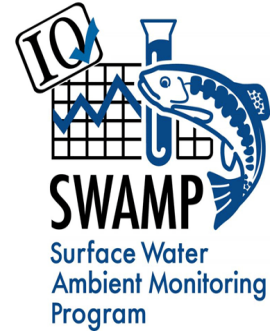




SWAMP's California Freshwater Harmful Algal Bloom Field Guide



Welcome to the California Freshwater Harmful Algal Bloom Field Guide, prepared by the Surface Water Ambient Monitoring Program (SWAMP). 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). The topics covered in this field guide are listed on the side of this page for easy navigation.

- **Not sure which resources you need?**

Download our visual guide to assist you in selecting field forms and methods. ***Coming Soon***

Before Heading Out . . .

Health and Safety Guide

Protecting the health and safety of field personnel is of the utmost importance in any type of environmental sampling. Collecting samples in and around water bodies experiencing HABs has additional risks because some HABs can produce toxins, which can poison livestock and wildlife, as well as humans. Caution and safety procedures should be used to prevent direct contact with a bloom.

Field personnel should read and familiarize themselves with the information contained in this Health and Safety Guide before visiting a monitoring site.

- **Download Health and Safety Guide**

Site Reconnaissance SOP

Project staff should gather information about a monitoring site before and during an initial site visit. It is important to understand where the site is located, who owns and manages the land where you want to sample, and if there are any access limitations or safety issues that field personnel will encounter.

This Site Reconnaissance SOP provides procedures and helpful tips for compiling information about the site before and during a site visit.

- **Download Site Reconnaissance SOP**

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Making Observations and Measurements in the Field

Field Sheet and Chain-of-Custody Forms

When visiting a site to collect samples, it is important to record information about the visit on a field sheet. Information that should be recorded includes who made the visit, notable field conditions, measurements taken at the site, and the samples that were collected. In addition to the field sheet, a sample chain-of-custody (COC) form must be completed in order to submit those samples to a laboratory.

- [Download Field Sheet](#)
- Chain of Custody (COC) Form - PDF
- Chain of Custody (COC) Form - Excel

Visual Guide to Observing Blooms

When visiting a potential HAB, it is important to distinguish between a cyanobacteria bloom (CyanoHAB) and other non-toxic nuisance blooms. This guide includes photographs taken in the field to show the color and general appearance of blooms that you may encounter, including nuisance green algae, aquatic plants, and toxic cyanobacteria blooms. While this guide will get you started in your investigation, some blooms are difficult to distinguish visually and will require also observing the bloom sample under a microscope.

- [SOP - Bloom Observation Guide - Google Docs](#)

Field Microscopes

Confirming the identity of the bloom is a crucial step in HAB monitoring. Digital field microscopes are lightweight, economical, and allow observation of bloom organisms with appropriate magnification. By identifying cyanobacteria in your waterbody to the taxonomic level of genus, you can determine whether or not the bloom runs the risk of producing toxins. This SOP describes the steps to collect and view a water sample with a field microscope to identify the organisms present. Refer to the [Cyanobacteria and Known Toxins Chart.pdf - Google Drive](#)

Field Fluorometry

Field-based fluorometry for the real-time detection of photosynthetic bacteria and algae is a simple technique. This SOP describes the use of handheld probes with sensors to detect pigments like chlorophyll-a, and a unique pigment called phycocyanin that is only produced by cyanobacteria. The detection of these pigments can be used to determine algae biomass and whether cyanobacteria are present or absent. The concentration of these pigments can also be used to monitor the trend of the bloom (increase/decrease growth). ***SOP Coming Soon***

Field Toxin Detection Test Kits

Several different field-based toxin tests are on the market for detection of microcystins, cylindrospermopsin, and anatoxin-a. Each toxin test kit comes with detailed instructions on how to run the

test from the manufacturer. SWAMP used these during the 2016 HAB season and are in the process of reviewing feedback and still researching kits.

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Collecting Samples for Laboratory Analysis

Toxin Sample Collection

The presence of toxins from a bloom cannot be determined visually, so laboratory analysis is needed. This SOP describes how to collect water samples from various water bodies (lakes, reservoirs, streams) for a laboratory to analyze. The results from laboratory analyses are used to understand which toxins, if any, are present, what their concentration in the water body is. This information can then be used to assess the risk they pose to wildlife and humans.

- [Download SOP - Sample Collection for Toxin Analysis](#)

Microscopy Sample Collection

Laboratory-based microscopy is an additional method, similar to field-based microscopy, used to identify cyanobacteria and determine the biomass (density, biovolume) of algae cells. This SOP describes how to collect water and algae samples for laboratory microscopic identification. Refer to the [Cyanobacteria and Known Toxins Chart.pdf - Google Drive](#)

Fluorometry Sample Collection

Laboratory-based fluorometry measures the concentration of photosynthetic pigments extracted from cyanobacteria and algae cells. This guide describes how to collect samples of water and algae for laboratory analysis. The concentration of pigments (chlorophyll-a, phycocyanin) can be used to estimate a bloom's density, and track trends over time. ***SOP Coming Soon***

Laboratories for Analysis

This laboratory list readily provides information about laboratories, located nationwide, that are capable of analyzing samples for cyanobacteria and toxins. Laboratories should be contacted prior to submitting any samples to arrange for services. This list does not make any laboratory endorsements.

- [Download Laboratory List](#)

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Interpreting the Data & Posting Advisories

Cyanobacteria and Known Toxins Chart

Researchers are documenting which genus or species of cyanobacteria produce toxins. This chart lists commonly found cyanobacteria and potential toxins produced by the taxonomic groups. Field- or laboratory-based microscopy can be used to identify the dominant genera found in a bloom.

- [Download the Freshwater Cyanotoxin Producers Chart](#)

Guide to Interpreting the Lab Report

This guide provides an overview of common laboratory tests and how to interpret laboratory results.

Guidance Coming Soon

HAB Incident Response and Posting Advisories Guide

When a CyanoHAB is occurring, it is critical that there is understanding of the cyanobacteria and cyanotoxins present in order to communicate the risk to the public. Currently, there are no mandatory federal or state standards for cyanotoxins in drinking water or recreational waters. Participating agencies - State Water Board, OEHHA, and CDPH - have developed, and are further refining recommended guidelines for addressing health concerns for cyanotoxins in recreational waters. The Department of Public Health, county health departments, and water body managers are encouraged to use this guidance, and the signs contained therein, when CyanoHABs pose a public health threat.

- [Download Cyanotoxin Guidance for Recreational and Related Water Uses](#)

Submitting Data to SWAMP

To advance CyanoHAB response, monitoring, and research, it is critical to store all collected data in a centralized database. CyanoHAB monitoring data will support several ongoing efforts, including response to blooms, satellite monitoring and notifications, and other projects. The State Water Board recommends submitting data to SWAMP. Submitted data will be uploaded to the Central Environmental Data Exchange Network (CEDEN) database. CyanoHAB monitoring data, regardless of format, are currently being accepted. Please submit data by email to OIMA-Helpdesk@waterboards.ca.gov. ***Guide Coming Soon***

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Incidents of Toxin Exposure

Report a Bloom

When a freshwater HAB is suspected of causing a human or animal illness, please report the bloom by:

- [Incident Form](#)
- [Email](#) or
- Call toll free at 1 (844) 729-6466

Veterinary Fact Sheets on CyanoHABs

If an animal has become ill or died from suspected exposure to a CyanoHAB bloom, this fact sheet, developed by SWAMP, CDPH, and OEHHA, can be offered to the veterinarian to assist with the diagnosis, testing, and treatment. Additionally, the fact sheet provides information about financial assistance offered by the State Water Board for cyanotoxin analyses of veterinary samples.

- [Blue-Green Algae: A Veterinary Reference](#)

Glossary

The following are commonly used abbreviations found in SWAMP's Harmful Algal Bloom Field Guide.

CDPH - California Department of Public Health
 CEDEN - California Environmental Data Exchange Network
 CyanoHAB - Cyanobacteria Harmful Algal Bloom
 GIS - Geographic Information Systems
 HAB - Harmful Algal Bloom
 H&S - Health and Safety
 OEHHA - Office of Environmental Health and Hazard Assessment
 PPEs - Personal Protective Equipment
 SOP - Standard Operating Procedures
 SWAMP - Surface Water Ambient Monitoring Program
 State Water Board - State Water Resources Control Board

Contacts

- How did we do? Please provide feedback on guide content to OIMA-Helpdesk@waterboards.ca.gov
- For assistance with a freshwater HAB, contacts can be found on the [My Water Quality HAB Portal](#).

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(Updated 02/21/2023)

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