

California Regional Water Quality Control Board
San Francisco Bay Region

San Francisco Bay Harmful Algal Bloom Incident Response Procedure



Heterosigma akashiwo bloom in the Oakland Estuary. Photo credit: Vanessa Zubkousky, California Department of Public Health.

September 2023

1 Purpose

This procedure outlines the San Francisco Bay Regional Water Quality Control Board (Water Board) and Nutrient Management Strategy (NMS) response to harmful algal blooms (HABs) in the San Francisco Bay (Bay). These procedures are consistent with the State Water Board's [Statewide HAB program](#) but describe the detailed actions for coordination and communication for blooms specific to the Bay. This is a living document and may be updated after the algae bloom season.

2 Initial Report

Members of the public or staff from agencies should report blooms using the [Freshwater and Estuarine Bloom Incident Form](#) or by emailing the Water Board HAB Coordinator (SF HAB Coordinator), Rebecca Nordenholt (Rebecca.Nordenholt@waterboards.ca.gov). Despite this recommendation, there are several ways we might also be notified of a potential HAB event in the Bay. For example, reports have been submitted to the Water Board spill line, the San Francisco Estuary Institute (SFEI), or San Francisco Baykeeper (Baykeeper), or have been observed from the remote sensing imagery.

Whichever agency is alerted first should notify the NMS at SFEI (Program Director: Dave Senn; Monitoring Manager: Ari Chelsky) and Water Board staff (Rebecca Nordenholt, Kevin Lunde, and Eileen White). They will review the report and determine next actions as soon as possible, and within two business days.

3 Bloom Communication and Response

3.1 Water Board HAB Coordinator Communication Duties

After a report is filed, the SF HAB Coordinator will review the report and follow-up with the reporting party to request additional information, if needed (e.g., bloom description, photos of the bloom, etc.). After necessary follow-up, the SF HAB Coordinator will notify Water Board management of the suspected/confirmed bloom and prepare a summary report for the San Francisco Bay HAB Coordination Group (Appendix 1). The SF HAB Coordinator will also notify impacted local entities (health departments, water body manager, land manager, etc.) to request they post caution advisory signs if the area has public access to the water. The SF HAB Coordinator will update and maintain FAQs on the Water Board's website during active blooms.

3.2 NMS Communication Duties

SFEI staff will notify the NMS Planning Subcommittee of potential Bay HABs. Depending on the scope and severity of the initial report, SFEI may choose to put collaborators (e.g., USGS, UCSC) on standby in case a large field response is needed.

3.3 San Francisco Bay HAB Coordination Group

After a bloom is reported, the SF HAB Coordinator will begin a new email chain with the interagency San Francisco Bay HAB Coordination Group (Coordination Group). The Coordination Group will communicate mainly through email updates, but will schedule virtual meetings when necessary (e.g., at the beginning of a bloom event, after a major fish kill, etc.). Communication will continue until the bloom dissipates.

- San Francisco Bay Water Board – communication lead. Has lab contract to pay for HAB ID and toxin analysis and can perform shore-based fieldwork. (*Heterosigma akashiwo* degrades too rapidly to be identified by contract lab so local labs are needed.)

- State Water Board – provides communication, lab contract, and database support.
- CDFW – can coordinate fish collection and necropsy, tracks fish kills through [iNaturalist](#)
- CDPH Preharvest Shellfish Program – can collect shore-based samples and ID samples (including *Heterosigma akashiwo*)
- SFEI – satellite monitoring, fieldwork, coordination, collects and analyzes continuous monitoring dissolved oxygen data for the NMS.
- USGS – collects pre-scheduled sampling for algae composition, nutrients, and DO via NMS. Can conduct enhanced contracted field sampling, if needed.
- Baykeeper – can conduct field sampling and field observations via drone or boat.
- Other entities or citizen scientists may make observations of the bloom, collect samples, or bring other information to the Coordination Group.

3.4 Sharing Observations

Entities within the Coordination Group are requested to provide immediate email updates regarding important information such as field observations (expansion of bloom), local actions (posting or de-posting advisories), and laboratory results. The Coordination Group will catalog bloom reports, data files, and other relevant information using the SF Bay Collaboration Folder. The SF HAB Coordinator will ensure that all HAB incidents (suspected or confirmed) in the shared Bloom Observation Tracking spreadsheet are uploaded to the Water Board's HAB database and published on the [HAB Reports Map](#).

In the event of a HAB related illness or death, the Interagency HAB Illness Workgroup will communicate with the applicable contacts (physician, veterinarian, ill person's representative, and animal owner) to collect information to create an illness record for the CDC's OHHABS database. The Illness Workgroup will primarily communicate information to the SF HAB Coordinator, who will then share with the Coordination Group.

3.5 Field Investigation to Confirm Bloom

When a potential bloom is reported, the NMS and the Water Boards will discuss a response plan and the Coordination Group will be notified. A HAB report will also trigger the NMS to evaluate satellite data. The Coordination Group will communicate existing sampling plans and their ability to conduct additional monitoring in response to bloom reports. Protocols detailed in [SWAMP's California Freshwater Harmful Algal Bloom Field Guide](#) will be used to collect samples. The appropriate field response and personnel will depend on the bloom location and extent. Sample analysis will typically be requested through the CDPH Preharvest Shellfish Program because they can quickly identify marine species including *Heterosigma akashiwo*. If needed, the Water Boards can arrange freshwater or marine algal species ID and toxin testing through Bend Genetics.

3.5.1 In-Bay Field Response

Initial sampling may include collection of water samples for microscopy (various labs) or molecular analysis (Bend Genetics). SFEI will coordinate sample collection with Baykeeper, USGS, or others if a boat is required. SFEI will prep bottles and preservatives so they have equipment on hand if needed.

An additional NMS field investigation will occur if:

- The spatial extent of the bloom includes large parts of the Bay, many areas with the Bay, or seems likely to expand across the Bay
- The chlorophyll concentrations in the bloom area, measured directly or estimated from satellite imagery, are considered very high and likely to affect dissolved oxygen
- There is interest from the media
- The dominant bloom species identified is *Heterosigma akashiwo* or a toxin producing species

If additional NMS contract funded monitoring is triggered, the response will depend on several factors including size and location of bloom. Priority field activities will be decided through discussion with [or led by] SFEI, Water Boards, Raphe Kudela (UCSC), and USGS (Brian Bergamaschi and Tamara Kraus). Field investigation may include collection of additional discrete samples, spatial mapping, and more frequent field trips to service and download data from moored sensors. Available resources are listed in Appendix 2. The budget of the initial response will be up to \$10,000. Any costs beyond this preapproved amount will require additional approval from the NMS Steering Committee/Planning Subcommittee. A status update of the event will also be provided to the Coordination Group.

If thresholds for field investigation are not met, SFEI will continue monitoring remote sensing data until the HAB is resolved or monitoring is triggered.

3.5.2 Bay Shoreline Field Response

The Communication Group will discuss availability to collect and analyze samples. The SF HAB Coordinator, CDPH, Baykeeper, and USGS (Keith Bouma-Gregson) may be available to collect shoreline samples.

3.5.3 Lake Merritt Field Response

Lake Merritt is tidally influenced and can be impacted by in-Bay blooms. If a Bay bloom expands to Lake Merritt, the Water Board and their community partners will be the primary response team.

1. The Water Board and Rotary Nature Center Friends began a collaborative Lake Merritt HAB monitoring program in 2023. Rotary Nature Center Friends collect monthly samples from two locations during the bloom season (May – October) that are analyzed for freshwater toxins by Bend Genetics using the Water Board’s HAB contract.
2. The Rotary Nature Center Friends and SF HAB Coordinator will be available to collect additional shoreline samples in the event of a bloom.
3. Lake Merritt Institute has a boat and can assist with mid-lake sampling, if necessary.

4 Appendix 1 - San Francisco Bay HAB Coordination Group

- Rebecca Nordenholt, SF Water Board HAB Coordinator
- Kevin Lunde, SF Water Board HAB Supervisor
- Eileen White, SF Water Board Executive Officer
- Carly Nilson and Marisa Van Dyke, State Board HAB Coordinators

- Dave Senn, NMS Program Director
- Ari Chelsky, NMS Monitoring Manager
- Dan Killam, SFEI
- Karen Odkins, CDFW HAB Coordinator
- Jim Hobbs, CDFW SF Bay lead
- Shannon Murphy, OEHHA Toxicologist
- Matt Scanlon, CDPH Preharvest Shellfish Program
- Sam Rankin, CDPH
- Vanessa Zubkousky, CDPH Preharvest Shellfish Program Supervisor
- Thomas Hayashi, CDPH Center for Healthy Communities
- Aundi Mevoli, Field Investigator
- Ian Wren, Baykeeper Staff Scientist
- Julia Dowell, Baykeeper
- Jon Rosenfield, Baykeeper
- Keith Bouma-Gregson, USGS
- Dulcinea Avouris, USGS
- Tamara Kraus, USGS
- Brian Bergamaschi, USGS
- Emily Richardson, USGS
- Damon Tighe, Community Naturalist
- Levi Lewis, UC Davis

4.1 Lake Merritt Coordination Group

- Katie Noonan, Rotary Nature Center Friends

5 Appendix 2- Resources for Response

- Baykeeper boat
- UCD/Levi Lewis boat
- Water Board SWAMP staff (from shore, sloughs w trails)
- Water Board – Bend Genetics contract
- CDPH microscopy lab
- CDFW – fish health lab