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College of Agriculture, Forestry and Life Sciences



HARMFUL ALGAL BLOOMS

A pocket field guide for South Carolina

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Sarah A. White
Clemson University

Emily Bores
SC Department of Health and Environmental Control

John Hains
Clemson University

Heather Nix
Clemson Cooperative Extension

Debabrata Sahoo
Clemson University

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*Clemson University in Cooperation with Southern SARE,
SC Department of Health and Environmental Control, and SC State University*

Images by Emily Bores unless otherwise noted.

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Cyanobacterial bloom in outflow from a stormwater pond

Harmful algal blooms (HABs) are the overabundant growth of algae or bacteria that may interfere with use of water or a waterbody.

HABs include several types of blooms:

- Large, nontoxic blooms that can interfere with physical movement in the waterbody (e.g., swimming) or can clog a water intake/outlet structure.
- Blooms that produce problematic compounds that interfere with taste and odor of the water, causing it to be unpalatable for drinking.
- Cyanobacterial blooms that are capable of producing toxins that can harm fish, wildlife, livestock, pets, and humans.

HABs occur throughout South Carolina's fresh waters and sometimes cause taste and odor issues in local drinking water.

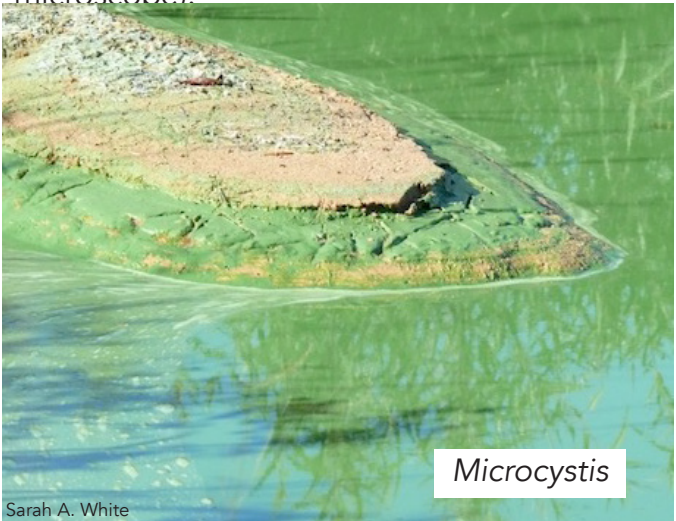
This field guide provides pictorial examples of the species of algae and cyanobacteria likely to be found in South Carolina waters and common look-alike species of plants and algae.

HABs in South Carolina may consist of more than one species of algae or bacterium.

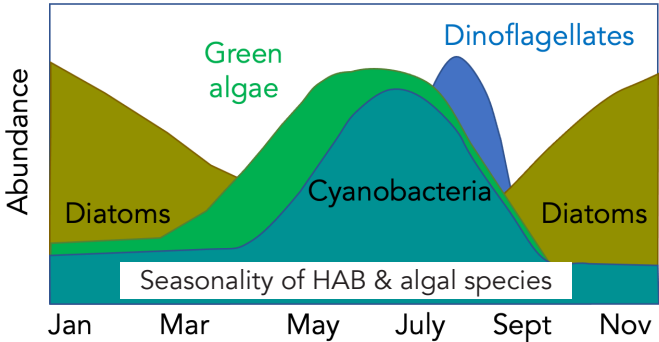
HABs look different:

- thick layers of floating algal mats
- a scum or paint-like appearance on the waters surface
- bright pea-soup green, blue, red, brown, or a mixture of these colors

Color is not a reliable indicator of algae or cyanobacterium species - as many species look-alike (unless they are under a microscope).



Microcystis



HABs are most common in the summer and fall, although a bloom can occur throughout the year.





Microcystis

***Microcystis* spp.**

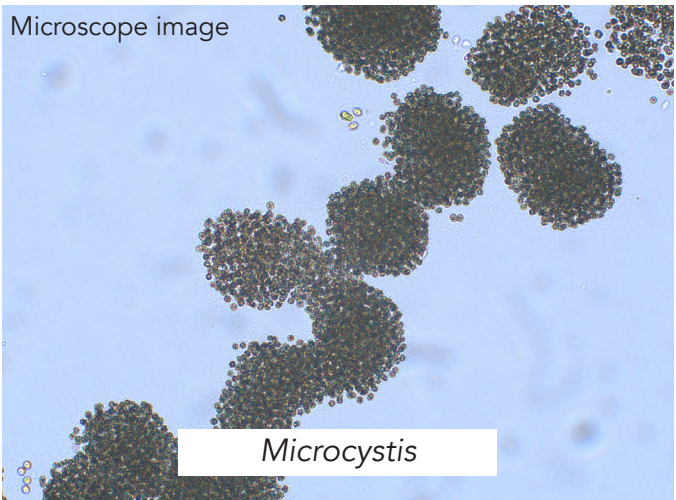
Microcystis is a genus of cyanobacteria that forms dense blooms and is commonly found in nutrient rich freshwater.

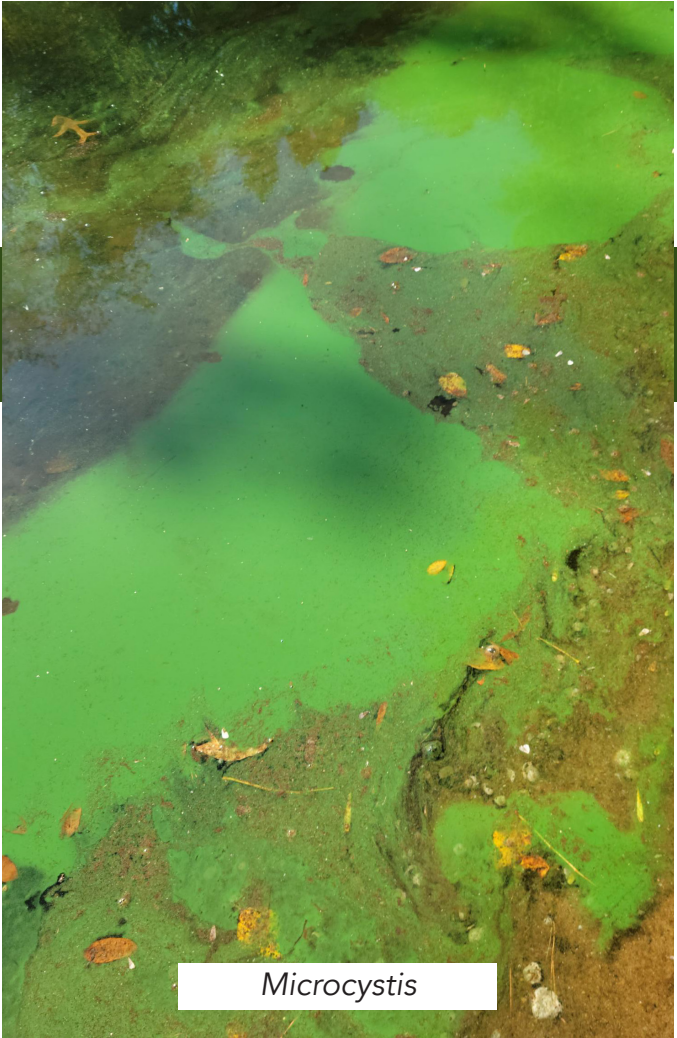
Their cells can produce gas vesicles which allow them to move up and down the water column.

Microcystis can potentially form potent liver toxins that can be harmful to humans and animals when ingested.

The South Carolina Department of Health and Environmental Control has a recreational advisory level for microcystins of 8 µg/L.

Microscope image





Microcystis



Microcystis



Microcystis

***Aphanizomenon* spp.**

Aphanizomenon (typically *A. flos aquae*) is a genus of cyanobacteria that can form blooms in freshwater and brackish waters in summer and winter.

These blooms can form “bundles” on the surface of water that resemble grass clippings.

Aphanizomenon spp. can potentially produce liver toxins (cylindrospermopsin) and neurotoxins (anatoxins, saxitoxins).




Filtered water sample containing *Aphanizomenon* spp.



Aphanizomenon

Microscope image



A photograph of a pond with a dense population of Aphanizomenon cyanobacteria. The water is dark and turbid, with numerous small, yellowish-green, rod-shaped organisms visible throughout. The organisms are arranged in long, thin chains. The background shows some green foliage and a dark, shadowed area, possibly a tree or building, reflected in the water.

Aphanizomenon



Lyngbya

Lyngbya (microseria) wollei

Lyngbya wollei is a cyanobacterium that forms thick, dense mats on the bottom of water bodies.

Gas bubbles trapped in the mats can cause them to float to the surface. The mats have a strong musty or earthy smell, can be quite large, and can physically impede navigation, recreation or clog water intakes.

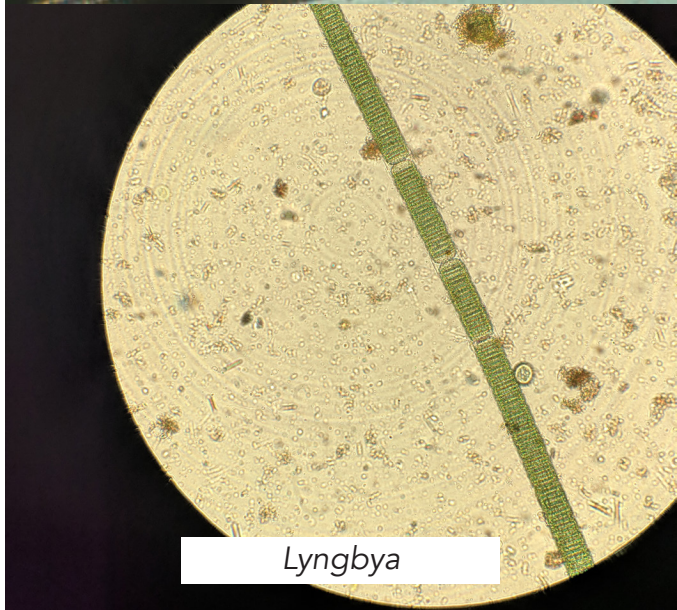
Contact with *Lyngbya* mats can cause irritation to the skin. *Lyngbya* may be able to produce liver toxins (cylindrospermopsin), or neurotoxins (saxitoxin) that can cause gastrointestinal and neurological symptoms.



Sarah A. White

Microscope images

Cyanobacteria



Lyngbya

***Dolichospermum* spp.**

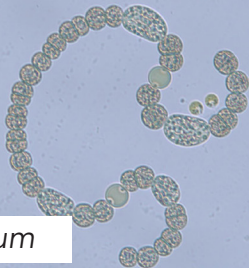
Dolichospermum (formerly classified as *Anabaena*) is a genus of cyanobacteria commonly found in freshwater environments that may form dense blooms.

Their cells can form gas vesicles that allow them to move up and down the water column.

Dolichospermum may produce liver toxins (microcystins, cylindrospermopsin) and neurotoxins (anatoxin, saxitoxin).



Microscope images



Dolichospermum



Dolichospermum

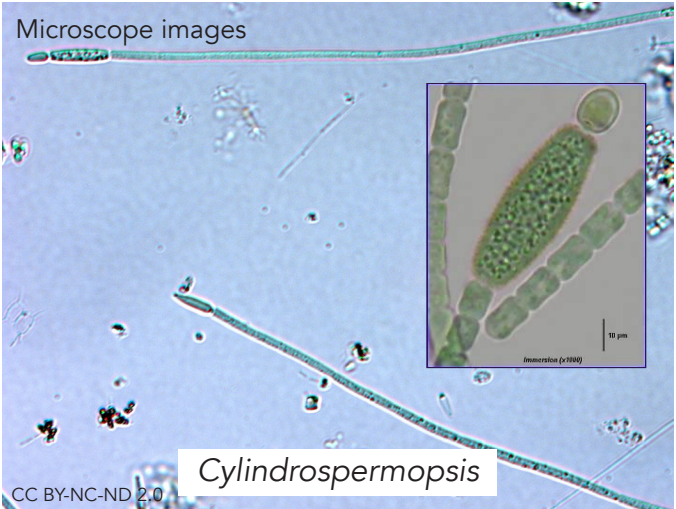
***Cylindrospermopsis* spp.**

Cylindrospermopsis is a genus of cyanobacteria that form filamentous (forms long, hair-like structures) blooms in nutrient-rich (eutrophic) waters.

Cylindrospermopsis can potentially produce liver toxins (cylindrospermopsin) and nerve toxins (saxitoxins).

The South Carolina Department of Health and Environmental Control has a recreational advisory level for cylindrospermopsin of 15 $\mu\text{g/L}$.

Microscope images



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Cylindrospermopsis

Edward Carney

***Planktothrix* spp.**

Planktothrix is a genus of cyanobacteria that is filamentous (forms long, hair-like structures) and can bloom in freshwater environments.

Planktothrix can be found throughout the water column but can also exist as a benthic (bottom-dwelling) bloom.

Planktothrix can produce liver toxins (microcystin) and neurotoxins (anatoxin, saxitoxin).

Microscope image

A light micrograph showing several long, thin, greenish-brown filaments of the cyanobacterium Planktothrix. The filaments are composed of individual cells, some of which are visible as small, rounded structures. The background is a pale, slightly hazy green. A white rectangular box is overlaid at the bottom center of the image, containing the text 'Planktothrix'.

Planktothrix



Planktothrix

Bloom sample

Cyanobacteria



Planktothrix

***Oscillatoria* spp.**

Oscillatoria is a filamentous cyanobacterium that can form mats in shallow waters, lakes, ponds, and more. It can also form on the bottom of water bodies and within other mats of algal species.

Oscillatoria is closely related to and can be confused with *Planktothrix* spp.

Oscillatoria can potentially produce liver toxins (microcystin) and neurotoxins (anatoxin, saxitoxin).

Microscope image



Oscillatoria

***Phormidium* spp.**

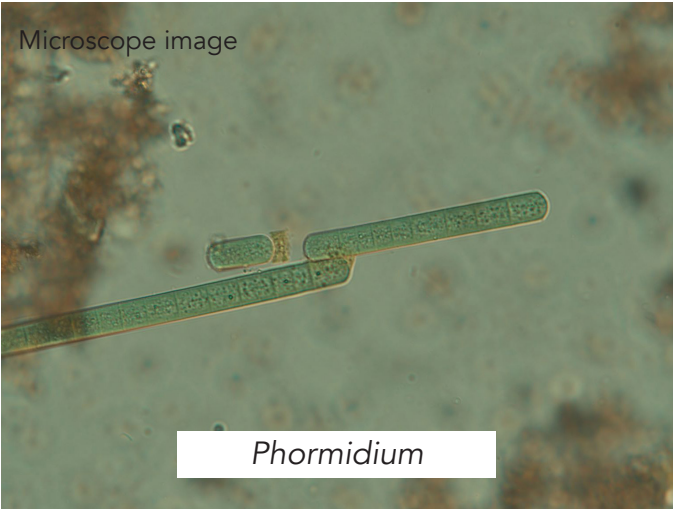
Phormidium spp. is a freshwater genus of cyanobacteria that can form dense mats at the bottom of water-bodies that can be green or brown in color.

They can also form mats on substrates, such as rocks.

Phormidium spp. may produce a musty smell that can be attractive to dogs.

Phormidium spp. can potentially produce neurotoxins (anatoxin).

Microscope image



Phormidium



Phormidium

Kurt D Carpenter

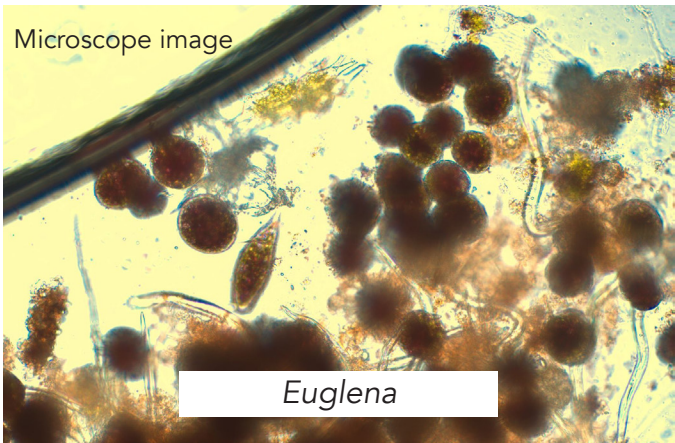
Euglena spp.

Euglena is not a cyanobacterium species but can commonly form blooms and scum in water-bodies.

Euglena are found in fresh, brackish, and marine waters and can be an indicator of water pollution. These blooms can be either green or red in coloration, dependent on the species and light availability.

Euglena spp. are not harmful to humans but could potentially produce a toxin called euglenophycin, which can impact and kill fish.

Microscope image



Euglena



reddish color in water

Euglena

reddish color in water



Euglena

Aquatic plants:
Azolla caroliniana (red tinted) foliage &
Lemna spp. (light green)

Look-alikes



Sarah A. White



Azolla caroliniana
(mosquito fern)

Look-alikes



Sarah A. White



Aquatic plants:
Lemna spp. (duckweed) - fine leaf
Hydrocotyle spp. (pennywort) - large leaf

John Hains

Sarah A. White




Duckweed (top) larger with visible roots.
Water meal (bottom) - feel like small grains when rolled between the fingers.



John Hains

Look-alikes



Duckweed infestation

Sarah A. White



Look-alikes

Duckweed and water meal infestation.

John Hains

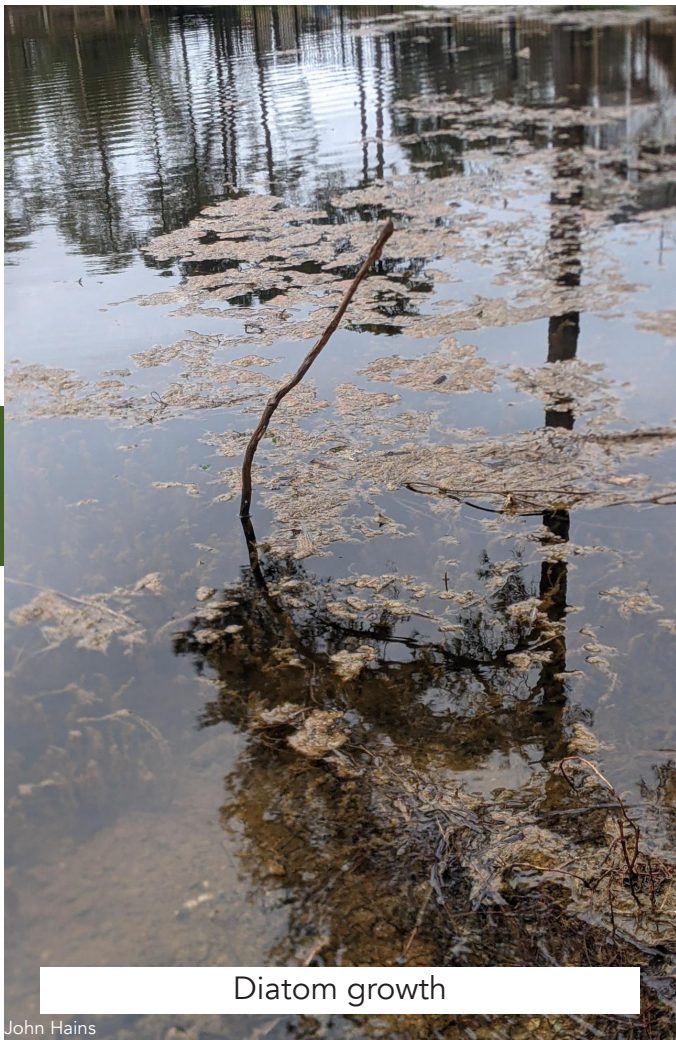


Duckweed (large leaves) and water meal (small leaves) infestation

Sarah A. White



Common green algae



Diatom growth

John Hains



Aquatic plant:
Eleocharis (creeping spike rush)



Eleocharis (creeping spike rush)

John Hains



Aquatic plant:
Salvinia molesta (giant salvinia)

Judson Riser



Salvinia molesta (giant salvinia)

Judson Riser

What to do for a suspected HAB

If you suspect that your waterbody has a HAB - assume it is toxic - **avoid coming into contact with the water.**

Dogs

Do not let your dog eat any scum or algae or lick the water off their fur.

If your pet has been in contact with a HAB, immediately wash them off with clean water.

Contact your veterinarian if your animal has any symptoms such as vomiting, convulsions, excessive drooling, diarrhea, and more.



Livestock

- Provide access to clean, non-contaminated water (the best choice, if possible).
- Restrict access to natural water bodies with suspected HABs to prevent exposure from drinking or wading access.
- If livestock must access the pond, move access points for livestock to the upwind side, or limit access to a location with less/no visible algae (not foolproof, but may be helpful if no other options are available).



- If livestock exhibit any symptoms of illness, call a veterinarian to evaluate treatment options.



Ask your veterinarian to contact the state veterinarian to report the HAB and suspected reason for livestock sickness or death.

State Veterinarian and
Director of Livestock Poultry Health:
Mike J. Neault, DVM
mneault@clemson.edu
803-726-7818

<https://www.clemson.edu/public/lph/state-veterinarian/index.html>

If livestock health was impacted (sickness/death), collect a water sample (next page) wearing gloves or other appropriate PPE, and submit it to a lab.

Remember, “when in doubt, stay out!”

If the HAB is present in a:

Public waterbody: Please contact the SCDHEC’s HAB program (contact information on last page)

Private waterbody (stormwater pond, neighborhood pond, livestock pond, etc.): Management information for aquatic plants and algae available at Clemson Extension Home and Garden Information Center and Land-Grant Press.

Pond management companies in SC:

- SC Department of Natural Resource’s website (<https://www.dnr.sc.gov/wildlife/publications/pdf/LakeMgtConsultants.pdf>)
- Clemson Certified Master Pond Managers (<https://www.clemson.edu/extension/water/programs/mpm/certified.html>)

Collecting & submitting a sample

Algal bloom samples from ponds can be submitted to the Clemson University Plant Diagnostic Clinic. Algae species will be identified and control recommendations offered.

Detailed sampling instructions:

<https://hgic.clemson.edu/factsheet/submitting-an-algae-sample-for-identification/>

Sample submission form:

<https://www.clemson.edu/public/regulatory/plant-problem/pdfs/form-weed-id-2018-pdf.pdf>

Collecting a sample involves the risk of exposure to the potentially toxic bloom. Appropriate safety measures should be taken to avoid skin contact, inhalation, and ingestion.

Samples can be submitted/mailed:

1. USPS, FedEx, or UPS. Samples can be received Tues-Thurs
2. Dropped off at your local county office (<https://www.clemson.edu/extension/co/index.html>)

Sample collection:

- Wear waterproof gloves
- Use a clean, plastic bottle that holds more than 1 cup (e.g., a rinsed, disposable drink container)
- Fill the bottle 90% full with the algae and pond water
- Place the plastic container with a sample inside a sealed, zip-top plastic bag
- Fresher samples are better for testing
- Keep the sample from overheating and limit exposure to direct sunlight (avoid leaving the sample in your car for very long on a hot day)

Sample packages should include:

- A completed Plant/Weed Identification Sampling Form
- The sample
- Payment (\$20 if SC resident)

Contact Information:

Report a suspected HAB in public waters:

boreseb@dhec.sc.gov
803-898-8374

Report a livestock / animal exposure to State Veterinarian & Director Livestock Poultry Health:

Mike J. Neault, DVM
mneault@clemson.edu
803-726-7818

Contact the Authors:

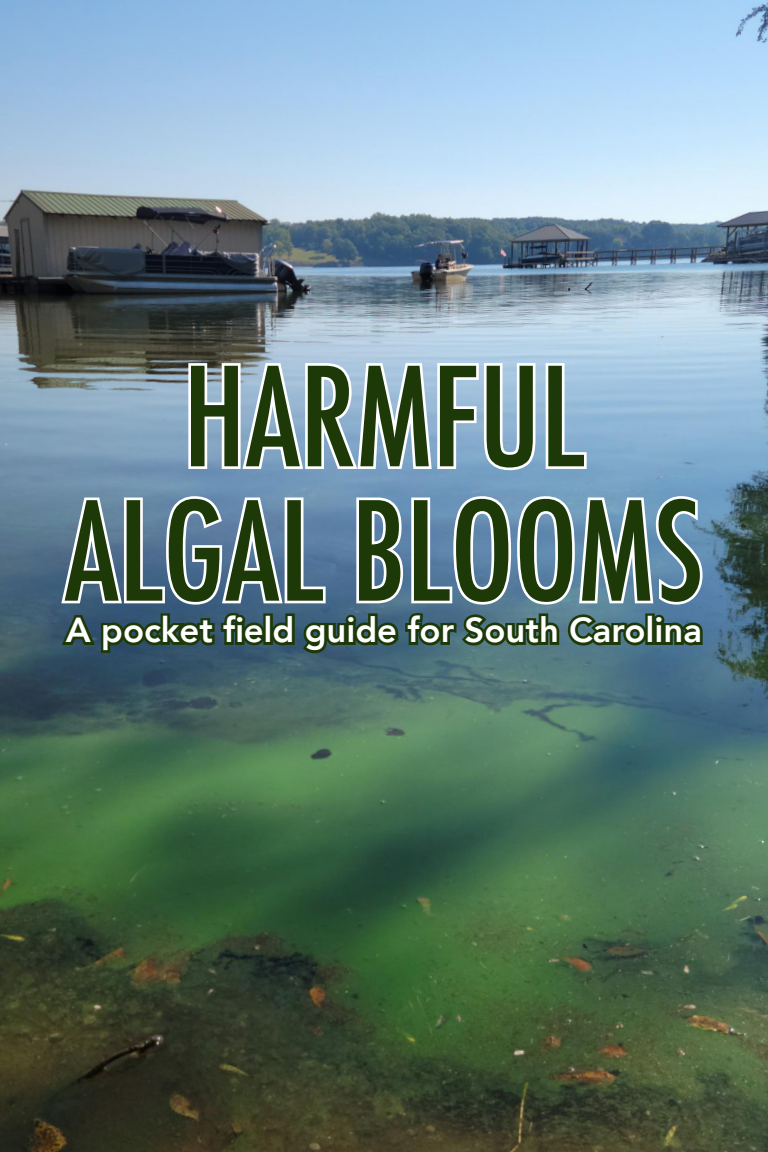
Sarah White (swhite4@clemson.edu)

Emily Bores (boreseb@dhec.sc.gov)

John Hains (jhains@g.clemson.edu)

Heather Nix (nix4@clemson.edu)

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