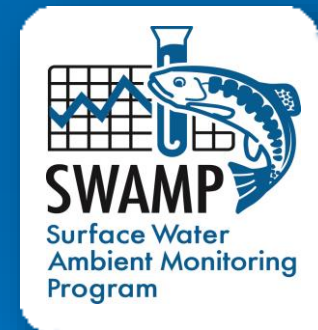


# California Harmful Algal Blooms (HABs) Incident Response

Beverley Anderson-Abbs  
Environmental Scientist  
Surface Water Ambient  
Monitoring Program



Jon B Marshack, DEnv  
Executive Director  
CA Water Quality Monitoring Council



# Why California needs a Freshwater Harmful Algal Bloom (HAB) Strategy

- HABs increasing worldwide and in California
  - Increasing water temperatures
  - High nutrient concentrations
  - Drought – less water, low flows
- HABs create significant water quality issues



# Where are they?



Lakes



Wetlands



Rivers and streams



Estuaries



Marine waters

# Microcystis

- 💧 Most common toxic cyanobacteria
- 💧 Produces microcystins
- 💧 Microcystin human health thresholds
  - 💧 OEHHA recreation = 0.8 ug/L
  - 💧 USEPA drinking water = 0.3 ug/L



Toxin	Chemical Class	Action	Effect	Reference	Producing Species
<b>Microcystins</b>	Cyclic heptapeptides; 80 variants; microcystin-LR is most toxic	Serine/threonine protein phosphatase (1 and 2A) inhibitors	Hepatotoxin; damages liver	MacKintosh <i>et al.</i> 1990, Yoshizawa <i>et al.</i> 1990	<b><i>Microcystis aeruginosa</i></b> <i>Planktothrix sp.</i> <i>Phormidium sp.</i> <b><i>Anabaena sp.</i></b> <i>Anabaenopsis sp.</i> <i>Nostoc sp.</i> <i>Oscillatoria limosa</i> <i>Radiocystis sp.</i> <i>Gloeotrichia sp.</i>
<b>Anatoxin-a</b>	Alkaloid	Competitive inhibitor of acetyl choline	Neurotoxins: causes death by respiratory arrest	Devlin <i>et al.</i> 1977, Carmichael <i>et al.</i> 1990, Skulberg <i>et al.</i> 1992	<b><i>Anabaena sp.</i></b> <b><i>Aphanizomenon sp.</i></b> <i>Planktothrix sp.</i> <i>Phormidium sp.</i> <i>Oscillatoria sp.</i> <i>Raphidiopsis sp.</i> <i>Cylindrospermum sp.</i>
<b>Cylindrospermopsin</b>	Cyclic guanidine alkaloid	Protein synthesis inhibitor	Hepatotoxin/ Cytotoxin; affects liver, also kidney, spleen, thymus and heart	Runnegar <i>et al.</i> 1994, Terao <i>et al.</i> 1994, Ohtani <i>et al.</i> 1992	<b><i>Cylindrospermopsis sp.</i></b> <b><i>Anabaena sp.</i></b> <b><i>Aphanizomenon sp.</i></b> <i>Raphidiopsis sp.</i> <i>Umezakia natans</i>

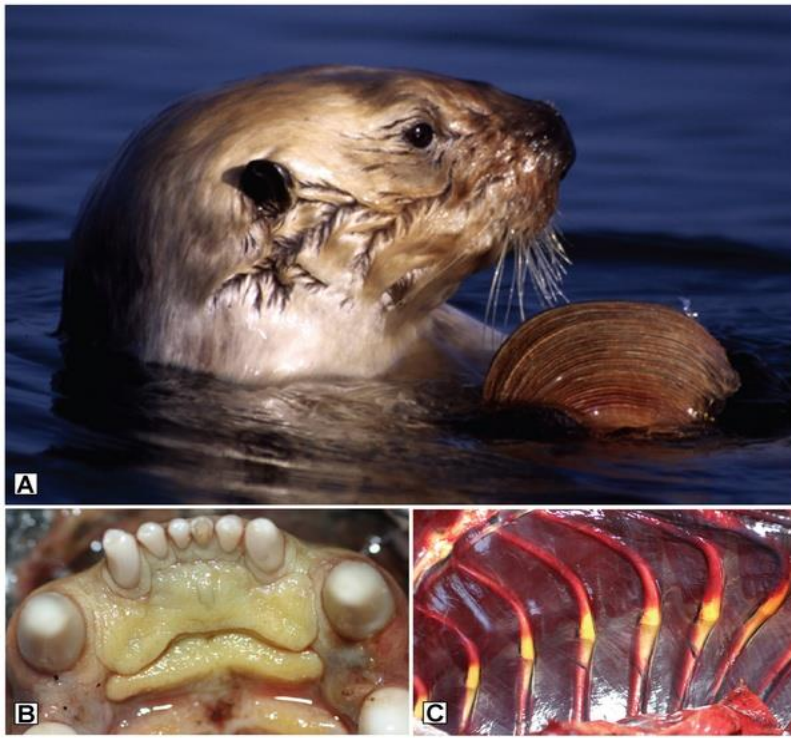
# Freshwater Toxins Record Breaking Years 2014 – 2015

- First time several lakes closed due to cyanotoxins
- Extremely high toxin concentrations recorded
- Several dog deaths attributed to toxins
- Multiple toxins detected simultaneously



# Freshwater Impacts to Marine Waters

## Pinto Lake



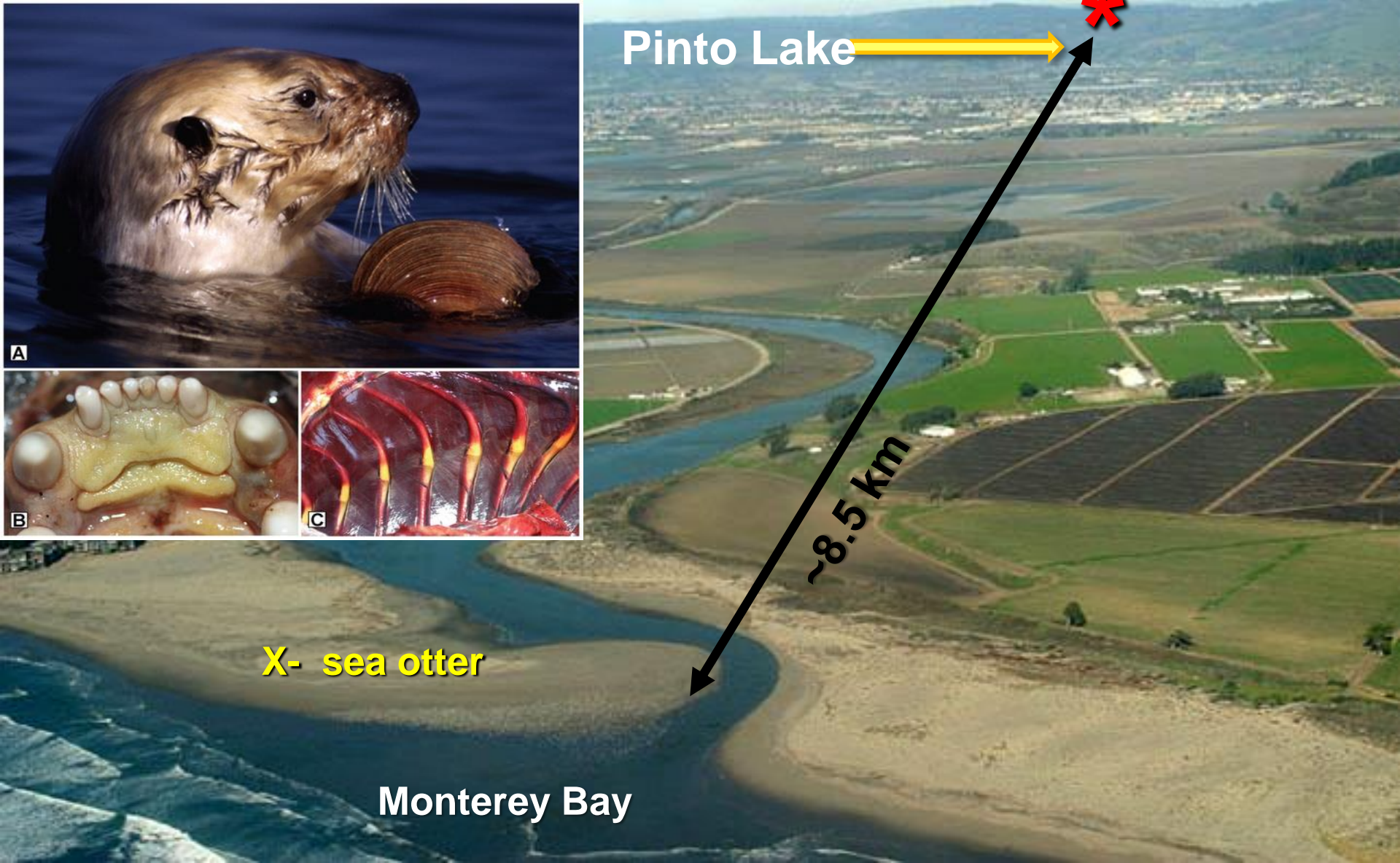
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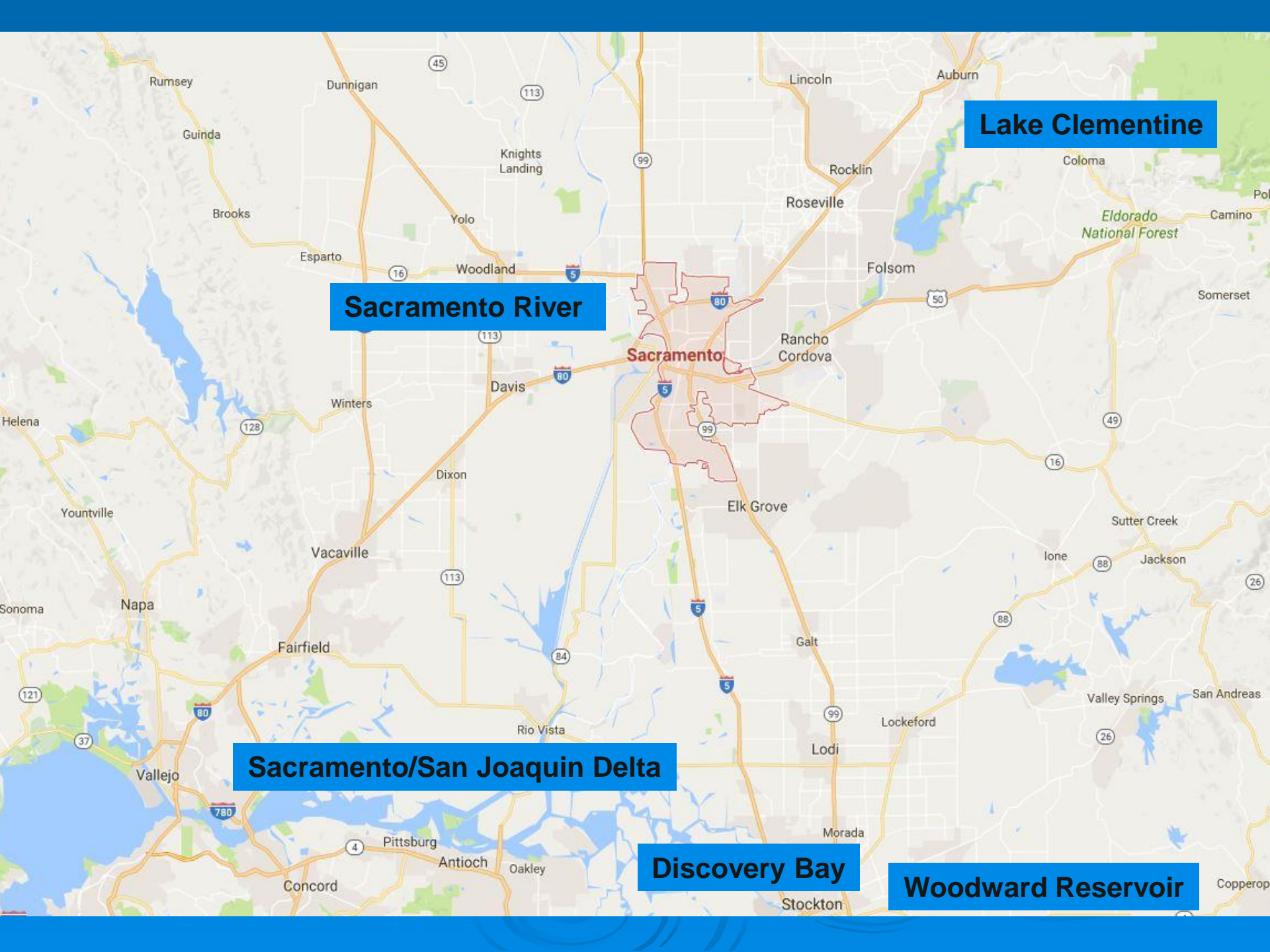
~8.5 km

X- sea otter

Monterey Bay







**Lake Clementine**

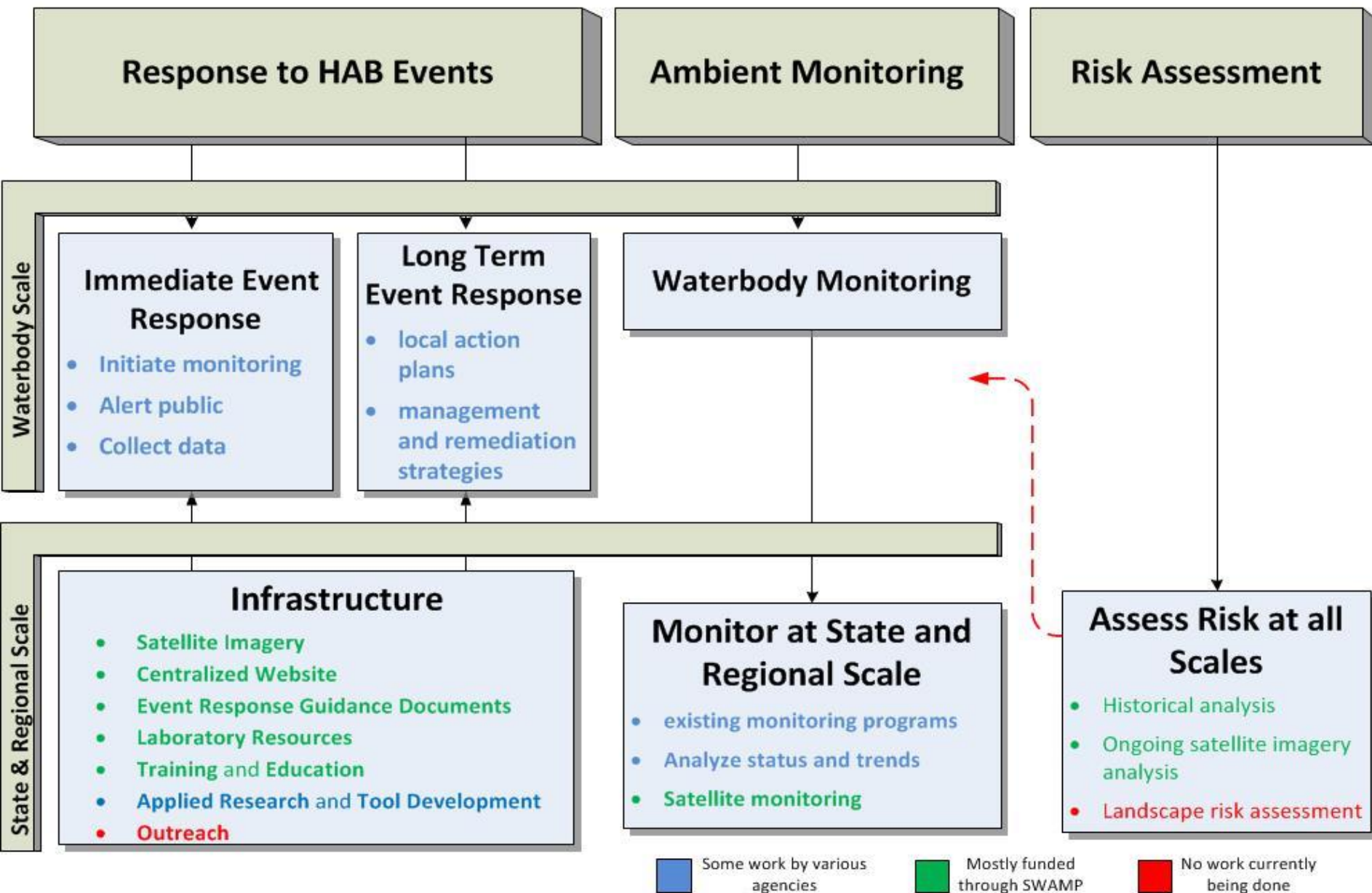
**Sacramento River**

**Sacramento/San Joaquin Delta**

**Discovery Bay**

**Woodward Reservoir**

# Freshwater HABs Assessment and Support Strategy Framework





# Website and Portals

[www.MyWaterQuality.ca.gov](http://www.MyWaterQuality.ca.gov)



Portals

About Us

Work Groups

These web portals, supported by a wide variety of public and private organizations, present California water quality and aquatic ecosystem monitoring data and assessment information that may be viewed across space and time.



## Welcome to My Water Quality

### Is Our Water Safe to Drink?



Safe drinking water depends on a variety of chemical and biological factors regulated by a number of local, state, and

federal agencies. *[Future Portal]*

### Is it Safe to Swim in Our Waters?



Swimming safety of our waters is linked to the levels of pathogens that have the potential to cause disease. [Learn more >>](#)

### Is it Safe to Eat Fish and Shellfish From our Waters?



Aquatic organisms are able to accumulate certain pollutants from the water in which they live, sometimes reaching

levels that could harm consumers. [Learn more >>](#)

### Are Our Aquatic Ecosystems Healthy?



The health of fish and other aquatic organisms and communities depends on the chemical, physical, and

biological quality of the waters in which they live.

[Learn more >>](#)

### Are Harmful Algal Blooms Affecting Our Waters?



Harmful algal blooms can make water unsafe for swimming and other recreational activities. The

toxins they produce can harm pets, livestock, and people. [Learn more >>](#)

### About Us



The Monitoring Council seeks to provide multiple perspectives on water quality information and to highlight existing data gaps and inconsistencies in data collection and interpretation. [Learn more >>](#)

View the new **Harmful Algal Blooms Portal**.  
Increasing due to drought and climate change, HABs are threatening the use of our waters.

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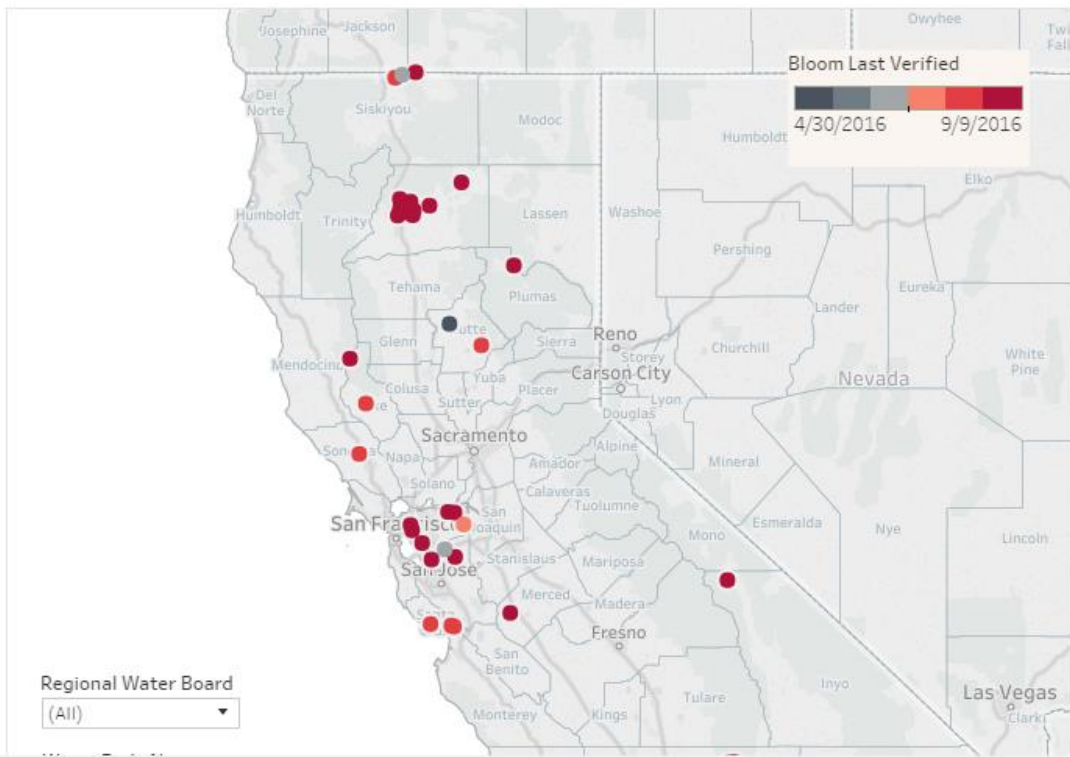


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### News and Announcements

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- [Current Advisories](#)
- [Bulletins & Newsletters](#)
- [California CyanoHAB Network](#)

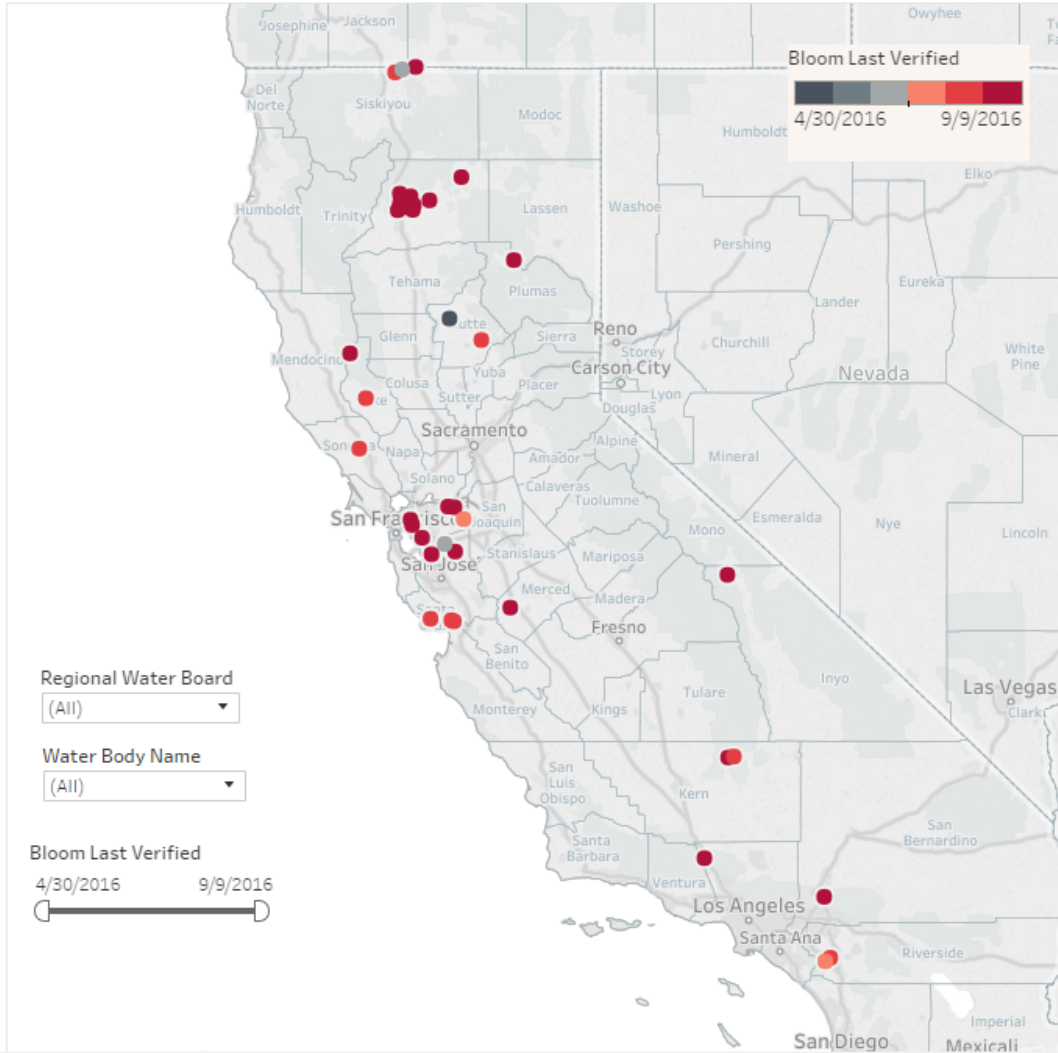
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- **What are harmful algal blooms?**
  - What are harmful algae?
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  - Where do they come from?
  - Why should I be concerned?
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    - Drinking water
    - Fish & shellfish harvesting
    - Domestic animals
    - Wildlife
- **Where are harmful algal blooms occurring?**
  - HABs event maps
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- **What resources and guidance are available to address harmful algal blooms?**
  - Recreational Water Use

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  - [Monitoring](#)
  - [Laboratory Resources](#)
  - [Freshwater Assessment and Support Strategy](#)
  - [Freshwater Incident Response and Interagency Coordination](#)
  - [Informational Presentations](#)
  - [Other Resources](#)

## What are harmful algal blooms?

### What are cyanobacteria and harmful algae?

At the base of the food chain in fresh, brackish, and marine systems are photosynthetic cyanobacteria and algae. Both single-celled microscopic and larger multicellular forms exist. When conditions are optimal, including light and temperature, levels of nutrients, and lack of water turbulence, cyanobacteria and some algae can quickly multiply into a **harmful algal bloom (HAB)**. Some cyanobacteria and harmful algae can produce toxic chemicals, including cyanotoxins, domoic acid, and other algal toxins.

### Why are they important?

Cyanobacteria and algae are present in most freshwater and marine aquatic ecosystems, and perform many roles that are vital for ecosystem health. Cyanobacteria and algae provide organic matter and energy to higher trophic levels, such as aquatic insects and fish.

### Where do they come from?

There are a large number of environmental factors that have been linked to bloom increases and toxin production. These include climate change, nutrient over-enrichment (nitrogen and phosphorus), higher temperatures, salinity, water residence time (stagnation), vertical lake stratification, organic matter enrichment, and high pH (more alkaline).

### Why should I be concerned?

Cyanobacteria and harmful algal blooms (HABs) can have negative impacts on the environment, people, pets, wildlife, or livestock, as well as the economy. Some HABs can produce large amounts of cyanotoxins or algal toxins, which can poison livestock, wildlife, and humans. Certain other types of cyanobacteria are nontoxic but can impart an unpleasant taste to water and fish as well as giving off an unpleasant smell as they die and decay. Cyanotoxins and algal toxins pose risks to the health and safety of people and pets recreating in water bodies, eating fish, and drinking water. They can accumulate in fish and shellfish to

- What are the impacts of cyanobacteria and harmful algal blooms?
  - Swimming & recreation
  - Drinking water
  - [Fish & shellfish harvesting](#)
  - Domestic animals
  - Wildlife
- [How do I identify harmful algae?](#)

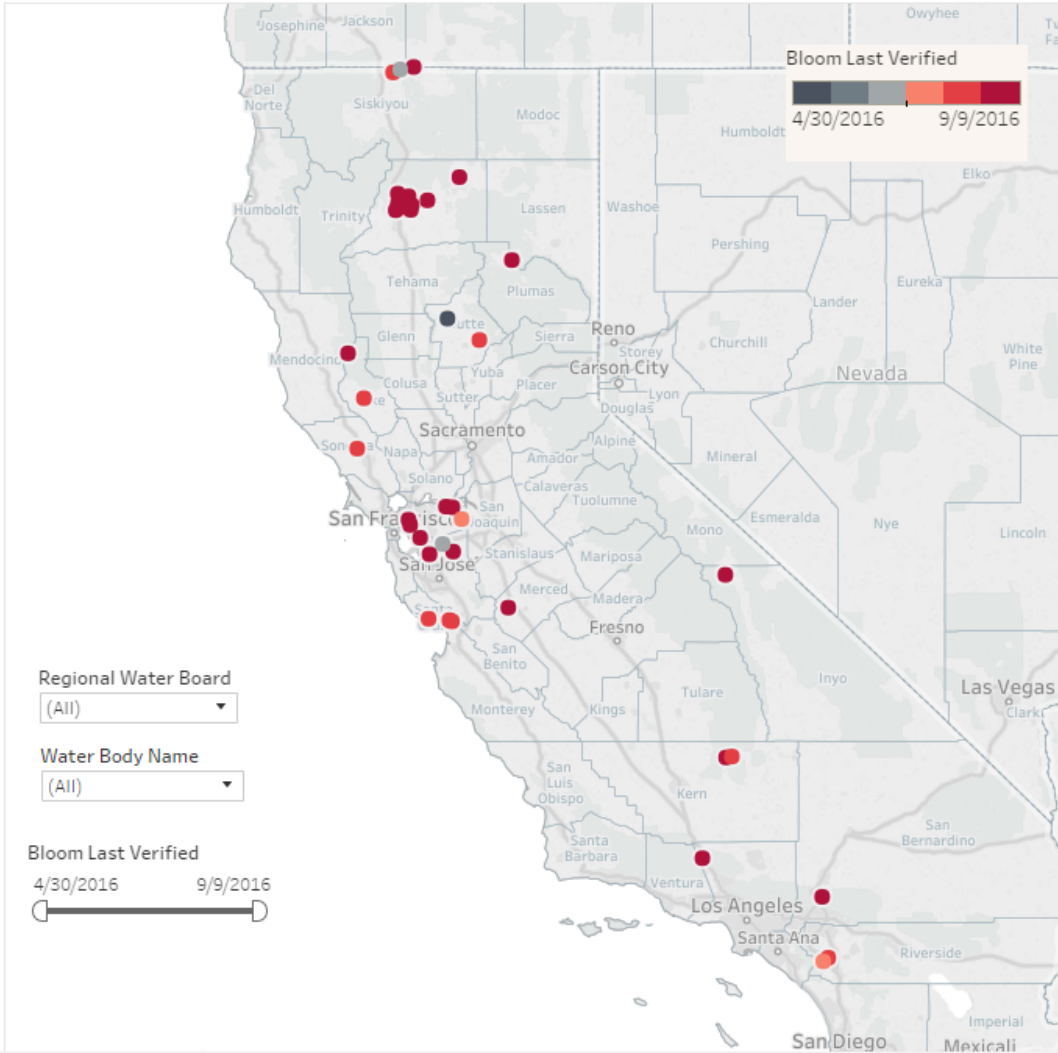




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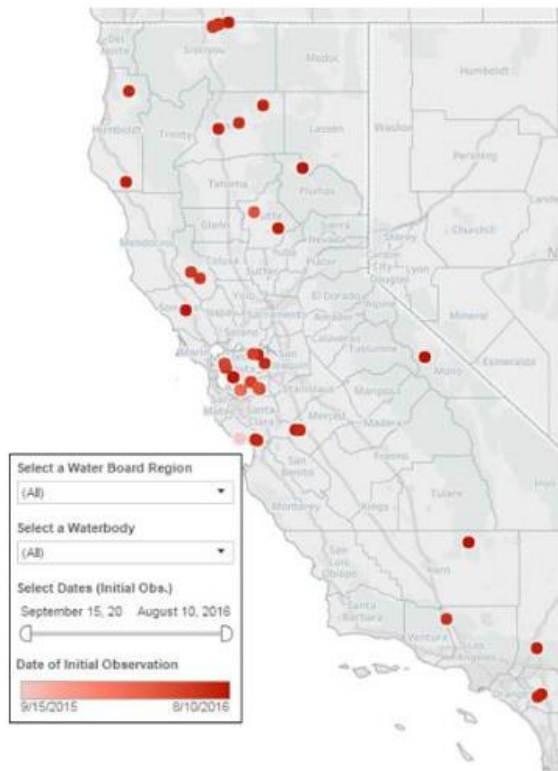
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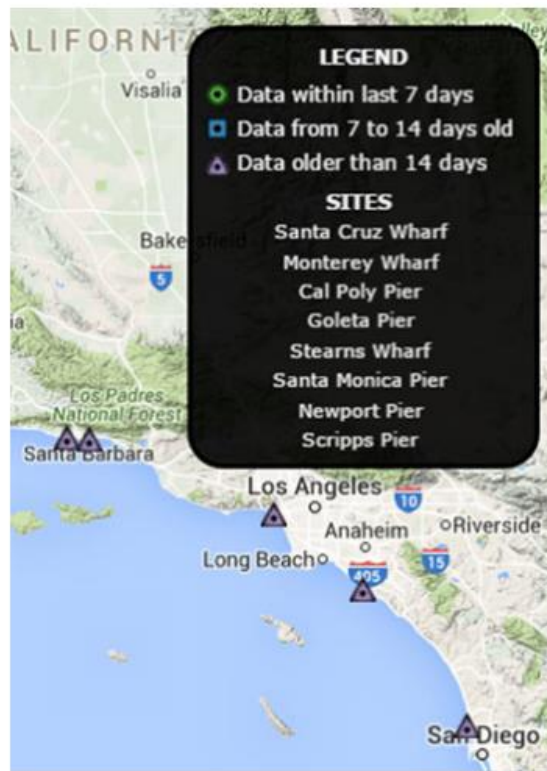
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Recreational closures and advisories



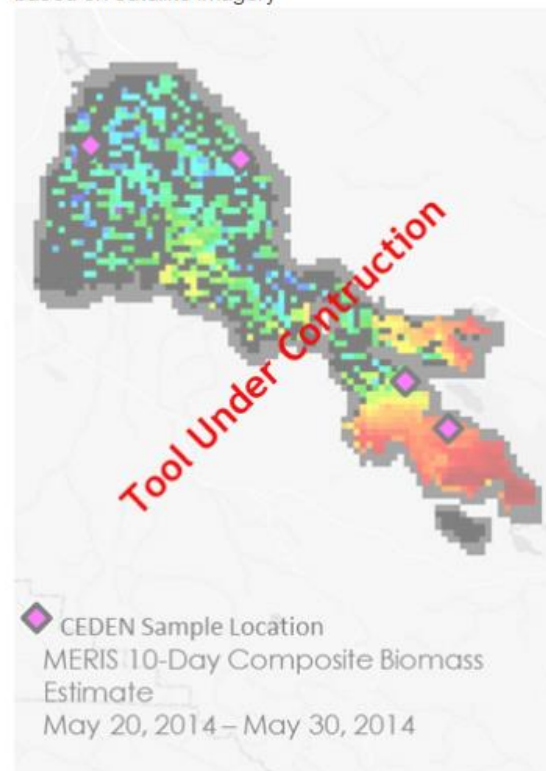
### CalHABMAP

Marine HABs information



### Satellite Maps

Where HABs are occurring in larger water bodies based on satellite imagery

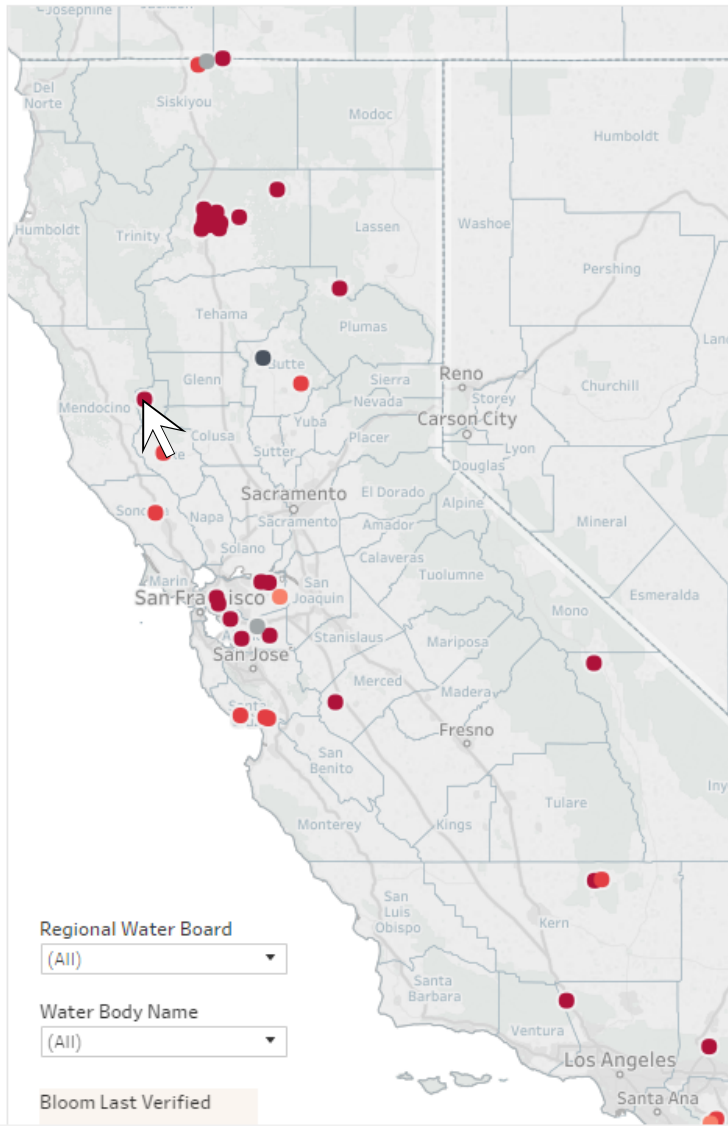


- Klamath Basin Monitoring Program, Blue-Green Algae Tracker

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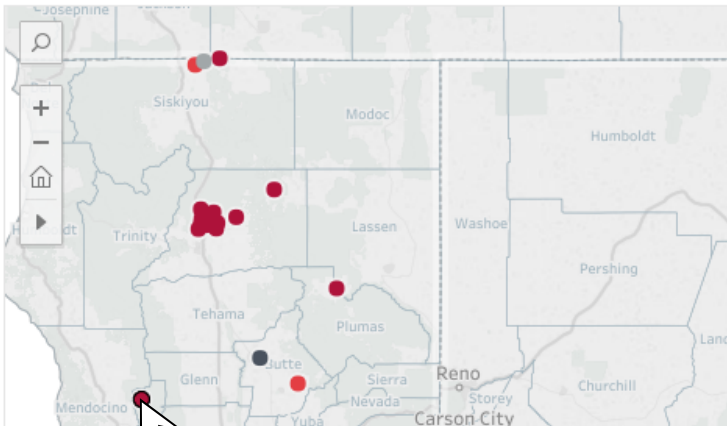


Regional Water Board	Waterbody Name	Day of First Observed	Day of Bloom Last Verified	
<b>Central Coast</b>	Kelly Lake	July 15, 2016	August 2, 2016	<a href="#">Details</a>
	Pinto Lake	August 2, 2016	August 2, 2016	<a href="#">Details</a>
	San Lorenzo River Lagoon	September 15, 2015	August 2, 2016	<a href="#">Details</a>
<b>Central Valley</b>	Big Break Regional Shoreline	July 25, 2016	September 9, 2016	<a href="#">Details</a>
	California Park Lake	April 24, 2016	April 30, 2016	<a href="#">Details</a>
	Clear Lake	June 19, 2016	July 28, 2016	<a href="#">Details</a>
	Discovery Bay	July 15, 2016	July 15, 2016	<a href="#">Details</a>
	Isabella Lake	August 10, 2016	August 10, 2016	<a href="#">Details</a>
	Kern River	August 3, 2016	September 9, 2016	<a href="#">Details</a>
	Lake Britton	July 22, 2016	September 9, 2016	<a href="#">Details</a>
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	Mountain Meadows Reservoir	August 5, 2016	September 9, 2016	<a href="#">Details</a>
	O'Neill Forebay	July 11, 2016	September 9, 2016	<a href="#">Details</a>
	San Joaquin River (Stockton ..	June 2, 2016	September 9, 2016	<a href="#">Details</a>
	San Luis Reservoir	July 26, 2016	September 11, 2016	<a href="#">Details</a>
	Shasta Lake	July 5, 2016	September 9, 2016	<a href="#">Details</a>
	Shasta Lake - Bridge Bay	August 24, 2016	September 2, 2016	<a href="#">Details</a>
	Shasta Lake - Digger Bay	August 24, 2016	September 2, 2016	<a href="#">Details</a>
	Shasta Lake - Holiday Harbor	August 24, 2016	September 2, 2016	<a href="#">Details</a>
Shasta Lake - Jones Valley	August 9, 2016	September 2, 2016	<a href="#">Details</a>	
Shasta Lake - McCloud Arm	August 24, 2016	September 2, 2016	<a href="#">Details</a>	
Shasta Lake - O'Brien area	August 24, 2016	August 24, 2016	<a href="#">Details</a>	
Shasta Lake - Sacramento Arm	August 24, 2016	September 2, 2016	<a href="#">Details</a>	
Shasta Lake - Silverthorn	August 9, 2016	September 2, 2016	<a href="#">Details</a>	
Shasta Lake - Squaw Arm	August 9, 2016	September 2, 2016	<a href="#">Details</a>	
<b>Lahontan</b>	Diaz Lake	September 1, 2016	September 13, 2016	<a href="#">Details</a>
	Millpond	September 1, 2016	September 2, 2016	<a href="#">Details</a>
	Silverwood Lake	July 25, 2016	September 6, 2016	<a href="#">Details</a>
<b>Los Angeles</b>	Pyramid Lake	July 6, 2016	September 8, 2016	<a href="#">Details</a>
<b>North Coast</b>	Copco Reservoir	June 24, 2016	June 27, 2016	<a href="#">Details</a>
	Iron Gate Reservoir	June 20, 2016	August 9, 2016	<a href="#">Details</a>
	Klamath River	July 28, 2016	September 1, 2016	<a href="#">Details</a>
	Lake Pillsbury	August 31, 2016	August 31, 2016	<a href="#">Details</a>
	Russian River	August 4, 2016	August 8, 2016	<a href="#">Details</a>
<b>San Francisco Bay</b>	Arroyo del Valle	June 1, 2016	July 1, 2016	<a href="#">Details</a>

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## Lake Pillsbury

**Bloom Last Observed:** 8/31/2016 **First Date Observed:** 8/31/2016

**Signs Posted:** Caution **Bloom Determined by:** Observatio

**Latitude:** 39.436 **Longitude:** -122.967  
**County:** Lake **Regional Water Board:** North Coast

**Type of Waterbody:** Lake

**Waterbody Manager:** Land Manager:

**Incident Description:** *Cyano bacteria bloom noted in the Northern fingers of the lake and in the Western (near the Lake Pillsbury Resort) and Southwestern margins (near the Rice Fork and Dam outlet). Along the shoreline and docks and in the shallow portions of the northern fingers of the lake. Bloom contained aphanizomenon and microcystin, and likely other cyanobacteria. Tentative results for anatoxin-a and microcystin were all ND.*

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Regional Water Board  
 (All) ▼

Water Body Name  
 (All) ▼

Bloom Last Verified



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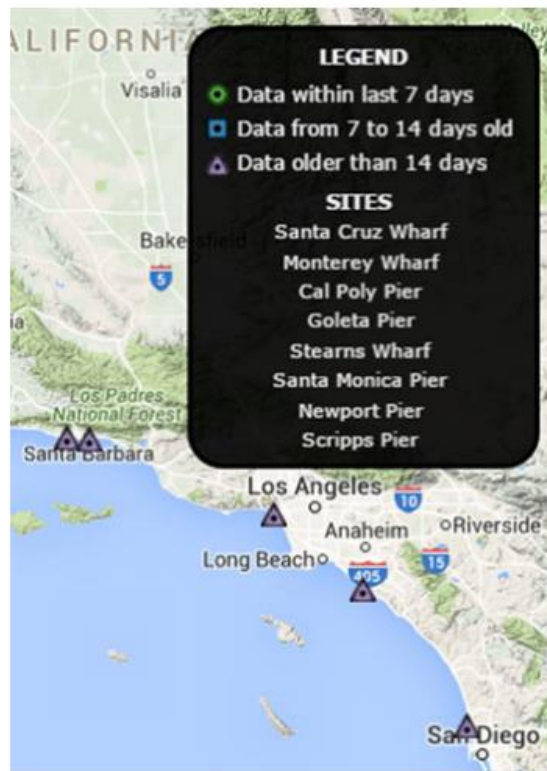
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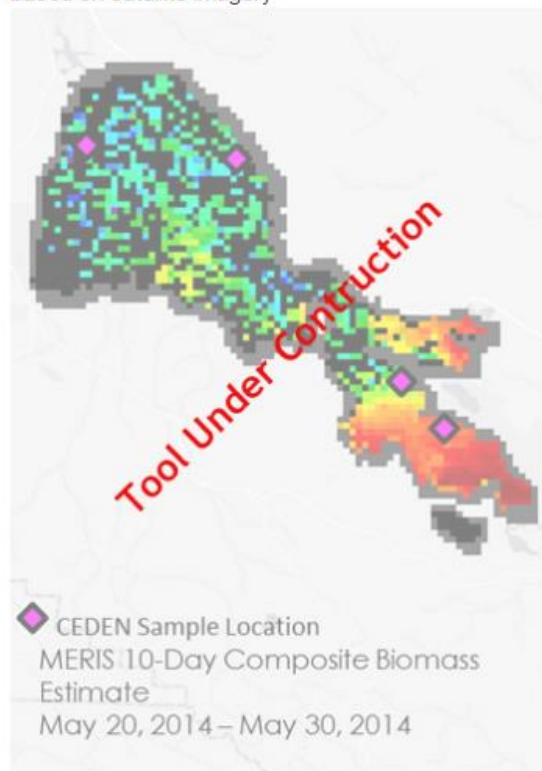
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# Monitoring & Alert

# Cal H A B

## Program

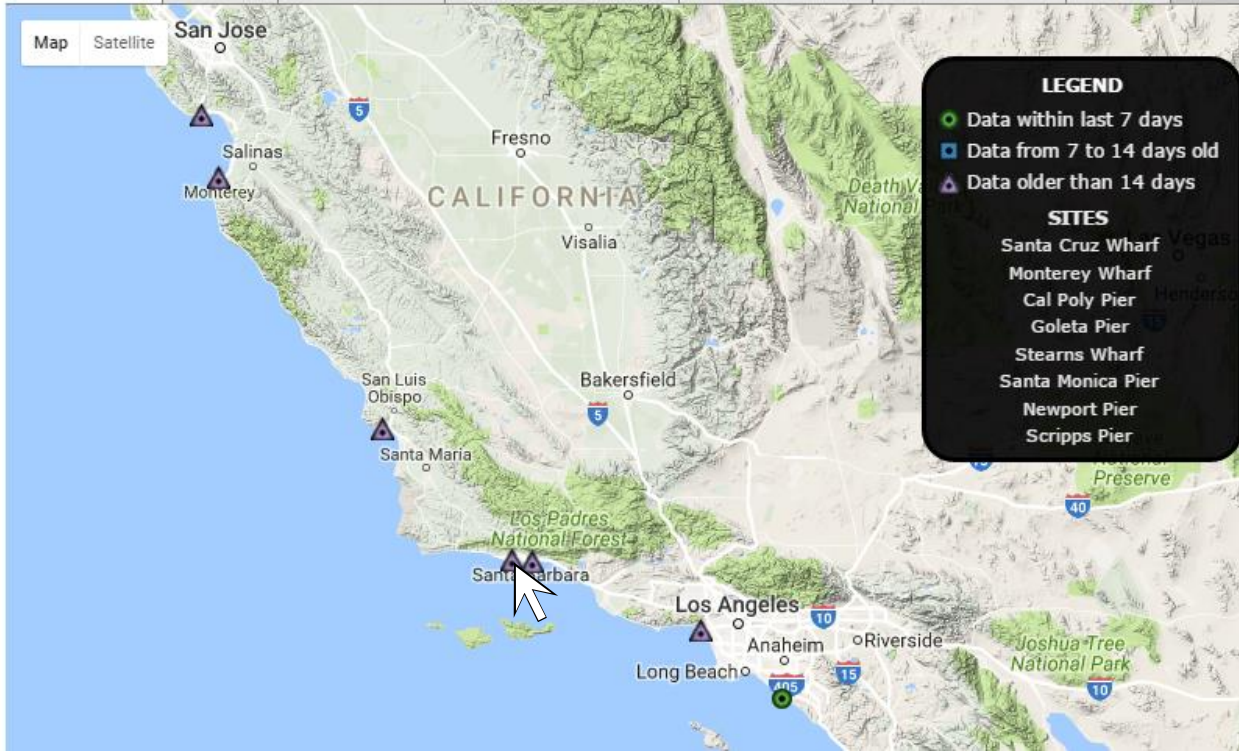
Implementing a statewide HAB network and forecasting system for California

[home](#)[news](#)[about](#)[data](#)[projects](#)[contact](#)

Interactive map showing data from sampling stations along the California coast. Click on each map icon or the inset station list to see the most recent data for that station. For more information, visit <http://www.sccoos.org/data/habs/index.php>.

For current predictions of *Pseudo-nitzschia* blooms and domoic acid events along the California coast, visit <http://www.cencoos.org/data/models/habs>

### Harmful Algal Blooms

[Map View](#)[About](#)[HAB News](#)[What are HABs?](#)[HAB Species](#)[Data History](#)[Plots](#)[Map](#) [Satellite](#)



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[Map](#) [Satellite](#)

San Jose

Salinas

Monterey

#### GOLETA PIER

34° 24.97' N, 119° 49.72' W

Provider / PI: UCSB / Mark Brzezinski

##### HAB Species

SPECIES	CELLS/L
<a href="#">Akashiwo sanguinea</a>	0
<a href="#">Alexandrium spp.</a>	0
<a href="#">Dinophysis spp.</a>	700
<a href="#">Lingulodinium polyedrum</a>	0
<a href="#">Prorocentrum spp.</a>	24700
<a href="#">Pseudo-nitzschia delicatissima group</a>	0
<a href="#">Pseudo-nitzschia seriata group</a>	0

##### Observations

OBSERVATION	VALUE
Chlorophyll	2.02 mg/m3
Domoic Acid	
Water Temperature	18.0 °C 64.4 °F

Last Sampled: 5 years ago

2011-09-26 16:59 UTC - 2011-09-26 09:59 PDT

NaN: not analyzed - nd/bd: below detection limit

##### Previous Observations

#### LEGEND

- Data within last 7 days
- Data from 7 to 14 days old
- △ Data older than 14 days

#### SITES

- Santa Cruz Wharf
- Monterey Wharf
- Cal Poly Pier
- > Goleta Pier <
- Stearns Wharf
- Santa Monica Pier
- Newport Pier
- Scripps Pier

Santa Barbara

Los Angeles

Anaheim

Riverside

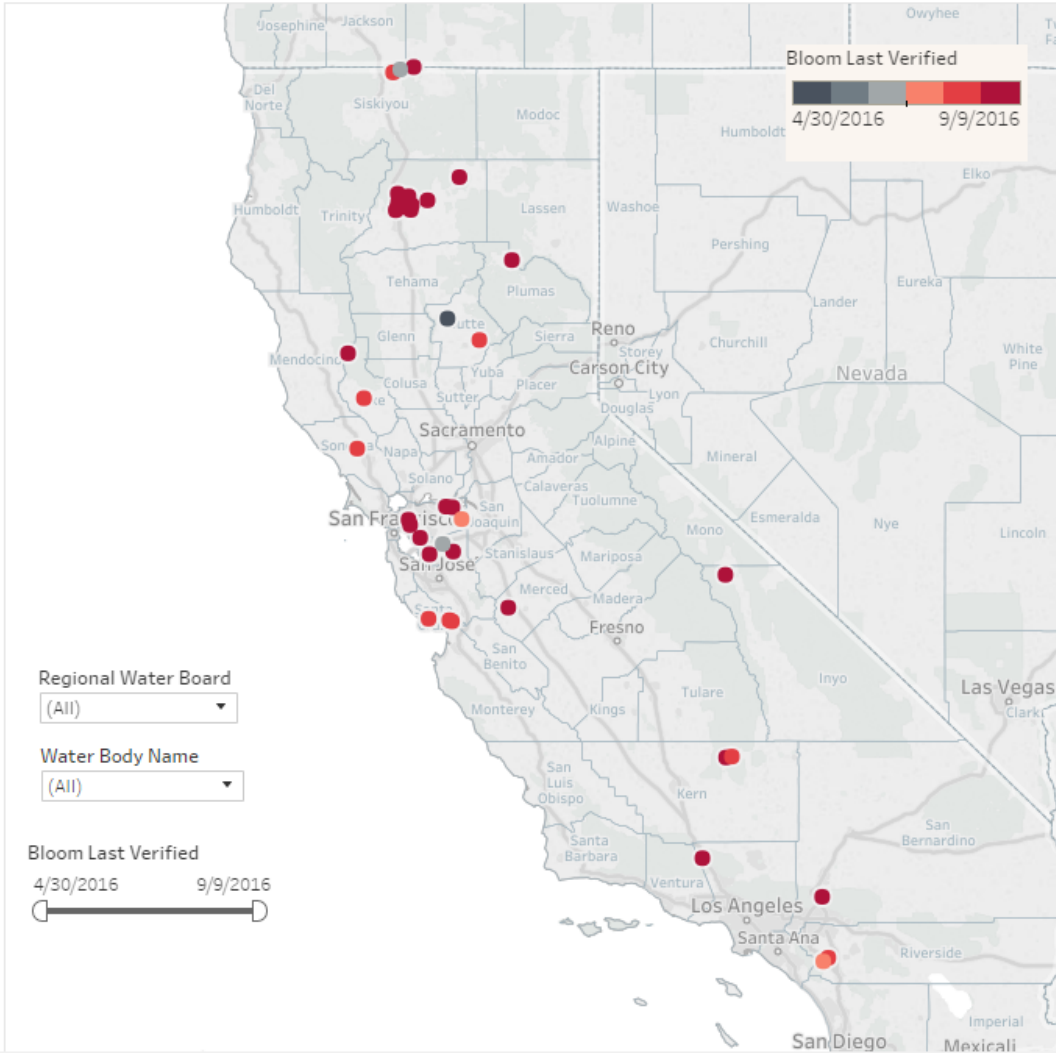
Long Beach

Joshua Tree National Park

# California Harmful Algal Blooms (HABs)

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- [More detailed information on freshwater HAB events](#)
- [Lake Shasta testing locations and concentrations](#)



## News and Announcements

- [Report a Bloom](#)
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- [Bulletins & Newsletters](#)
- [California CyanoHAB Network](#)

## Questions Answered

- **What are harmful algal blooms?**
  - What are harmful algae?
  - Why are they important?
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  - Monitoring
  - Laboratory Resources
  - Freshwater Assessment and Support Strategy
  - Freshwater Incident Response and Interagency Coordination
  - Informational Presentations
  - Other Resources



# What can I do about a harmful algal bloom?

If you see a harmful algal bloom, there are things you can do to help.

## How do I identify harmful algae?

There are many kinds of algae. Only some are capable of producing toxins.

- These are harmful algae (*under development*)
- These are **not** harmful algae (*under development*)
- US Geological Survey, [Field and Laboratory Guide to Freshwater Cyanobacteria Harmful Algal Blooms](#) Pages 4 through 15 provide photos of harmful algae and of non-harmful green algae and aquatic plants. Microscope images are also included.
- [Key to Algal Phyla/Classes](#)
- Western Washington University, [Freshwater Algae in Northwest Washington, Volume I, Cyanobacteria](#)

## How can I **report a bloom**, or an animal illness or human illness related to a bloom?

Reporting a harmful algal bloom or an animal or human illness associated with exposure to a bloom helps authorities understand where problems are occurring and to respond appropriately

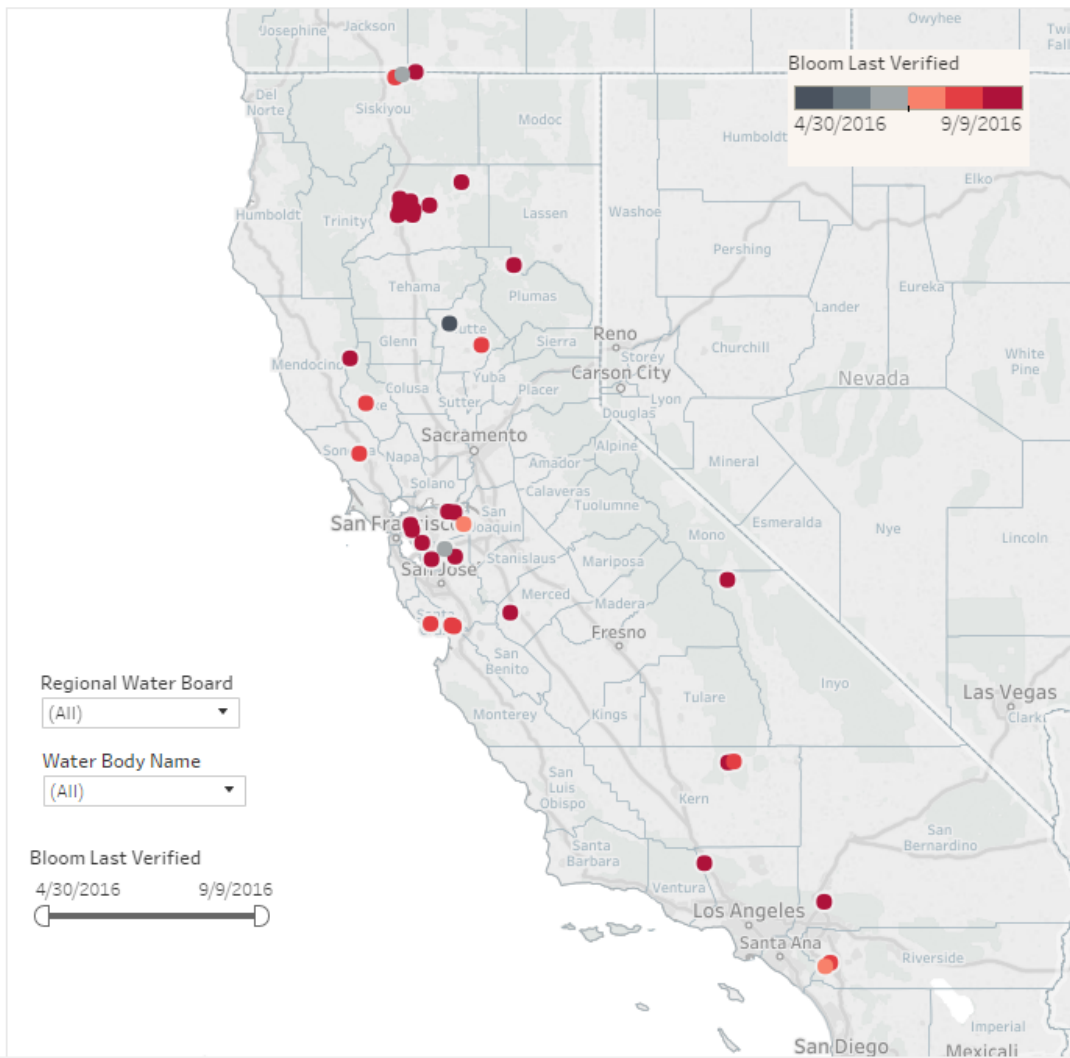
- [Freshwater Bloom Incident Form](#)
  - Human Illness Incident Form (*under development*)
  - Animal Illness or Mortality Incident Form (*under development*)
- [Report a red tide or other unusual marine sighting](#)
- **Bloom reporting and information**
  - Call: 1 (916) 341-5357
  - Call toll free: 1 (844) 729-6466
  - Email: [CyanoHAB.Reports@waterboards.ca.gov](mailto:CyanoHAB.Reports@waterboards.ca.gov)



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  - [Informational Presentations](#)
  - [Other Resources](#)

# What resources and guidance are available to address harmful algal blooms?

Help is out there for local health agencies, lake managers, park rangers, and the public.

- [Recreational and Related Water Uses](#)
- [Drinking Water](#)
- [Shellfish Harvesting and Biotoxins](#)
- [Monitoring](#)
- [Laboratory Resources](#)
- [Freshwater Assessment and Support Strategy](#)
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- [Other Resources](#)
- [Related Programs and Organizations](#)

## Cyanotoxin Guidance for Recreational and Related Water Uses

When a cyanoHAB is occurring, it is critical that there is understanding of the cyanobacteria and cyanotoxins present and communication of the risk to protect public health. Currently, there are no federal or state standards for cyanotoxins in drinking water and recreational waters. Participating agencies - State Water Board, OEHHA, and CDPH - have developed and are further refining suggested guidelines for addressing health concerns for cyanotoxins in recreation waters. The Department of Public Health, county health departments, and water body managers are encouraged to use this guidance for posting of water bodies when cyanoHABs pose a health threat.

- [Blue-Green Algae Draft Voluntary Guidance Document, prepared by CCHAB Network, 2010](#)
- 2016 Updates to the Document [Linked Directly Above](#)
  - [Decision Tree & Narrative for Posting and De-Posting Health Advisories for CyanoHABs](#)
  - [CyanoHAB Trigger Levels for Protection of Human Health](#)
  - [Appendix A - Description of cyanotoxin trigger levels in recreational water bodies](#)
  - SIGNS: The PowerPoint files allow deletion of individual icon/text message components that may not be appropriate for a specific water body. However, text with each component cannot be changed. Components may be moved to allow more space for local agency contact information (text box at the bottom of each sign). Signs are available in both English and Spanish. (version 8/5/2016)
    - In-House Printing (PowerPoint format)
      - [English](#)
        - [Caution](#)
        - [Warning](#)
        - [Danger](#)
      - [Spanish/en Español](#)
        - [Caution/Precaución](#)
        - [Warning/Advertencia](#)
        - [Danger/Peligro](#)
    - Commercial Printing (PDF format)
      - [English](#)
        - [Caution](#)



# Drinking Water

Releases of cyanotoxins by harmful algal blooms create concerns for drinking water sources, treatment of drinking water, and the safety of drinking water.

- The State Water Resources Control Board's [Division of Drinking Water](#) is developing a communication strategy and resources for drinking water treatment plants to ensure the provision of safe drinking water.
- The U.S. Environmental Protection Agency posted [Health Advisories](#) in May 2015 to provide guidance for drinking water on the cyanotoxins microcystin and cylindrospermopsin.
  - [Health Advisories and health effects support documents](#)  
Non-regulatory concentrations of the two algal toxins in drinking water at or below which adverse human health effects are not anticipated to occur over a ten-day exposure period.
  - [Support document for managing cyanotoxins in drinking water](#)  
Provides information and a framework that public water systems (PWSs) and others can consider using to inform their decisions on managing the risks from cyanotoxins to drinking water. Includes a potential stepwise approach PWSs could use to inform their decisions on whether and how to monitor, treat, and communicate with stakeholders.



# Shellfish Harvesting and Biotoxins

California Department of Public Health

- [Preharvest Shellfish Protection and Marine Biotxin Monitoring Program](#)
- Shellfish Information Line: 1-800-553-4133



# Monitoring

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. For more information on monitoring projects, please contact [Bev.Anderson-Abbs@Waterboards.ca.gov](mailto:Bev.Anderson-Abbs@Waterboards.ca.gov).



# Laboratory Resources

It is important to detect the presence of cyanobacteria and cyanotoxins in drinking and recreational water, as well as detecting bioaccumulation in freshwater and marine organism tissues. Having rapid and accurate detection methods - including visual and qualitative methods along with quantitative laboratory techniques - are critical to ensure the proper management of cyanoHABs. **The State Water Board's Office of Information Management & Analysis is focused on bringing together laboratories to develop cyanoHAB data comparability and improve cyanoHAB data interpretation. Laboratories that are interested in joining the Cyano Lab Network, please contact [marisa.vandyke@waterboards.ca.gov](mailto:marisa.vandyke@waterboards.ca.gov).**



# Freshwater Incident Response and Interagency Coordination

These documents were developed in July 2016 by an interagency team representing California State government organizations charged with responsibilities to address harmful algal blooms (HABs) through either notification or management tasks and activities. The team broke into two groups, one focused on incident response and interagency coordination and communication and the other focused on how to coordinate and best communicate this critical information to the public. These documents are "working drafts" and may be updated regularly to be made more useful to the teams and stakeholders using them. If you have any comments on these documents or questions about their use please contact Greg Gearheart at [greg.gearheart@waterboards.ca.gov](mailto:greg.gearheart@waterboards.ca.gov) or (916) 341-5892.

- [Draft Protocol for Publicizing Harmful Algal Blooms \(HABs\) in State Waterbodies](#) (8/22/16)
- [Draft Blue-Green Algae Talking Points](#) (8/22/16)
- [Draft Press Release Template \(MS Word\)](#) (9/2/16)
- [Draft State Agency Notification Coordination System for CyanoHAB Incidents](#) (8/22/16)

## Freshwater Assessment and Support Strategy

The Surface Water Ambient Monitoring Program has released a [Statewide Freshwater Harmful Algal Bloom Assessment and Support Strategy](#) that outlines actions and infrastructure being developed to support local response to HAB events.

- [SWAMP Strategy Fact Sheet](#)



## 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



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  - The California CyanoHAB Network (CCHAB) 42:21
  - Genetic Testing of Cyanobacteria Blooms 49:27
  - Biotoxin Gene qPCR Assay for the Aquatic Monitoring 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

## Other Resources

- California Surface Water Ambient Monitoring Program FHAB webpage
  - California Freshwater Harmful Algal Bloom Assessment and Support Strategy - Phase 1  
Outlines actions and infrastructure being developed to support local response to HAB events
- Field and Laboratory Guide to Freshwater Cyanobacteria Harmful Algal Blooms for Native American and Alaska Native Communities, prepared by US Geological Survey
- Harmful Algal Blooms and Cyanobacterial Toxins - Frequently Asked Questions and Resources, July 2015, Prepared by USA EPA Region 9
- Ocean Science Trust, Harmful Algal Blooms and California Fisheries
- Office of Environmental Health Hazard Assessment Suggested Action Levels for Six Cyanotoxins, 2012
  - Cyanotoxin Action Levels for Humans and Domestic Animals, July 2012 - presentation by Regina Linville, OEHHA
- The National Science and Technology Council Subcommittee on Ocean Science and Technology report on HABS



## Related Programs and Organizations

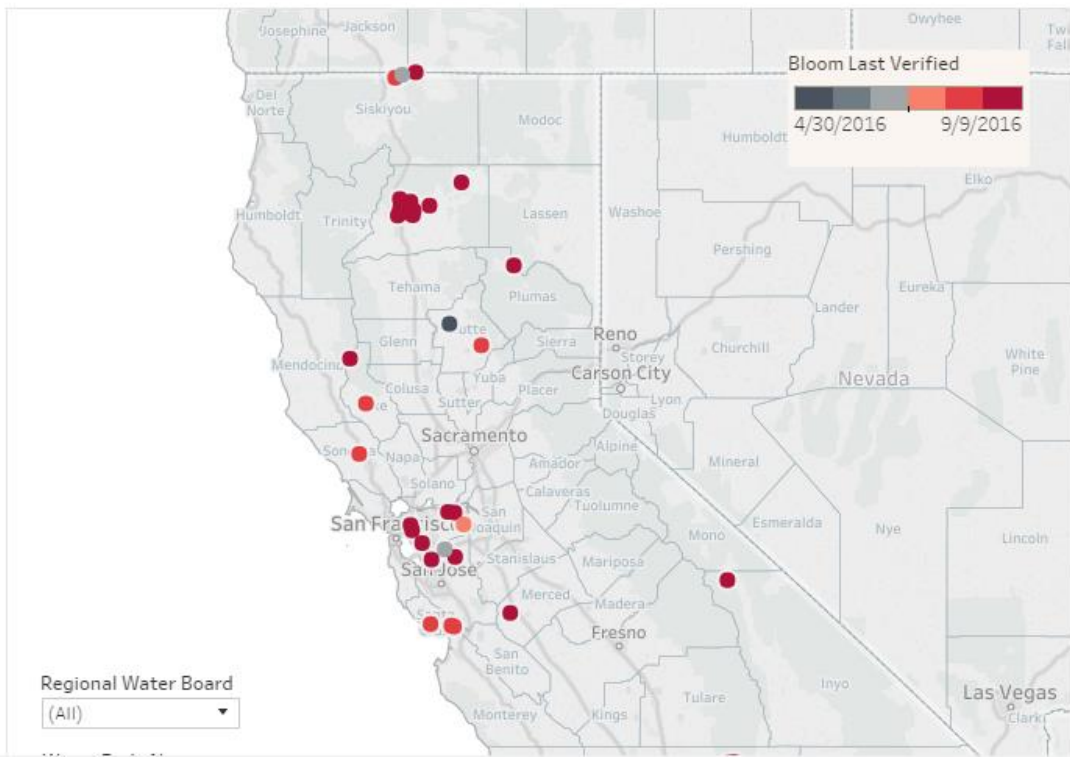
- Eel River Recovery Project, Algae Monitoring
- California Harmful Algal Bloom Monitoring and Alert Program (CalHABMAP)
- Klamath Basin Monitoring Program
- U.S. Environmental Protection Agency's CyanoHABs web page
- World Health Organization's Guide to CyanoHABs
- US Geological Survey Kansas Algal Toxin Research Team
- California Department of Public Health's Environmental Management Branch Blue Green Algae Bloom web page



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  - Recreational Water Quality

## About Harmful Algal Blooms

### Where Blooms Are Occurring

- Freshwater HABs Event Map
- Marine HABs Event Map
- Satellite Map

### What You Can Do About a Bloom

- Identify Harmful Algae
- Report A Bloom, or Related Animal or Human Illness

## California CyanoHAB Network

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## California Cyanobacteria and Harmful Algal Bloom (CCHAB) Network

[California HABs Portal](#) | [CCHAB Network History](#) | [Meetings](#) | [Products](#) | [Membership](#) | [More Information](#)

Algae Identification or Report A Bloom: [What can I do about a harmful algal bloom?](#)

### Announcements

- **California Cyanobacteria and Harmful Algal Bloom (CCHAB) Network launches new California Harmful Algal Blooms (HABs) Portal**
  - [Charter](#)
  - [Press Release](#)
  - [Fact Sheet](#)
- **NEW Editable/printable caution, warning and danger signs are available under the CyanoHAB Guidance for Recreational and Related Water Uses Updates in both English and Spanish.**
- The next CCHAB Network Meeting will be held on September 29th, 2016 from 9:00 am - 3:00 pm at the Joe Serna Jr./CalEPA Building, 1001 I Street, Sacramento, Room 230, 2nd Floor.
- **New tools available under the CyanoHAB Guidance for Recreational and Related Water Uses. Tools include tiered decision tree and signs for posting & de-posting health advisories.**
- SWAMP released a [Statewide Freshwater Harmful Algal Bloom Assessment and Support Strategy](#) that outlines actions and infrastructure being developed to support local response to HAB events.

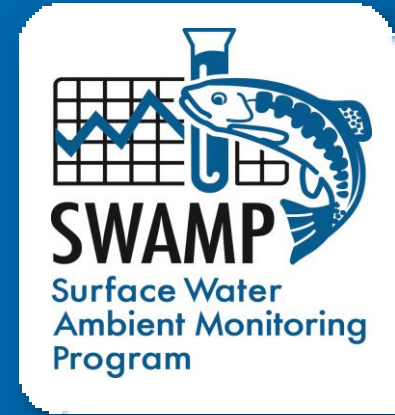
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### CCHAB Network History

The CCHAB Network was first established in 2006 as the Statewide Blue-Green Algae Working Group in response to record-setting toxigenic blooms in Klamath River reservoirs. The focus is to bring all of the stakeholders that work on cyanoHABs to the table to collectively resolve issues and create a statewide framework to address cyanoHABs.

### What is the mission of the California Cyanobacteria and Harmful Algal Bloom Network?

- To develop a statewide framework to address cyanoHABs in California's freshwater and marine ecosystems.



# Questions?

