? Yes No

Can area of lake containing bloom be accessed by foot? Yes No

Sample Container Type: Plastic Bottle Glass Bottle Other: \_\_\_\_\_

Sample Quantity: \_\_\_\_\_

Sample Depth: Surface Below Surface \_\_\_\_\_ ft

**Physical Site Conditions:**

Algae Bloom Color: Bright Green Dark Green Blue-Green Red Other: \_\_\_\_\_

Lake Water Color: Brown Green Blue Clear Other: \_\_\_\_\_

Size of Surface Bloom: \_\_\_\_\_

Describe weather conditions of previous weeks leading up to the surface bloom: \_\_\_\_\_  
\_\_\_\_\_

**Shipping/Sample Information**

Is sample being: Shipped Delivered Picked up

How is sample preserved: Lugol's solution Ice Both

Shipping notes: \_\_\_\_\_  
\_\_\_\_\_

Sampled by: \_\_\_\_\_ Shipment date: \_\_\_\_\_

Carrier: Fed Ex UPS USPS Expected Receiving date: \_\_\_\_\_

\* All samples are to be shipped to LRH Water Quality Lab unless directed otherwise by Water

Management staff. Shipping address: U.S. Army Corps of Engineers  
R.C. Byrd Water Quality Lab  
State Route 2  
Apple Grove, WV 25502

**Appendix D: Agency contacts**

**OHIO:**

<http://www.epa.state.oh.us/dsw/HAB.aspx>

Emergency response hotline: 1-800-282-9378

Linda Merchant-Masonbrink  
DSW HAB Coordinator (Recreation Waters)  
Ohio EPA - Division of Surface Water  
50 W. Town St., Suite 700  
P.O. Box 1049  
Columbus, OH 43215  
Office (614) 644-2135  
Cell (614) 560-5086  
[linda.merchant-masonbrink@epa.ohio.gov](mailto:linda.merchant-masonbrink@epa.ohio.gov)  
Fax (614) 644-2745

Scott Fletcher, CPM  
Deputy Chief for District Services  
Ohio State Parks  
2045 Morse Road C-3  
Columbus OH 43229  
Office 614-265-7055  
Cell 614-946-5974  
Fax 614-265-7202

Mary Clifton  
Ohio Department of Health  
Bureau of Environmental Health  
Ohio Department of Health  
PO Box 1430  
Reynoldsburg, OH 43068-6430 Office: 614/466-1390  
[Mary.clifton@odh.ohio.gov](mailto:Mary.clifton@odh.ohio.gov)

**MUSKINGUM WATERSHED CONSERVANCY DISTRICT:**

<http://mwcd.org/>

Mark Swiger  
Conservation Administrator  
Muskingum Watershed Conservancy District  
PO Box 349, 1319 3rd St.  
New Philadelphia, OH 44663  
Office (330) 343-6647 ext. 2273  
[mswiper@mwcd.org](mailto:mswiper@mwcd.org)

**VIRGINIA:**

<http://www.vdh.state.va.us/epidemiology/DEE/habs/>

HAB Hotline: 1-888-238-6154 or 1-757-518-2000

Rebecca LePrell

Director of Environmental Epidemiology

Virginia Department of Health

Office: 804.864.8111

Cell: 804.432-9900

John Settle

Pollution Response Coordinator

Virginia Department of Environmental Quality

Tidewater Regional Office

5636 Southern Blvd.

Virginia Beach, VA 23462

Office (757) 518-2179

[John.settle@deq.virginia.gov](mailto:John.settle@deq.virginia.gov)

**John W. Flannagan Lake**

Dickenson County Health Department

Office: 276/926-4979

Fax: 276/926-4427

**North Fork of Pound Lake**

Wise County Health Department

Office: 276/382-8000

Fax: 276/376-1020

**WEST VIRGINIA**

<http://www.dep.wv.gov/WWE/Pages/default.aspx>

Jeff Bailey

Division of Water and Waste Management

West Virginia Department of Environmental Protection

601 57th Street, S.E.

Charleston, WV 25304

Office (304) 926-0499 ext 1094

[Jeffrey.e.bailey@wv.gov](mailto:Jeffrey.e.bailey@wv.gov)

**Beech Fork Lake**

Harry Tweel  
Cabell County Health Department  
Office: 304/523-6483  
Fax: 304/523-6403

Kevin McCann  
Wayne County Health Department  
Office: 304/272-6761  
Fax: 304/272-6763

**Bluestone Lake**

Sandra Ball  
Summers County Health Department  
Office: 304/466-3388  
Fax: 304/466-1230

**Burnsville Lake**

JoAnn McChesney  
Braxton County Health Department  
Office: 304/765-2851  
Fax: 304/765-2020

**East Lynn Lake**

Kevin McCann  
Wayne County Health Department  
Office: 304/272-6761  
Fax: 304/272-6763

**R. D. Bailey Lake**

Cathy Headen  
Mingo County Health Department  
Office: 304/235-3570  
Fax: 304/235-2654

Cheryl Sneed  
Wyoming County Health Department  
Office: 304/732-7941  
Fax: 304/732-6709

**Summersville Lake**

Rodney Boyce  
Nicholas County Health Department  
Office: 304/872-5329  
Fax: 304/872-6128

**Sutton Lake**

JoAnn McChesney  
Braxton County Health Department  
Office: 304/765-2851  
Fax: 304/765-2020

**KENTUCKY**

<http://water.ky.gov/Pages/default.aspx>

Rodney Pierce  
Kentucky Division of Water  
200 Fair Oaks Lane  
Fourth Floor  
Frankfort, KY 40601  
502-564-3410 x4873  
[rodney.pierce@ky.gov](mailto:rodney.pierce@ky.gov)

<http://water.ky.gov/Pages/default.aspx>

Mark Martin  
Kentucky Division of Water  
200 Fair Oaks Lane  
Fourth Floor  
Frankfort, KY 40601  
502-564-3410  
[Mark.Martin@ky.gov](mailto:Mark.Martin@ky.gov)

**Dewey Lake**

Thursa Sloan  
Floyd County Health Department  
Office: 606/886-2788  
Fax: 606/886-9318

**Fishtrap Lake**

Paul Hopkins  
Pike County Health Department  
Office: 606/437-5500  
Fax: 606/437-0873

**Grayson Lake**

Lloyd Miller

Little Sandy District Health Department

Office: 606/474-4115

Fax: 606/474-0256

**Paintsville Lake**

Russell Briggs

Johnson County Health Department

Office: 606/789-2590

Fax: 606/789-8888

**Yatesville Lake**

Susan Frazier

Lawrence County Health Department

Office: 606/638-7389

Fax: 606/638-3008

Appendix E: Public information signs.

**Harmful Algal Blooms (HABs)**

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

**Good or bad?**  
Not all "scums" or floating mats are harmful! Healthy lakes produce many species of aquatic vegetation and algae that are beneficial to the environment and pose no threat to human or animal health. When in doubt, err on the side of caution and avoid contact.

**What are HABs?**  
Harmful Algal Blooms are microscopic cyanobacteria or "blue green algae" colonies that resemble green algae. HABs can have a bluish appearance and can often times be seen as scums, foams or mats anywhere on the surface of a lake or stream. The area affected by a "bloom" can range from the size of a basketball to half the lake.

**Why are they harmful?**  
HABs can generate toxins that can potentially impact human, pet, livestock, and fish health. The toxins can cause:  

- Allergic type reactions
- Skin irritation
- In severe cases liver or nervous system damage could occur
- Unexplained pet/livestock sickness

**What can you do?**  
Follow instructions found on posted signs and avoid contact with any questionable waters or floating scum that may have an odd green or sometimes blue or brown color. Do not let livestock or pets drink from any waters posted with an advisory. Please report possible HAB sighting or fish kills to the local USACE office.

**Measures you can take:**  

- Limit fertilizer use near streams or ditch lines
- Maintain septic tanks
- Do not treat possible HAB blooms with algicides
- Promote native plant growth along streams and shorelines that may act as a "buffer zone" and reduce potential runoff.

**ADVISORY**  
 ADVISORY: Harmful Algal Blooms (HABs) may be present in this area. Avoid contact with water and do not drink from it. If you have any questions, contact the local USACE office at (304) 576-3300.

**CAUTION**  
 CAUTION: Harmful Algal Blooms (HABs) may be present in this area. Avoid contact with water and do not drink from it. If you have any questions, contact the local USACE office at (304) 576-3300.

**If an unknown illness occurs after water contact seek medical attention!**

To report a HAB please call the local project office at ( ) - - .  
 For more general information concerning HABs contact the Huntington District Water Quality Office at ( 304 ) 576-3300

Anabaena, Planktothrix, Microcystis

Blue-green Algae Awareness Level

# ADVISORY

Elevated Risk of Adverse Health Effects

## BLUE-GREEN ALGAE BLOOMS ARE PRESENT

For Your Safety, The U.S. Army Corps of Engineers, Huntington District  
Recommends the Following:

- **DO NOT** drink untreated lake water.
- Use caution when swimming, water skiing and coming into contact with water.
- Children and animals are more likely to get sick with exposure to or consumption of blue-green algae.
- Avoid areas with visible algae accumulation.

**Symptoms from exposure may include nausea, vomiting, diarrhea, skin rash, eye irritation, respiratory problems or other unexplained illness.**

For more information go to:



[www.cdc.gov/nceh/hsb/hab/default.htm](http://www.cdc.gov/nceh/hsb/hab/default.htm)

or

[www.lrh.usace.army.mil](http://www.lrh.usace.army.mil)

Report algae blooms to:  
USACE lake project office or the  
Huntington District Water Quality Lab  
304/576-3300

For additional information contact your local  
health department

Blue-green Algae Awareness Level

# CAUTION

Elevated Risk of Adverse Health Effects

## BLUE-GREEN ALGAE BLOOMS ARE PRESENT

For Your Safety, The U.S. Army Corps of Engineers, Huntington District  
Recommends the Following:

- **DO NOT** drink untreated lake water.
- Children and pets are more likely to get sick because of blue-green algae.
- Contact with the water is *discouraged* (e.g., swimming, wading, water skiing).
- Keep pets/livestock off of the beach and out of the water the water.
- Avoid areas with visible algae accumulation.

**Symptoms from exposure may include nausea, vomiting, diarrhea, skin rash, eye irritation, respiratory problems or other unexplained illness.**

For more information go to:

[www.cdc.gov/nceh/hsb/hab/default.htm](http://www.cdc.gov/nceh/hsb/hab/default.htm)

or

[www.lrh.usace.army.mil](http://www.lrh.usace.army.mil)



Report algae blooms to:  
USACE lake project office or the  
Huntington District Water Quality Lab  
304/576-3300

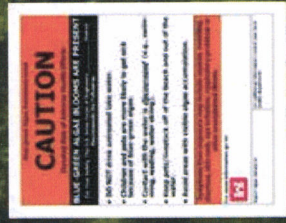
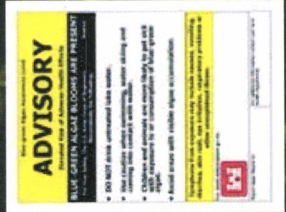
For additional information contact your local  
health department:

Tri-fold brochure



**What can you do?**

- Follow instructions found on posted signs and avoid contact with any questionable waters or floating scum that may have an odd green or sometimes blue or brown color.



**YELLOW** – Advisory signs will be posted when cyanobacteria concentrations reach levels that may potentially cause irritative or allergic effects.

**ORANGE** – Caution signs will be posted when higher concentrations are found. At these higher levels, cyanotoxins are more likely to be present and increase the risk of more pronounced health effects.

- Do not let livestock or pets drink from any waters posted with an advisory.
- Immediately rinse off after swimming in natural waters.
- If anyone becomes ill after swimming, seek medical attention immediately. Seek veterinary assistance if a pet appears ill.
- Please report possible HAB sighting or fish kills to the appropriate USACE office.

Please help reduce the risk of HABs

**Measures you can take:**

- Limit fertilizer use near streams and ditch lines
- Maintain septic tanks
- Do Not treat possible HABs with algaecides
- Promote native plant growth along streams and shorelines that may act as a “bufferzone” and reduce potential runoff.

[Additional HAB Resources](#)

Ohio EPA:  
<http://www.epa.state.oh.us/dsw/HAB.aspx>

National Oceanic and Atmospheric Administration:  
<http://www.glerl.noaa.gov/res/Centers/HABs/>

Centers for Disease Control and Prevention:  
<http://www.cdc.gov/nceh/hab/hab/default.htm>

U.S. Geological Survey:  
[http://toxics.usgs.gov/highlights/algal\\_toxins/algal\\_tox.html](http://toxics.usgs.gov/highlights/algal_toxins/algal_tox.html)

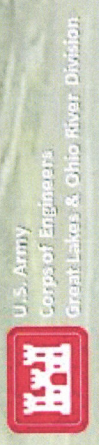
# Harmful Algal Blooms (HABs)

## What are they?

## What do I need to know?

To report a HAB please call the local project office at ( ) ( ) -

For more general information concerning HABs contact the \_\_\_\_\_ District Water Quality Office at ( ) ( ) -



## Good or bad?

Not all "scums" or floating mats are harmful! Healthy lakes produce many species of aquatic vegetation and algae that are beneficial to the environment and pose no threat to human or animal health. When in doubt, err on the side of caution and avoid contact.

*Avoid floating scums!*

*Avoid green or unusually colored water!*

## What are HABs?

**Harmful Algal Blooms** are microscopic cyanobacteria or "blue green algae" colonies that resemble green algae.

HABs can have a bluish appearance and can often times be seen as scums, foams or mats anywhere on the surface of a lake or stream. The area effected by a "bloom" can range from the size of a basketball to half the lake.

## Why are they harmful?

HABs can generate toxins that can potentially impact human, pet, livestock, and fish health. The toxins can cause:

- Allergic type reactions
- Skin irritation
- In severe cases liver or nervous system damage could occur
- Unexplained pet/livestock sickness

*If an unknown illness occurs after water contact seek medical attention!*

