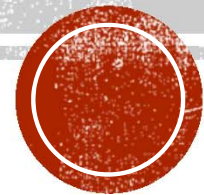


# **CYANOBACTERIA AND THEIR TOXINS**

Materials for Recreational Water Managers Interested in  
Monitoring for Cyanobacteria and Responding to  
Cyanobacterial Blooms



# EPA WEBSITE MATERIALS

The screenshot shows a web browser window with two tabs: "test - Recreational Water" and "test - Cyanotoxins and C...". The address bar shows the URL: <https://wcms.epa.gov/nutrient-policy-data/test-cyanotoxins-and-cyanobacterial-blooms-recreational-waters>. The browser's user interface includes a search bar, a user profile for "Hello jhealey", and a "Production - 3.0.5" indicator.

The website header features the EPA logo and the text "United States Environmental Protection Agency". A navigation bar includes "Environmental Topics", "Laws & Regulations", and "About EPA", along with a search bar labeled "Search EPA.gov" and an "Admin Info" button. A "LOG OUT" link is also present.

The main content area is titled "test - Cyanotoxins and Cyanobacterial Blooms in Recreational Waters". Below the title, there is a "Related Topics: Nutrient Policy and Data" section with "Share" and "Contact Us" links. The page content includes a list of links under the heading "On this page:" and a sidebar titled "Related Information" with sections for "Report a Cyanobacterial Bloom", "Communication", "Monitoring", and "Management".

**On this page:**

- [What are Cyanotoxins and Cyanobacteria?](#)
- [What are the Health Risks from Cyanobacteria and Cyanotoxins?](#)
- [What Causes Cyanobacteria and Cyanotoxin Levels to Increase?](#)
- [What Levels of Cyanotoxins are Safe in Recreational Waters?](#)
- [What Are States Doing to Protect the Public?](#)
- [What Are Some Visual Signs of a Cyanobacterial Bloom?](#)
- [What Should the Public Do if They See a Bloom?](#)
- [What Should a Recreational Waterbody Manager Do If a Cyanobacterial Bloom is Identified or Suspected?](#)
- [How Can a Public Health Official Be Prepared to Respond to a Cyanobacterial Bloom in the Future?](#)
- [What Can Be Done to Reduce the Frequency and Severity of Future Cyanobacterial Blooms?](#)

**What are Cyanotoxins and Cyanobacteria?**

Cyanotoxins, such as microcystins or cylindrospermopsin, are produced by cyanobacteria, commonly referred to as blue-green algae. Cyanobacterial blooms are a specific type of growth which is sometimes referred to more generally as harmful algal blooms, or HABS, although H&Bs can refer to other types of blooms as well. Cyanobacteria are naturally...

**Related Information**

**Report a Cyanobacterial Bloom**

- If you suspect a cyanobacterial bloom at your waterbody, [click here](#).

**Communication**

- [Recreational Water Communication Toolbox for Cyanotoxins and HABS](#)

**Monitoring**

- [Recommendations for Cyanotoxin Monitoring in Recreational Waters](#)

**Management**









- [Nutrient Pollution Policy and Data](#)
- [International Guidance Manual for the Management of Toxic Cyanobacteria \(Global Water Research Coalition\)](#)

[EXIT](#)



# 1-PAGE KEY COMPONENTS OF AN EMERGENCY RESPONSE PLAN


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## What Should a Recreational Waterbody Manager Do If a Cyanobacterial Bloom is Identified or Suspected?

Recreational water managers should take action to confirm the presence of cyanotoxins and consider whether to notify partner agencies and the public, depending on the level of cyanotoxins present. They should follow key steps of an emergency response plan including:

- 1) Assess whether the bloom is producing cyanotoxins at levels potentially harmful to human or animal health.
  - For more information regarding how to determine whether the suspected bloom is harmful, see [Recommendations for Cyanotoxin Monitoring in Recreational Waters](#).
  - For a list of laboratories in each state that conduct sample analyses for cyanobacteria and cyanotoxins, see [State Resources](#).
  - For testing methods, see [Detection Methods for Cyanobacteria and Cyanotoxins](#).
  - For an example of guidance from the State of Colorado on handling a harmful algal bloom, see the Colorado Lake and Reservoir Management Association's [Guidance Document for Harmful Algal Blooms in Colorado](#).
- 2) Notify key partners at the local and state level to coordinate a response.
  - For a list of possible partner agencies (such as poison control, veterinary facilities,



# COMMUNICATION TOOLBOX

The screenshot shows a web browser window displaying the EPA website. The address bar shows the URL: <https://wcms.epa.gov/nutrient-policy-data/test-recreational-water-communication-toolbox-cyanobacterial-blooms>. The page header includes the EPA logo and navigation links: Environmental Topics, Laws & Regulations, and About EPA. A search bar is present with the text "Search EPA.gov". The main content area features the title "test - Recreational Water Communication Toolbox for Cyanobacterial Blooms" and a sub-header "Related Topics: Nutrient Policy and Data". The page is divided into two columns. The left column contains the main text, and the right column contains a sidebar titled "Communication Toolbox" with three sections: Social Media, Press Releases, and Other. The sidebar lists links for "Advisory/Closure Issued", "Advisory/Closure Lifted", "Frequently Asked Questions", "Cyanobacterial Bloom Response", and "Contact List".

**test - Recreational Water Communication Toolbox for Cyanobacterial Blooms**

[pictures of blooms, beaches, marinas]

## Purpose of the Toolbox

Recreational water managers should explore multiple pathways to communicate the cyanobacterial risks to swimmers, as well as owners of pets and livestock, including information about the symptoms potentially caused by exposure. Communication to the public may occur through signage at the recreational water, radio and TV announcements, and social media. Different messages should be tailored to the different levels or risk and contamination, for example, based on the different degrees of water contact in different types of recreation.

This toolbox provides tools and resources for communicating risk to the public about cyanotoxins in lakes, rivers or other bodies of water where people recreate. Recreational water managers should also be aware that toxins may be carried downstream and could still have effects downstream in coastal waters.

The communication toolbox (located right) is a ready-to-use, "one-stop-shop" to support states, tribes, territories, and local governments in developing, as they deem appropriate, their own risk communication materials. It includes editable social media posts, press release templates and other quick references.

### Communication Toolbox

#### Social Media

- [Advisory/Closure Issued](#)
- [Advisory/Closure Lifted](#)

#### Press Releases

- [Advisory/Closure Issued](#)
- [Advisory/Closure Lifted](#)









#### Other

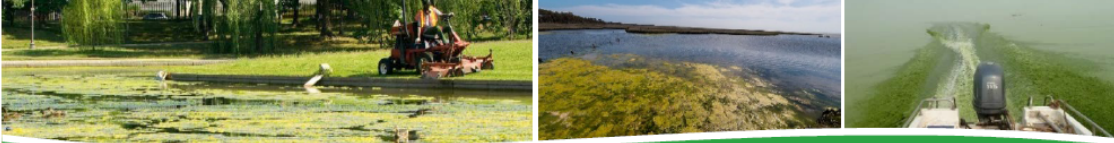
- [Frequently Asked Questions](#)
- [Cyanobacterial Bloom Response](#)
- [Contact List](#)



# SAMPLE SOCIAL MEDIA MESSAGES

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## SOCIAL MEDIA


### RECREATIONAL WATER ADVISORY or CLOSURE ISSUED

#### TWITTER

- “WARNING—Water Contact Might Cause Illness. The water at [location] contains cyanotoxins at levels that could cause harm. Do not swim. For more information, see: [insert website link]”
- “[Location] is closed. The water at [location] contains cyanotoxins at levels that could cause harm. Avoid all contact with the water, foam or algae. For more information, see: [insert website link]”

#### FACEBOOK


- WARNING- cyanotoxins have been measured at [location] and could cause harm.



# SAMPLE PRESS RELEASE

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Home Tools Document [Save] [Print] [Email] [Search] [Up] [Down] 1 / 1 [Comment] [Edit]




## PRESS RELEASE

### RECREATIONAL WATER CLOSURE LIFTED

FOR IMMEDIATE RELEASE  
Media Contact: [insert name, title, telephone and fax number, and e-mail of spokesperson]

**[Organization name] LIFTS THE RECREATIONAL CLOSURE FOR [CYANOTOXIN NAME] AT [LOCATION] – SAFE FOR SWIMMING**

[LOCATION] [Month Date, Year] – Officials from [organization name] lifted the recreational water advisory in [area affected] issued on [date]. Water quality samples collected on [dates] showed [cyanotoxin name], a toxin produced by cyanobacteria (formerly known as blue-green algae), detected at [levels and/or ranges] on [dates]. This level is [less than or equal to] the state-designated recreational water health advisory levels for [cyanotoxin level]. Residents may resume recreating at [location].



# FAQs INFORMATION SHEET

## FREQUENTLY ASKED QUESTIONS

### WHAT ARE CYANOBACTERIAL BLOOMS AND CYANOTOXINS?

Cyanobacteria, also referred to as blue-green algae, are found naturally in lakes, rivers, ponds and other surface waters. When certain conditions exist, such as in warm water containing an abundance of nutrients, they can rapidly form harmful blooms, referred to as cyanobacterial blooms. Blooms can have negative impacts on the ecosystem, human and animal health, and on the economy. Some blooms are capable of producing toxins, called cyanotoxins, which can harm humans and animals.

### WHAT ARE THE HEALTH EFFECTS FROM CYANOTOXINS?

Cyanobacteria and cyanotoxins have been shown to cause acute inflammatory effects or illnesses and may also cause long-term effects. Exposure to cyanobacterial cells while in recreational waters may cause skin irritations, including rashes, hives, swelling or skin blisters (especially on the lips and under swimsuits). Exposure to high levels of cyanotoxins can affect the liver, kidneys, in humans. Different cyanotoxins have different health effects associated with exposure, based also on the magnitude, duration and frequency of the exposure. For example, short-term exposures to microcystins in drinking water have been associated with liver toxicity, while kidney toxicity is a key health effect for cylindrospermopsin.

### IS ANY CYANOBACTERIAL BLOOM POTENTIALLY DANGEROUS?

Yes. Any cyanobacterial bloom potentially dangerous, and it is difficult to tell by looking at a bloom if it is producing toxins. To determine if the bloom is producing toxins, it needs to be tested. If a bloom has developed near recreational areas or drinking water intakes, testing should be considered as soon as possible.

### WHAT TYPES OF ALGAE ARE ASSOCIATED WITH TOXINS?

In freshwater, cyanobacteria (formerly known as blue-green algae), are capable of producing toxins. Cyanobacteria are bacteria with some properties of algae. Some freshwater cyanobacterial blooms are capable of producing toxins that can affect the skin, liver and neurological functions. In estuaries and marine waters, other types of algae including diatoms, dinoflagellates, and golden algae can produce toxins that have been responsible for illnesses like Paralytic Shellfish Poisoning, Neurotoxic Shellfish Poisoning, Amnesic Shellfish Poisoning, Diarrhetic Shellfish Poisoning, and Ciguatera Fish Poisoning.

### HOW MIGHT I BE EXPOSED TO CYANOTOXINS?

Exposure to cyanobacteria and their toxins may occur by accidental ingestion or inhalation of toxin-contaminated water, or dermal contact during recreational activities (for example swimming, waterskiing, or tubing).

### WHAT ARE THE RECREATIONAL SWIMMING ADVISORIES FOR CYANOTOXINS?

EPA developed draft values for microcystins and cylindrospermopsin for states to consider as the basis for public health protection in recreational waters (see Table 1). Although these guidelines are intended

Table 1. Draft Recreational AWQC for Cyanotoxins

Microcystins	Cylindrospermopsin
4 µg/L <sup>a, b</sup>	8 µg/L <sup>a, b</sup>

a) Swimming Advisory: not to be exceeded on any day  
b) Recreational Criteria for Waterbody Impairment: not exceeded more than 10 percent of days per recreational season up to one calendar year.

Some local or state governments have already implemented response guidelines in the event of a significant cyanobacterial bloom in recreational waters. These include specific criteria (cyanotoxin concentrations or cyanobacteria cell counts) for evaluating the severity of a bloom and triggering actions—public advisories, posted warnings, waterway closures, management techniques, among others—when a bloom exceeds a state-designated guidance value. For a summary of the U.S. states with health advisory values, see [guidelines for cyanobacteria and cyanotoxins in recreational water](#).

### WHAT ABOUT ANIMALS EXPOSED TO CYANOTOXINS AT RECREATIONAL WATERS?

Contact a veterinarian if pets or livestock show signs of illness. Cyanotoxins can be harmful to animals if they are exposed to waters contaminated with elevated levels. Keep animals away from the water (no drinking/stealing swam) and wash off animals immediately if they do have contact. The CDC has produced a [Veterinarian Reference](#) document about health effects to animals from exposure to cyanobacteria and toxins.

### WHERE CAN I FIND MORE INFORMATION ABOUT HARMFUL BLOOMS AND CYANOTOXINS?

- For general information, please visit EPA's [CyanoHABs website](#) or contact your local health department. The [State Resources tab](#) on the CyanoHABs website contains information about state monitoring programs.
- For information about bloom-associated illnesses, please visit the CDC's [HAB-Associated Illnesses webpage](#).

### WHAT CAN THE PUBLIC DO TO HELP PREVENT CYANOTOXINS FROM OCCURRING?

Reducing nutrient pollution, such as excess nitrogen and phosphorus, is essential to avoiding the occurrence of cyanotoxins in recreational waters. Excess nutrients may originate from agricultural, industrial and urban sources as well as from atmospheric deposition. In some areas, members of the public participate in monitoring programs that sample and assess local waters for the presence of HABs. The broader public can help address HABs by taking the following simple actions where they live and work to reduce the amount of nutrients entering the environment:

- use phosphate-free detergents,
- dispose of your pet waste properly,
- apply fertilizers only when necessary and at the recommended amount, and
- volunteer in local watershed protection efforts.



# SAMPLE SIGNAGE



## CAUTION

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



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



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



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



**Do not** drink this water or use it for cooking.



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



**Do not** eat shellfish from this water.

Call your doctor or veterinarian if you or your pet get sick after going in the water.  
For information on harmful algae, go to [mywaterquality.ca.gov/monitoring\\_council/cyanoHab\\_network](http://mywaterquality.ca.gov/monitoring_council/cyanoHab_network)  
For local information, contact:





# CALLING LIST TEMPLATE

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## Cyanobacteria Bloom Response Contact List

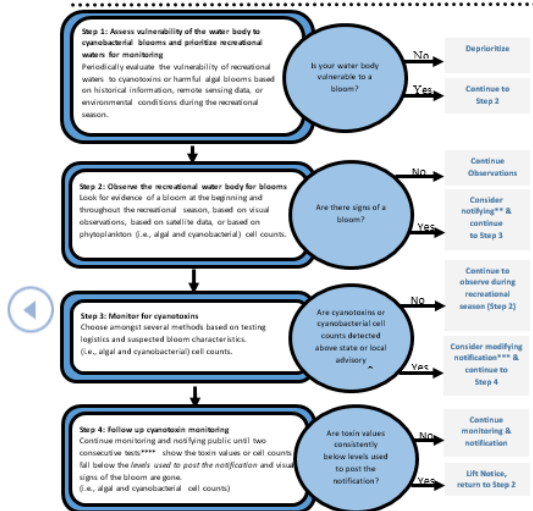
This contact list template is meant to prepare a recreational water manager or program to respond in the initial phase of a cyanobacterial bloom. Collecting contact information and establishing relationships with the organizations listed below prior to a bloom will allow for a quicker response or notification. Blank rows at the bottom of the table are for additional contacts, if necessary.

Organization	Function/responsibility	Contact Name	Phone	Email
Laboratory	Testing and analysis of cyanobacteria and toxins (see <a href="https://www.epa.gov/nutrient-policy-data/states-resources">https://www.epa.gov/nutrient-policy-data/states-resources</a> )			
Poison Control	May receive illness calls and should be alerted			
Emergency medical facilities	May need to provide medical services for people			
Veterinary facilities	May need to provide medical services for pets and livestock			
Other water managers or water body users	Public drinking waters systems, other recreational locations, agricultural users			
State Health Department	State-level organization that can provide health services			
State Department of Homeland Security and Emergency Response. (or its equivalent)	Provide resources for large-scale environmental or public health issues, such as flooding, a large toxic bloom, or avian flu.			



# MONITORING DOCUMENT

## How to Monitor Cyanotoxins in Recreational Waters\*



\*Adapted from "Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water" June 2015, EPA 815-R-15-010  
 \*\* This can either be an advisory warning or a closure.  
 \*\*\*If yes, consider modifying notification to indicate dangerous toxin level or cell count. If toxins are present but less than appropriate trigger value, continue to monitor toxins.  
 \*\*\*\*If the state does not have a HAB program with a value for cyanotoxins or cell counts upon which to base a notification, recreational water managers may want to consider using the default values that EPA recommends.

## Recommendations for Cyanotoxin Monitoring in Recreational Waters

### Step 1: Assess vulnerability of the water body to cyanobacterial blooms and prioritize recreational waters for monitoring

Protecting public health is the primary objective for a monitoring program. To meet this objective, recreational water program managers and public health officials should make every effort to sufficiently characterize the water body to better understand the potential for harmful blooms, and thus the adverse public health risk that might occur in these waters. Sometimes phytoplankton (which include cyanobacteria, microalgae, dinoflagellates and other microorganisms) can grow to high cell densities and form blooms. These blooms may or may not be toxic. This document focuses on cyanobacterial blooms with the potential for harmful cyanotoxins (also known as harmful algal blooms or HABs). A bloom can have extremely high cell densities of cyanobacteria (extremely high densities are typically defined as greater than 20,000 to 100,000 cells per mL) (Loftin et al., 2008). High cell densities do not necessarily mean cyanotoxins are present; however, contact with some cyanobacterial cells can cause skin rashes.

### 1.1 Assess vulnerability of the water body to cyanobacterial blooms

Some recreational waters will have greater vulnerabilities than others based on the waterbody characteristics. Fast flowing, nutrient-poor rivers are less vulnerable than nutrient-rich lakes and reservoirs. Existing water quality data can help to determine if the water body has had a history of blooms or bloom indicators such as high cyanobacterial cell counts or chlorophyll-a levels. Elevated nitrogen and phosphorus levels will be important to consider in a waterbody evaluation. Waterbody assessments, including a consideration of the predominant land use in the watershed and potential nutrient sources that may lead to cyanobacterial growth, will provide useful information for a system-specific evaluation. Similarly, climate and weather information such as water temperature and intensity of precipitation events will help to determine if conditions are conducive to increased levels of site-specific cyanobacterial growth currently and in the future.

