

Regional Water Quality Control Board  
North Coast Region

Executive Officer's Summary Report  
September 6, 2018  
Regional Water Board Office  
5550 Skylane Blvd, Suite A  
Santa Rosa, California

**ITEM: 10**

**SUBJECT:** Update on the Cyanobacteria Harmful Algal Bloom Monitoring and Response Program (Lisa Bernard, Rich Fadness)

**BOARD ACTION:** This is an informational item only. No action will be taken by the Regional Water Board.

**BACKGROUND:** Cyanobacteria, commonly known as blue green algae, are natural components of healthy marine and fresh water ecosystems. Under certain water quality conditions cyanobacteria can rapidly multiply, causing nuisance "blooms." Not all blooms include toxin-producing cyanobacteria; however, a number of cyanobacteria species are capable of producing toxins that can be harmful to animals and humans.

Cyanobacteria harmful algal blooms (cyanoHABs) are of special concern because of their potential impacts to drinking water, recreation in lakes and rivers, and effects on fish, domesticated animals and wildlife.

In recent years, there has been an increase in frequency and severity of cyanoHABs around the world, including the North Coast Region. Annually, the North Coast Regional Water Quality Control Board (Regional Water Board) receives reports of nuisance blooms and algal scums, animal illnesses and deaths, and on rare occasions, human health impacts within the North Coast Region.

There are generally two types of cyanoHABs: 1) planktonic, wherein the cyanobacteria float or drift in a body of water; and 2) benthic, wherein colonies of cyanobacteria are attached to the bottom of a body of water or attached to the substrate. Many of the cyanoHABs present in the North Coast Region are related to benthic blooms. These blooms can appear as green, brown, yellow, or black growth on the bottom of lakes and streams and may not affect the appearance of the water to the untrained eye.

Risk factors believed to contribute to cyanoHABs and nuisance blooms include warming climate, warm water temperatures, lower flows (which allow more sunlight to penetrate the water column), and, in the case of some types of cyanobacteria, nutrient (phosphorus and nitrogen) enriched waters. The Regional Water Board is working to reduce these risk factors through its water quality improvement and protection programs. However, there remains a need to better understand the exposure routes and risks of these toxic blooms, to identify cost effective means to monitor these blooms and protect public health, and to better understand the effects of cyanotoxins on our aquatic systems.

**DISCUSSION:** In the North Coast Region there have been fifteen suspected or documented incidents of dog deaths due to toxins produced by cyanobacteria between 2001-2015 in Big Lagoon, the South Fork Eel River, Van Duzen River, mainstem Eel River, and the Russian River. In addition, there has been a documented human-related dermatological incident in the Trinity River in 2014. These incidents are suspected to be caused by benthic cyanoHABs about which little research has been conducted.

Increased scientific understanding of benthic cyanoHABs is key to ongoing public health protection, education, and outreach. Since 2015, the Regional Water Board's CyanoHAB program staff have focused on monitoring for the protection of public health while collecting data to further understand the habitat, growth patterns, and toxin production of benthic cyanobacteria found in North Coast Rivers. This is in an effort to better understand the exposure routes and risks associated with these blooms. The cyanoHAB monitoring program has focused on the collection and analysis of: 1) water grab samples, 2) integrated and single-species dominated cyanobacteria mat samples, and 3) the deployment of Solid Phase Adsorbing Toxin Tracking (SPATT) passive samplers that are designed to adsorb cyanotoxins from the water column as water flows through the sampler.

Through the cyanoHAB monitoring program, staff have documented the presence of multiple cyanotoxins in benthic mats as well as many low-level detections of various cyanotoxins in the water column from samples collected at every sample site tested.

California public health alert posting guidelines for recreational water bodies focus on water column concentrations in either absolute toxicity ( $\mu\text{g}/\text{L}$ ) or cell counts ( $\text{cells}/\text{mL}$ ). Current posting guidelines do not take into consideration the toxicity of benthic mats which are the most probable vector for dog deaths and are a likely health risk, especially for young children.

The North Coast Regional Water Board's benthic cyanoHAB monitoring program is the first of its kind in California. CyanoHAB program staff have led statewide cyanobacteria response efforts by providing guidance, sharing information, and developing protocols and guidance documents for use in other regions and by the State Board. Over the past several months, Regional Water Board staff have provided guidance to the Office of Information Management and Analysis (OIMA) to further efforts to develop online Field Guides and Standard Operating Procedures for the identification, collection, and testing of cyanotoxins in benthic cyanobacteria. Staff are also working with the Office of Environmental Health Hazard Assessment (OEHHA) through the California Cyanobacteria and Harmful Algal Bloom (CCHAB) Network's Guidance Subcommittee to develop guidelines for the posting of waterbodies based upon the relative risk associated with various benthic cyanobacteria species, the concentration of toxins they produce, and the amount of biomass covering the river or lake bottom.

In addition, Regional Water Board CyanoHAB staff are coordinating with other agencies, academics, and research scientists from all over the world to further develop lab analysis and data collection protocols as well as increase collaboration in this field of research to better understand the dynamics of cyanotoxin production and their effects.

Staff's collaborative efforts to date have led to the first scientific documentation of cyanotoxins causing toxicity impacts to benthic macroinvertebrates in the laboratory setting. Genetic analysis of cyanobacteria from the Russian River suggests that some of these species uniquely produce a potent cyanotoxin, which was previously considered to be a cyanotoxin degradant with limited toxicity.

As ongoing efforts to monitor for the protection of public health continue, North Coast Regional Water Board Staff will continue our open dialogue and data sharing with other researchers to provide answers to research questions being asked about benthic cyanobacteria and their toxicity throughout the world.

**RECOMMENDATION:** No action will be taken by the Regional Water Board.

**SUPPORTING  
DOCUMENTS:**

CA Water Quality Monitoring Council's My Water Quality – California Harmful Algal Blooms (HABs) Portal:

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

USEPA CyanoHAB webpage:

[https://www.epa.gov/nutrient-policy-data/monitoring-and-responding-cyanobacteria-and-cyanotoxins-recreational-waters?utm\\_medium=email&utm\\_source=govdelivery](https://www.epa.gov/nutrient-policy-data/monitoring-and-responding-cyanobacteria-and-cyanotoxins-recreational-waters?utm_medium=email&utm_source=govdelivery)

USEPA Benthic HABs Discussion Group:

<https://www.epa.gov/nutrient-policy-data/benthic-habs-discussion-group>

North Coast Regional Water Board Surface Water Monitoring Webpage:

[https://www.waterboards.ca.gov/northcoast/water\\_issues/programs/swamp/](https://www.waterboards.ca.gov/northcoast/water_issues/programs/swamp/)

North Coast Regional Water Board Executive Officer's Report –  
April 19, 2018

[https://www.waterboards.ca.gov/northcoast/board\\_info/board\\_meetings/04\\_2018/pdf/item\\_8/180321\\_EOReport%20v3.pdf](https://www.waterboards.ca.gov/northcoast/board_info/board_meetings/04_2018/pdf/item_8/180321_EOReport%20v3.pdf)

North Coast Regional Water Board Executive Officer's Report –  
May 17, 2018

[https://www.waterboards.ca.gov/northcoast/board\\_info/board\\_meetings/05\\_2018/pdf/item\\_7/180501\\_EO%20Report%20May\\_msj.pdf](https://www.waterboards.ca.gov/northcoast/board_info/board_meetings/05_2018/pdf/item_7/180501_EO%20Report%20May_msj.pdf)