

Spotlight on a State Program: California HAB Response and Illness Tracking



California Interagency HAB-related Illness Tracking Workgroup

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US EPA CyanoSymposium Day 4: October 25, 2023



How Did We Get Here?

California HAB History

Freshwater Harmful Algal Blooms (FHAB)

1970s: Clear Lake experiences harmful algal blooms; documented by researchers

2000s: Klamath River reservoirs where blooms reach record levels; first impairment listings

2006: **California Cyanobacteria and Harmful Algal Bloom (CCHAB) Network formed**

2016: CCHAB Network develops standardized *Voluntary* Guidance for response to HABs

2016: State agency led FHAB Program begins with formal tracking of HAB incidents on web-based map (priority focus is HAB event response, coordinate assessment for public health, and communication)

2017: **Interagency HAB-related Illness Tracking Workgroup (SWRCB, OEHHA, CDFW, CDPH) implemented**

2019: Legislative Mandate AB 834 Freshwater and Estuarine HABs Program Bill signed

2020: CCHAB Network adopts standardized *Voluntary* Guidance specific to benthic HABs

2021: **Full-time FHAB Program staff installed and resources implemented (per AB 834)**

State Water Boards (5 individuals)

Department of Fish and Wildlife (1 individual)

Assembly Bill 834 (Quirk – 2019)

Freshwater and Estuarine Harmful Algal Bloom Program



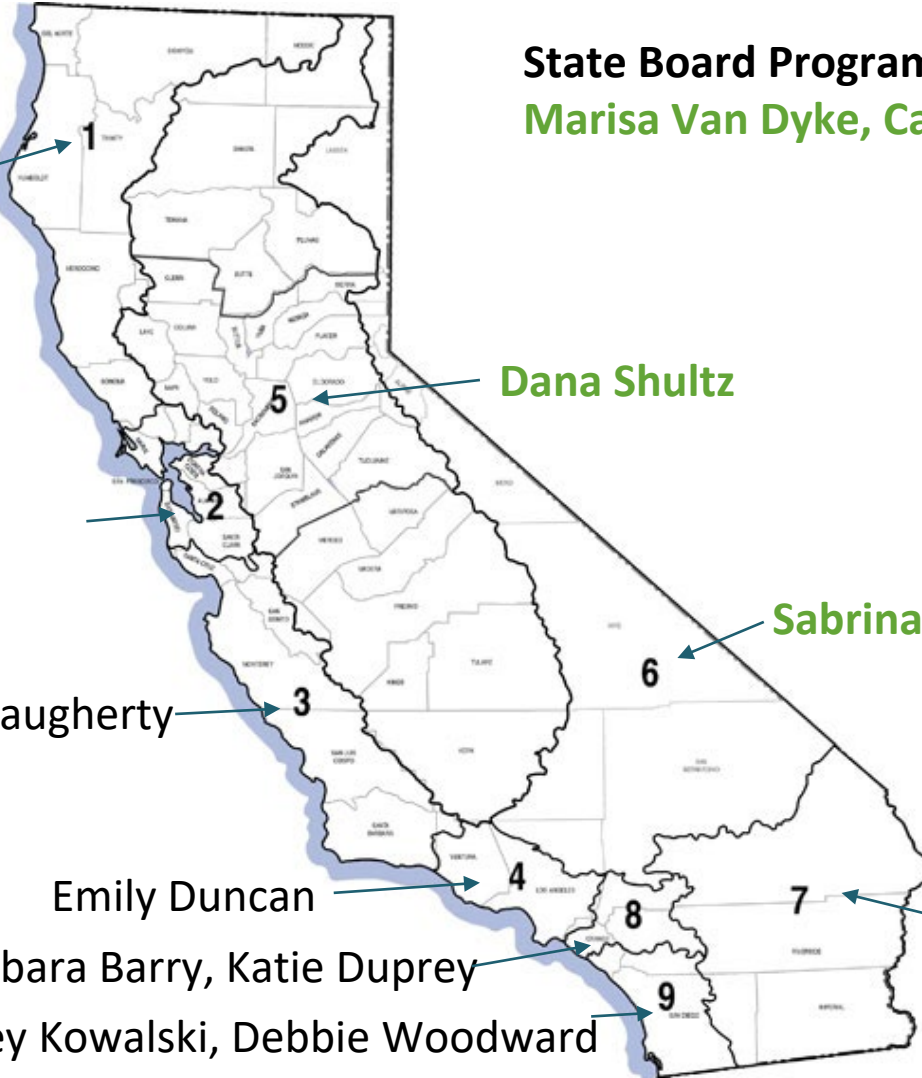
Bill mandates program objectives

- Coordinate immediate and long-term event response; communicate notifications and risks broadly
- Conduct monitoring and assessment at the state, regional, and water body scales to track status and trends and help identify “at-risk” waterbodies
- Conduct applied research and tool development
- Provide outreach, education, centralized website, and data management

BCP resources

- 5 positions at CA Water Board
- 1 position at CA Dept. of Fish and Wildlife
- \$750K annually in contracting funds

Water Boards FHAB Coordinators



State Board Program Leads

Marisa Van Dyke, Carly Nilson

- **Funded permanent staff**
- ~ 1 staff per Region, most part-time
- Coordinate HAB event response, monitoring, and communication (liaisons for illness tracking workgroup)
- State agency contacts at HAB Portal:
https://mywaterquality.ca.gov/habs/resources/habs_response.html#table2

Michael Thomas, Rich Fadness

Rebecca Nordenholt; Kristina Yoshida

Melissa Daugherty

Emily Duncan

Barbara Barry, Katie Duprey

Carey Kowalski, Debbie Woodward

Dana Shultz

Sabrina Rice

Jeff Geraci

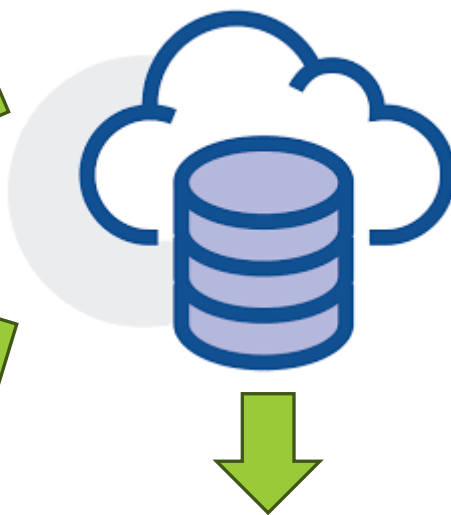
How are HAB Reports shared between the Public or other entities and the HAB Illness Workgroup?

Web Report Form
<https://mywaterquality.ca.gov/habs/do/bloomreport.html>

California Poison Control Services

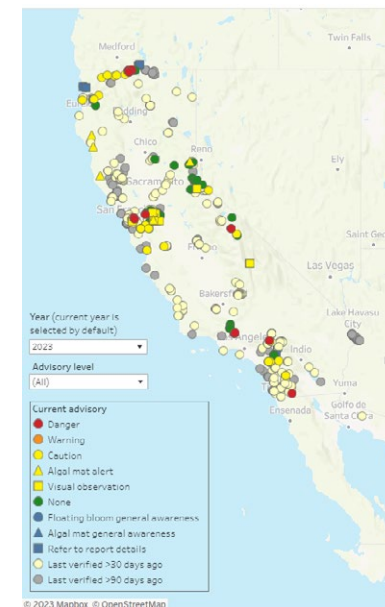


FHAB Program Database and Web Interface



HAB-related Illness Workgroup response

HAB Portal Web Map
https://mywaterquality.ca.gov/habs/where/freshwater_events.html



** Weekly Map Updates distributed via listserv*

Resources at CA Freshwater and Estuarine Harmful Algal Bloom Portal

Where are HABs?









How to stay safe?



How are advisories issued and communicated?

WARNING

Toxins from algae in this water can harm people and kill animals

 No swimming.	 Do not let pets or other animals go into or drink the water, or go near the scum.
 Stay away from scum, and cloudy or discolored water.	 Do not eat shellfish from this water.
 Do not use this water for drinking or cooking. Boiling or filtering will not make the water safe.	 For fish caught here, throw away guts and clean fillets with tap water or bottled water before cooking.

For people, the toxins can cause:

- Skin rashes, eye irritation
- Diarrhea, vomiting

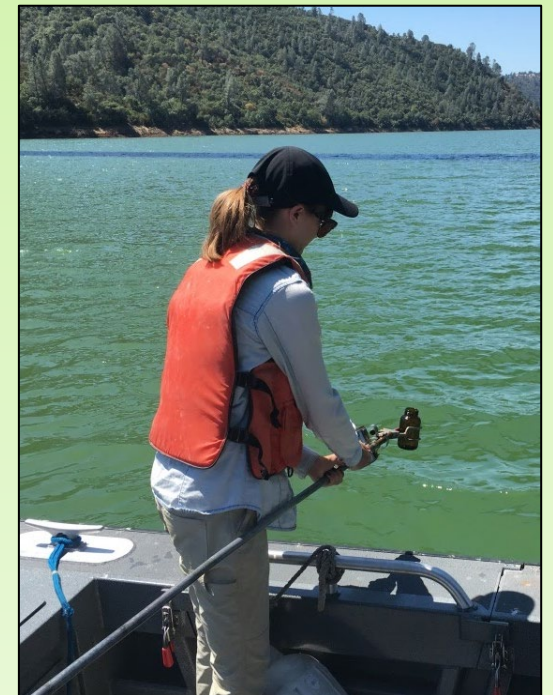
For animals, the toxins can cause:

- Diarrhea, vomiting
- Convulsions and death

Call your doctor or veterinarian if you or your pet get sick after going in the water.

For information on harmful algae, go to mywaterquality.ca.gov/monitoring_council/cyanohab_network
For local information, contact:

How to collect samples?



<https://mywaterquality.ca.gov/habs>

Response to Planktonic and Benthic HABs

- Primary exposure of benthics is through ingestion of mat material
 - Children and dogs are most at risk
- Different messaging for bloom types

Benthic blooms/proliferation	Planktonic blooms
Clear water from shore	Reduced water clarity
Fast and slow flows	Lakes, shallow beaches, slow flows
Attached, floating, stranded on shore	Mixed in water column or surface scums
<i>Potentially invisible from shore</i>	<i>Discoloration visible from shore</i>
Patchy distribution	Continuous in water column
Mixed algae and cyanobacteria mats	Blooms dominated by cyanobacteria
<i>No toxin trigger levels (ug/g)</i>	<i>Toxin Trigger levels (ug/L)</i>



California Voluntary Guidance for Response to HABs in Recreational Inland Waters

PLANKTONIC

Table 3. CCHAB trigger levels for posting PLANKTONIC advisory signs.

Trigger Levels For Human and Animal Health				
Criteria*	No Advisory ^a	Caution (TIER 1)	Warning (TIER 2)	Danger (TIER 3)
Total Microcystins ^b	< 0.8 µg/L	0.8 µg/L	6 µg/L	20 µg/L
Anatoxin-a	Non-detect ^c	Detected ^c	20 µg/L	90 µg/L
Cylindrospermopsin	< 1 µg/L	1 µg/L	4 µg/L	17 µg/L
Cell Density of potential toxin producers	< 4,000 cells/mL	4,000 cells/mL	_____	_____
Site-specific indicator(s)	No site-specific indicators present	Discoloration, scum, algal mats, soupy or paint-like appearance. Suspected illness	_____	_____

**Trigger levels apply only to recreational water concentrations (not for use in drinking water or algal mat assessments).*

* Action levels are met when one or more criteria are met.

^a For de-posting, all criteria for no advisory must be met for a minimum of 2 weeks. General awareness sign may remain posted and healthy water habits are still recommended.

^b Microcystins refers to the sum of all measured Microcystin congeners.

^c Must use an analytical method that detects ≤ 1µg/L Anatoxin-a.

CAUTION

PLANKTONIC

**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
For local information, contact:

Enter your contact information in this text box

WARNING

PLANKTONIC

Toxins from algae in this water can harm people and kill animals



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 information on harmful algae, go to mywaterquality.ca.gov/monitoring_council/cyanohab_network

For local information, contact:

Enter your contact information in this text box

DANGER

PLANKTONIC

Toxins from algae in this water can harm people and kill animals



**Stay out of the water until further notice.
Do not touch scum in the water or on shore.**



Do not let pets or other animals drink or go into the water or go near the scum.



Do not eat fish or shellfish from this water.



Do not use this water 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 information on harmful algae, go to mywaterquality.ca.gov/monitoring_council/cyanohab_network

For local information, contact: Enter your contact information in this text box

BENTHIC

CHECK FOR ALGAE

Toxic algal mats may be present in this water

Mats can be attached to the bottom, detached and floating, or washed up on shore



Presence of mats is sufficient for posting.

If you see algal mats:



Do NOT let children or adults touch, eat, or swallow any algal mats.



Do NOT let dogs eat algal mats or drink from the water.

Call your doctor or veterinarian if you or your pet get sick after contacting or ingesting algae. For more information on toxic algae visit: mywaterquality.ca.gov/habs
For local information, contact:

BENTHIC

TOXIC ALGAE ALERT

Toxic algal mats ARE present in this water

Mats can be attached to the bottom, detached and floating, or washed up on shore



Do NOT let children or adults touch, eat, or swallow any algal mats.



Do NOT let dogs eat algal mats or drink from the water.

Presence of potentially toxic mats AND planktonic bloom also present (visual indicators; trigger levels in water) OR cyanotoxins/cyanotoxin synthesis genes detected in mat material.



Call your doctor or veterinarian immediately if you or your pet get sick after contacting or ingesting algae. For more information on toxic algae visit: mywaterquality.ca.gov/habs

For local information, contact:

Date posted:

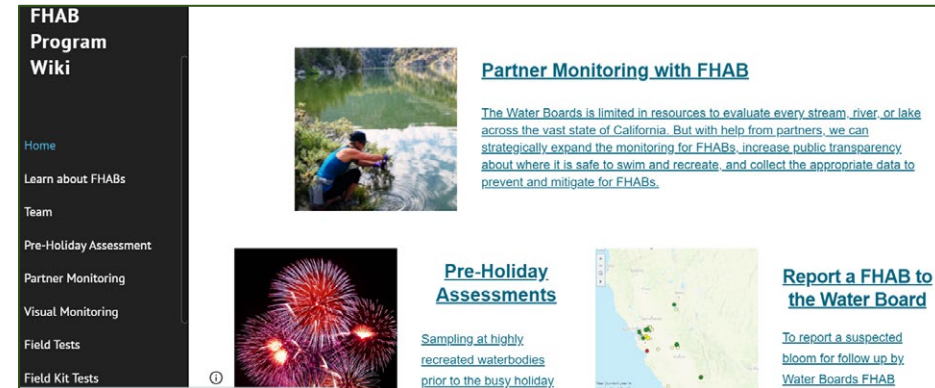


Tools to Bolster Our Program

FHAB Program Wiki: How to Start a HAB Monitoring Program and Partner with Us

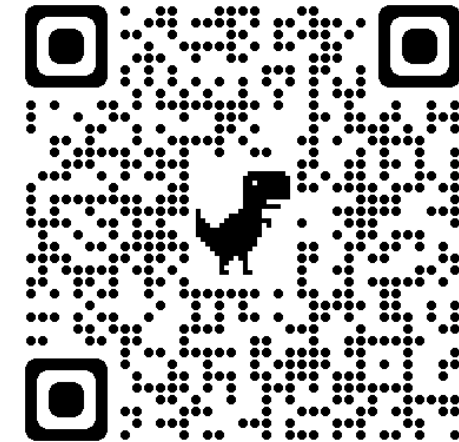
Training materials for FHAB Monitoring

- Tutorial Videos
- Visual Monitoring tools
- Instructions on field tests
- Benthic/planktonic monitoring for lab analyses
- Partner monitoring/Holiday assessment resources
- And more.....



The screenshot shows the FHAB Program Wiki homepage. On the left is a dark navigation menu with the following links: Home, Learn about FHABs, Team, Pre-Holiday Assessment, Partner Monitoring, Visual Monitoring, Field Tests, and Field Kit Tests. The main content area features three featured articles:

- Partner Monitoring with FHAB**: Accompanied by an image of a person sampling water. The text states: "The Water Boards is limited in resources to evaluate every stream, river, or lake across the vast state of California. But with help from partners, we can strategically expand the monitoring for FHABs, increase public transparency about where it is safe to swim and recreate, and collect the appropriate data to prevent and mitigate for FHABs."
- Pre-Holiday Assessments**: Accompanied by an image of fireworks. The text states: "Sampling at highly recreated waterbodies prior to the busy holiday."
- Report a FHAB to the Water Board**: Accompanied by a map of California. The text states: "To report a suspected bloom for follow up by Water Boards FHAB."

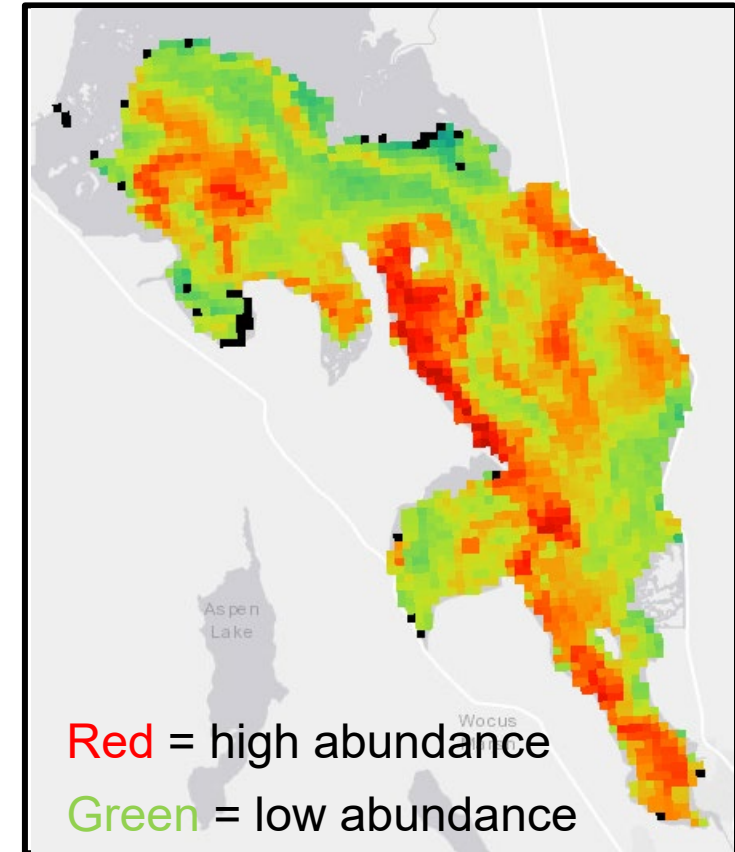


Satellite Map Screening Tool

Satellite CyanoHAB/Chl-a Map Tool

https://mywaterquality.ca.gov/habs/where/satellite_map.html

- Displays processed satellite imagery for ~250 largest water bodies
- Informs where cyanobacteria blooms are developing and prioritize field assessments
- No advisories are issued based on satellite data and imagery does not show toxin concentrations from blooms
- Added chlorophyll-a data in 2023 and expanding functionalities of platform (e.g., API, high resolution data)





HAB Illness Response

CA Interagency HAB-related Illness Workgroup

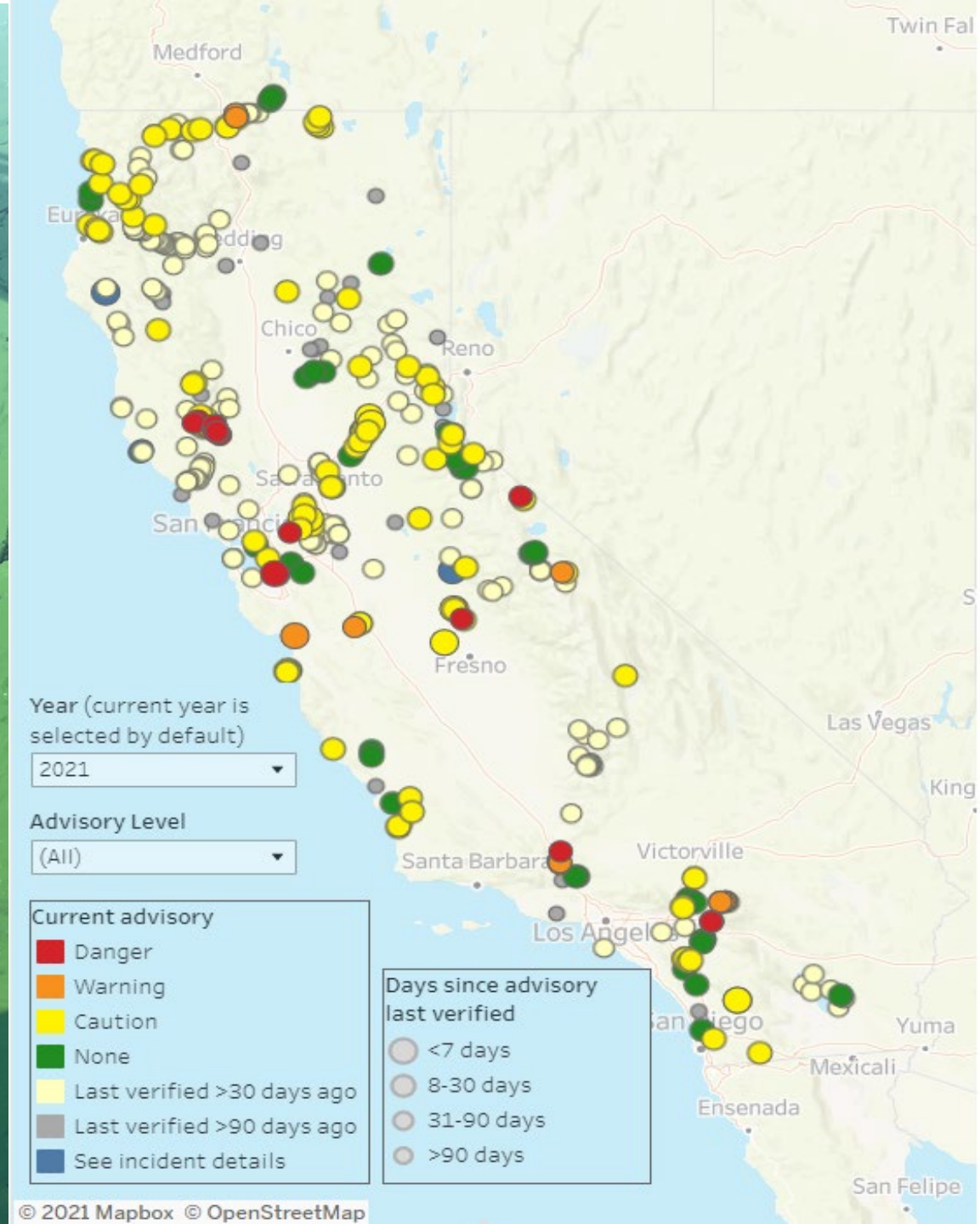
Workgroup began in late 2017 and includes technical staff from 4 state agencies

- Receive notifications for California human and animal illnesses potentially related to HABs
- Coordinate response to individual cases
 - Human: **CDPH/Tracking CA**
 - Domestic animal: **OEHHA**
 - Fish and wildlife: **CDFW**
 - Response and agency coordination (mostly freshwater/estuarine): **SWRCB**
- Consensus determination on which illnesses are “HAB-related”
- Investigate HAB-related cases, complete statewide tracking documentation, submit to OHHABS
- Develop/distribute outreach materials to public, medical, and veterinary professionals, local public and environmental health departments, and other target audiences
- Participate in CDC’s OHHABS “Community of Practice” calls



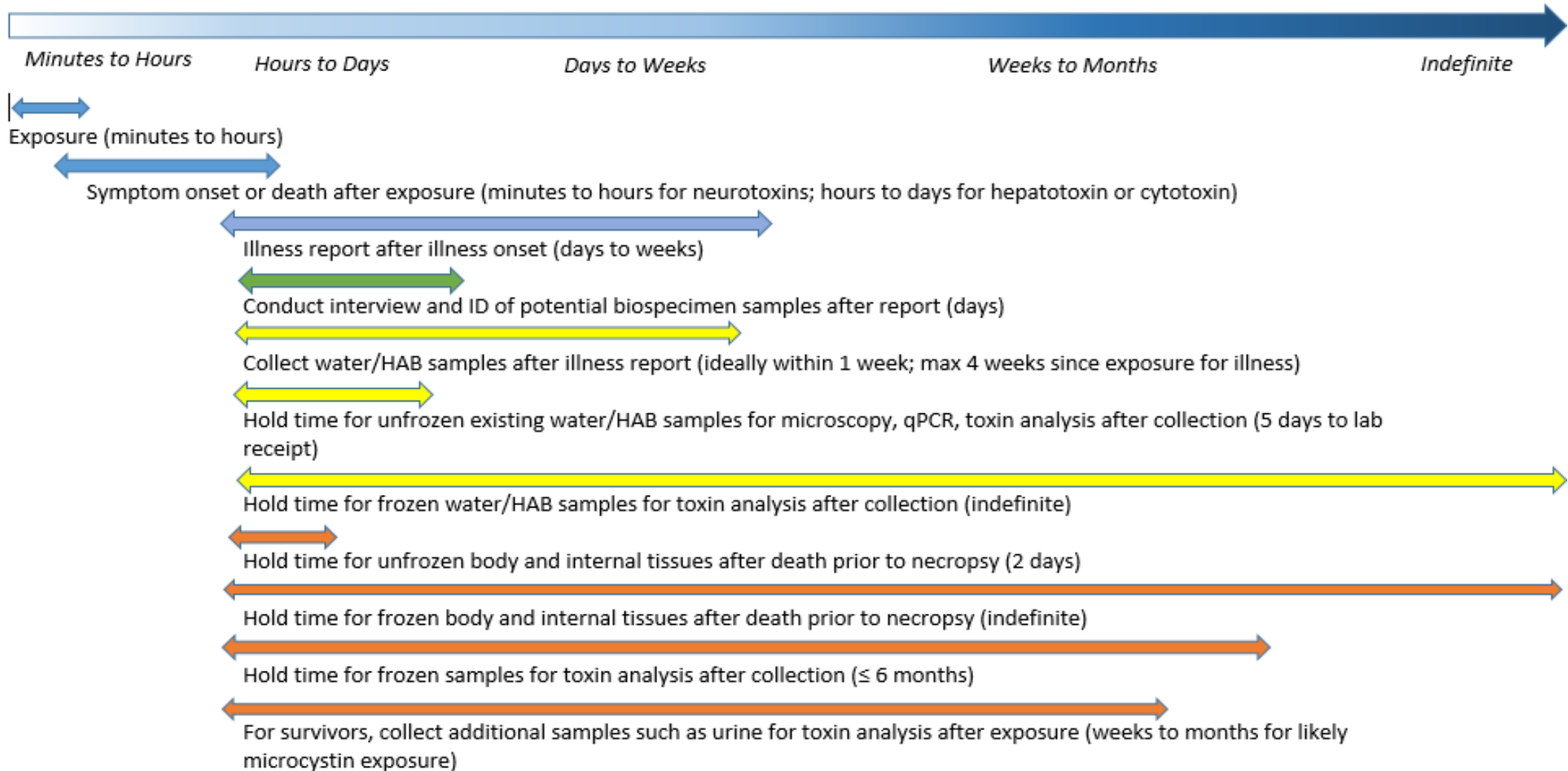
California HAB Tracking

YEAR	HAB Incident Reports Received	HAB <i>Illness</i> -Related Reports Received for Evaluation
2019	241	48
2020	370	42
2021	603	91
2022	684	80



Illness Evaluation Timeline

Figure 1. CONCEPTUAL ILLNESS EVALUATION TIMELINE. Arrow colors correspond to BLUE – illness/reporting party; GREEN – illness workgroup; YELLOW – environmental samples; ORANGE – biospecimen samples; length of arrows correspond to qualitative time scale with time since exposure increasing from left to right with approximate periods shown under the blue gradient arrow below).



Illness Determination by Illness Workgroup

Discuss details for each illness and reach consensus determination

- *HAB-related*
 - sufficient information on illness and symptomatic individual
 - onset and type of signs/symptoms are consistent with HAB exposure
 - sampling results and observations provide sufficient evidence of cyanobacteria and/or cyanotoxins consistent with symptom type(s) and severity
 - work with water body managers and FHAB regional coordinators to post [HAB-related signage](#) (available in English and Spanish), where appropriate
- *Not HAB-related*
 - Insufficient information on illness and/or potential HAB – **most frequent**
 - Illness onset/symptoms not consistent with HAB exposure in general or site-specific conditions
 - Another more likely cause of illness identified
 - Potential exposure only (not an illness)

Sample Case Determinations: HAB-related or not HAB-related?

Case Study 1: Human illness, 2 minor children

- Respiratory symptoms
- Environmental evidence- planktonic bloom, cyanobacteria present, toxins detected
- Determination- not HAB-related illness

Case Study 2: Dog death

- Neurological symptoms
- Environmental evidence- benthic bloom, cyanobacteria present, no toxins detected
- Determination- HAB-related death

Case Study 3: Fish death

- Large fish kill, only 1 species affected
- Environmental evidence- no visual bloom indicators, no cyanobacteria present
- Determination- not HAB-related death (cause of death definitively determined)

CDC's One Health Harmful Algal Bloom System (OHHABS)

OHHABS is a voluntary reporting system available to state and territorial public health departments and their environmental health or animal health partners since 2016.

OHHABS collects data on:

- Individual illnesses likely caused by exposure to a HAB
 - Humans
 - Domestic animals
 - Wild animals
- Environmental data about HABs

CDC has produced summary reports of OHHABS data

- [2016-2018](#)
- [2019](#)
- [2020](#)
- [2021](#) (16 states reported)

OHHABS REPORTING
ONE HEALTH Harmful Algal Bloom System

The One Health Harmful Algal Bloom System (OHHABS) is a CDC surveillance system. It informs actions to prevent people and animals from becoming ill from [harmful algal blooms \(HABs\)](#). Health departments work with their human, animal, and environmental health partners to detect and investigate HAB events and associated illnesses and report them to OHHABS. This is a One Health approach that improves surveillance and health outcomes by recognizing that human health is connected to the health of animals and our shared environment.

OHHABS collects data on HABs and associated illnesses in freshwater and coastal areas, including:

- HAB events
- Human illness
- Animal illness in pets, livestock, and wildlife

One Health partners help detect HAB events and associated illnesses
Understanding human and animal exposures and illnesses can help prevent future illnesses. Public health officials can also use information from algal bloom observations, toxin testing, and other measures of environmental impacts to reduce HAB exposures.

Human Illnesses
Partners that help detect human illnesses include:

- Healthcare providers
- Poison control centers
- General public

Animal Illnesses
Partners that help detect animal illnesses include:

- Veterinarians
- Wildlife biologists
- Pet and livestock owners

HAB Events
Partners that help detect HAB events include:

- Environmental professionals
- Researchers
- General public

Partners report HAB events and illnesses to health departments
Health departments review reports, collect additional information, and conduct case investigations for illnesses.

OHHABS users enter reports online
Public health users and their designated environmental and animal health partners review evidence, classify cases and events, and enter HAB environmental, human illness, and animal illness reports in OHHABS.

CDC analyzes and shares OHHABS data
OHHABS surveillance data can help public health professionals understand:

- The number of illnesses occurring each year
- Where illnesses are occurring across the U.S.
- Signs and symptoms in humans and animals

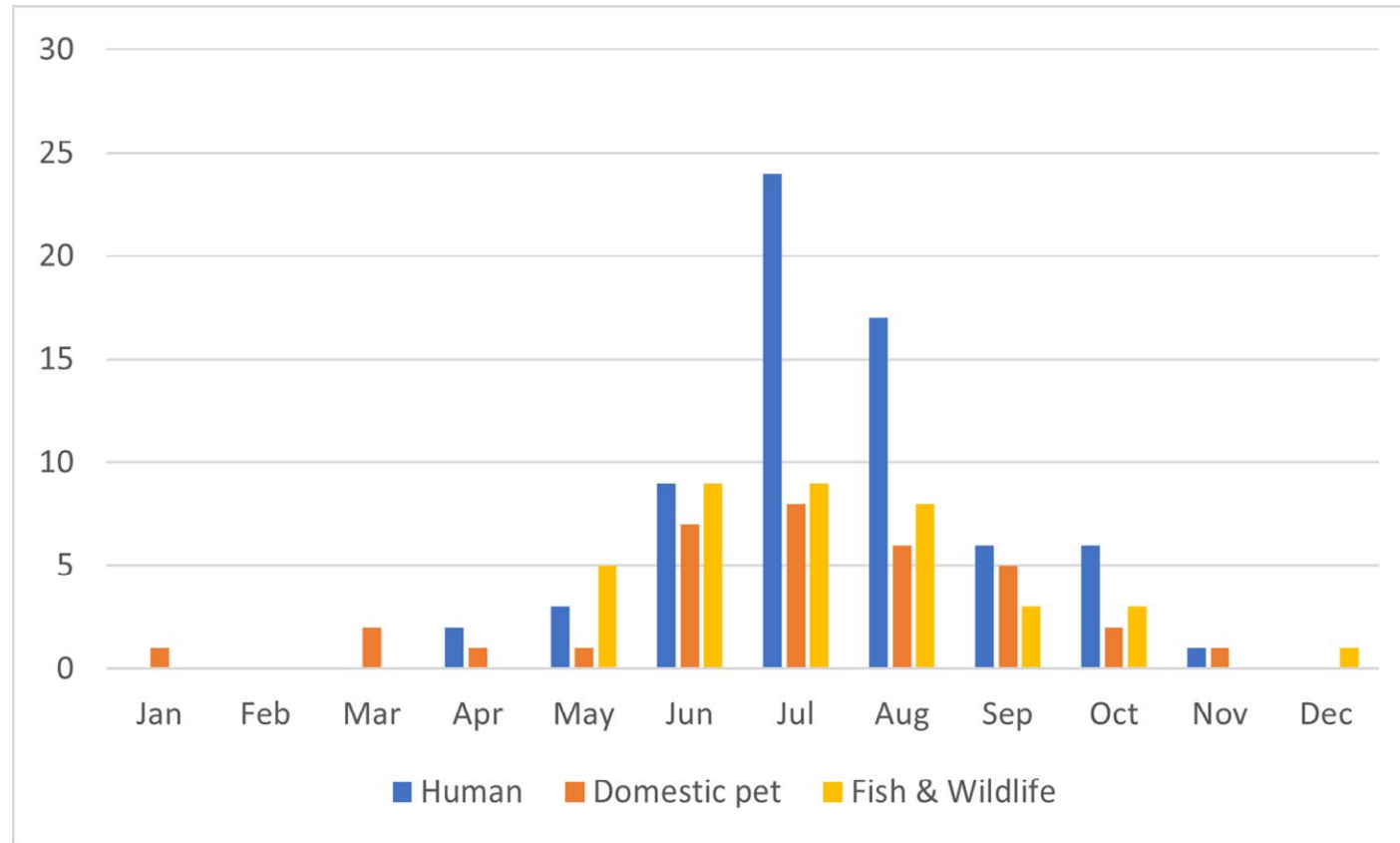
Centers for Disease Control and Prevention
Department of Health and Human Services

www.cdc.gov/habs/ohhabs

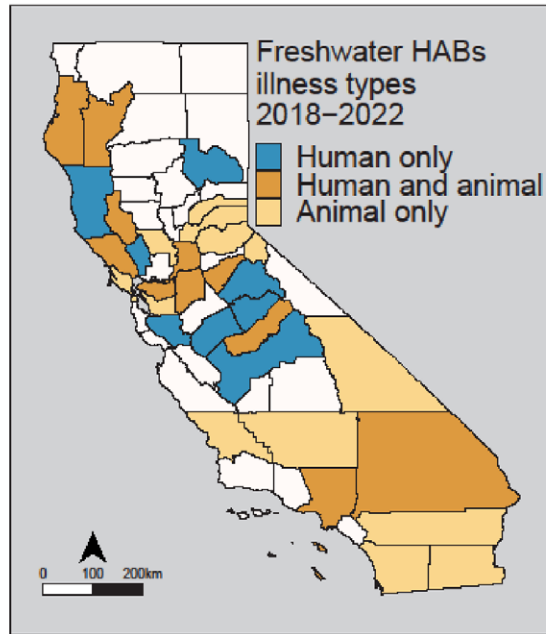
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Timing of Freshwater HAB-related Illness Reports (2018-2022)

*HABs occur year-round.
In California, it's
ALWAYS "HAB season."*



NEW – Illness Summary by County (2018-2022)



→ Click [link](#) to see number and type of cases by county.

County	Human	Animal *
Alameda	2	3
Alpine	0	1
Calaveras	2	1
Contra Costa	4	3
El Dorado	0	3
Fresno	3	0
Humboldt	2	2
Imperial	0	1
Inyo	0	1
Kern	0	1
Lake	5	8
Los Angeles	4	3
Madera	2	2
Marin	0	1
Mariposa	3	0
Mendocino	2	0
Merced	6	0
Napa	2	0
Nevada	0	3
Placer	0	4
Plumas	1	0
Riverside	1	5
Sacramento	2	3
San Bernardino	13	11
San Diego	0	2
San Francisco	0	1
San Joaquin	1	1
San Luis Obispo	0	2
Santa Clara	3	0
Sonoma	4	1
Trinity	1	2
Tulare	5	1
Tuolumne	2	0
Yolo	0	4

In which counties did these reported freshwater HAB-related illnesses occur?

The maps below display the counties in which freshwater HAB-related illnesses for California (reported to OHHABS) have occurred for previously reported years combined (2018-2021) and for 2022. Illnesses are grouped by human-only, human and animal (domestic or wild), or animal only. A more detailed [table with cumulative HAB-related illnesses in humans and animals, by county](#), is also available.

* May represent groups of animals, such as with fish kills.

HAB-Related Illness Tracking Outreach Materials

Freshwater Harmful Algal Bloom-related Illness Tracking in California

What are freshwater harmful algal bloom (HAB)-related illnesses?

When algae and cyanobacteria (also known as blue-green algae) occur in freshwater and estuarine waterbodies at levels that pose a risk to humans, animals, and the environment, they are referred to as [freshwater harmful algal blooms \(HABs\)](#). Humans and animals can become sick after ingesting or contacting cyanobacteria, water contaminated with cyanotoxins, or algal mats. Cyanotoxins may also accumulate in fish and shellfish. Signs and symptoms may occur within minutes or days following exposure and may include:

- irritation of skin, ears, eyes, nose, or throat
- abnormal breathing (coughing, wheezing, asthma-like symptoms)
- vomiting, diarrhea, abdominal pain
- headaches, agitation, weakness
- seizures and death (in animals).

How can I report an illness that may be related to freshwater HABs?

Please report any suspected freshwater HAB or potential HAB-related illness by any of these methods:

- Fill out the [Online Freshwater HAB Report Form](#) including the illness information section
- Call (844) 729-6466 (toll free)
- Email CvanHAB.Reports@waterboards.ca.gov.

How can I protect myself, my family, and my pets from freshwater HAB-related illness?

- Check if a waterbody has a reported bloom on the [HAB Reports Map](#), contact the waterbody manager, and look for [posted advisory signs](#).
- Check to see if the water is [discolored](#), or has [scum or algal mats](#).
- Always practice [healthy water habits](#) at your local lake, reservoir, river, or stream.

Learn more on the [California HABs Portal](#)

(<https://mywaterquality.ca.gov/habs/>):

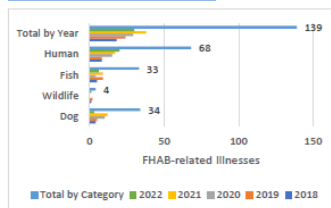
- [Frequently Asked Questions \(FAQs\) for HABs](#)
- [FAQs for Human Health and Resources for Medical Professionals](#)
- [FAQs for Dogs, Livestock and other Large Animals and Resources for Veterinarians](#)
- [FAQs for Fish and Wildlife](#)
- [Visual Guide Factsheet for Freshwater HABs](#)

Who is tracking HAB-related illnesses in California?

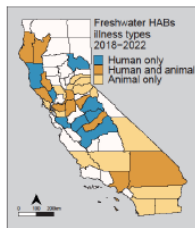
The interagency HAB-related Illness Workgroup investigates and tracks potential HAB-related illnesses in humans and animals throughout California and includes staff from the Office of Environmental Health Hazard Assessment, State Water Resources Control Board, California Department of Public Health (CDPH), and the California Department of Fish and Wildlife. This workgroup also investigates and tracks [marine HAB-related illnesses](#) in California.

How many freshwater HAB-related illnesses have been reported for California?

From 2018-2022, CDPH reported 139 freshwater HAB-related human and animal illnesses from California to the Centers for Disease Control and Prevention's [One Health Harmful Algal Bloom System](#) (OHHABS).



In which counties did these reported freshwater HAB-related illnesses occur?



Marine Harmful Algal Bloom-Related Illness Tracking in California

<https://oehha.ca.gov/fish/general-info/marine-harmful-algal-bloom-hab-related-illness-tracking>

What are marine harmful algal bloom (HAB)-related illnesses?

When phytoplankton and algae in marine waters occur at levels that pose a health risk to humans, animals, and the environment, they are referred to as marine harmful algal blooms (HABs). The US Centers for Disease Control and Prevention (CDC) provide resources on potential [human and animal exposures to marine HABs or associated marine biotoxins](#).

- People exposed to marine HABs during water contact may experience irritation of the eyes, skin, or respiratory system. People may experience nausea, vomiting, diarrhea, or neurological symptoms following ingestion of seafood contaminated with marine biotoxins. [Contact a medical provider or the California Poison Control System \(1-800-222-1222\) if you experience these symptoms after potential exposure to marine HABs.](#)
- Marine mammals and birds may be stranded onshore with neurological symptoms associated with [ingestion of marine HABs and marine biotoxins](#), particularly domoic acid (DA). *If a sick, injured, or dead wild marine animal (mammal, bird, or turtle) is found, please report it as soon as possible to the [appropriate resource agencies and animal rescue organizations](#), which are listed on the Office of Environmental Health Hazard Assessment's (OEHA's) [marine HAB-related illness tracking webpage](#).*

How can I protect myself, my family, and my pets from marine HAB-related illness?

- Check to see if the water has scum or is discolored prior to water contact.
- Follow [health advisories for marine biotoxins in fish and shellfish](#).
- Follow [CDC's general guidelines to protect yourself and your pets](#).

More information on marine HABs is available on the [Marine HAB-Related Illness Tracking webpage](#).

Who is tracking HAB-related illnesses in California?

The Interagency HAB-related Illness Workgroup investigates and tracks potential HAB-related illnesses in humans and animals throughout California and includes staff from OEHA, the State Water Resources Control Board, California Department of Public Health (CDPH), and the California Department of Fish and Wildlife (CDFW). This workgroup also tracks and investigates [freshwater and estuarine HAB-related illnesses](#) in California.

How can I notify the HAB-related Illness Workgroup of a potential marine HAB-related illness in California?

- Potential marine HAB-related human illness: please email CDPH at Thomas.Hayashi@cdph.ca.gov.
- Potential marine HAB-related animal illness: please email OEHA at marinehab@oehha.ca.gov.

How many marine HAB-related illnesses have been reported for California?

- Marine animal strandings related to DA are reported into the Southern California Coastal Ocean Observing System (SCCOOS) by many of the [California marine animal rescue centers](#). The HAB-related Illness Workgroup tracks these marine HAB-related illnesses (since 2019), and submits the reports to CDC's [One Health Harmful Algal Bloom System](#) (OHHABS). Numbers and locations are available on an [interactive tool for suspected DA marine mammal strandings](#) developed by SCCOOS.
- Other marine HAB-related illnesses reported in California for previous years (2019-2021), the most recent year (2022), and the overall total reported to date are included in the table below.

Category	2019-2021	2022	Total
Human (water contact)	1	2	3
Marine Invertebrate	2	2	4
Marine Mammals & Birds	307	116	423

Spring 2023



Freshwater HAB-related illness

- English: [webpage](#) and [factsheet](#)
- Spanish: [webpage](#) and [factsheet](#)

Marine HAB-related illness

- English : [webpage](#) and [factsheet](#)
- Spanish : [webpage](#) and [factsheet](#)

**Distribution is ongoing.
Please help us share!**

<https://mywaterquality.ca.gov/habs/docs/factsheet-en.pdf>

<https://oehha.ca.gov/media/downloads/fish/factsheet/mhabillnesstrackingfactsheet2023.pdf>

Thank You! Please reach out.

SWRCB: cyanoHAB.reports@waterboards.ca.gov

OEHHA: Shannon.Murphy@oehha.ca.gov

CDFW: Karen.Odkins@Wildlife.ca.gov

CDPH: Thomas.Hayashi@cdph.ca.gov

