

Monitoring Monday – Let’s look at freshwater harmful algal blooms.

Join us each Monday as the Clean Water Team shares resources on water quality monitoring. Today’s focus is on freshwater harmful algal blooms.

In freshwater systems, [cyanobacteria](#) (also called blue-green algae) are microorganisms that can produce HABS. Some cyanobacterial harmful algal blooms (HABS), or CyanoHABS, can produce toxins. HABS and algal toxins have increased [globally](#) in geographic range, frequency, duration, and severity in recent years. These increases have been attributed to various anthropogenic factors; the most significant include climate change, nutrient loading, and water residence time. HABS are problematic because they can affect multiple beneficial uses including recreation, aquatic life, and drinking water by reducing aesthetics, lowering dissolved oxygen concentration, causing taste and odor problems, and producing potent toxins. In recent years, cyanobacteria blooms and their associated toxins have gained national attention due to the severity of issues in the Midwest and resulted in the release of health advisory values for drinking water by U.S. Environmental Protection Agency.

In California, toxic HABS caused by cyanobacteria (CyanoHABS) have been a recurring and escalating issue throughout the state, particularly in the Klamath River watershed, Clear Lake, Pinto Lake, Sacramento and San Joaquin River Delta, Lake Elsinore, and East San Francisco Bay Area lakes. Additionally, Copco and Iron Gate Reservoirs, the Klamath River, and Pinto Lake were placed on the [State’s 303\(d\)](#) list due to impairment caused by cyanotoxins.

More recently, cyanobacteria and cyanotoxin data have been collected opportunistically through several programs. These data indicate that cyanobacteria are prevalent throughout California in all types of waterbodies sampled (lakes, rivers, streams, wetlands, estuaries and coastal). Recent statewide assessment surveys of wadeable streams found that benthic cyanobacteria and related cyanotoxins are widely present, suggesting that these streams can be a significant cyanotoxin source to receiving waters (Fetscher et al., 2015). In statewide studies conducted from 2007 through 2013, samples were collected from more than 1,200 wadeable stream reaches. Analysis revealed a high occurrence of potentially toxic benthic cyanobacteria taxa, and detection of microcystins in one-third of reaches and 34% of stream kilometers. Detected toxins included lyngbyatoxin, saxitoxins, anatoxin-a, and microcystins (Fetscher et al., 2015). Additionally, the State Water Quality Control Board’s Surface Water Ambient Monitoring Program (SWAMP) has measured cyanotoxins in sediment at the bottom of major watersheds in a majority of sampling sites.

To assist agencies and the public with FHABS, the [State and Regional Water Boards](#) have worked to coordinate monitoring and follow up when algal blooms are detected. SWAMP has also developed the infrastructure (bloom reporting form, guidance documents, field and lab procedures, etc.) to support the strategy and to coordinate monitoring when blooms are detected. Additionally, the [California Cyanobacteria and Harmful Algal Bloom Network](#) has been working towards the development and maintenance of a comprehensive, coordinated program

to identify and address the causes and impacts of cyanobacteria and harmful algal blooms (HABs) in California as well as supporting the [California Water Quality Monitoring Council's](#) portal "[Are harmful algal blooms affecting our waters?](#)".

California Freshwater and Estuarine Harmful Algal Bloom (FHAB) Program

Water Board staff are working with state and local entities to identify and respond to HAB incidents throughout California. The Water Board first began to formally address this issue in 2005 when it formed the Blue Green Algae Work Group, later renamed the California Cyanobacteria Harmful Algal Bloom Network (CCHAB). An initial product of this group was the Voluntary Guidance Document (original release 2010, updated 2016). Subsequently, SWAMP prepared California Freshwater HAB Assessment and Support Strategy to articulate a coordinated program to assess, communicate and manage HABs in California.

Since then, staff at both the State and Regional Water Boards have worked to coordinate monitoring and follow up when algal blooms are detected. SWAMP has also developed the infrastructure (bloom reporting form, guidance documents, field and lab procedures, etc.) to support the strategy and to coordinate monitoring when blooms are detected.

www.waterboards.ca.gov/water_issues/programs/swamp/freshwater_cyanobacteria.html

- CA Water Boards' Framework and Strategy for Freshwater Harmful Algal Bloom Monitoring (2021)
 - [Fact Sheet](#)
 - [Executive Synthesis](#)
 - [Full Report](#)
- [CA Freshwater HAB Assessment and Support Strategy](#) (2016)
- [Report to the Legislature](#) (2021)

California Freshwater CyanoHABs Links:

- [CCHAB Portal \(with HAB Toolbox\)](#)
- [Voluntary Guidance Document](#) (Updated in 2016; Developed in 2010)
- [CA Freshwater HAB Assessment and Support Strategy](#)
- [Division of Drinking Water Cyanobacteria Page](#)
- [CCHAB Work Group Page](#)
- [CA Water Quality Monitoring Council](#)
- Regional Water Board HAB Resource Web Pages
 - [North Coast Region](#)
 - [San Francisco Bay Region](#)
 - [Central Valley Region](#)
 - [Lahontan Region](#)

SWAMP's California Freshwater Harmful Algal Bloom Field Guide

The goal of this manual is to provide easy-to-use, individually downloadable guidance documents, forms, and standard operating procedures (SOPs) for responding to possible harmful algal blooms (HABs). <https://mywaterquality.ca.gov/habs/resources/field.html>

SWAMP and the California Water Quality Monitoring Collaboration Network's HAB Videos

- Identifying and Responding to Cyanobacteria Harmful Algae Waterblooms in California Full workshop recordings (7) from a SWAMP workshop held June 2016. www.youtube.com/watch?v=Ih90P7nsBTM&list=PLvTjRb8VCkp7y1NtA-b2NTNF1L8puCclM
- Identifying and Responding to Cyanobacteria Harmful Algae Waterblooms in California – One day workshop 2016. [Playlist](#)
- Cyanobacteria (Blue-green Algae) Harmful Algae Blooms Webinars - [Playlist](#)

Water Monitoring and Laboratory Analysis

Monitoring of cyanoHAB is critical to understanding the dynamics of a bloom, deciding on best management strategies, and protecting aquatic life and public health. There are many challenges to monitoring due to available resources, size and dynamics of the water body, and laboratory analytical techniques. The State Water Board's Surface Water Quality Monitoring Ambient Monitoring Program (SWAMP) is focused on developing a statewide monitoring strategy for cyanotoxins, guidance for field and laboratory protocols, and a satellite monitoring program to be a first alert system for cyanoHABs in larger water bodies.

https://mywaterquality.ca.gov/habs/resources/water_monitoring.html

WATER QUALITY PORTAL

CALIFORNIA HARMFUL ALGAL BLOOMS (HABS) PORTAL

The CA HABs Portal is the central resource for HABs in the state of California. HABs can pose a health risk to people and animals, harm aquatic ecosystems, and limit the use of drinking and recreational waterbodies due to the toxins, odors, and scums or mats they can produce.

The Portal is an informational resource for the public and also functions as a tool to support coordination with statewide partners to address HABs. The content is developed by the [California Cyanobacteria and HAB \(CCHAB\) Network](#) and participating state agencies.

The content included here focuses on freshwater and estuarine HABs; similar content for marine (coastal) HABs is provided by the [California Harmful Algal Bloom Monitoring and Alert Program \(CalHABMAP\) webpages](#).

- [Frequently Asked Questions about Freshwater and Estuarine Harmful Algal Blooms Healthy Water Habits](#) (Video)
- [Opportunities for Training and Collaboration](#)
- [Latest HAB Weekly Updates List](#)
- [Harmful Algal Blooms: How to Recreate Safely in Summer](#) (PDF)

Reports Map

The HAB Incident Reports Map is maintained by the State Water Resources Control Board. This map and corresponding table only show locations where harmful algal blooms (HABs) have

been voluntarily reported. Colored dots on the map represent reported locations with pop-up windows providing additional details for each HAB report. Dots are symbolized based on the current advisory status and the time since the report was last verified by staff (refer to map legends for details). These details are also available in the adjacent table sorted by county. https://mywaterquality.ca.gov/habs/where/freshwater_events.html



CALIFORNIA CYANOBACTERIA AND HARMFUL ALGAL BLOOM (CCHAB) NETWORK

The CCHAB Network was established in 2006 in response to record-setting toxin producing blooms in the Klamath River reservoirs. Since its establishment, the CCHAB Network has developed guidance for responding to HABs, including action levels for cyanotoxins; held trainings on HAB identification and sampling; and funded a number of grant projects. These efforts demonstrated a need for the development of a long-term vision and strategic plan for identifying and managing HABs in California. Four key goals were identified – prioritization of management questions, synthesis of existing data, identification of data gaps, and the development of communication tools.

https://mywaterquality.ca.gov/monitoring_council/cyanohab_network/

SWAMP Freshwater Harmful Algal Bloom (FHAB) Database Modernization

The [Freshwater and Estuarine Harmful Algal Bloom \(FHAB\) Program](#) has been updating and modernizing the database that is used to track and respond to FHABs in California. This process has included developing partnerships with [The Internet of Water](#), [The Commons](#), CA Tribes, and other non-governmental organizations to develop a process to ingest non-state FHAB monitoring data into the CA FHAB database.

- [California FHAB Monitoring Systems Data Ingestion Framework Recommendations](#)
- [Watch the Dec 2, 2021 Internet of Water Webinar Recording](#) to hear from a panel of project leaders about implementing all aspects of this project – tiered data

management, database alignment, API development, software training, stakeholder engagement, and more!

- Internet of Water Coalition: [Leveraging Tribal Government and Community Science Data to Monitor Harmful Algal Blooms](#)

REPORTING BLOOMS

California Report a Bloom: Freshwater & Estuarine Harmful Algal Bloom Report Form

Please use [this online form](#) to provide information about the suspected or confirmed algal blooms and any related human or animal illnesses. The information you provide will assist Water Boards staff to investigate the bloom. Only questions marked with bold text and an asterisk are required. Click the submit button at the end of the form to send the information. After submitting you will be provided a Bloom Report ID. If you have questions, please contact the HAB Hotline: CyanoHAB.Reports@waterboards.ca.gov; 1-844-729-6466 (toll free).

CYANOBACTERIA MONITORING COLLABORATIVE: Three Coordinated Monitoring Projects to Locate and Understand Harmful Cyanobacteria

We work with citizen scientists, trained water professionals, and the general public to find and study cyanobacteria in waterbodies. Check out [bloomWatch](#), [cyanoScope](#), and [cyanoMonitoring](#) to find ways you can start monitoring cyanobacteria. <https://cyanos.org/>

- **bloomWatch App**

Do you notice that a lake suddenly turned the color of pea soup or a blue-green paint spill? Or do you see green clumps, flakes or filaments floating in a lake? State and local officials can't be watching every lake at all times! By using the bloomWatch app on your smartphone, you will help us understand where and when these organisms may be causing issues. Install the bloomWatch app on your iOS or Android device.

<https://cyanos.org/bloomwatch/>

- [VIDEOS](#)

ADDITIONAL RESOURCES

Symptoms of HAB-related illness in people and animals are available from the [Center for Disease Control and Prevention](#) (CDC) and by contacting the California Poison Control Center (1-800-222-1222).

USEPA - Cyanobacterial Harmful Algal Blooms (CyanoHABs) in Water Bodies

EPA developed a series resources and tools to support planning for and responding to cyanobacterial blooms and cyanotoxins in water bodies.

www.epa.gov/cyanoHABs

- Basic Information about CyanoHABs
- Managing Cyanotoxins in Recreational Waters

- Monitoring and Analysis
- Managing Cyanotoxins in Public Drinking Water Systems
- Prevention, Control and Treatment
- Research, Collaboration and Other Resources

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