SC DEPARTMENT *of*
ENVIRONMENTAL
SERVICES

# Harmful Algal Blooms in South Carolina

## A Program Overview and Look Forward

SCDES Water Summit - May 19, 2026

Emily Bores

Shallow water + increased nutrient concentrations from drought

Nutrient runoff from heavy precipitation

Warmer temperatures

Eutrophication



# What are HABs?

- Harmful Algal Blooms, or HABs, are when microscopic organisms, overgrow under the right conditions in water bodies
- Associated with discoloration, films, mats etc. on the surface or bottom (benthic) of a waterbody
- Can grow due to nutrients, temperature/light availability, stagnant, slow -moving water
- Not all algal blooms are harmful, but some blooms, such as **cyanobacteria blooms, can produce toxins** that affect humans, animals, and the environment
- Four most well known toxins are:
  - **Microcystins**= hepatotoxins- liver toxins
  - **Cylindrospermopsin**= liver toxins
  - Saxitoxins= neurotoxins
  - Anatoxins= neurotoxins

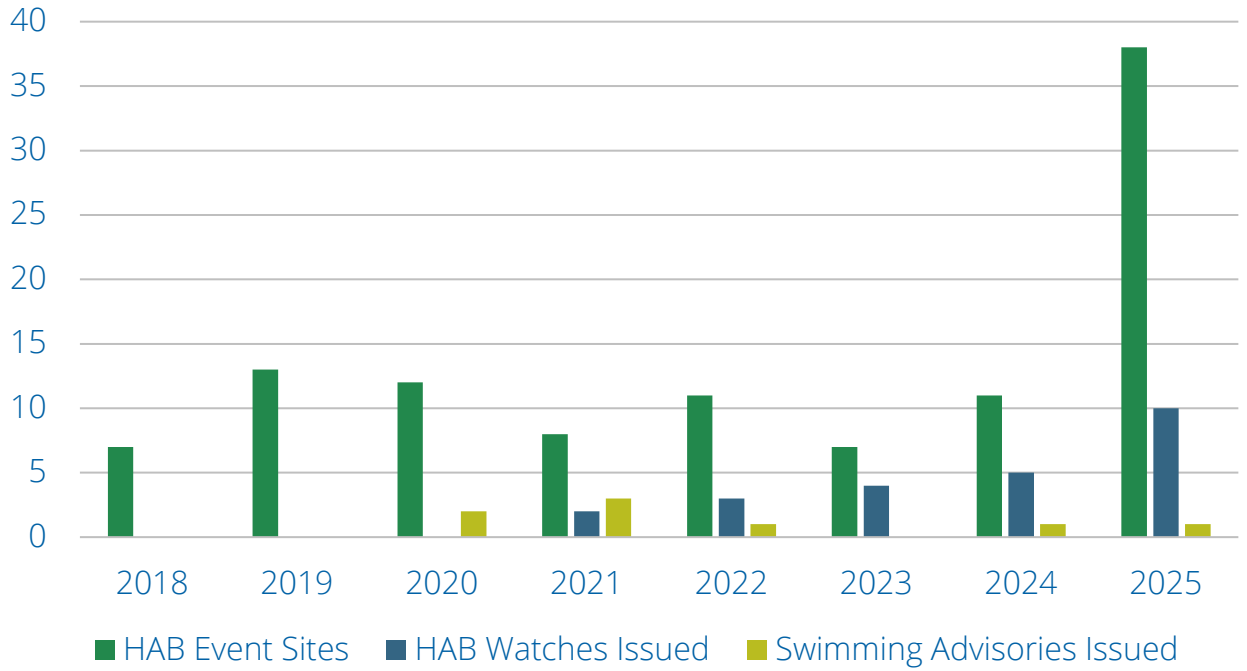
# SCDES HABs program

- Program started in 2018
- HAB program consists of:
  - Source water protection for drinking water
    - Water that is pumped/withdrawn from a lake and then treated and used for drinking water
  - Event driven sampling
  - Monitoring established sampling stations across the state for baseline data (background toxin levels)
  - Issuing watches and/or advisories in waters of the states

# SCDES Recreational Criteria

| | Microcystins | Cylindrospermopsin |
|---|---|---|
| Magnitude | 8 µg/L | 15 µg/L |

*adopted in 2020
*recreational watch is issued when a bloom is below these toxin standards



# Cyanobacteria and their associated algal toxins

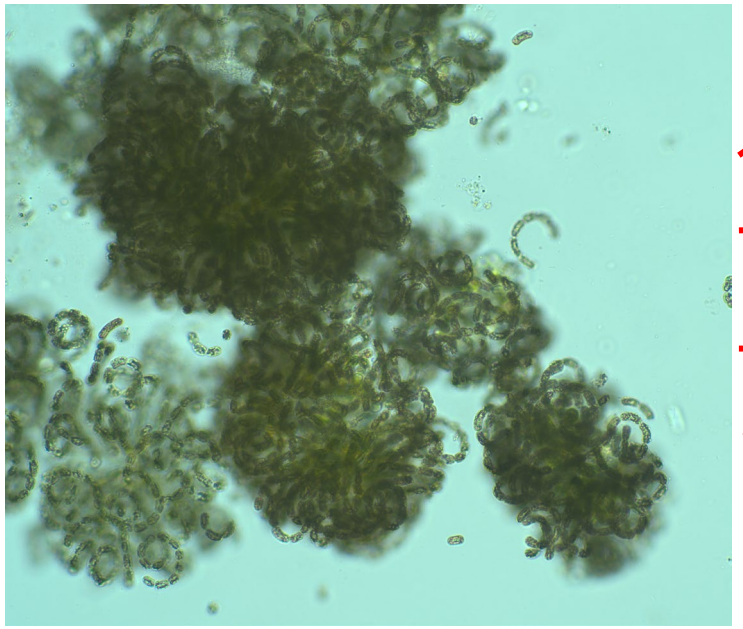
| Cyanobacteria Genera | Hepatotoxins | | Neurotoxins | |
|---|---|---|---|---|
| | Cylindrospermopsin | Microcystins | Anatoxin | Saxitoxins |
| *Anabaena* | X | X | X | |
| *Aphanizomenon* | X | | X | X |
| *Dolichospermum* | X | X | X | X |
| *Hapalosiphon* | | X | | |
| *Microcoleus* | | X | X | |
| *Microcystis* | | X | | |
| *Microseira (Lyngbya)* | X | | | X |
| *Oscillatoria* | X | X | X | |
| *Phormidium* | | X | X | X |
| *Planktothrix* | | X | X | X |
| *Woronichinia* | | X | | |

# How to determine if a bloom is harmful:

**1. Collect a water/HAB sample**

**2. Look at the sample under a microscope**

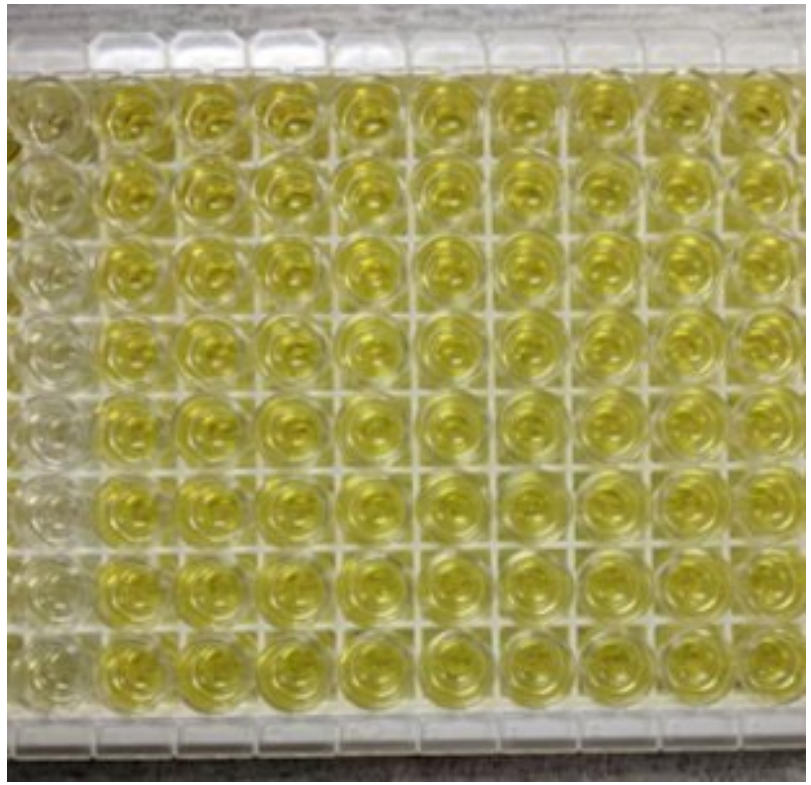
**3. Identify the algal species (harmful or non harmful)**

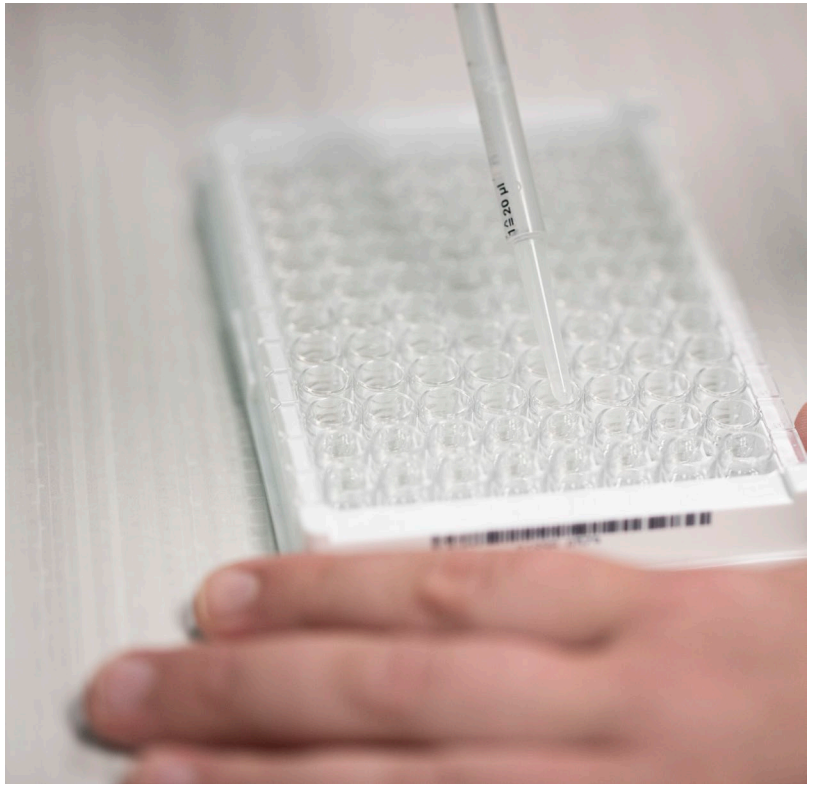


*Dolichospermum sp.*

**4. If harmful, determine what toxins it could be producing**

- Cylindrospermopsin
- Microcystins
- Anatoxin-a
- Saxitoxin



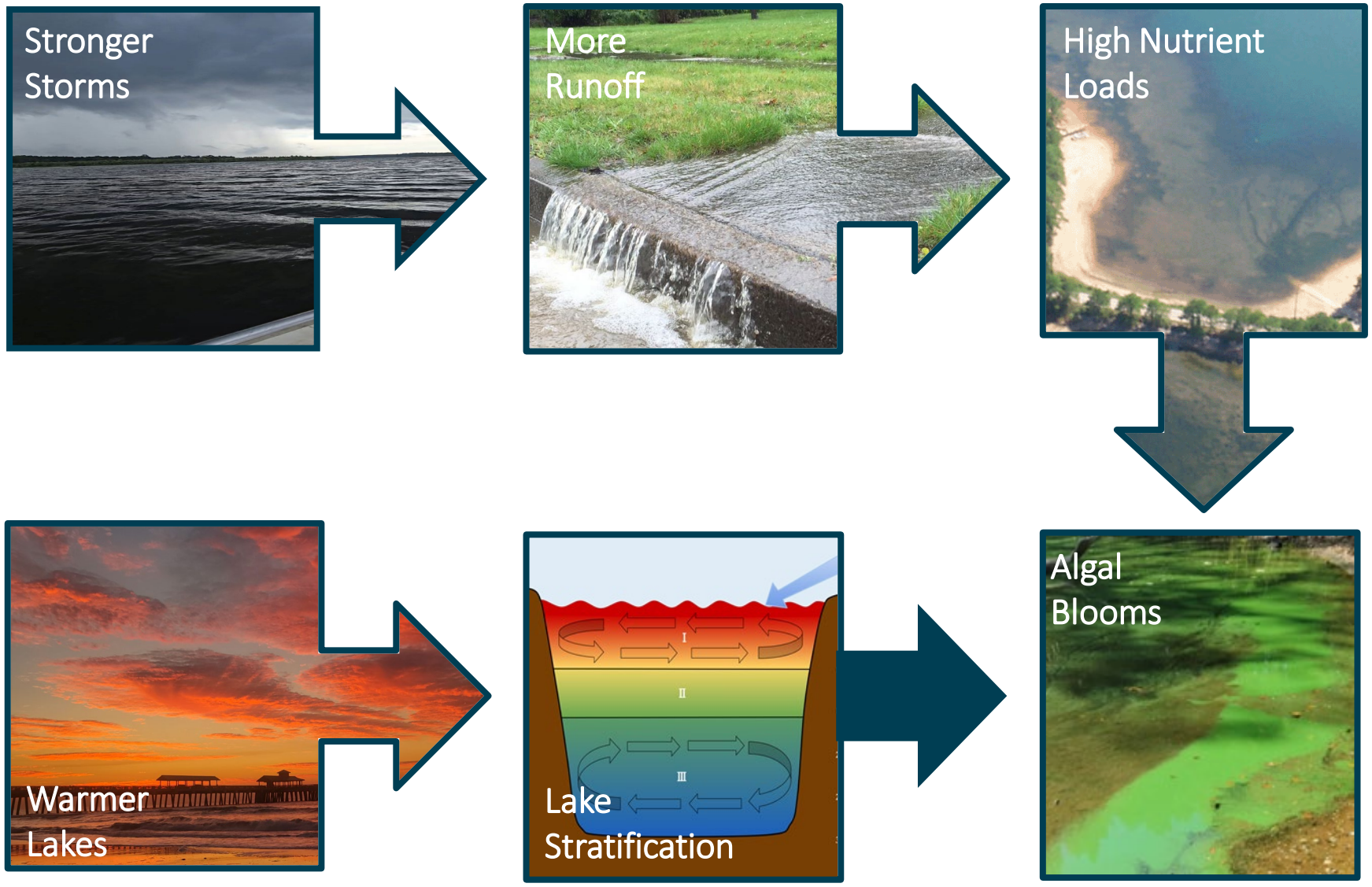


# Enzyme Linked Immunosorbent Assay (ELISA)- TOXIN ANALYSIS

# 2025 SC HAB Watches and Advisories

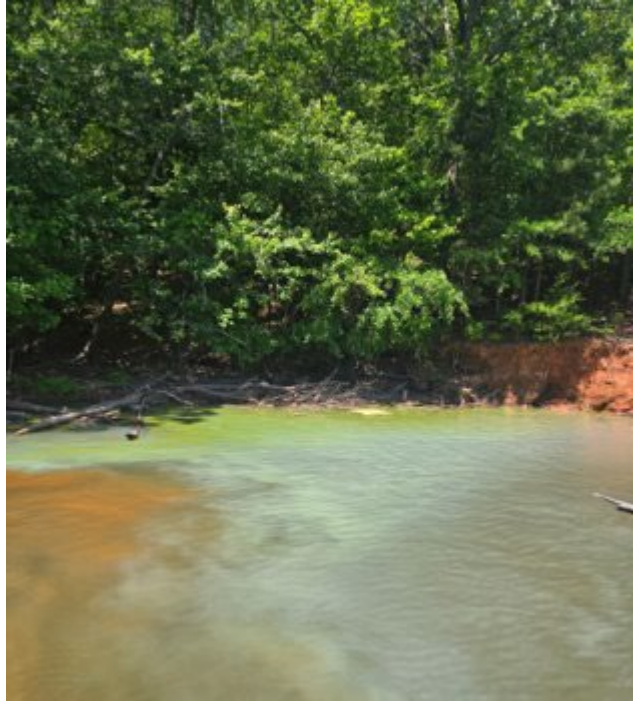
| Lake | Date Issued | Date Lifted | Level | Algal Species | Microcystin Toxins (ug/L) |
|---|---|---|---|---|---|
| **Goose Creek Reservoir** | 03/25/2025 | 04/29/2025 | Watch | *Dolichospermum* | Below detection limit |
| **Lake Hartwell** | 04/30/2025 | 07/01/2025 | Watch | *Dolichospermum* | 0 to 2.4 |
| **Broadway Lake** | 06/11/2025 | 06/20/2025 | Watch | *Dolichospermum* | 0.233 |
| **Broadway Lake** | 07/16/2025 | 09/24/2025 | Watch | *Planktothrix* | 0.147 |
| **Edgar Brown** | 07/16/2025 | 11/4/2025 | Watch | *Dolichospermum* and *Microcystis* | 0.280 |
| **Lake Robinson** | 08/14/2025 | 11/3/2025 | Watch | *Planktothrix* | 0.215 |
| **J. Strom Thurmond** | 09/19/2025 | 11/10/2025 | Watch | *Microcystis* | 0.666 |
| **Goose Creek Reservoir** | 09/23/2025 | 10/28/2025 | Watch | *Dolichospermum* | 2.89 |
| **Lake Wylie** | 09/24/2025 | 12/3/2025 | Watch | *Microcystis* | 3.37 |
| **J. Strom Thurmond** | 11/26/2025 | 01/13/2026 | **Advisory** | *Microcystis* | **8.35** |

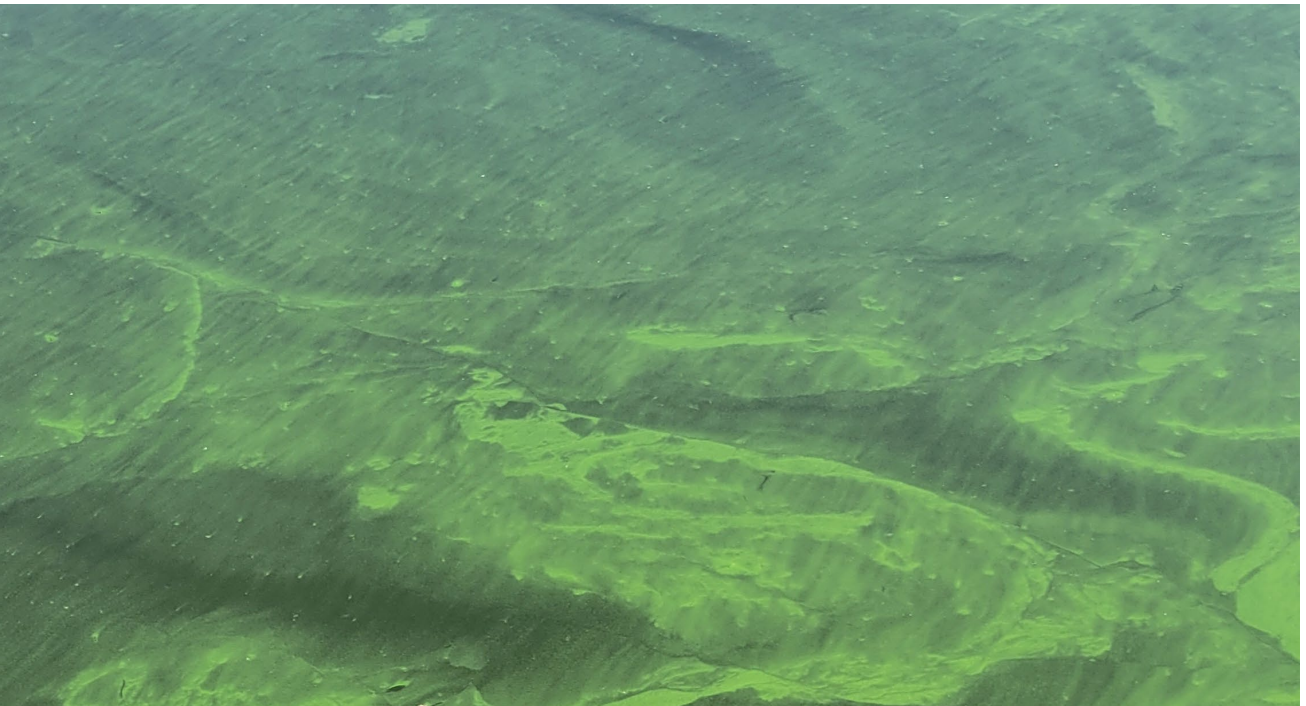
# HABs in a changing environment



# HABs in a changing environment

- Both hurricanes and droughts have been linked to increases in HABs
  - Increases sediment-water interface interactions
    - Provides pulses of nutrients
    - Resuspension of sediments
- Cyanobacteria are adaptative species; can survive in extreme conditions when other species cannot
- Droughts
  - Less water = increased light availability and higher temperatures
- Hurricanes
  - Increased precipitation and stormflow are the best indicators for increases in algal biomass in lakes
  - High intensity storms with peak wind velocities followed by calmer conditions
    - Uprooting and inundation of submerged vegetation





# Case Study: Lake Hartwell

- Hurricane Helene in 2024 brought massive rainfall and winds to northwestern SC
  - 13-19 inches of rain, not including runoff
  - Winds of at least 70mph
- Major disruptive event, followed by calmer conditions
  - Would expect increased runoff to enter the lake, as well as removal of buffer zones (natural vegetation), vegetation within the lake, and sediment disturbances
- Major HAB event in 2025- have not seen a bloom of this extent (to our knowledge) on the lake before
  - May be due to the disruptive hurricane event

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