



North Coast Regional Water Quality Control Board Freshwater Harmful Algal Bloom Monitoring & Response Program End of Year Summary 2023

Overview

Freshwater harmful algal blooms (FHABs) are dense proliferations of planktonic (floating) and/or benthic (attached) cyanobacteria capable of producing cyanotoxins that can impact human and animal health. In 2023, the North Coast Regional Water Quality Control Board (RB1) FHAB Program recommended 30 public health alert postings in rivers and lakes, including a confirmed human and dog illness (see Table 1 and [Reports Map](#) (https://mywaterquality.ca.gov/habs/where/freshwater_events.html)). These planktonic and benthic FHAB postings are discussed below.

Table 1. Number of planktonic and benthic postings in the North Coast Region, 2023.

Report Type	Planktonic Postings			Benthic Postings
	Caution	Warning	Danger	Toxic Algae Alert
Routine Monitoring	13	3	2	1
Pre-Holiday Assessment	1	0	0	2
Incident Response	2	0	0	3
Studies & Research	0	0	0	3
Total:	16	3	2	9

See [California HABs Portal](#) for more information on posting guidance. (https://mywaterquality.ca.gov/habs/resources/habs_response.html)

In addition to responding to FHAB reports, RB1 worked with partners on routine monitoring; performed pre-holiday assessments; conducted studies and research; reported and presented study findings; provided FHAB program trainings; and continued to aid others in the development and implementation of their monitoring programs. Staff worked with various partners including Blue Lake and Big Lagoon Rancherias; Karuk, Yurok, Hoopa, and Wiyot Tribes; Quartz Valley Indian Reservation; Del Norte, Humboldt, Lake, Mendocino, Sonoma, and Trinity Counties; and the Klamath Basin Monitoring Program, US Environmental Protection Agency (USEPA), US Army Corps of Engineers, and Pacificorp.

Routine & Partner Monitoring

Routine monitoring was conducted for three waterbodies or locations:

- *Big Lagoon* – monitored biweekly for a common class of cyanotoxins called microcystins by Big Lagoon Rancheria and USEPA. Big Lagoon Rancheria also participated in an additional partner monitoring effort by collecting a biweekly sample for cyanotoxin suite analysis and cyanobacteria identification (ID).
- [Klamath Basin](#) (https://mywaterquality.ca.gov/habs/resources/habs_response.html) – monitored biweekly for microcystins by Hoopa, Karuk, and Yurok Tribes, as well as Pacificorp and USEPA.

- *Russian River* – recreational beaches visually assessed by Sonoma County, and four stations monitored biweekly (cyanobacteria ID) by Sonoma Water.

Pre-Holiday Assessments

RB1 and partners collected water grab or algal mat samples from popular recreational lakes and rivers prior to major holiday weekends to inform visitors of waterbody conditions (Table 2). See [State FHAB Program Wiki Page](https://sites.google.com/view/fhab-program-wiki/pre-holiday-assessment) (<https://sites.google.com/view/fhab-program-wiki/pre-holiday-assessment>) for more information on pre-holiday assessments and participation.

Table 2. FHAB waterbody postings during pre-holiday assessments, 2023.

Waterbody	Memorial Day	Fourth of July	Labor Day	Post-Holiday
Lake Mendocino		No Advisory	No Advisory	No Advisory
Lake Pillsbury	No Advisory	No Advisory	Caution	Caution
Lewiston Reservoir		Toxic Alert	Toxic Alert	Toxic Alert
Ruth Lake		No Advisory	No Advisory	No Advisory
Salmon Creek		Toxic Alert	Toxic Alert	Toxic Alert
Stone Lagoon		No Advisory	No Advisory	No Advisory
Trinity Lake		No Advisory	No Advisory	No Advisory
Klamath River		No Advisory	No Advisory	No Advisory
Salmon River		Wildfire	Wildfire	No Sample
Trinity River		No Advisory	No Advisory	No Advisory

Incident Response & Illnesses

RB1 received five reports of human and dog illnesses in 2023 (Table 3). Reports of illnesses are referred to the State Illness Workgroup who determines if the incident is believed to be related to FHABs. A human illness was confirmed in the Russian River due to the presence of cyanobacteria. A dog illness was confirmed in Humboldt Bay, however, because the marine bloom was comprised of *Noctiluca*, which does not produce toxins, the illness was attributed to contact/ingestion of dried algae byproducts (e.g., ammonia). See [Illness Tracking](https://mywaterquality.ca.gov/habs/hab-related_illness.html) (https://mywaterquality.ca.gov/habs/hab-related_illness.html) for more information.

Table 3. FHAB reports of human and dog illness, 2023.

Illness Type	Waterbody	Symptoms	Status
Human illness	Salmon Creek Estuary	Not disclosed	Not HAB-related
Human illness	Russian River, Monte Rio Beach	Gastrointestinal illness, fever for 48 hours	Confirmed HAB-related illness
Human illness	Lake Mendocino, Pomo Area	Gastrointestinal, vomiting, diarrhea for 24 hours	Not HAB-related
Dog illness	Humboldt Bay, King Salmon B.	Not disclosed	Confirmed HAB-related illness
Human illness	Little River, Van Damme Beach	Not disclosed	Not HAB-related

Studies & Research

The following studies and research were conducted in 2023:

- To better understand the spatial heterogeneity of benthic growth and cyanotoxin production, RB1 collaborated with University of Nevada Reno to monitor cyanobacteria in the South Fork Eel River.
- RB1 participated in the national USEPA Region ORD Associated Research (ROAR) project to develop standardized benthic sampling methods by employing various collection protocols in the South Fork Eel River.
- RB1 provided benthic samples for USEPA to determine the expression of toxin-producing genes at different cyanobacterial growth stages and to identify other groups of genes that are specific to anatoxin producers (i.e., anaF genes).
- RB1 participated in the Helicopter Surveillance Program and was able to observe riffle-specific benthic mats in the South Fork Eel River from the air.
- RB1 conducted a special study in the Eel, Navarro, Russian, and South Fork Eel Rivers to evaluate RB1's tiered benthic monitoring recommendations:
 - 1) Deployed Solid Phase Adsorption Toxin Tracking (SPATT) as sentinel samplers to characterize cyanotoxin production;
 - 2) Conducted visual assessments to determine percent cover of benthic cyanobacteria when cyanotoxins increased in SPATTs; and
 - 3) Collected samples to confirm toxicity of benthic mats when cyanobacteria percent cover increased.

Figure 1 shows results for all three tiers at a station in the South Fork Eel River.

- RB1 is currently co-leading the California Cyanobacteria Harmful Algal Bloom (CCHAB) Benthic Subcommittee and using results from the above special study to revise current benthic guidelines.

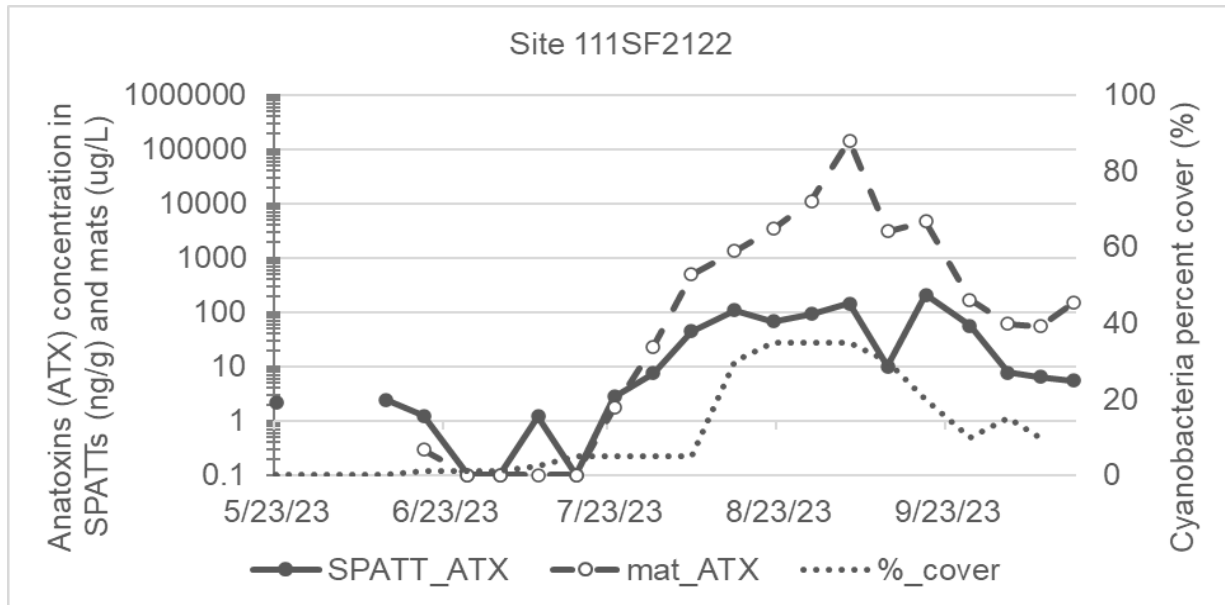


Figure 1. Trend lines showing anatoxins concentrations (ATX) in SPATTs and benthic cyanobacterial mats as well as percent cover of mats in the South Fork Eel River, 2023.

Reports, Presentations, & Trainings

RB1 provided the following reports, presentations, and trainings in 2023:

- [Proposal for Reconvening Benthic HABs Subcommittee.](https://www.youtube.com/watch?v=81by73aJLt0) (https://www.youtube.com/watch?v=81by73aJLt0) State Board, RB1, and Southern California Coastal Water Research Project (SCCWRP) Presentation for CCHAB Network, January 2023.
- North Coast Regional Water Quality Control Board Executive Officer Briefing Memorandum: FHAB Monitoring & Response Program. April 2023.
- FHAB and SWAMP Program Overview. RB1 Presentation for Mendocino High School Class, May 2023.
- [Partner Training in the North Coast Region.](https://waterboards.ca.gov/northcoast/water_issues/programs/swamp/media/GMT20230823-170410_Recording_1920x1080.mp4) Virtual Training, August 2023. (waterboards.ca.gov/northcoast/water_issues/programs/swamp/media/GMT20230823-170410_Recording_1920x1080.mp4)
- Partner Training in the South Fork Eel River. Field Training, August 2023.
- Partner Training in the Russian River. Field Training, August 2023.
- Helicopter Surveillance of Freshwater Harmful Algal Blooms. Memorandum, September 2023.
- Benthic HABs Guidance Subcommittee. State Board, RB1, and SCCWRP Presentation to CCHAB Benthic Subcommittee, October 2023.
- North Coast Region FHAB Season Recap. RB1 Presentation for the Coastal Streamflow and Salmon Meeting, December 2023.