Developing Standardized Methods for Sampling, Analyzing and Assessing Benthic Harmful Algal Blooms

United States Environmental Protection Agency

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Background

Benthic harmful cyanobacterial blooms (HCBs) and their toxins pose a significant environmental threat to domestic animals, wildlife, and humans, and have impacted drinking water treatment operations in recent years. Specifically, dog and cattle deaths have been attributed to exposure to benthic HCBs in various states across the nation (and internationally). With this in mind, state, tribal, and local agencies have expressed a need for a greater understanding of the role of benthic versus planktonic blooms in cyanotoxin production and tools for identification and quantification of HCBs.

Issue

To date, limited work has been done to review and evaluate appropriate collection and analysis methods for benthic HCBs. While the Interstate Technology and Regulatory Council (ITRC) has developed valuable draft guidance with multiple sampling approaches, it does not specify the most appropriate way to characterize risk quickly and effectively during a HCB event. EPA also doesn't currently have comprehensive guidance on characterizing and responding to benthic HCBs to share with states, tribes, and local agencies.

This lack of information can hinder scientists' and decision-makers' ability to characterize risk and quickly respond during a time-sensitive HCB event, leading to further adverse impacts.

Methods

EPA researchers plan to conduct an estimated six pilot studies during the summer of 2023 and 2024 at streams and rivers across the United States that have recently experienced benthic HCBs. Researchers are looking to characterize locations on wadeable streams and wadeable areas of larger rivers where high exposure risks have the potential to occur, such as places where children and pets (i.e., dogs) play in water, wade, or have the potential for direct interaction with benthic cyanobacteria; and locations that are in the vicinity of vulnerable drinking water systems.

Sites will be sampled up to three times a year during the bloom season for each pilot study. Researchers will analyze cyanobacterial composition, associated toxins, and areal extent of benthic periphyton and cyanobacteria mat samples. Periphyton are the benthic algae and organic debris that cling to surfaces and aquatic plants. They are an important part of the aquatic community, especially in shallow lakes, streams and rivers.

Results

The anticipated results of this study will enable EPA to work more effectively with state, local and tribal partners by providing sampling protocols and analytical methods that can be employed to efficiently assess potentially life-threatening benthic HCB events. Results will also help state and tribal partners develop benthic HCB plans that use common sampling and analysis methods, with the goal of identifying and reducing vulnerabilities for drinking water supplies and risk of adverse impacts to pets, wildlife, and humans recreating in and around water.

Related Links

Cyanobacterial Harmful Algal Blooms (CyanoHABs) in Water Bodies**:** www.epa.gov/cyanohabs

EPA Newsletter and Collaboration & Outreach on HABs: www.epa.gov/cyanohabs/epa-newsletter-and-collaboration-and-outreach-habs#benthic

EPA HABs Contacts List: www.epa.gov/cyanohabs/epa-office-water-and-regions-contact-information

National Office for Harmful Algal Blooms: hab.whoi.edu/impacts/impacts-wildlife

ITRC Strategies for Preventing and Managing Harmful Cyanobacterial Blooms (Benthic): itrcweb.org/itrcwebsite/teams/training/hcb

Technical Contacts for this Project

- **Tina Laidlaw**
  laidlaw.tina@epa.gov
  Contact for EPA Region 8
  www.epa.gov/aboutepa/epa-region-8-mountains-and-plains

- **Rochelle Labiosa**
  labiosa.rochelle@epa.gov
  Contact for EPA Region 10
  www.epa.gov/aboutepa/epa-region-10-pacific-northwest

- **Jim Lazorchak**
  lazorchak.jim@epa.gov
  Contact for general study design & implementation

- **Avery Tatters**
  tatters.avery@epa.gov
  Contact for sampling methods

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