

Harmful Algal Bloom Response Plan

USACE, Chicago District

November 2020

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Executive Summary

- The purpose of this document is to serve as a reference for harmful algal bloom response for the rivers and reservoirs within USACE Chicago Districts (LRCs) area of responsibility.
- Water quality monitoring, including the monitoring of harmful algal blooms and associated toxins, supports the ability to meet authorized purposes described in each project's Water Control Manual.
- The activities of LRCs water quality monitoring are driven by the guidance and requirements set forth in ER 1110-2-8154, titled "Water Quality and Environmental Management for Corps Civil Works Projects," which states "The Corps operates a water quality management program to ensure that all applicable state and federal water quality standards are met, water quality degradation of Corps resources is avoided or minimized, and project responsibilities are attained."
- LRCs water quality area of responsibility includes 3 flood control reservoirs in Indiana.
- Research and literature described in ERDC/EL TR-17-11 indicate that reservoir operations impact algal populations within the reservoir.
- Any data collected in response to harmful algal blooms, including data collected by state agencies, will be reviewed by the CELRC-ECD-ENG, distributed, analyzed and documented as appropriate. Any relevant data analysis will be used to aid the project in meeting authorized purposes as described in Water Control Manuals or other Corps policies.

Introduction

The US. Army Corps of Engineers, Chicago District (LRC) water quality area of responsibility includes three (3) flood control reservoirs in the Upper Wabash watershed in northeast Indiana (see Figure 1). According to the 2016 Upper Wabash River Watershed Management Plan, approximately 92% of the Upper Wabash River Basin watershed is in agriculture use, including mainly grain and livestock operations. Traditional row crop production pushes tillage to the edge of many stream and ditch banks where sediments, nutrients, and other pollutants can migrate from the agricultural lands to surface waters via runoff, sub-surface tile systems and erosion. Many waterways lack grassed buffers and are void of riparian areas (<https://www.in.gov/idem/nps/3187.htm>).

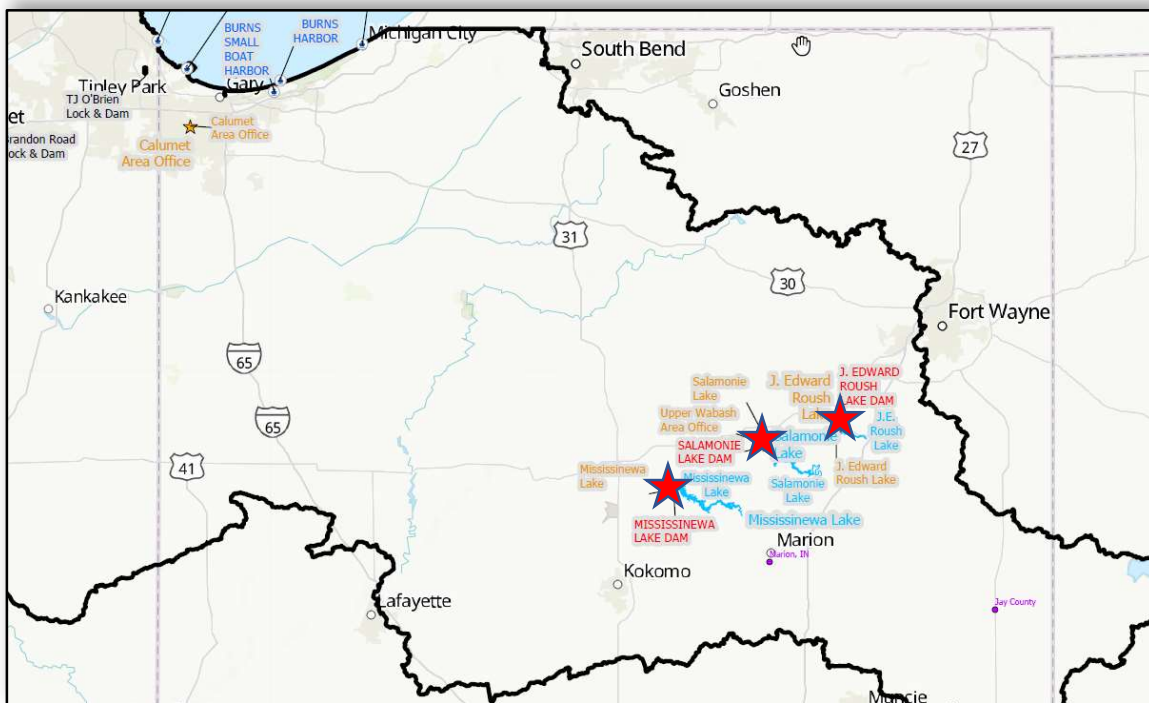


Figure 1: Upper Wabash Projects

LRC also manages the Lake Winnebago Fox-Wolf River Basin, though does not have a water quality mission on the waterway. The Fox-Wolf River project includes nine federal dams (and associated locks and channels authorized for commercial navigation) along 39 miles of the Lower Fox River in Wisconsin (see Figure 2). These works operate in harmony with five private dams on the Lower Fox River, which are for hydropower generation, and Lake Winnebago. Two of these dams serve as outlet controls for Lake Winnebago: a private dam at Neenah and a federal dam at Menasha. The dams at Neenah and Menasha are operated in the interest of flood control, wetlands preservation, fish and wildlife enhancement, hydropower, boating,

municipal water supply and occasional low flow augmentation for Lower Fox River water quality purposes.

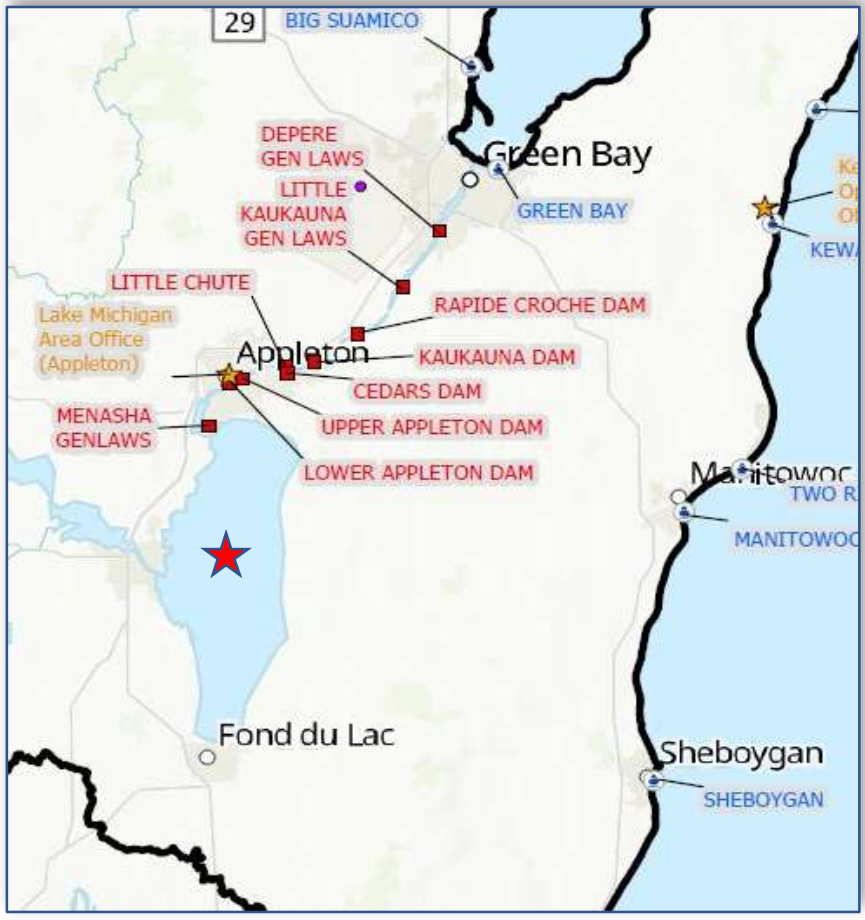


Figure 2: Lake Winnebago Fox-Wolf River Basin

The primary responsibility of the LRC water quality monitoring program is to meet each project’s authorized purposes as described in the project’s Water Control Manual (WCM). Water quality monitoring, including the monitoring of harmful algal blooms (HABs) and associated toxins, supports this responsibility. Another responsibility of the water quality monitoring program is to uphold state and federal water quality standards, whenever possible. This includes noting the presence of, reporting, and monitoring of freshwater HABs. The purpose of this document is to serve as the response plan to HABs at the LRC Upper Wabash and Lake Winnebago Fox-Wolf River project areas.

What are HABs?

Freshwater HABs are significant and excessive growths of blue-green algae, also known as cyanobacteria. All freshwater reservoirs are inhabited by native Cyanobacteria species that can

produce HABs. Several of these species can produce toxins (called cyanotoxins) that are harmful



to the nervous system (neurotoxins), the liver (hepatotoxins), and the skin (dermatotoxins) of humans and other animals. In addition to cyanotoxins, HABs can be harmful to the reservoir ecosystem and can cause depletion of oxygen levels which can cause fish mortality.

Figure 3: HAB Outbreak Roush Lake, 2019

Examples of HAB outbreaks at Lake Winnebago and Roush Lake are included in Figures 3 and 4. Frequently asked questions (FAQs) about HABs are included in this document as Appendix A: Frequently Asked Questions about HABs.

What Causes HABs?

General contributing factors that promote the formation of HABs are:

- Ample/excessive sunlight
- Warm temperatures
- Low-water or low-flow conditions
- Excessive nutrients (nitrogen and phosphorus)

Although some HABs occur during the cold seasons, they most frequently occur during the summer when temperatures are high, sunlight is ample, and the flow of incoming water is low.

Also, one of the most influential factors of HAB growth is the concentration of nutrients such as nitrogen and phosphorus. Nitrogen and phosphorus are both required by cyanobacteria to live and one is often scarce in the environment, therefore limiting growth. Most nitrogen and phosphorus pollution (also known as nutrient overloading) comes from the runoff of agricultural fertilizer, lawn fertilizer, untreated human sewage (storm overflows), and untreated animal sewage from concentrated animal feeding operations.

Why is the Corps Involved in HAB Response?

In a 29 June 2012 Memorandum from BG Margaret Burcham (Appendix B: LRD Memorandum Requiring HAB Response Plan

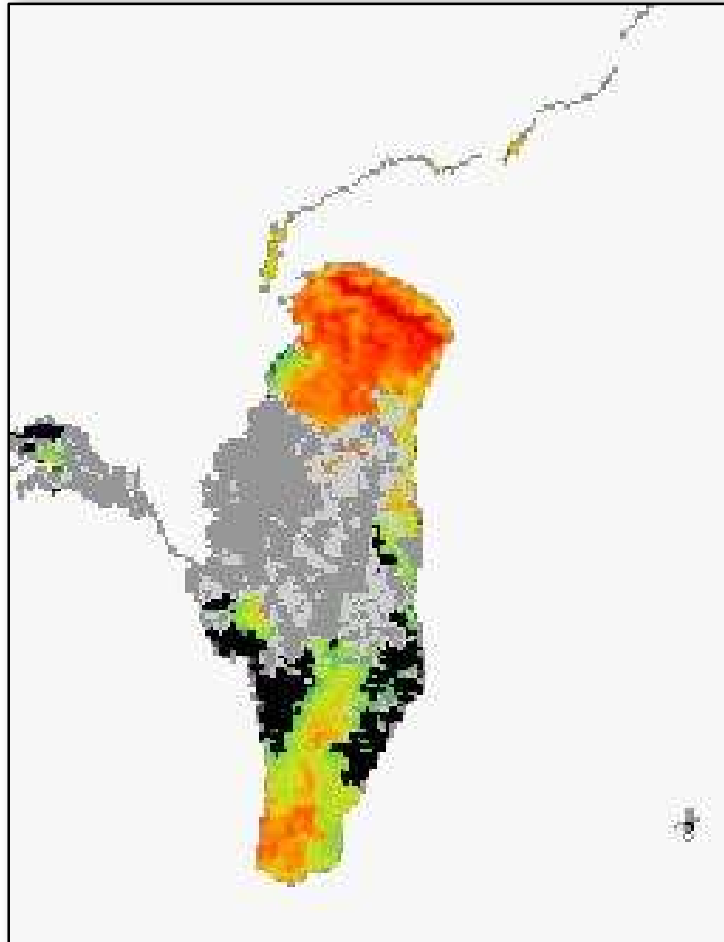


Figure 4: Satellite Imagery of HAB Outbreak, Lake Winnebago, July 2020

Development), the Districts within the Great Lakes and Ohio River Division (LRD) of the Corps were directed to develop HAB Response Plans for projects with recreational missions in order to protect the public from the potential threats posed by HABs. In accordance with the 2012 memorandum, these plans are to be coordinated with the appropriate state agencies. This Response Plan will be revised as needed to reflect any changes from ongoing coordination with the State of Indiana and Wisconsin.

Any data collected in response to Harmful Algal Blooms, including data collected by state agencies, will be reviewed by the LRC water quality monitoring program and distributed, analyzed and documented as appropriate. Relevant data analysis will be used to aid the project in meeting authorized purposes as described in the WCM or other Corps policies. Water quality monitoring, including the monitoring of HABs and associated toxins, supports the ability to meet authorized purposes described in each project's WCM.

Research and literature described in ERDC/EL TR-17-11 indicate that reservoir operations impact algal populations within the reservoir. Several algal-related research projects are occurring at the Corps nationally, indicating the need for response and data collection. Information regarding these projects are described in ERDC/EL TR-11-13 and ERDC/EL TR-19-19.

HAB Response at Indiana Reservoirs

If HAB conditions are observed at an Upper Wabash reservoir, or if reports are received from the public, an Algal Bloom Notification Form (Appendix C: Indiana Algal Bloom Notification Form) is used to report the conditions. The Algal Bloom Notification Form is also available online at the following link:

https://www.in.gov/isdh/files/Algal_Bloom_Notification.pdf.

Completed forms should be emailed to the following POCs at the Indiana State Department of Health (ISDH), Indiana Department of Environmental Management (IDEM), Indiana Department of Natural Resources (IDNR) and the Chicago District Environmental Engineering Team:

- ISDH POC, eph@isdh.in.gov
- Cyndi Wagner, CWAGNER@idem.IN.gov
- Ginger Murphy, GMurphy@dnr.IN.gov
- Casey Pittman, casey.l.pittman@usace.army.mil

Reporting HAB conditions via the Algal Bloom Notification Form concludes LRCs responsibilities.

If the public reports potential HAB related illness to LRC personnel, they should be advised to contact the Poison Control Center at 1-800-222-1222 or to seek immediate medical attention from a licensed medical provider.

Information regarding Indiana's HAB response procedures can be found in Appendix D: Indiana Department of Natural Resources HAB Response SOP, by contacting IDEM at 1-800-451-6027 extension 24464 or by visiting their website at <https://www.in.gov/idem/algae/>.

Indiana State Parks Advisories and Closings

Blue-green algae alerts in the State of Indiana, and other notices, such as road construction advisories and park and trail closures are posted at <https://www.in.gov/dnr/parklake/7881.htm>. For real-time information, follow Indiana State Parks on Twitter ([@INDNRstateparks](https://twitter.com/INDNRstateparks)) or ([@INDnrstateparksandreservoirs](https://twitter.com/INDnrstateparksandreservoirs)), or follow frequented properties on Facebook.

HAB Response in Wisconsin Waterways

If HAB conditions are observed within the Lake Winnebago Fox-Wolf River Basin, or if reports are received from the public, notification to the Wisconsin Department of Natural Resources (WDNR), the Wisconsin Department of Health Services (WDHS), and the Chicago District Environmental Engineering team should be submitted.

- WDNR Notification: the following information is submitted to the WDNR through e-mail notification to DNRHABS@wisconsin.gov:
 - Bloom size
 - Bloom duration
 - Location, with water body name
 - Town and county name
 - Photos noting close-up view and overall views
- WDHS Notification: reports of blue-green algae blooms and related human or animal illnesses are reported to the Wisconsin Harmful Algal Blooms Program by calling 608-266-1120 or by completing the [Harmful Algae Bloom \(HAB\) Illness or Sighting Web Survey](#) found online at:

<https://www.dhs.wisconsin.gov/water/bg-algae/contacts.htm>

If the public reports potential HAB related illness to LRC personnel, they should be advised to contact the Poison Control Center at 1-800-222-1222 or to seek immediate medical attention from a licensed medical provider.

Appendix A: Frequently Asked Questions about HABs

BACKGROUND INFORMATION FOR HABs

What is a HAB?

Freshwater harmful algal blooms (HABs) are significant and excessive growths of blue-green algae, also known as cyanobacteria. All freshwater reservoirs have native cyanobacteria species that can produce HABs. Several of these species can at times produce toxic chemicals (called cyanotoxins) that can be harmful to the nervous system (neurotoxins), the liver (hepatotoxins), and the skin (dermatotoxins) of humans and other animals. In addition to cyanotoxins, HABs are harmful to the reservoir ecosystem and can cause depletion of oxygen levels resulting in fish mortality.

What causes HABs to form?

Some factors that can contribute to HABs include sunlight, low-water or low-flow conditions, calm water, warmer temperatures and excess nutrients (phosphorus or nitrogen). The primary sources of nutrient pollution are runoff of fertilizers, animal manure, sewage treatment plant discharges, storm water runoff and failing septic tanks.

Can you see the algae blooms?

Blooms can grow and be visible, at which time they often form mats or scums that can be seen on or just below the water surface. Visible algae scums are indicative of a high risk of negative health effects for humans and other animals. However, blooms are not always visible and that is why many states rely on toxin testing to detect HABs.

Do HABs mean that the lake will be closed to recreation?

Sometimes the beaches at Indiana reservoirs and Lake Winnebago are closed as a result of the presence of HABs; however, boating may be permitted, and businesses may remain open in the case of advisories or cautions. Visitors are encouraged to enjoy the reservoir, but be aware of the possibility of adverse health impacts associated with contact with the water and know that immediate healthcare is needed if there is a sudden onset of symptoms associated with HAB exposure.

Is this part of global warming?

We do not know. What we do know is lower water levels, higher water temperatures, and increased levels of nutrients impact algae growth.

What does interagency cooperation accomplish in terms of assessing and improving water quality?

Interagency cooperation provides for better communication between federal, state, and local governmental agencies, and non-governmental agencies all having vested interests and responsibilities for care of the environment including our water resources. To protect our reservoirs and streams, a holistic watershed approach to develop best management practices is needed. Because different agencies have different authorities and specific areas of focus, and because of the complexity and interdependency of urban development, infrastructure, agriculture, recreational and economic interests, cooperation among all stakeholders is needed for an effective response plan for HABs.

ADVERSE HEALTH EFFECTS

Is it safe to have contact with the water?

At this time, the algae levels are at a higher risk of causing health concerns for all people and animals that come in contact with the water. Visitors to the reservoir should consider risks before participating in water-related activities. The visitors that swim, boat or enter the water are now at higher risk to experience adverse health effects if they come in contact with water from the reservoir.

What are the risks if I am exposed to water with a HAB?

Exposure to cyanobacteria during recreational activities such as swimming, wading, and water-skiing or boating – for example – may lead to rashes, skin, eye irritation, and other uncomfortable effects such as nausea, stomach aches, and tingling in fingers and toes. Effects to the skin can develop fairly quickly. Most cyanobacteria produce skin toxins which may cause rash, nausea, diarrhea, vomiting, upper respiratory symptoms, and other flu-like symptoms. Some but not all cyanobacteria blooms produce nerve and liver toxins, which are extremely dangerous.

If you suspect you are experiencing health related issues due to HAB exposure, please contact the Poison Control Center at 1-800-222-1222 or seek medical attention from a licensed medical provider. The Corps is not licensed, nor permitted, to provide medical advice.

If I get my water through a public utility, is it safe to drink if the water is drawn from the reservoir?

If a reservoir provides water to local water/utility companies, the utility companies are notified of the HAB so that they can take precautionary measures in treating the drinking water. For specific inquiries about your drinking water quality, contact your utility office.

What about clothing, life jackets and equipment used in reservoir water impacted by HABs?

Wash all clothing and equipment including life jackets after contact with algal blooms and scum. At a minimum use fresh water to wash life jackets but for additional precaution use soap. Algal cells can accumulate under swimwear so it is especially important to rinse clothing and skin with fresh water and soap.

What are some precautionary measures I can take?

Precautionary measures include:

- Avoiding contact with visible algae and not swallowing water while swimming.
- Taking a bath or shower with warm, soapy water after coming in contact with water in ponds and reservoirs, especially before preparing or consuming food.
- Pets and livestock should not be allowed to swim in or drink untreated water from these sources. Livestock, pets and wild animals can be poisoned by the toxins produced by some algal blooms. Small animals can ingest a toxic dose quickly.
- Dogs are particularly susceptible to cyanobacteria poisoning because the scum can attach to their coats and be swallowed during self-cleaning.
- Remove 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.
- If you are picnicking, wash your hands before eating if you have had contact with lake water or shore debris.

- Wash all clothing and equipment including life jackets after contact with algal blooms and scum. At a minimum, use fresh water to wash life jackets and swimwear but for additional precaution use soap.

Who does a HAB affect?

Discomfort and illness can happen to people, pets, livestock and all animals. Children, pets, and individuals susceptible or already experiencing illness or a rash are at a much higher risk of effects of cyanobacteria than others.

What if I or (my) animals feel sick after contact with the water?

First, seek immediate care through your physician or care center if you feel you or your family have been impacted by algal blooms.

If you suspect you are experiencing health related issues due to HAB exposure, please contact the Poison Control Center at 1-800-222-1222 or seek medical attention from a licensed medical provider. The Corps is not licensed, nor permitted, to provide medical advice.

In **Indiana** you may also contact or report a diagnosed illness to the Indiana State Department of Health at the following link:

<http://www.in.gov/isdh/25974.htm>.

In **Wisconsin** you may also contact or report a diagnosed illness to the Wisconsin Department of Health Services at the following link:

<https://www.dhs.wisconsin.gov/water/bg-algae/contacts.htm>

What health effects in animals should we watch for?

Clinical signs of cyanobacteria poisoning in animals include vomiting, diarrhea, decreased appetite, weakness, seizures and sudden death, especially in livestock. If you see a cyanobacteria bloom in the water where you visit, do not allow pets or livestock to swim in or drink from areas where blooms are seen. If pets swim in scummy water, rinse them off with soap and water immediately to remove the toxin. Do not let them lick the algae off their fur. Direct livestock to water sources away from infected waters. If your animal shows any of the clinical signs listed above, contact your veterinarian immediately.

THE WAY AHEAD

What agencies does USACE work with to determine HAB conditions?

LRC works with the reservoir project offices, the IDNR and the Indiana Department of Environmental Management (IDEM) to determine HAB conditions at any of the USACE operated reservoirs in Indiana.

How does a reservoir get “cleaned up” from an overabundance of nutrients or algae or bacteria?

The health of a watershed is related to many factors: environmental, human, global conditions, etc. Through natural processes, organic elements will break down over time entering watersheds. It is critical that agencies work together to employ and educate stakeholders and generate interagency partnerships. Equally critical to understanding the natural processes are educating landowners about establishing buffer boundaries, erosion, farm ponding, and conservationist policies.

What can USACE do to fix this problem?

It will take a cooperative interagency effort to develop and implement best watershed management strategies to address this problem. Improvement in water quality will require a rather extensive time period for system stabilization once strategies are in place. Strategy development with participation on the part of all parties involved (farmers, developers, cities, towns, municipalities, economic offices, and the general public) will also take time.

Where can I find information on algal blooms?

U.S. Army Corps of Engineers, Chicago District:

<https://www.lrc.usace.army.mil/Missions/Water-Management/Water-Quality/>

Indiana Blue-Green Algae

<http://www.in.gov/idem/algae/>

Wisconsin Blue-Green Algae

<https://www.dhs.wisconsin.gov/water/bg-algae/index.htm>

USEPA State HAB Resources

<https://www.epa.gov/cyanohabs/state-habs-resources>

Centers for Disease Control and Prevention (CDC)

- [Harmful Algal Bloom \(HAB\)-Associated Illness website](#)
- [One Health Harmful Algal Bloom System \(OHHABS\)](#)

National Institutes of Health (NIH)

- [National Institute of Environmental Health Sciences, Harmful Algal Blooms webpage](#)

National Oceanic and Atmospheric Administration (NOAA)

- [Monitoring and Event Response for Harmful Algal Blooms \(MERHAB\) Program](#)
- [NOAA Harmful Algal Bloom Forecasting System](#)

National Aeronautics and Space Administration (NASA)

- [Citizen Scientists Track Algal Blooms website](#)

Appendix B: LRD Memorandum Requiring HAB Response Plan Development

Appendix B: LRD Memorandum Requiring HAB Response Plan Development



DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DIVISION, GREAT LAKES AND OHIO RIVER
CORPS OF ENGINEERS
550 MAIN STREET
CINCINNATI, OH 45202

CELRD-RBW

JUN 29 2012

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Harmful Algal Bloom (HAB) Response Plans

1. REFERENCES:

- a. ER-1110-2-8154, Subject: Water Quality and Environmental Management, dated 31 May 1995.
- b. ER-1110-2-8156, Subject: Preparation of Water Control Manuals, dated 31 August 1995.
- c. EM-1110-2-3600, Subject: Management of Water Control Systems, dated 30 November 1987.
- d. ER-110-2-240, Subject: Water Control Management, dated 1 March 1994.
- e. ER-1130-2-550, Subject: Recreation Operations and Maintenance Policies, dated 30 March 1990.
- f. ER-1110-2-1400, Subject Reservoir/Water Control Centers, dated 30 September 1993.
- g. World Health Organization (WHO). 2003. Guidelines for Safe Recreational Water Environments, Volume 1: Coastal and Fresh Waters.

2. District Commanders are delegated primary responsibility for Water Control/Quality Management (WC/QM) within their respective areas. Execution of and responsibility for the WC/QM mission is delegated to the MSCs by ER 1110-2-240 (Ref. 1.d) and ER 1110-2-1400 (Ref. 1.f).

a. HABs are a cause for concern. Blue-green algae (BGA) or cyanobacteria blooms of various magnitudes are regularly reported from reservoirs and river systems within the LRD footprint. Human illnesses, pet deaths and fish kills have been associated with BGA blooms that occurred at LRD reservoirs. HAB response plans are necessary to ensure rapid, consistent response to emergency conditions associated with HABs and to communicate to the public the potential risks associated with recreating in waters containing blooms.

CELRD-RBW

SUBJECT: Harmful Algal Bloom Response Plans

b. Districts must take immediate action and do what is necessary to protect the public from threats posed by HABs and to ensure districts are ready to fully respond to the unique threat posed by HABs, I am requiring each district submit a HAB Response Plan by 31 July 2012, for recreation areas providing public access to water recreation opportunities. At a minimum, this directive includes all reservoir projects and may include other recreation areas that present a risk of public exposure to HABs. Districts that do not currently have such recreation areas shall submit a response plan within 90 days of opening a recreation area.

3. Detailed guidance on the content of the HAB Response Plans has been provided by the LRD Water Management Division. At a minimum the HAB Response Plans must:

a. Adhere to the guidelines set forth by the World Health Organization, 2003 (in the absence of any standards in the state where the district operates) or the district(s) may choose to use state standards (if stricter than the standards below):

i. If BGA cell densities above 20,000 cells/mL are observed:

- The public must be advised of increased risk
- Sampling must be conducted on a weekly basis to track bloom conditions
- Two consecutive weeks of results below the threshold (20,000 cells/mL) are

necessary to lift the advisory.

ii. If BGA cell densities above 100,000 cells/mL are observed:

- The public must be advised of the increased risk
- Sampling must be conducted on a weekly basis to track bloom conditions
- Two consecutive weeks of results below the threshold (100,000 cells/mL) are

necessary to downgrade to the lower advisory or two consecutive weeks of results below the threshold (20,000 cells/mL) are necessary to lift the advisory.

b. Include detailed internal/external communications strategies and examples of signage, notices or educational materials that may be used to inform/advise the public.

c. Include a timeline for fully implementing the plan.

4. The districts within the Division that share jurisdiction in a state are directed to coordinate with one another (within the Division) to develop a response action consistent for all recreation areas in that state. The goal of such coordination is to consistently and thoroughly address issues unique to that state, including legal issues.

5. District plans should be developed through coordination with appropriate Water Management/Water Quality, Real Estate, Operations and Public Affairs POCs. Plans must also


CELRD-RBW

SUBJECT: Harmful Algal Bloom Response Plans

be developed in coordination with Office of Counsel to ensure thorough consideration of any legal implications of various courses of action.

6. LRD WM has prepared and distributed an HAB Response Plan template. The districts can use the template (or components of the template) if so desired, to expedite the plan development process. LRD WM staff are prepared to assist districts with plan development and to help facilitate coordination among districts and between the districts and state agencies as necessary.

7. The point of contact on my staff for this action is Mr. Erich Emery, 513-684-3048.


MARGARET W. BURCHAM
Brigadier General, US Army
Commanding

DISTRIBUTION:

COMMANDER, Buffalo District
COMMANDER, Chicago District
COMMANDER, Detroit District
COMMANDER, Huntington District
COMMANDER, Louisville District
COMMANDER, Nashville District
COMMANDER, Pittsburgh District

EXECUTIVE OFFICE SUMMARY PAGE

DEBBIE LEE's TM.
27 June 2012
EBE/3048

OFFICE	ACTION	INITIALS	DATE
CELRD-RB-W	DISTRIBUTION	DAL	27 Jun 12
CELRD-RB	CONCUR/NONCONCUR	DRH	28 Jun 12
CELRD-PDS-R	COORDINATION	WPC	28 Jun 12
CELRD-PDS-O	COORDINATION	WPC	28 Jun 12
CELRD-PD	CONCUR/NONCONCUR	WPC	28 Jun 12
CELRP-PA	COORDINATION	WPC	28 Jun 12
CECC-LRD-OC	CONCUR/NONCONCUR	WPC	28 Jun 12
CELRD-DD	CONCUR/NONCONCUR	WPC	28 Jun 12
CELRD-DD-L	COORDINATION	WPC	28 Jun 2012
CELRD-DE	APPROVAL/SIGNATURE	WPC	JUN 29 2012

SUBJECT: Harmful Algal Bloom (HAB) Response Plans

1. PURPOSE: In an effort to inform and protect the public from the risks associated with Harmful Algal Blooms, districts are to prepare and submit Harmful Algal Bloom Response Plans by 31 July 2012.
2. RECOMMENDATION: Commander sign attached memorandum.
3. DISCUSSION: The memorandum directs the districts to prepare Harmful Algal Bloom Response Plans and provides general guidelines that promote consistency across districts.
4. RESOURCE IMPACTS: N/A
5. COMMAND ACTION:
 APPROVED _____
 REVISE _____
 SEE ME _____
 COMMENTS: _____

Appendix C: Indiana Algal Bloom Notification Form

Appendix C: Indiana Algal Bloom Notification Form



ALGAL BLOOM NOTIFICATION
 State Form 55581 (3-14)
 INDIANA STATE DEPARTMENT OF HEALTH
 INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

State use only
 HABISS # _____
 Date _____

Notifying Party

Public State Agency
 Healthcare Provider County Agency
 Other (specify): _____
 Contact Name _____
 Telephone Number _____

Location Information

Date bloom observed ____/____/____
mm dd yyyy

Time bloom observed ____:____ am/pm
hh mm

Private Water body
 Public Water body
 Unknown

Name of water body _____
 Location: _____

Is this body of water a drinking water source?
 Yes No Unknown

Is near a public recreational area?
 Yes No Unknown

Attached map with bloom location noted (e.g. Google Map image)?
 Yes No Unknown

Digital photos attached?
 Yes No Unknown

Environmental Conditions

Visible algae present
 Yes No Unknown
 If yes, what color _____

Unusual odors
 Yes No Unknown

Any sick or dead animals _____
 Yes No Unknown

If yes species & count _____
 Additional information _____

Bloom Description and Sampling Information

Please describe the location of the bloom in the water body (e.g. center of lake, at boat dock, at the beach)

Please check any colors you see
 Green Blue Red Rust Brown Milky White Purple Black

Were samples taken? Yes No Unknown
 If yes, when were they taken and where were they sent? _____

Is there any other information you would like to add? _____

Please FAX completed forms to: Indiana State Department of Health: (317) 233-7047 or E-MAIL to eph@isdh.in.gov.

Appendix D: Indiana Department of Natural Resources HAB Response
SOP

**INDIANA DEPARTMENT OF NATURAL RESOURCES
HARMFUL ALGAL BLOOM (HAB) RESPONSE
STANDARD OPERATING PROCEDURE**

SUBJECT: Harmful Algal Blooms (HABs)
PURPOSE: To provide guidance for informing the public about harmful algal blooms (HABs) in our tested State-managed lakes and reservoirs.
SCOPE: Applicable to management staff at properties containing swimming areas and public boat ramps where testing for HABs may impact public use of a body of water.
REFERENCE: SOP # _____

ORIGINATOR: IDNR Division of State Parks and Division of Forestry

BACKGROUND

Harmful Algal Blooms (HABs) occur when blue-green algae, a group of photosynthetic bacteria, produce toxins under certain weather and water conditions. When water temperatures, sunlight and nutrient levels are right, blue-green algae may have a significant bloom. As algae cells grow and then die off, toxins that are sometimes present in these organisms are released into the water. Sufficient concentrations of these toxins may create a potential health risk to people and animals that come into contact with the water.

This standard operating procedure is provided to direct the response of property staff to these HABs when sampling is taking place so that the public may be appropriately informed.

PROCEDURE

By Memorial Day Weekend each summer, the following materials will be made available to property users:

1. A standard HAB informational sign will be posted at all tested beaches. This informational sign will describe a HAB and how it works, provide some identification tips, and explain our 4-step alert process. This informational sign will also be made available to Project Offices on U.S. Army Corps of Engineers (USACE) reservoirs. (See Appendix.)

¹This is the most recent version of IDNR's HAB Response SOP available at the publication date of this document.

2. A Water Quality Notice sign will be placed at boat ramps and other points where users may access the water as designated by the property manager (e.g. common fishing access sites), and that same sign or an informational HAB poster will be posted in bulletin boards, offices and other locations where information is usually displayed. (See Appendix.) This does not apply to the Lake Michigan shoreline or to river access sites unless they feed into state reservoirs or state park lakes.
3. An HAB informational rack card will be made available online, at gatehouses, in nature centers and in other appropriate locations on the property. (See Appendix.)
4. A detailed HAB FAQ sheet will be provided to individuals who want additional information. The FAQ sheet will be available online and can be printed by properties as needed. The FAQ is located at stateparks.IN.gov/8473.htm.
5. A dog risk infographic will be posted in bulletin boards at beaches and in any other bulletin boards near boat ramps, shoreline locations and other water access points where owners might allow their dogs to swim. (NOTE – dogs are not permitted to swim at beaches or be off leash to be in the water in other locations, but this notice will help advise dog owners of the potential impact of HABS on dogs.)
6. HAB test results that impact alert levels for both humans and dogs will be posted on DNR's property advisory page on the web, and will be noted in the Indiana State Parks social media channels.
7. The Indiana Department of Environmental Management will maintain a webpage at algae.IN.gov that provides general information, beach test results and a list of properties at each alert level.

HAB alerts and postings other than the Water Quality Notice (#2) and the dog risk infographic on properties and the algae.IN.gov site on the web will only be in place from mid-June through August when beach testing is occurring. On USACE reservoirs, the Water Quality Notice (#2) and dog risk infographic will remain in place year round.

Alert level signs will NOT be placed at properties where beaches are not tested. On these properties a simple Water Quality Notice and/or HAB poster should be posted in the beach area and in property bulletin boards. HAB rack cards may be made available as well.

Starting just prior to or just after Memorial Day Weekend, the Indiana Department of Environmental Management (IDEM) will take samples from state beaches and/or other designated swimming areas and analyze the water for indicators of HABs. The indicators evaluated are blue-green algae types, cells per milliliter of sample, and four toxins with levels stated in milliliters per liter (**ug/l**).

IDEM will report their findings to designated DNR central office and to property management staff via email or phone, and will post the results on the IDEM managed algae website at www.algae.IN.gov. Property management staff will notify local Corps Project Offices of results.

On USACE reservoirs, Corps Managers may test when HABs are observed in coves, bays or other areas of the lake. USACE test results will be reported to IDEM and to the local property for posting on www.algae.IN.gov.

CELL COUNTS, TOXINS AND ALERT LEVELS

In conjunction with IDEM testing, alert messages associated with the informational signs and signs at the entrance gate should be kept at the appropriate alert level, as determined by the sampling results from IDEM and the protocols in Table 1(Humans) and Table 2(Pets) below.

Table 1: Cell count and toxin thresholds with corresponding warning color and associated precautions for HUMANS. If either the cell count or toxin threshold is met, the associated alert level will be activated. (Both thresholds DO NOT have to be met before activation of a particular alert level.)

Alert Level	Cell Count/ml	Toxin Level (ug/l)	Color	Precautions
LOW RISK	< 100,000	< 0.8 saxitoxin < 8.0 microcystin <15 cylindrospermopsin <80 anatoxin-a	Blue	Don't drink the water; shower after you swim.
ADVISORY	≥ 100,000	< 0.8 saxitoxin < 8.0 microcystin <15 cylindrospermopsin <80 anatoxin-a	Yellow	Swimming and boating permitted; Avoid contact with algae. Don't drink the water; shower after you swim.
CAUTION	≥ 100,000	≥ 8 but < 20 microcystin ≥ an evaluated value for saxitoxin, cylindrospermopsin, or anatoxin-a.	Orange	All ADVISORY precautions plus children and immune-compromised individuals should avoid the water.
CLOSED	≥ 100,000	≥ 20 microcystin ≥ an evaluated value for saxitoxin, cylindrospermopsin, or anatoxin-a	Red	Unsafe to swim.

The alert level criteria are also detailed in the text below:

1. **LOW RISK (Blue):** If the cell count is less than 100,000 cells/ml and all toxin levels are less than the noted ug/l of 0.8 ug/l saxitoxin, 8 ppb microcystin, 15 ug/l cylindrospermopsin, and 80 ug/l anatoxin-a, then the HAB alert message will remain at the LOW RISK recreation alert level without any additional warnings. Monthly sampling will continue through the end of August and the property will react appropriately to future sampling results as they change.
2. **ADVISORY (Yellow):** If the cell count is greater than or equal to 100,000 cells/ml and all toxin levels are less than the noted ug/l of 0.8 ug/l saxitoxin, 8 ug/l microcystin, 15 ug/l cylindrospermopsin, and 80 ug/l anatoxin-a, then the HAB alert message will be posted at the recreation ADVISORY alert level and this alert will be posted on the state parks property advisory webpage with appropriate instructions for how to use recreational waters. Bi-weekly sampling will commence and continue through the end of August, and the property will react appropriately as sampling results change.

3. CAUTION (Orange): If the cell count is greater than or equal to 100,000 cells/ml and any toxin level is greater than or equal to 0.8 ug/l saxitoxin, 8 ug/l microcystin, 15 ug/l cylindrospermopsin, or 80 ug/l anatoxin-a, but is below 20 for microcystin or any evaluated value for the other toxins, then the HAB alert message will be posted at the recreation CAUTION alert level and this alert will be posted on the state parks property advisory webpage with appropriate instructions for how to use recreational waters. Weekly sampling will continue until the toxins drop below 0.8 ppb saxitoxin, 8 ppb microcystin, 15 ppb cylindrospermopsin, and/or 80 ppb anatoxin-a. The property will react appropriately as sampling results change.

4. BEACH CLOSED (Red): If the cell count is greater than or equal to 100,000 cells/ml and any toxin levels (ppb) are greater than or equal to 20 ppb for microcystin or any evaluated value for the other toxins, then the property will CLOSE THE BEACH and this alert message will be posted on signs and on the state parks property advisory webpage. Weekly sampling will continue until the toxins drop below values in Alert Level 2. The property will react appropriately as sampling results change.

ALERTS FOR DOGS

Campers, hikers and boaters often bring dogs with them for outdoor recreation experiences. None of our beaches where testing occurs permit dogs to swim, but it is important for us to help guests to understand that pets are generally more sensitive to the toxins produced by HABS than are healthy humans. Our alert levels signage include general references to impacts on dogs.

Table 2: Toxin thresholds for DOGS. If any toxin exceeds the thresholds below, a DOG RISK alert sign will be added at the bottom of the beach HAB sign.

Exposure Reference Values ug/l	Microcystin	Cylindrospermopsin	Anatoxin-a	Saxitoxin
Dog recreation Prohibited	0.8	1.0	Any detection	Any detection

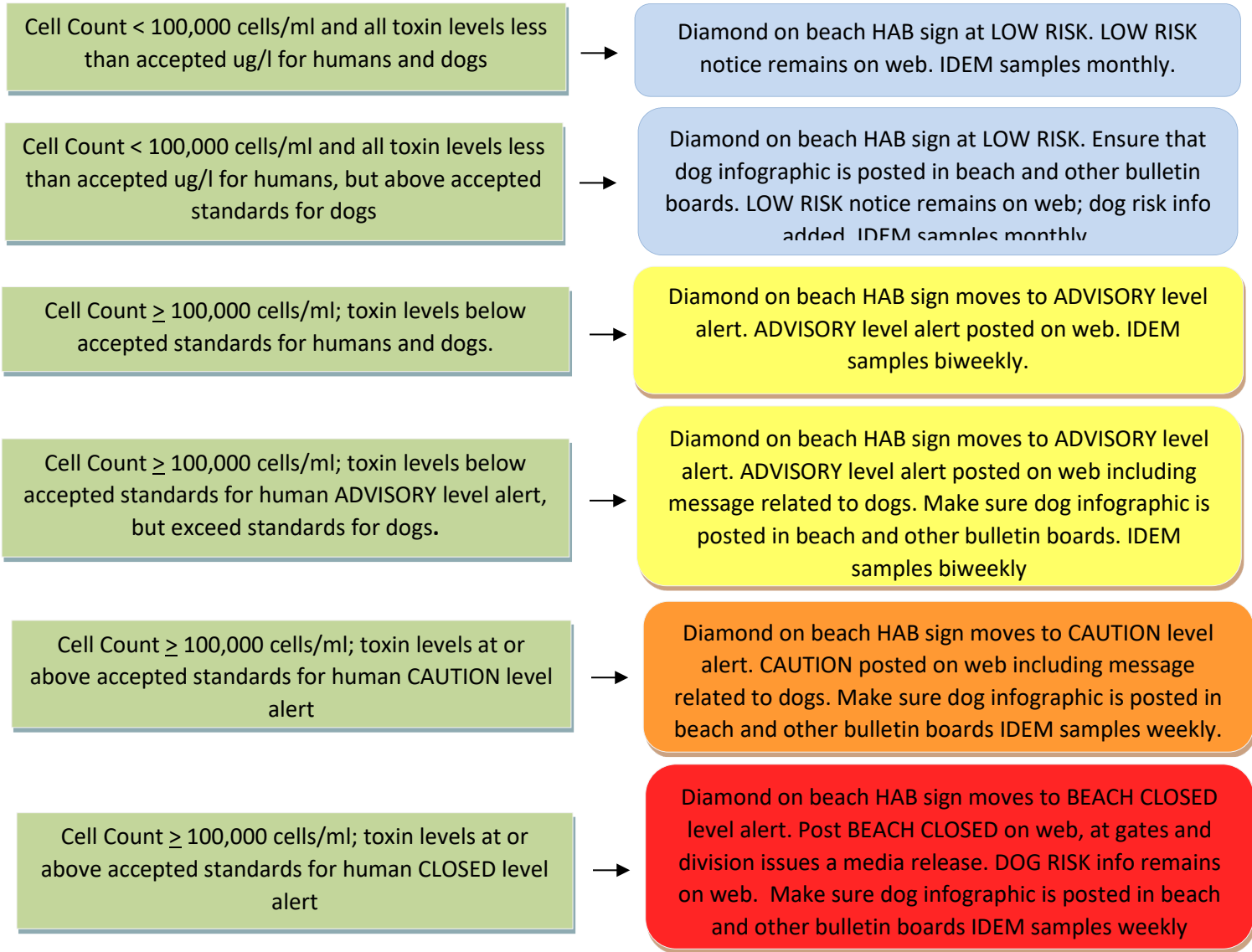
FORT HARRISON DOG PARK

Indiana State Parks currently has one dog park at Fort Harrison State Park where dogs can swim in a lake. The lake will be tested weekly by IDEM from April-October each year. The lake in the Fort Harrison Dog Park will be closed if toxin levels exceed the ug/l noted in the chart above. Notification of test results will be provided weekly to dog park pass holders social media posts in the dog park Facebook group. Notifications of any closures will be provided to dog park pass holders by email and through the dog park Facebook group.

OVERVIEW OF SIGNAGE AND NOTIFICATION FOR HABS

BEFORE MEMORIAL DAY: Post HAB info sign at beach for summer season. Check Water Quality Notice signs at ramps and access points. Post dog infographic information in bulletin boards near beaches and other water sources. Make rack cards available at gates and in brochure racks. Make sure park staff understand the HAB policy and alert levels.

THROUGHOUT THE SUMMER: Monitor for HABS; IDEM staff sample beaches monthly June-August. USACE notes potential HABS in USACE lakes.



Exposure Reference Values ug/l	Microcystin	Cylindrospermopsin	Anatoxin-a	Saxitoxin
Human Recreation ADVISORY Alert	Less than 8	Less than 15	Less than 80	0.8
Human Recreation CAUTION Alert	8 or greater but < 20	Evaluated	Evaluated	Evaluated
Human Recreation Prohibited (CLOSED Alert	20 or greater	Evaluated	Evaluated	Evaluated
Dog Recreation Prohibited	0.8 or greater	1.0	Any detection	Any detection

RESPONSE TO POTENTIAL OBSERVED BLUE-GREEN ALGAE BLOOMS

Harmful Algae Blooms (HABs) occur when blue-green algae, a group of photosynthetic bacteria, produce toxins under certain weather and water conditions. When water temperatures, sunlight and nutrient levels are right, blue-green algae may have a significant bloom to cause illness or death of humans and animals.

Property personnel will be trained to potentially recognize when our lakes and reservoirs are subject to these harmful algae blooms.

Property management will take the following priority steps if they suspect an algae bloom.

1. Contact Indiana State Parks Regional Manager and Deputy Director for Stewardship (Division of Forestry – contact Assistant State Forester).
2. Deputy Director for Stewardship in State Parks or Assistant State Forester in Forestry will contact respective division leadership and the DNR Director of Communications.
3. Follow further instructions by the aforementioned which may include continued monitoring, sampling, adding or managing signage, or other steps.
4. In certain instances trained property staff will obtain water samples and transport to USACE or IDEM personnel for analysis
5. Complete an Incident Report. Send to DNR Safety, and copy to Regional Manager and SPR Deputy Director for Stewardship (Division of Forestry – Send to Assistant State Forester), who will complete SF55581 HAB Report for Indiana Department of Health (IDOH) when appropriate.

RESPONSE TO BLUE-GREEN ALGAE INCIDENTS

Harmful Algae Blooms (HABs) occur when blue-green algae, a group of photosynthetic bacteria, produce toxins under certain weather and water conditions. When water temperatures, sunlight and nutrient levels are right, blue-green algae may have a significant bloom to cause illness or death of humans and animals.

A blue-green algae incident is defined as a potentially harmful exposure (illness and/or death of a human or dog) to blue-green algae cells and/or toxins.

Property management will take the following priority steps:

1. Complete an accident report (human) or incident report (animal). Include contact information for doctor or veterinarian if individual reporting the incident has taken that step. If they have not seen a doctor or veterinarian, please note that on the incident/accident report and suggest that they follow up since DNR staff are not qualified to offer a diagnosis.
2. Contact: Indiana State Parks Regional Manager and Deputy Director for Stewardship (State Parks) or Assistant State Forester (Forestry.)

3. Deputy Director for Stewardship in State Parks or Assistant State Forester in Forestry will contact respective division leadership and the DNR Director of Communications.
4. Send a copy of the report to DNR Safety and to SPR Deputy Director for Stewardship (Division of Forestry – Send to Assistant State Forester), who will complete SF55579 HAB Human Illness or SF55580 HAB Animal Illness and submit to IDOH/BOAH.
5. Follow further instructions by the aforementioned which may include closing the beach or other facilities if necessary, continued or increased monitoring and/or sampling to confirm or discount the incident if possible, adding or managing signage, or other steps as the circumstances warrant.
6. In certain instances trained property staff will obtain water samples and transport to USACE or IDEM personnel for analysis
7. Monitor local media, and report any contacts or coverage to Regional Manager and SPR Deputy Director for Stewardship or Division of Forestry Assistant State Forester.
8. Reopen any closed facilities only after testing has confirmed levels are below a cell count of 100,000 and the toxin levels that are safe per standard protocols.

Appendix

Informational Sign for Beaches Where Beaches are Being Tested (To be posted during summer recreation season only.)Dimensions: 3' x 4'; metal sign, mounted on wooden or metal posts

Informational Sign for Boat Ramps and Other Lake Access Points

Does the Beach Have Blue-green Algae?

Blue-green algae can be found in many of Indiana's lakes and reservoirs. Swimmers, boaters and pet owners can enjoy water based recreation, but should be on the lookout for evidence of harmful algal blooms (HABs).

Blue-Green Algae

Algae of many species occur naturally in Indiana's lakes and reservoirs. Blue-green algae is common and not a problem unless levels are high. When levels are high, toxins may be produced as algae cells grow and die.

What Does Blue-Green Algae Look Like?

When conditions are right, HABs may occur. An HAB occurs when algae reproduce quickly, creating mats of algae or discoloration of the water because of the large quantity of algae cells present. High nutrient levels from lawn and agricultural fertilizers, sunlight and warm, shallow water all contribute to HABs.

Colors may vary from green, blue-green, brown, black, white, purple, red or black.

Algae may look like a film, crust, puff balls, grass clippings, dots, spilled paint, pea soup, foam, wool, streaks or cottage cheese curds.

Watch for signs that might indicate a blue-green algae bloom in this lake or reservoir and report your sighting to the property office.

How Can Exposure to High Levels of Blue-Green Algae Affect People, Pets and Fish?



Swimmers and boaters

Precautions:
Avoid contact with algae.

Avoid swallowing water while swimming.

Take a bath or shower with warm, soapy water after coming in contact with lake water.

Do not use lake water for cooking or bathing.



Pet Owners

Pets can be poisoned by the toxins produced by some algae.

Precautions:
Do not allow your pets to swim in or drink water where algae is present.

Rinse pets with soap and water if they swim in murky water.

Do not let your pet lick algae off their fur.



Fishing

Some toxins may accumulate in the tissues of fish.

Precautions:
Do not cut into organs when filleting your fish.

Rinse the fillets with clean water before freezing or cooking.

Avoid consuming the guts, where toxin accumulation is greatest.

Eat in moderation.

Blue-green algae and toxin levels are tested in this body of water. Alert levels vary with testing results:



LOW RISK
Don't drink the water
Shower after you swim



ADVISORY
Swimming and boating permitted.

Avoid contact with algae.

Avoid swallowing water while swimming.

Take a bath or shower with warm soapy water after coming in contact with lake water.

Do not use lake water for cooking or bathing.

Do not allow your pets to swim in or drink water where algae are present.



CAUTION
All Recreation Advisory precautions, plus . . .
Children and those with compromised immune systems should not swim.



BEACH CLOSED
Algae and toxin levels make this beach currently unsafe for swimming.



Photos courtesy of the Indiana Department of Environmental Management.

Today's Alert Level



Indiana's lakes and reservoirs provide great recreational opportunities. Learn to recognize blue-green algae, be alert, take precautions and have fun on the water!

About
12" x
18";
Metal
or
Heavy
Foam;
To
remain
up
year-
round



Photos courtesy of IDEM and DNR

Water Quality Notice

Watch for Blue-Green Algae!

Water conditions, combined with weather and high nutrient levels may result in harmful algal blooms (HABs).

- Check for alerts at property offices, entrances or beaches indicating possible HABs.
- **DO NOT** drink untreated lake water.
- Learn to recognize blue-green algae and avoid areas with visible algae accumulation.
- Do not allow children or pets to swim where algae is present.
- After swimming, wading or skiing, shower with warm soapy water and wash hands thoroughly.

Take appropriate precautions for people and pets, and have fun on the water!

More information available:

- Property offices
- www.algae.IN.gov
- www.lrlusace.army.mil



Dog Impacts Infographic for Bulletin Boards at Beaches and Other Lake Access Points
8.5 x 11, printable at properties from pdf, can remain up year round.

Pets AND Blue-Green Algae at DNR Properties



When in Doubt... Stay out!

If you see a bloom, do not let your pet in the water.

- Blue-green algae blooms can cause skin irritations and digestive issues in humans, but can poison pets and wildlife.
- Blue-green algae blooms can be different colors: green, blue, red, or brown.
- Blooms appear as foam, scum, or streaks on the surface of the water.
- Look for blooms in lakes, ponds, and rivers.



If your pets go in the water:

- Make sure they have plenty of fresh water to drink before swimming.
- Do not let them lick their fur.
- Rinse them with clean water.
- Rinse your hands and any exposed skin.

Dogs can have severe signs within minutes to hours.

Look for these signs:

Low energy	Weakness
Not eating	Drooling
Vomiting	Diarrhea
Stumbling	Paralysis
Seizures	Tremors

If your pet becomes ill - Call your veterinarian immediately.

For more information about blue-green algae,
please visit this website:

www.algae.IN.gov

Poster developed by the Washington State Department of Health
Modified for Indiana DNR in cooperation with IDEM, ISDH and BOAH



Indiana State
Department of Health



DNR
Indiana Department
of Natural Resources

Rack Card for Brochure Racks and Distribution

Harmful Algal Blooms

Blue green algae and outdoor recreation in Indiana's waters

Indiana's lakes and reservoirs provide great recreational opportunities. To be safe while having fun on the water, you should learn to recognize blue-green algae. Be alert and take appropriate precautions for people and pets.

What is a Harmful Algal Bloom?

Algae occurs naturally in most lakes, and most algae does not present a health risk. A harmful algal bloom (HAB) is a large growth of certain types of algae that can produce toxins. These toxins may affect the liver, nervous system and/or skin.

How dangerous are HABs?

If you touch HABs, swallow water with HAB toxins or breathe in HAB water droplets, you could get a rash, have an allergic reaction, get a stomachache, or feel dizzy or light-headed. HABs also are toxic to pets.

How will I know if there is an HAB?

HABs have different colors and looks. Some colors are green, blue-green, brown, black, white, purple, red and black. They can look like film, crust or puff balls at the surface. They also may look like grass clippings or dots in the water. Some HABs look like spilled paint, pea soup, foam, wool, streaks or green cottage cheese curd.

The Indiana Department of Environmental Management (IDEM) samples the water at many state beaches in the summer. Watch for advisory postings at entrance gates and beaches, but know that high algae or toxin levels also may be present in untested areas such as coves, shallow bays and along shorelines.

Always look for HABs before going in the water.

Check for HAB advisories at www.algae.IN.gov or www.dnr.IN.gov. Ask the property manager if there has been a recent HAB. If so, colorless toxins can still be in water.



What should I do if I see an HAB?

- Stay out of water that may have an HAB.
- Do not let your children or pets play in HAB debris on the shore.
- After swimming, wading or skiing, even where no HABs are visible, shower with warm soapy water as soon as possible.
- Never swallow any lake or river water, whether you see HABs or not.
- Do not let pets lick HAB material from their fur or eat HAB material.
- Do not drink or cook with lake or river water.
- See a doctor if you or your children might be ill from HAB toxins. If your pet appears ill, contact your veterinarian.

What about fishing and other activities?

If you plan to eat the fish you catch, remove the guts and liver, and rinse filets in tap water before cooking and eating.

Other activities near the water such as camping, picnicking, biking and hiking are safe. If you are picnicking, wash your hands before eating if you have had contact with lake water or shore debris.

For general HAB information and current advisories visit www.algae.IN.gov



For more information about state parks, reservoirs and forests visit www.dnr.IN.gov



For U.S. Army Corps of Engineers' HAB info visit www.lrl.usace.army.mil



Pictured: Clean water (top), Blue-green algae (bottom)

