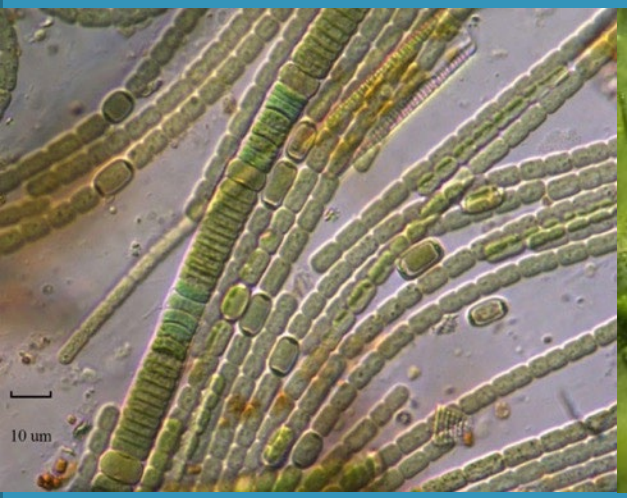
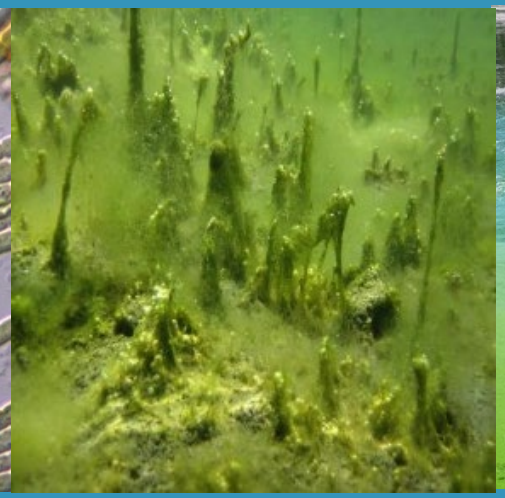
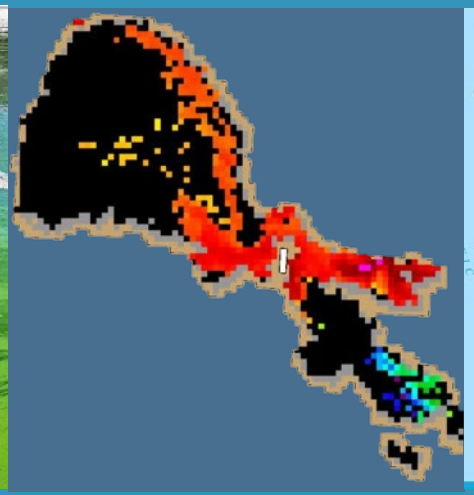
CA Water Boards
Freshwater harmful algal bloom program








Marisa Van Dyke
Statewide FHAB Program Lead
State Water Resources Control Board

Christine Joab
Regional FHAB Coordinator
Central Valley Regional Water Quality Control Board

Why is SWAMP involved in FHABs?

Cal EPA

State Water Boards: WQ

Drinking water

OIMA

SWAMP

Cal Health & Human Services

Cal Public Health: Human and Environmental health

- SWAMP provides water quality resources and information to decision makers and the public about the condition of California waterbodies.
- Water Boards - SWAMP is the designated agency lead for the Freshwater Harmful Algal Bloom (FHAB) Program. The statewide initiative to address HAB issues and support the protection of animal, wildlife and human health throughout California.

SWAMP
Surface Water Ambient Monitoring Program

Statewide FHAB Leads

FHAB Program Leads at State Water Board		
SWAMP - Office of Information Management & Analysis	Greg Gearheart, Task Force Manager Keith Bouma-Gregson & Marisa Van Dyke, Program Managers	FHAB Program Managers: -Implement SWAMP FHAB Program -Manage HAB Hotline -Manage HAB Portal -Coordinates event response, field investigations, and communication of public advisories
Division of Drinking Water	Stefan Cajina Amy Little Betsey Litchi	Implements drinking water regulations and advisories -District offices support event response and coordinate with water utilities
Division of Water Quality	Joseph Westhouse	Supports CA CyanoHAB Network

Regional Board FHAB Leads

FHAB Program Leads at Regional Water Boards		
1	Katharine Carter Rich Fadness	9 Regional Water Boards -At least 1 staff per region -Supported by HAB Illness Workgroup -Lead HAB event response Coordinates response with: • State Board FHAB leads • SWAMP staff • Local health agencies • Waterbody managers • Tribal groups • Division Drinking Water • Interested community members & watershed stakeholders
2	Carrie Austin	
3	Melissa Daugherty	
4	Jun Zhu	
5	Christine Joab Matt Krause Alice Lopes	
6	Mary Fiore-Wagner Tom Browne	
7	Jeff Geraci	
8	Heather Boyd Mark Smythe	
9	Betty Fetscher Carey Nagoda	

HAB-Related Illness Workgroup

HAB-Related Illness Team		
CAL EPA – Office of Environmental Health Hazard and Assessment (OEHHA)	Regina Linville Beckye Stanton	-Responds to reports of human health and animal illness cases
CA Department of Public Health – Tracking California Program	Susan Paulukonis Jeff Fowles	-Responds to reports of human health illness cases
CA Dept of Fish and Wildlife - Wildlife Investigations Unit	Krysta Rogers Glenn Sibbald	-Responds to reports of wildlife illness cases
CAL EPA - State Water Board	Marisa Van Dyke Keith Bouma-Gregson	-Notifies workgroup of reports and coordinates response by partner agencies

Division of Drinking Water Offices

DDW Office Districts		
Section I (Redding)	01-Klamath 02-Lassen 09-Sacramento 10-Stockton 21-Valley	24 District offices across the state -Coordinates on HAB response efforts Coordinates response with: ● Water Districts ● Water System Purveyors ● State Board FHAB Leads ● Regional Board FHAB Leads
Section II (Richmond)	03-Mendocino 04-San Francisco 05-Monterey 17-Santa Clara	
Section III (Fresno)	11-Merced 12-Visalia 23-Fresno 24-Tulare	
Section IV (Los Angeles)	06-Santa Barbara 07-Hollywood 15-Metropolitan 16-Central 22-Los Angeles	
Section V (San Bernardino)	08-Santa Ana 13-San Bernardino 14-San Diego 19-Tehachapi 20-Riverside	

California Counties

California Counties and Special Districts

58 California Counties
6 Special Districts

- Each county has a Public Health & Environmental Health Department
- Health agencies responsible for posting & de-posting health advisories
- State Board and Regional Board FHAB leads coordinate with local public & environmental health staff on advisories and public notification

California County Map

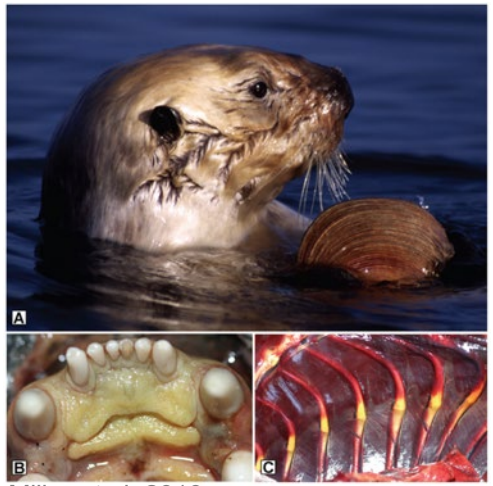
Diversity of FHABs in California

Waterbodies: rivers, lakes, reservoirs, estuaries

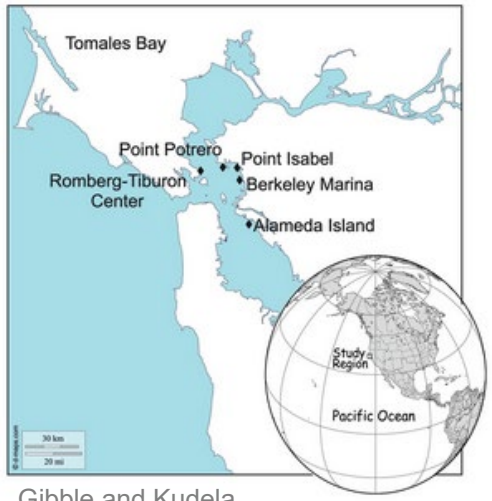
Environmental conditions: eutrophic, oligotrophic, low-elevation, high-elevation, saline

Taxa: *Microcystis*, *Dolichospermum*, *Aphanizominon*, *Cuspidothrix*, *Anabaena*, *Microcoleus*, *Nostoc,* etc.

Cyanotoxins: Microcystins, Anatoxins, Saxitoxin, Nodularin, Cylindrospermopsin



Miller et al. 2010



Gibble and Kudela, 2016

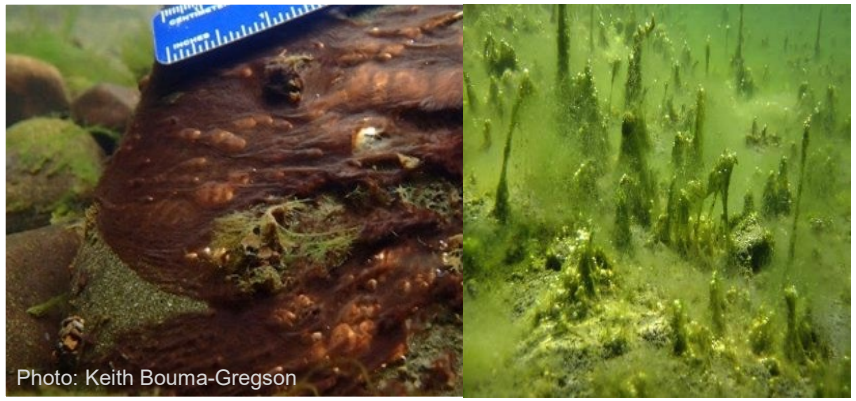


Photo: Keith Bouma-Gregson

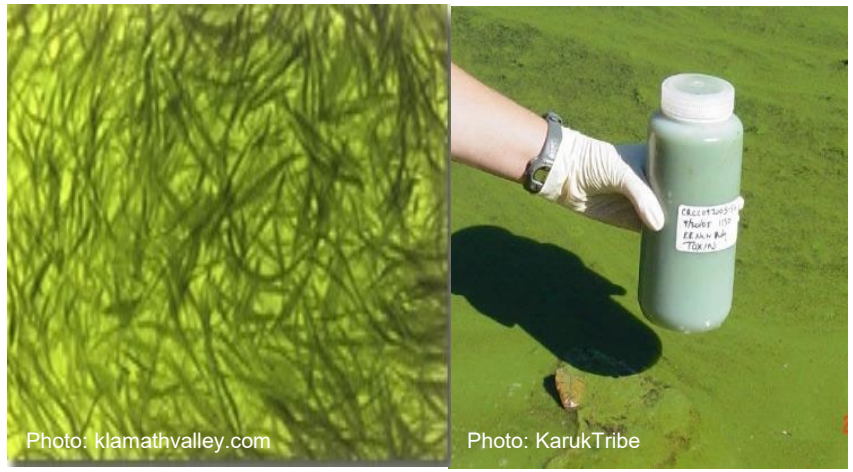


Photo: klamathvalley.com

Photo: KarukTribe

FHAB Program Framework & Infrastructure

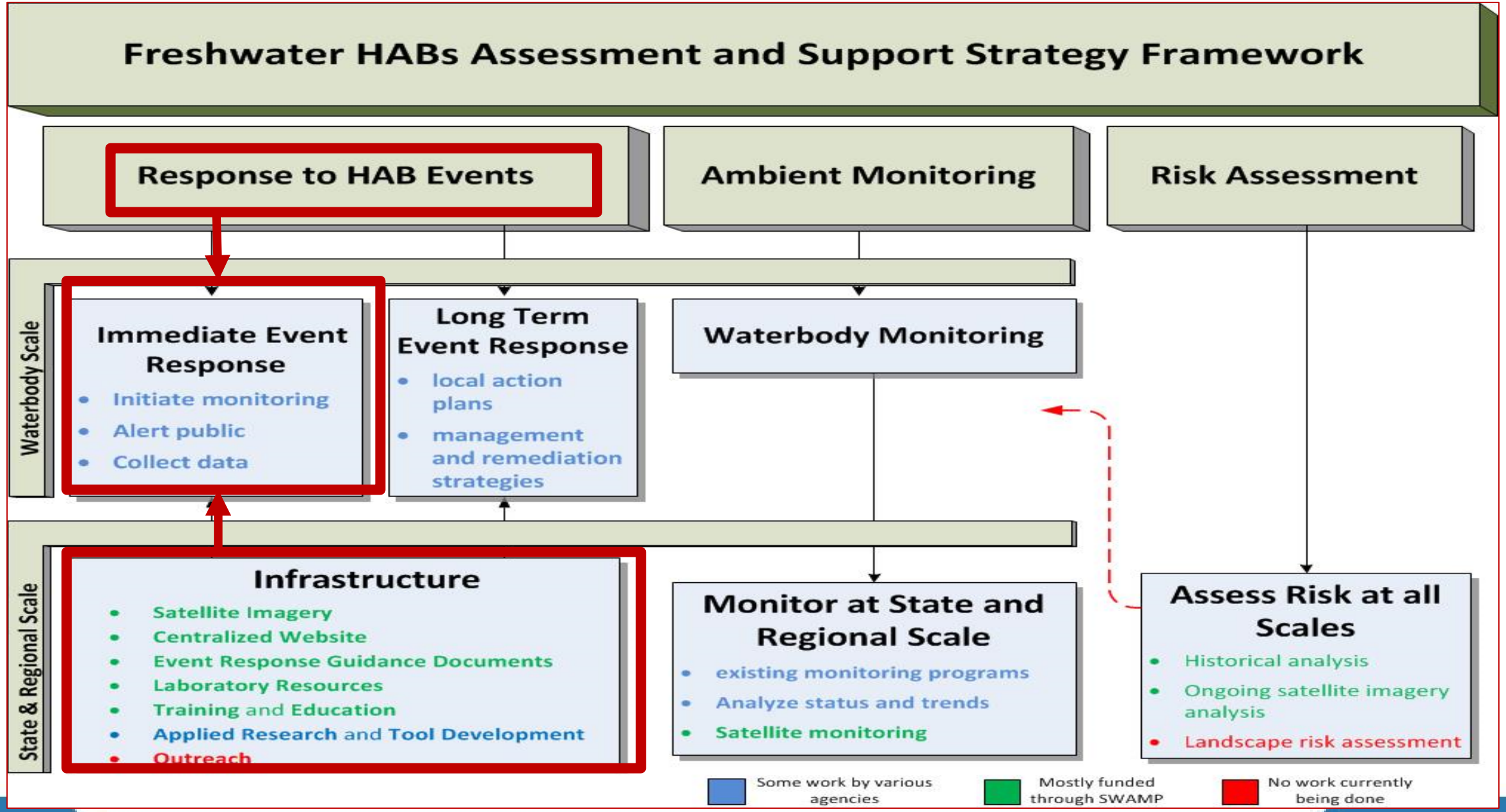
CA Cyanobacteria Harmful Algal Bloom Network (CCHAB)

- Workgroup under the Monitoring Council; formed in 2006
- Some objectives:
  - Develop a unified multi-entity program to identify and address HABs in California's freshwater ecosystems.
  - Promote improvements in, and coordination of monitoring assessment, reporting, and management of HABs in California.
  - Work collaboratively toward public awareness of the risks associated with HABs to people, pets, livestock, and wildlife

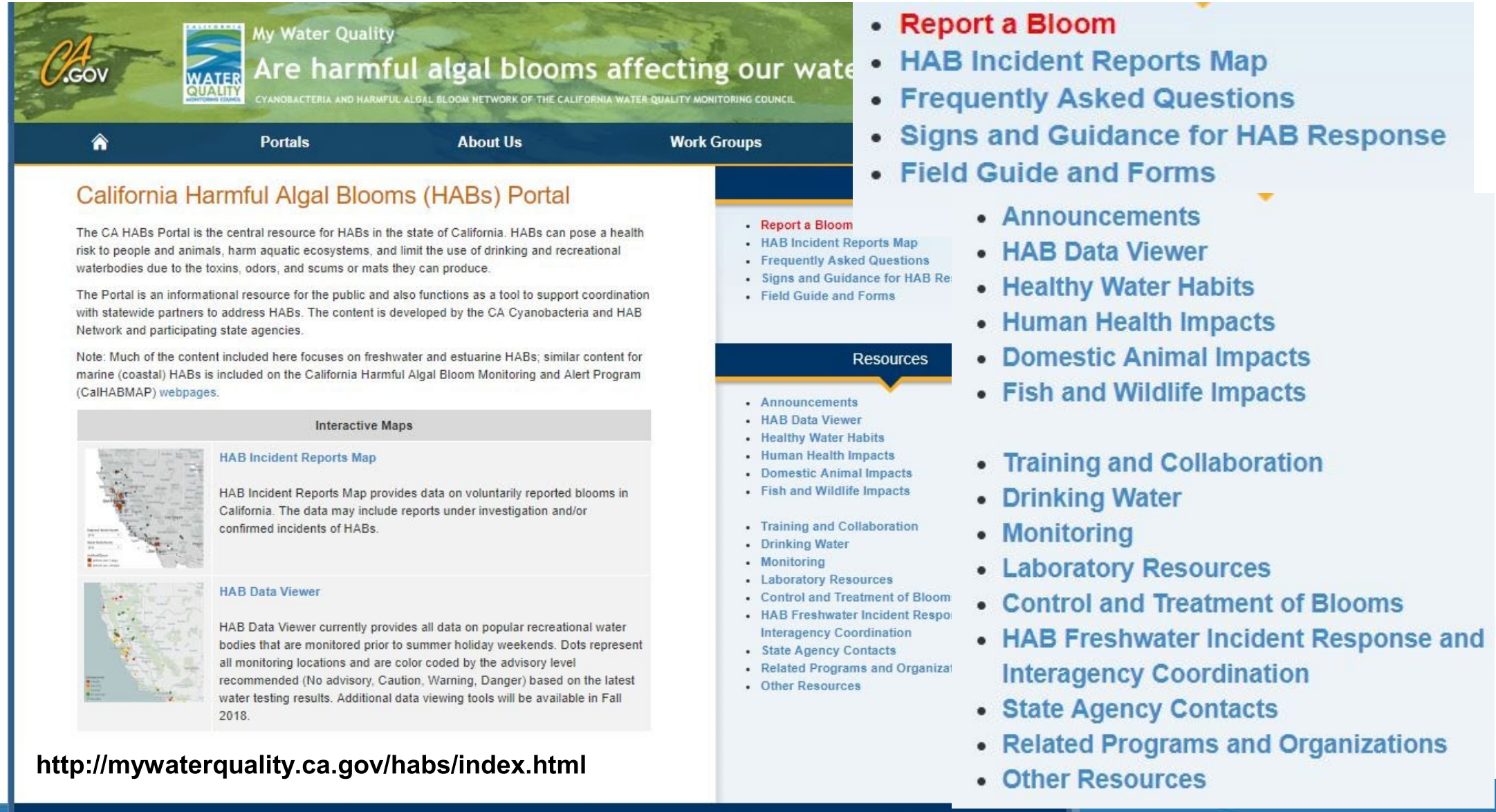
CALIFORNIA
WATER
QUALITY
MONITORING COUNCIL

FHABs assessment and support strategy (2016)

- HABs increasing worldwide and in California
- HABs create significant water quality issues
- Multi-agency and stakeholder involvement via CCHAB Network
- Build partnerships


Freshwater HABs Assessment and Support Strategy Framework
Response to HAB Events
Ambient Monitoring
Risk Assessment
Waterbody Scale
Immediate Event Response
Initiate monitoring
Alert public
Collect data
Long Term Event Response
local action plans
management and remediation strategies
Waterbody Monitoring
State & Regional Scale
Infrastructure
Satellite Imagery
Centralized Website
Event Response Guidance Documents
Laboratory Resources
Training and Education
Applied Research and Tool Development
Outreach
Monitor at State and Regional Scale
existing monitoring programs
Analyze status and trends
Satellite monitoring
Assess Risk at all Scales
Historical analysis
Ongoing satellite imagery analysis
Landscape risk assessment
Some work by various agencies
Mostly funded through SWAMP
No work currently being done

Centralized Website for Bloom Reporting and Information Dissemination



- Report a Bloom
- HAB Incident Reports Map
- Frequently Asked Questions
- Signs and Guidance for HAB Response
- Field Guide and Forms

- Announcements
- HAB Data Viewer
- Healthy Water Habits
- Human Health Impacts
- Domestic Animal Impacts
- Fish and Wildlife Impacts

- Training and Collaboration
- Drinking Water
- Monitoring
- Laboratory Resources
- Control and Treatment of Blooms
- HAB Freshwater Incident Response and Interagency Coordination
- State Agency Contacts
- Related Programs and Organizations
- Other Resources

http://mywaterquality.ca.gov/habs/index.html

Report a bloom

Portals | About Us | Work Groups | HAB

California Freshwater & Estuarine Harmful Algal Bloom Report Form

Please use the form below to provide information about the suspected or confirmed algal bloom and any related human or animal illnesses. Only questions marked with bold text and an asterisk are required. Please provide as much information as possible to assist us in investigating the bloom.

Submit Form: Click the submit button at the end of the form to send the information. You will be provided an Incident Tracking ID number.

Photos: This form will not support the upload of photographs. After you submit the form, please send bloom photographs and any additional information to CyanoHAB.Reports@waterboards.ca.gov and reference your Incident Tracking ID number.

Questions: If you have questions or concerns please contact the HAB Hotline:
Email: CyanoHAB.Reports@waterboards.ca.gov; Phone: 1-844-729-6466 (toll free).

Other Resources:

- For more information on harmful algal blooms, visit: Frequently Asked Questions
- 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).
- Report a bloom with your smart phone: bloomWatch App - available as a free download (Android, iOS).
- Report a marine (coastal) bloom (e.g. red tide), visit: https://jellywatch.org/

This page is maintained by CA State Water Resources Control Board - Surface Water Ambient Monitoring Program.

Waterbody Information

Report Type (*): ○ New Report ○ Follow Up from Previous Report

Incident ID from previous report, if known:

HAB Incident Reports Map

Portals | About Us | Work Groups | HABs Links

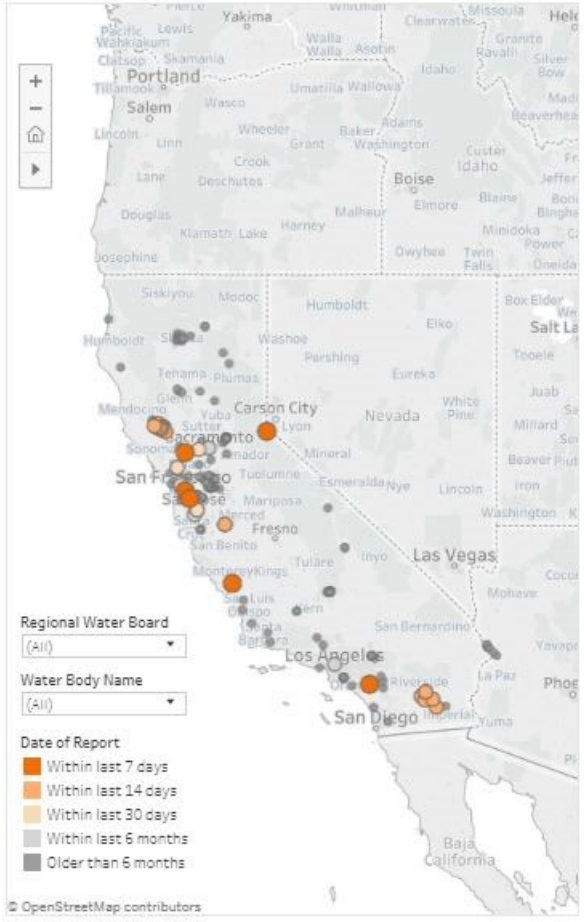
HAB Incident Reports Map

Where are freshwater and estuarine HABs occurring in California?

This map only shows locations where harmful algal blooms (HABs) have been voluntarily reported. California currently does not have adequate funding for a statewide routine monitoring program so monitoring data is limited. A waterbody with no data is not an indication that a bloom is not present. Dots represent reported locations with pop-up windows providing additional data for each HAB incident such as field and/or lab results. Several routine monitoring programs exist for some locations (Klamath Basin, East Bay Regional Parks, Clear Lake, and reservoirs along State Water Project), which may share monitoring data to present in this map.

Note - The exact location, extent, and toxicity of the reported bloom may not be accurate and may not be affecting the entire waterbody. Please use data presented in this map for general purposes only, as it may contain errors. The data are subject to change as new information is received. Please check back for daily updates.

- To download the full data set, click the download button located on the bottom right of the map below

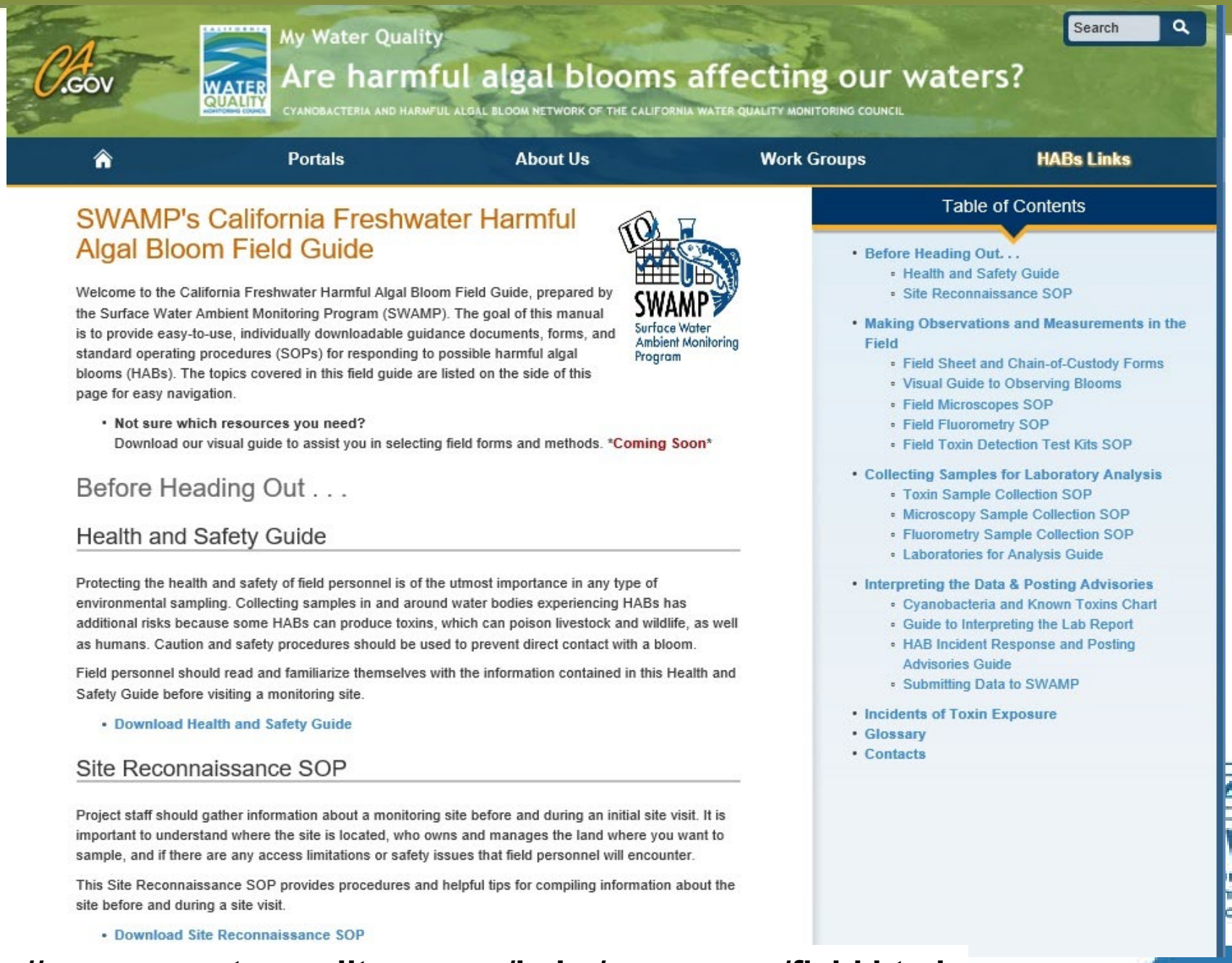


Regional Water Board	Waterbody Name	Day of First Observed	Day of Bloom Last Ver.	
Region 1 - North Coast	Big Lagoon	August 23, 2017	August 31, 2017	Details
	Eel River, Near Miranda, Sout..	August 28, 2017	September 14, 2017	Details
Region 2 - San Francisco Bay	Arroyo Del Valle in Shadow Cliffs Regional Park	June 1, 2016	July 1, 2016	Details
		August 25, 2017	October 19, 2017	Details
	Hulchica Pond 8, near Napa River	June 30, 2017	April 11, 2018	Details
		January 12, 2018	May 1, 2018	Details
	Lake Almaden	August 24, 2017	December 20, 2017	Details
	Lake Anza	May 20, 2016	December 29, 2016	Details
		June 5, 2017	July 21, 2017	Details
		September 18, 2017	November 29, 2017	Details
		January 2, 2018	January 2, 2018	Details
	Lake Chabot (Alameda Co)	August 5, 2016	December 8, 2016	Details
		January 1, 2017	December 28, 2017	Details
		January 10, 2018	May 24, 2018	Details
	Lake Cunningham	January 4, 2017	December 20, 2017	Details
		January 10, 2018	May 15, 2018	Details
	Lake del Valle	April 28, 2016	December 8, 2016	Details
		December 5, 2016	December 5, 2016	Details
		April 14, 2017	July 21, 2017	Details
	Lake Temescal	June 28, 2016	December 8, 2016	Details
		June 6, 2017	December 18, 2017	Details
		January 2, 2018	January 2, 2018	Details
	McNabney Marsh	September 12, 2017	September 12, 2017	Details
	O'Neill Slough, San Mateo	October 27, 2017	October 27, 2017	Details
	Quarry Lakes	March 4, 2016	December 8, 2016	Details
		March 9, 2017	December 26, 2017	Details
		January 11, 2018	May 24, 2018	Details
	Richardson Bay, at Coyote Cr..	April 30, 2017	April 30, 2017	Details
	Scottsdale Pond (btwn Hwy 1..	July 27, 2017	October 5, 2017	Details
	Shadow Cliffs Lake	January 24, 2017	January 24, 2017	Details
		June 2, 2017	June 6, 2017	Details
Region 3 - Central Coast	Atascadero Lake	April 19, 2017	April 20, 2017	Details
	Cachuma Lake, near boat ramp	May 22, 2017	May 22, 2017	Details
	Jim May Park Lake	August 10, 2017	August 10, 2017	Details
	Kelly Lake	July 15, 2016	August 2, 2016	Details
	Laguna Lake	September 27, 2016	September 22, 2016	Details
	Lake San Antonio	June 26, 2017	June 26, 2017	Details
		May 23, 2018	May 23, 2018	Details

+ableau

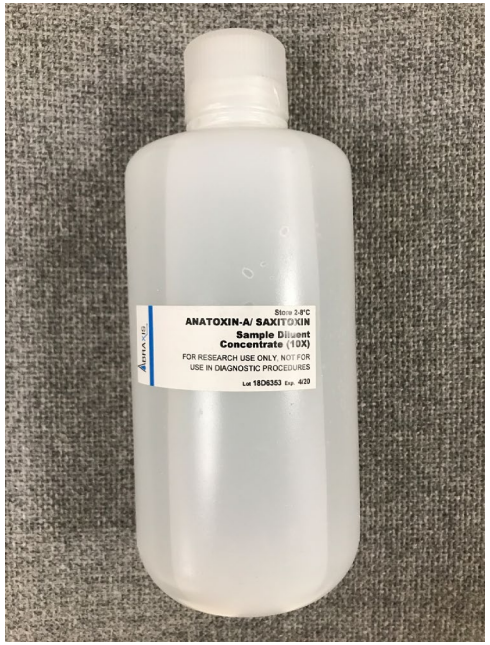
SWAMP
Surface Water Ambient Monitoring Program

Standard Operating Procedures for Monitoring & Sample Collection



http://www.mywaterquality.ca.gov/habs/resources /field.html

Field Sampling Kits



Request for Lab Analysis

- Email cyanoHAB.reports@waterboards.ca.gov
  - Provide: Location, photos, potential beneficial uses, recreation type (water contact, dog recreation, etc.), proposed sampling locations, No. of samples
- Requests will be reviewed on case-by-case basis
- Funding is prioritized for
  - Initial investigation of report
  - Pre-holiday assessments to support proactive monitoring

Tiered Approach to Assess Bloom & Toxins

<- Iterative Process ->

Re-evaluate bloom conditions to observe visual changes

Visual Monitoring

Jar & Stick Test

Collect Sample

Microscope Identification

Lab Analysis: Measure Cyanotoxin Genes (qPCR)

Determine targeted cyanotoxin analysis

Lab Analysis: Measure Cyanotoxins

Laboratory Resources

http://www.mywaterquality.ca.gov/habs/resources/ index.html#laboratory

CyanoHABs Laboratory List

The purpose of this laboratory list is to readily provide information about laboratories capable of analyzing water samples for cyanobacteria and the toxins cyanobacteria can produce. This list is not intended to describe any regulatory requirements or make any laboratory endorsements. The laboratories are listed in alphabetic order. Please note – laboratories should be contacted prior to submitting any samples. Many laboratories discussed flexibility in prices and the need to coordinate any sampling and analysis. {This list was last updated September 2016}

Cyanotoxin Analysis

Laboratory	Matrix	Cyanotoxin	Method	MDL (µg/L)	RL (µg/L)	Response Time	Sample Storage/ Shipping Condition	Shipping Preference
Beagle Bioproducts Inc. Contact: (614) 682-6588 info@beaglebioproducts.com Location: Columbus, OH	DW, AW	microcystins, total	ELISA	contact lab	contact lab	2 day response time. 24 hours response time upon request and additional fees.	Go to Beaglebioproduct.com for sampling kits & shipping containers for purchase. Go to beaglebioproducts.com for sampling guide and more details.	Fedex overnight. Samples collected over weekend should be frozen and shipped Monday.
	DW, AW	microcystins	LC-MS	contact lab	contact lab			
	DW, AW	microcystins	LC-MSMS	contact lab	contact lab			
	DW, AW	anatoxin-a	ELISA	contact lab	contact lab			
	DW, AW	cylindrospermopsin	ELISA	contact lab	contact lab			
	DW, AW	saxitoxins	ELISA	contact lab	contact lab			
	DW, AW	anatoxin-a	LC-MS	contact lab	contact lab			
	DW, AW	cylindrospermopsin	LC-MS	contact lab	contact lab			
	DW, AW	saxitoxins	LC-MS	contact lab	contact lab			
BEND GENETICS, LLC LABORATORY Contact:(541) 600-GENE or customer_service@bendgenetics.com Location: Sacramento, CA	DW, AW	microcystins, total	ELISA	0.10	contact lab	Response time next day from sample receipt (Mon. – Thurs. delivery), and rush services (same day) can be arranged.	Frozen or on wet ice	No preference
	DW, AW	anatoxin-a	ELISA	0.10	contact lab			
	DW, AW	cylindrospermopsin	ELISA	0.04	contact lab			
	DW, AW	saxitoxins	ELISA	0.015	contact lab			
	DW, AW	domoic acid	ELISA	6	contact lab			
	Tissue (shellfish)	microcystins	ELISA	contact lab	contact lab			
	Tissue (shellfish)	saxitoxins	ELISA	0.015	contact lab			
	Tissue (shellfish)	domoic acid	ELISA	30	contact lab			
	Tissue (shellfish)	okadaic acid	ELISA	100	contact lab			
CA Animal Health and Food Safety Lab (CAHFS), UC Davis Contact: (530) 752-7578 Location: Davis, CA	Note: Lab analyzes samples related to *animal health*. The lab can analyze animal samples (tissues and stomach contents) related to possible animal exposures to cyanotoxins from harmful algal blooms.			contact lab	contact lab	contact lab	contact lab	No preference

SWAMP
Surface Water Ambient Monitoring Program

Training and Collaboration

http://www.mywaterquality.ca.gov/habs/ resources/index.html#informational

Informational Presentations

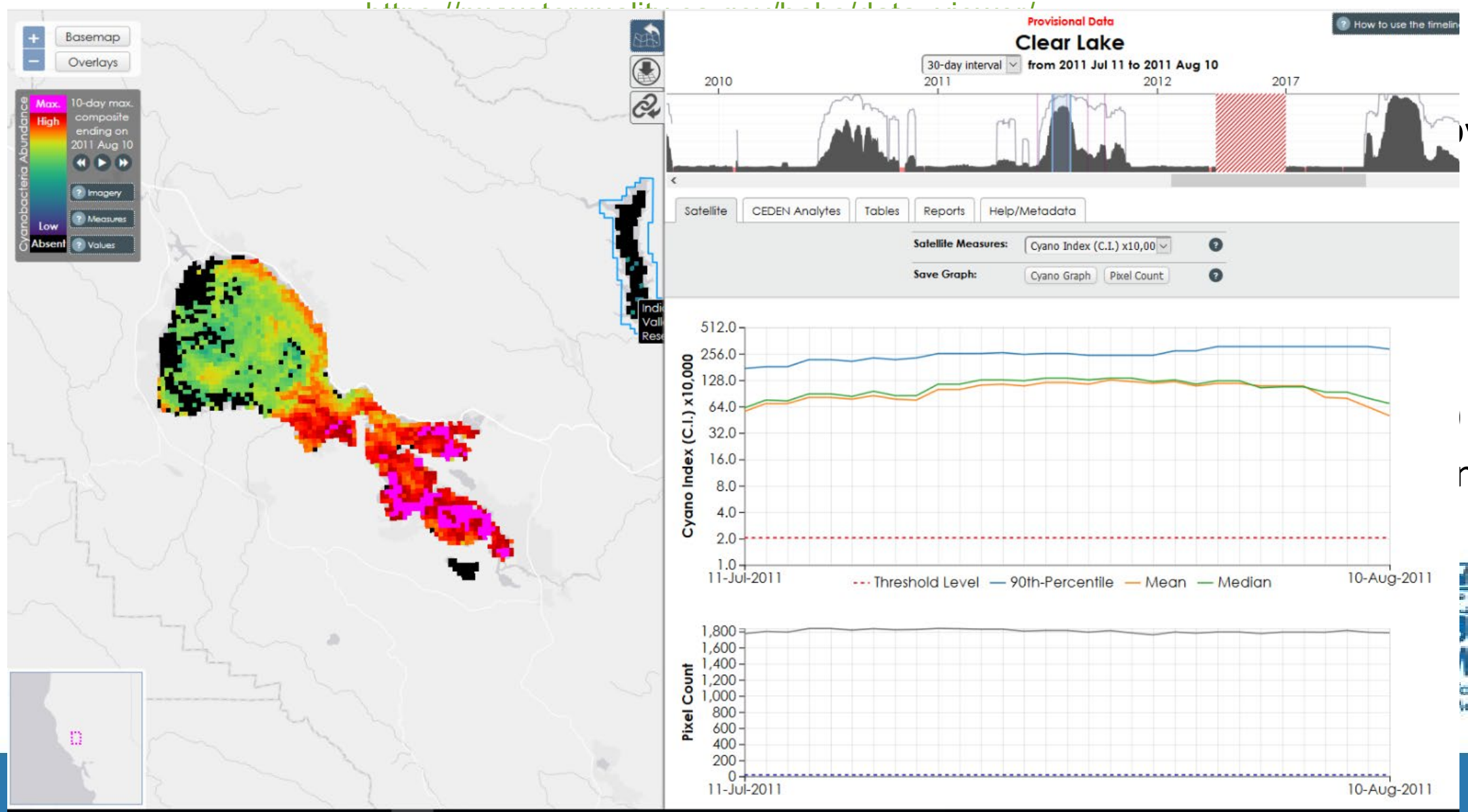
- 2016 One Day Workshop on **Identifying and Responding to Cyanobacteria Harmful Algae Waterblooms in California** - Recorded June 14, 2016 at the University of California, Davis
  These lectures, organized by the State Water Resources Control Board's Training Academy and OIMA's Surface Water Ambient Monitoring Program (SWAMP) in cooperation with UC Davis Extension, were recorded and can be viewed on YouTube.
  - HABs Workshop Video Playlist
  - Introduction: Goals of Workshop 9:35
  - Lecture 1: History and Biology of Harmful Algae Blooms (HABs) National and International Approaches to Detection, Management and Mitigation 56:18
  - Lecture 2: Sampling, Handling, Storage and Shipment of CyanoHABs 46:09
    Includes guidance on their classification as hazardous substances.
  - Lecture 3: Cyanobacteria taxonomy, identification, enumeration and biovolume determination 1:07:16
  - Lecture 4: SWAMP Freshwater HABS Program and Resources & CCHAB Voluntary Guidance Updates 52:47
  - Lecture 5: Management and mitigation options, a ground level approach 46:20
  - Lecture 6: Lab – Identification of CyanoHABs-discussion of taxonomy keys plus some discussion/demonstration of sampling, handling and enumeration 23:15
  - 2015 Lecture: An Introduction to Using Dichotomous Keys to Identify Organisms Causing Harmful Algal Blooms (HABs) 5:08
- California Water Quality Monitoring Collaboration Network's Cyanobacteria (Blue-green algae), January 2016
  - Widespread Prevalence of Cyanobacteria & Cyanotoxins from a Variety of California Waterbodies 1:09:28
  - The California CyanoHAB Network (CCHAB) 42:21
  - Genetic Testing of Cyanobacteria Blooms 49:27
  - Biotoxin Gene qPCR Assay for the Aquatic Motoring and Management of Biotoxin Risk 49:58
- Other Presentations
  - CyanoHABs Field Testing Presentation - May 31, 2016
  - Western Regional Epidemiology Network - May 21, 2015
  - Monitoring and Assessment Partnership Webinar - May 19, 2015

SWAMP Surface Water Ambient Monitoring Program

CALIFORNIA WATER QUALITY MONITORING COUNCIL

NAMP face Water bient Monitoring gram

Remote Sensing - Satellite Web Tool



FHAB Event Response Guidelines and Flowchart

WHEN TO POST, WHAT TO POST?

- Consistent guidelines and advisory signs

WHO DOES IT PROTECT?

- Tiered advisory thresholds that trigger action
- Considers exposure of humans and domestic animals

SWAMP
Surface Water Ambient Monitoring Program

REPORT A BLOOM

Report a bloom - either suspected or confirmed

- Online Freshwater Bloom Incident Form
- Call toll free: 1 (844) 729-6466
- Email: CyanoHAB.Reports@waterboards.ca.gov

Most reports through the State Board reporting system.

Some reports directly from staff at partner agencies and organizations

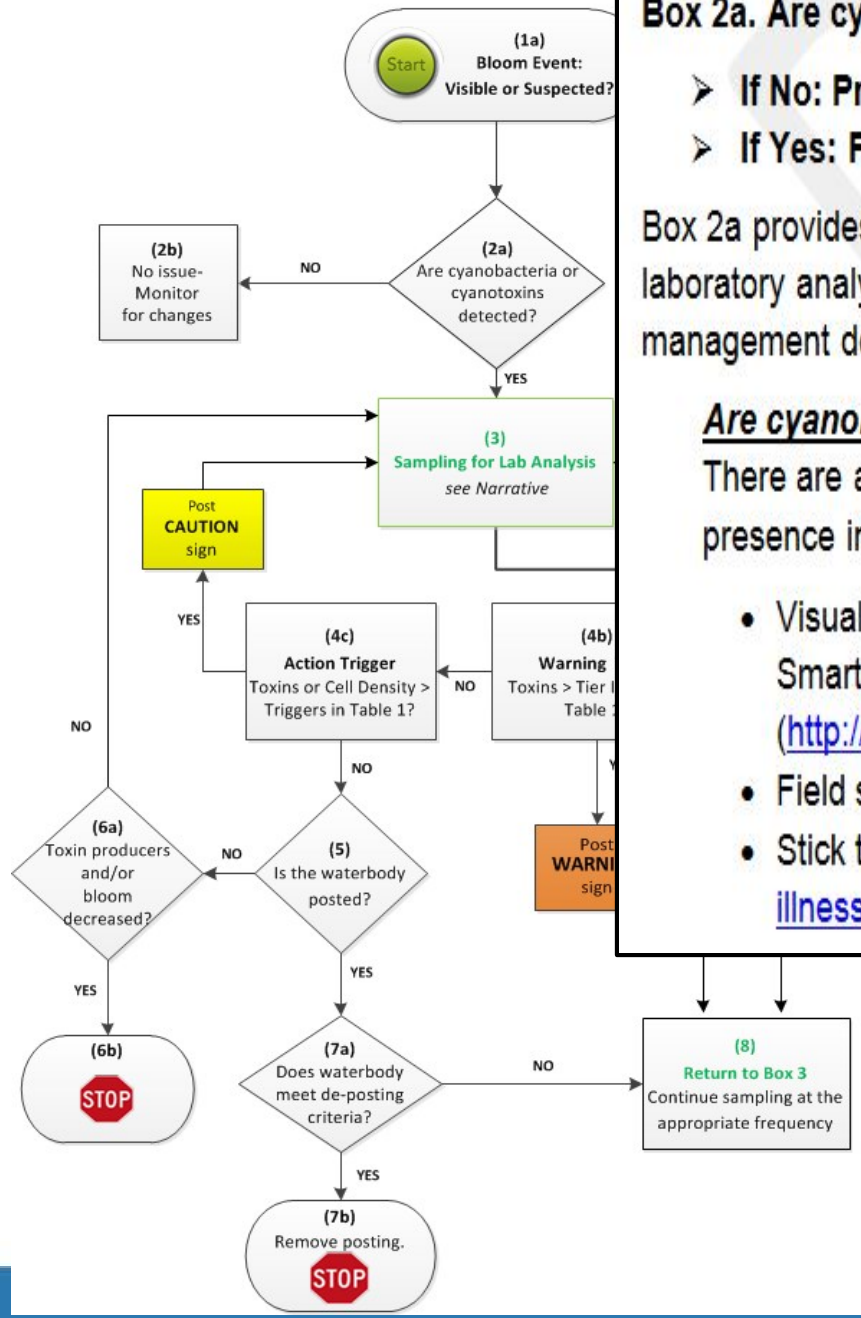
All reports are directed to the state reporting hub and managed by the Water Boards

- Incident response coordinated with multi-agency task force

SWAMP
Surface Water Ambient Monitoring Program

Figure 1. Decision Tree for Posting and De-posting Health Advisories for CyanoHABs

Proposed changes to consider for Voluntary CHAB Guidance (Working Draft)



Box 2a. Are cyanobacteria or cyanotoxins detected?

- **If No: Proceed to Box (2b), and continue routine monitoring for indicators**
- **If Yes: Proceed to Box (3)**

Box 2a provides an opportunity for initial screening using tools that do not require formal laboratory analysis. In some cases this is not a necessary step for making a management decision.

Are cyanobacteria detected?

There are a number of methods available for initial determination of cyanobacteria presence including:

- Visual screening for cyanobacteria using field or office-based microscopes, Smartphone tools (http://cellscope.berkeley.edu/), FlowCam (http://www.fluidimaging.com/)
- Field sensor or bench top fluorimeter measurements of phycocyanin pigments
- Stick test and jar tests (http://www.kdheks.gov/algae-illness/download/Jar_Test.pdf)

SWAMP Surface Water Ambient Monitoring Program

California Recreational Action Levels

Table 1: Trigger Levels For Human and Animal Health			
	Caution Action Trigger	Warning TIER I	Danger TIER II
Primary Triggers			
Total Microcystins [b]	0.8 µg/L	6 µg/L	20 µg/L
Anatoxin-a	Detection [c]	20 µg/L	90 µg/L
Cylindrospermopsin	1 µg/L	4 µg/L	17 µg/L
Secondary Triggers			
Cell Density (Toxin Producers)	4,000 cells/mL	--	--
Site Specific Indicators of CyanoHAB	Visible bloom/discoloration, scum, algal mats, satellite imagery.	--	--

a. The primary triggers are met when ANY toxin exceeds criteria
b. Microcystins refers to the sum of all measured microcystin congeners
c. Must use an analytical method that detects ≤ 1 µg/L Anatoxin-a

CAUTION

Harmful algae may be present in these waters.
For your family's safety:

DO NOT SWIM OR W
near algae or scum

KEEP CHILDREN AW
from algae in the wat
on the shore.

DO NOT drink this wa
use it for cooking.

Call your doctor or veterinaria
For more information, contact:

WARNING

Toxins from algae in these waters can harm people and kill pets and livestock

NO SWIMMING

STAY AWAY from scum, a
cloudy or discolored wate

DO NOT use these waters
drinking or cooking.
Boiling or filtering will no
make the water safe.

For people, the toxins can ca
- Skin rashes, eye irritation
- Diarrhea, vomiting

Call your doctor or veterinarian i
For more information, contact:

DANGER

Toxins from algae in these waters can harm people and kill pets and livestock

STAY OUT OF THE WATER UNTIL FURTHER NOTICE. Do not touch scum in the water or on shoreline.

DO NOT let pets or livestock drink or go into the water or go near the scum.

DO NOT eat fish or shellfish from these waters.

DO NOT use these waters for drinking or cooking.
Boiling or filtering will not make the water safe.

For people, the toxins can cause:
- Skin rashes, eye irritation
- Diarrhea, vomiting

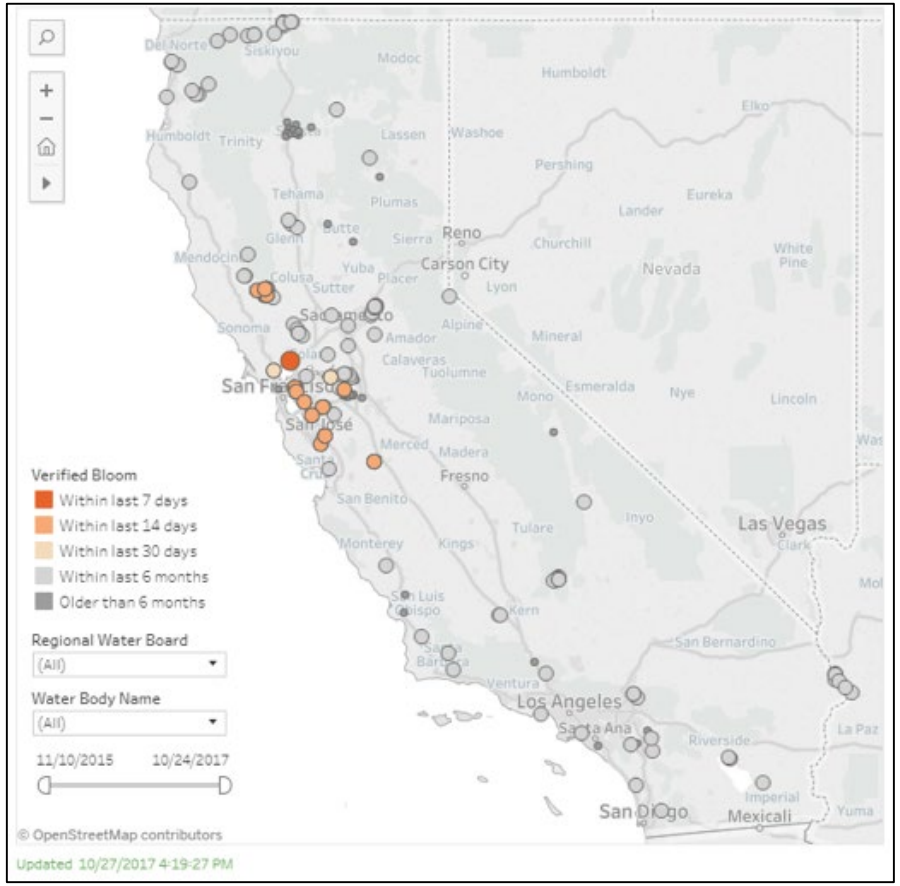
For animals, the toxins can cause:
- Diarrhea, vomiting
- Convulsions and death

Call your doctor or veterinarian if you or your pet get sick after going in the water.
For more information, contact:

WAMP
face Water
bient Monitoring
gram

HABs in California

	2016	2017	2018
Total reports	91	181	190
Total postings	80	141	145



2018 advisory levels

92

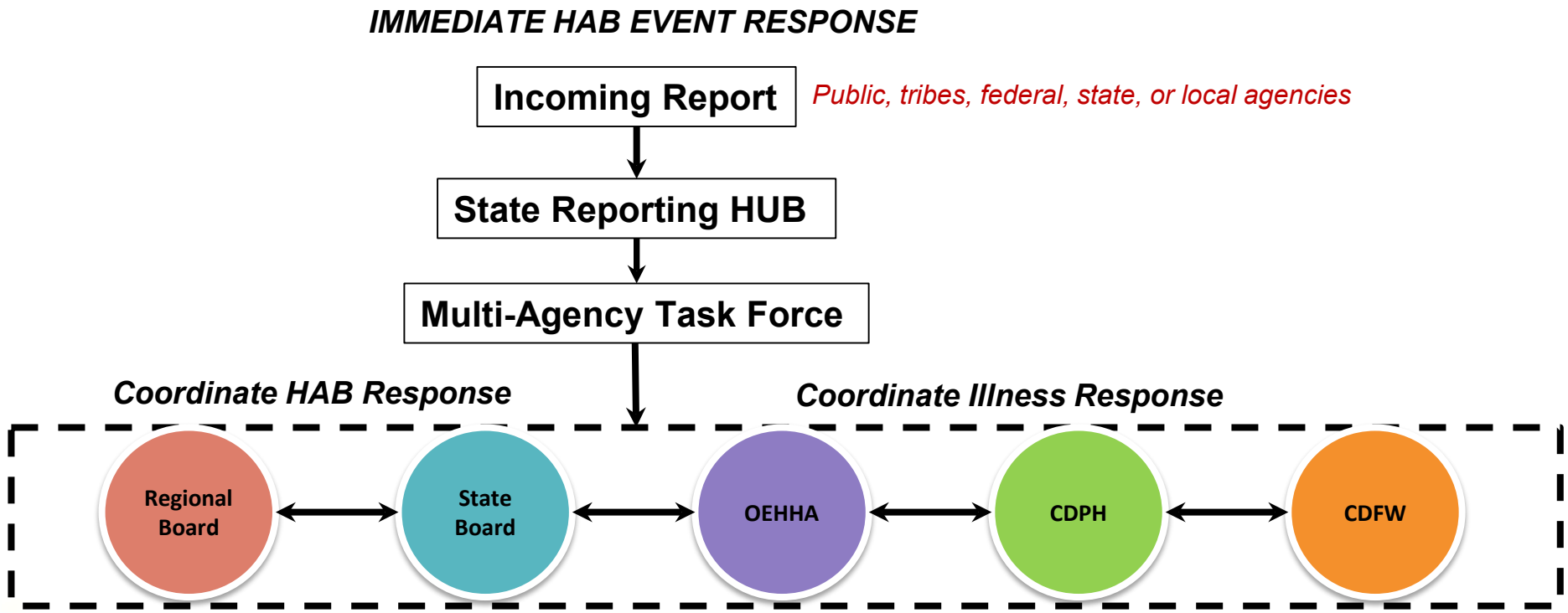
53

Event Response Example

HAB Event Response Strategy

Three Ways to Report a Bloom

- Online Freshwater Bloom Incident Form *(link available on HAB Portal)*
- Call toll free: 1 (844) 729-6466
- Email: CyanoHAB.Reports@waterboards.ca.gov



SWAMP Surface Water Ambient Monitoring Program

5 Step Coordination Process

Report of a Bloom

HAB Coordinator

REPEAT STEPS 1 – 5, AS NECESSARY

1. REVIEW & ASSESS INFORMATION
2. COMMUNICATE & SHARE INFORMATION
3. COORDINATE MONITORING & RESPONSE
4. COORDINATE WITH DDW DISTRICT OFFICE
5. COORDINATE NOTIFICATION & SIGNAGE

HAB Lead Coordinates with:

State Board ↔ HAB Illness Team ↔ Water & Land Managers ↔ Local Health Agencies ↔ Drinking Water Group

SWAMP Surface Water Ambient Monitoring Program

Regional Board Response

Report of a Bloom

HAB Coordinator

Assess Information

Step 1a: Review & Assess Reported Information

- Contact reporting party for additional information
- Assess beneficial uses
  - Public or private water body?
  - High recreational water contact use area?
  - Drinking water source?
- Reports of animal/wildlife illness or mortality?

Step 1b: Bloom Report & Database Entry

- Create a Bloom Report and collate collected information
- Enter data into centralized database

Step 1c: Notification to Water Managers

- Start notification process

SWAMP
Surface Water Ambient Monitoring Program

Report of a Bloom

HAB Coordinator

Communicate Information

Regional Board Response

Step 2a: Communicate & Share Information with Others

- Public Health & Environmental Health agencies
- Waterbody managers (including state agencies)
- Recreational managers (including state agencies)
- Division of Drinking Water District Offices
- CA Department Fish & Wildlife
- EPA Regional Representative
- Tribes
- State Board/Regional Board Management & Programs
- CA HAB Illness Team

Bloom Report

Step 2b: Bloom Report & Database Entry

- Collate information into Bloom Report
- Enter information into Centralized HAB Database

SWAMP
Surface Water Ambient Monitoring Program

Regional Board Response

Report of a Bloom

↓

HAB Coordinator

Discuss Coordination

Step 3: Coordinate Monitoring & Response

- Contact local agencies or water body managers

Step 3a: Identify lead agency for response

- Who is capable to respond? What are they able to do?
- *We need more regional partners monitoring!*

Monitoring Options:

- Local health agencies, water body/rec managers, tribes
- Regional Board (*only conducts initial incident response*)
  - Limited funding for monitoring & analyses

SITE PHOTOS WATER SAMPLES MICROSCOPY CELL ID qPCR TOXIN TESTING

Step 3b: Bloom Report & Database Entry

- Collate information into Bloom Report
- Enter information into Centralized HAB Database

SWAMP
Surface Water Ambient Monitoring Program

Regional Board Response

Report of a Bloom

↓

HAB Coordinator

Share Information

Step 4: Blooms in Drinking Water Sources*

- HAB Coordinator contacts DDW District Office staff
  - Provides known information on bloom status
  - Keeps DDW staff aware of changes in bloom conditions & response actions

DDW District Staff Coordinate with Water Purveyors

- District staff contact and coordinate with water purveyors
  - Keep water purveyors aware of bloom conditions
  - Coordinate sampling of raw & finished drinking water
  - Provide technical assistance, as needed
  - Share information with HAB Coordinator

**Water purveyors should notify DDW staff if they detect blooms or toxins in their raw or finished water.*

SWAMP
Surface Water Ambient Monitoring Program

Regional Board Response

Report of a Bloom

↓

HAB Coordinator

Coordinate Notifications

Step 5a: Coordinate Public Notifications & Posting Advisory Signs

- Relay lab sample & toxin results to water managers
- Make recommendations on public notifications & advisory signs
  - Advisory signs include: Caution, Warning, Danger
- Make or assist in notifications
  - Press Release & State Water Board Twitter page

Step 5b: Bloom Report & Database Entry

- Collate information into Bloom Report and share with water managers
- Enter information into Centralized HAB Database
- Repeat steps 1-5, as necessary

SWAMP
Surface Water Ambient Monitoring Program

Harmful Algal Bloom Report 1933 – New Hogan Reservoir

The information in this bloom report is intended only for the agencies directly notified. Do not distribute to others without the authorization from the Water Board. Updated information appears at the top of the bloom report. All previous reported information appears under the "Archived Information" section.

REPORT ID(s):	1933
WATER BODY:	New Hogan Reservoir
COUNTY:	Calaveras
GPS COORDINATES:	Not provided by time report was prepared Observation Area, Wrinkle Cove Day Use Area, Fiddleneck Day Use Area, and Acorn Day Use Area
MOST RECENT OBSERVATION DATE:	April 18, 2019 (State Board sampling); April 09, 2019 (visit southwestern area); April 05, 2019 (assess signs); April 02, 2019 (initial site visit near dam and northwestern rec areas)
REPORTING PARTY:	Satellite Imagery and Reconnaissance by RB5 staff
CYANOBACTERIA IDENTIFIED:	04/02/19 samples found Aphanizomenon, Dolichospermum, Oscillatoria, and other filamentous cyanobacteria
TOXIN(s) DETECTED:	☒ Microcystin ☐ Anatoxin-a ☐Cylindrospermopsin ☐ Saxitoxin ☐ Other: ☐ Not Tested
TOXIN CONCENTRATION(s):	Microcystin concentrations ranged from Non-Detect to 4.14 ug/L
ADVISORY LEVEL RECOMMENDED:	☒ **Caution** ☐ Warning ☐ Danger ☐ No Advisory Recommended ☒ Other: Exercise Healthy Water Habits
MAIN BENEFICIAL USES (if known):	☒ Municipal and Domestic Supply – Drinking Water Supply ☒Water Contact Recreation (Rec-1) – Swimming, Wading, Fishing ☒Non-contact Water Recreation (Rec-2) – Hiking, Camping, Boating ☒ Agricultural Supply ☐ Cultural/Tribal Uses ☐ Unsure
AGENCIES/INDIVIDUALS NOTIFIED:	Army Corps Park Manager/SAC District staff, Calaveras County Env Health and Public Health, Div. Drinking Water Stockton Office, CDPH Duty Officer, EPA, State Bd FHAB, FWHAB, RB5 management
WATER BOARD STAFF: *For follow-up information*	☒ Christine Joab, Christine.Joab@waterboards.ca.gov (916) 464-4655 ☐ Alisha Wenzel, Alisha.Wenzel@waterboards.ca.gov (916) 464-4717 ☐ Matt Krause, Matthew.Krause@waterboards.ca.gov (916) 464-4845 ☒ Marisa Van Dyke, Marisa.VanDyke@waterboards.ca.gov (916) 322-8431 ☒Keith Bouma-Gregson, Keith.Bouma-Gregson@waterboards.ca.gov (916) 322-8430

April 25, 2019 – New Hogan Reservoir Report ID 1933 – CAUTION Advisory Recommended

On April 18, State Water Board staff sampled 5 locations around New Hogan Reservoir. Five surface water samples and one composite mat sample were collected using a pole sampler at ~0.25 meter under the water surface from five recreational areas located around the north western end of the lake (Figure 1).

Samples were processed in a tiered approach. First, cyanobacteria were identified under the microscope (Figures 2a-2d). Samples were then analyzed to assess the number of gene copies per each toxin type (e.g., Microcystin, Anatoxin-a, Cylindrospermopsin, and Saxitoxin) using qPCR. Based on the microscopy and the qPCR results samples were then analyzed for the appropriate toxin. In this case, five of the samples were analyzed for total microcystin using ELISA method.

d low concentrations of the cyanotoxin Microcystin at three of the sample locations
d on the lab results, a CAUTION advisory is recommended. We also recommend that
provided to the public on practicing healthy water habits when recreating in waterbo
e potential to have cyanobacteria blooms.

of New Hogan Reservoir showing sampling locations

Central Valley Regional Water Quality Control Board

Table 1. Lab results from New Hogan Reservoir cyanobacteria sampling

Location	Anatoxin-a qPCR (gene copies/mL)	Cylindrospermopsin qPCR (gene copies / mL)	Microcystin qPCR (gene copies/mL)	Saxitoxin qPCR (gene copies/mL)	Microcystin (µg/L) ELISA	Advisory Recommended
NH101-T New Hogan Observation Area Trailhead Area	ND	ND	3,542	ND	**1.42**	Caution & Healthy Habits
NH102-T Wrinkle Cove Day Use Trailhead Area	ND	ND	286	ND	ND	Healthy Habits
NH103-T Wrinkle Cove Day Use Beach Area	ND	ND	1,481	ND	**1.33**	Caution & Healthy Habits
NH103-B composite/mat sample) Wrinkle Cove Day Use Beach Area	ND	ND	97,376	ND	**4.14**	Caution & Healthy Habits
NH104-T Fiddleneck Day Use Boat Launch	ND	ND	4,312	ND	ND	Healthy Habits
NH105-T Acorn Recreation Area South of Coyote Point	ND	ND	ND	ND	ND	Healthy Habits

Cyanobacteria Identified

Samples were analyzed for cyanobacteria by Bend Genetics, LLC. Cyanobacteria were identified to genus.

Table 2. Cyanobacteria observed in New Hogan Recreational Samples

Location	Cyanobacteria Identified	Notes
NH101-T	Microcystis (Dominant) Dolichospermum (Sub-dominant)	Sample contained low amounts of Microcystis sp. and Dolichospermum sp. No other cyanobacteria identified.
NH102-T	Dolichospermum (Dominant)	Sample contained low amount of Dolichospermum. No other cyanobacteria observed.
NH103-T	Dolichospermum (Dominant)	Sample contained low amount of Dolichospermum. No other cyanobacteria observed.
NH103-B composite/mat	Dolichospermum (Dominant) Aphanizomenon (Sub-dominant)	Sample contained high amount of Dolichospermum sp. and moderate

Figure 2a. Image of Microcystis sp. from NH101-T sample
(*Image from Bend Genetics, LLC. Lab report*)

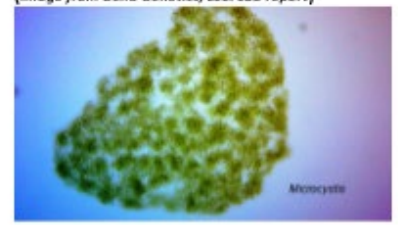


Figure 2b. Image of Dolichospermum sp. from NH103-T sample
(*Image from Bend Genetics, LLC. Lab report*)

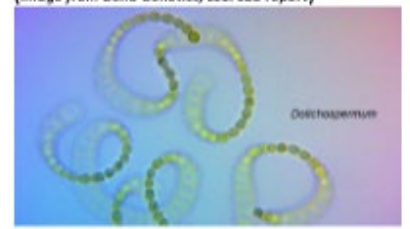


Figure 2c. Image of Aphanizomenon sp. from NH103-B sample
(*Image from Bend Genetics, LLC. Lab report*)

Example Bloom Report

Thank you

Marisa Van Dyke and Christine Joab

Freshwater HABs Program

Marisa.VanDyke@waterboards.ca.gov

Christine.Joab@waterboards.ca.gov