**The Florida Senate**

# BILL ANALYSIS AND FISCAL IMPACT STATEMENT

(This document is based on the provisions contained in the legislation as of the latest date listed below.)

Prepared By: The Professional Staff of the Committee on Environment and Natural Resources

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| BILL: | SB 834 |
| INTRODUCER: | Senator Brodeur |
| SUBJECT: | Long-term Cleanup of Harmful Algal Blooms |
| DATE: | November 29, 2021 REVISED: |

| | ANALYST | STAFF DIRECTOR | REFERENCE | ACTION |
|---|---|---|---|---|
| 1. | Carroll | Rogers | EN | **Pre-meeting** |
| 2. | | | AEG | |
| 3. | | | AP | |

## I. Summary:

SB 834 is the "Implementation of Long-term Solutions for Cleaning Florida's Water Bodies Act." It directs the Department of Environmental Protection (DEP) to:

- Procure technologies to physically remove algae, toxins, and nutrients from water bodies in the state;
- Provide the best available technology and other resources for reduction and long-term cleanup of harmful algal blooms; and
- Develop a plan for emergency response action.

The bill requires DEP to give preference to technologies that reduce nitrates and toxins that foster harmful algal blooms, are scalable, and are proven to improve water quality in freshwater bodies.

## II. Present Situation:

### Water Quality and Nutrients

Phosphorous and nitrogen are naturally present in water and are essential nutrients for the healthy growth of plant and animal life.[1] The correct balance of both nutrients is necessary for a healthy ecosystem; however, excessive amounts can cause significant water quality problems.

Phosphorous and nitrogen are derived from natural and human-made sources. Natural sources include the atmosphere, soils, and the decay of plants and animals. Human-made sources include sewage disposal systems (wastewater treatment facilities and septic systems), overflows of storm

[1] U.S. Environmental Protection Agency (EPA), *Sources and Solutions*, https://www.epa.gov/nutrientpollution/sources-and-solutions (last visited Nov. 18, 2021).

and sanitary sewers (untreated sewage), agricultural production and irrigation practices, and stormwater runoff.[2]

**Harmful Algal Blooms**

Algal communities naturally occur in healthy aquatic ecosystems.[3] However, under certain conditions algae may grow excessively or "bloom" and produce toxins that can harm human health, animals, aquatic ecosystems, and the economy. Harmful algal blooms are sometimes visible as green, yellow, red, or brown discolorations in the water that look like scums, paint-like slicks, clotted mats, or foam. Visible signs of a bloom are not necessary for algal toxins to exist in quantities sufficient to cause harm.[4] The image below is an aerial view of a cyanobacteria bloom in Lake Okeechobee.[5]

[2] *Id.*
[3] Congressional Research Service, *Freshwater Harmful Algal Blooms: Causes, Challenges, and Policy Considerations*, 1-2 (July 8, 2020) *available at* https://crsreports.congress.gov/product/pdf/R/R44871.
[4] *Id.*
[5] USGS, *Tracking the Bad Guys: Toxic Algal Blooms*, https://www.usgs.gov/center-news/tracking-bad-guys-toxic-algal-blooms#:~:text=An%20aerial%20view%20of%20Lake%20Okeechobee%20in%20Florida,inhabit%20water%20in%20every%20corner%20of%20the%20world (last visited Nov. 18, 2021).

Many factors may influence the occurrence and prevalence of harmful algal blooms in freshwater, including water temperature, nutrient concentration, pH, water circulation, and availability of light. Nutrient enrichment, especially nitrogen and phosphorous enrichment, is one of the key causes of harmful algal blooms. When high levels of nutrients enter a body of water, they stimulate plant and algal growth, which can lead to depletion of dissolved oxygen, reduced transparency, changes to the biological community, and degradation of the aesthetic appeal of the water. This process is called eutrophication. [6]

Studies also indicate that increased temperatures and changes in frequency and intensity of rainfall associated with climate change may favor harmful algal bloom formation. Some studies have found that swings between flooding and drought may result in more harmful algal blooms. For example, if intense rainfall is followed by drought, nutrients washed into receiving water bodies may remain there longer, increasing the potential for a harmful algal bloom.[7]

While many types of harmful algal blooms can occur in bodies of freshwater, cyanobacteria (sometimes called blue-green algae) blooms are most frequent and severe. Some species of cyanobacteria produce cyanotoxins, which can cause hepatic (liver-related), neurologic, respiratory, dermatologic, and other symptoms in humans and other animals. Exposure to cyanotoxins may occur by consuming tainted drinking water, fish or shellfish; swimming or recreating in waters with certain concentrations of cyanotoxins; and inhaling aerosolized cyanotoxins.[8] Long-term health effects from cyanotoxin exposure is unclear.[9]

**Blue-Green Algae Task Force**

In 2019, Governor DeSantis directed the Department of Environmental Protection (DEP) to establish a Blue-Green Algae Task Force to expedite reduction of nutrient pollution and cyanobacteria blooms in the state.[10] The task force provides guidance and specific, science-based recommendations with the goal of expediting the restoration of water bodies that have been adversely affected by cyanobacteria blooms.[11] The task force has focused on source identification, nutrient reduction and remediation efforts, algal toxins and human health effects, and innovative technologies as they relate to the prevention, cleanup, and mitigation of harmful algal blooms.[12]

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[6] *Id.* at 6.
[7] *Id.*
[8] *Id.* at 3. Common cyanotoxins that can cause illness in people and animals include: microcystin, cylindrospermopsin, anatoxin, saxitoxin, nodularin, and lyngbyatoxins. CDC, *Illness and Symptoms: Cyanobacteria in Fresh Water*, https://www.cdc.gov/habs/illness-symptoms-freshwater.html (last visited Nov. 19, 2021).
[9] CDC, *Illness and Symptoms*.
[10] State of Florida, Office of the Governor, *Executive Order Number 19-12 (2019)*, available at https://www.flgov.com/wp-content/uploads/orders/2019/EO_19-12.pdf; DEP, *Blue-Green Algae Task Force*, https://protectingfloridatogether.gov/state-action/blue-green-algae-task-force (last visited Nov. 18, 2021).
[11] DEP, *Blue-Green Algae Task Force Consensus Document #1* (Dec. 2, 2019), *available at* https://floridadep.gov/sites/default/files/Final%20Consensus%20%231_0.pdf.
[12] *Id.*

**Nutrient and Algae Removal Technologies**

There are three key elements to managing cyanobacteria blooms: monitoring, mitigation, and prediction. Mitigation, especially through nutrient reduction, is likely to be most effective in the long term.[13] Mitigation methods that are commonly used to reduce nutrient loads generally include: upgrading sewage treatment plants; more effectively managing stormwater; controlling erosion; reducing excess fertilizer in agriculture; and utilizing retention ponds and wetlands to intercept and assimilate nutrient loads. [14] Because many of these strategies may take decades to have a sustained effect on algal blooms, it is important to have reactive options.[15]

Shorter-term, within-lake management options can be either physical, biological, or chemical. Physical methods include:

- Ultrasonics,
- Booms and curtains,
- Surface mixers,
- Fountains,
- Oxygenation (including nanobubbles),
- Destratification,
- Withdrawal of bottom waters,
- Light exclusion technology, and
- Flow manipulation.[16]

Chemical methods include:

- Hydrogen peroxide,
- Geochemical compounds (e.g., alum, Phoslock™, Aqual-P, etc.),
- Sediment capping, and
- Plant extracts.[17]

Biological methods include:

- Biological treatments (e.g., bacterial seeding),
- Biomanipulation of the food web, and
- Aquatic plants.[18]

DEP's Innovative Technology Grant Program is available to local governmental entities for projects that evaluate and implement innovative technologies and short-term solutions to combat algal blooms and nutrient enrichment, restore and preserve Florida waterbodies, and implement certain water quality treatment technologies.[19] Project proposals must prevent, mitigate, or clean

[13] Intergovernmental Oceanographic Commission/UNESCO, *Solutions for Managing Cyanobacterial Blooms*, 6 (2019), *available at* http://www.globalhab.info/files/Cyano_mitigation_GlobalHAB2019.pdf.
[14] In Florida, these types of mitigation methods are often adopted through regulatory practices such as Basin Management Action Plans (BMAPs). BMAPs are the primary method that DEP uses to address pollutant loading for impaired waterbodies. Section 403.061, F.S.
[15] *Solutions for Managing Cyanobacterial Blooms* at 6.
[16] *Id.* at 14.
[17] *Id.* at 14.
[18] *Id.* at 14.
[19] DEP, *Grants*, https://protectingfloridatogether.gov/state-action/grants-submissions (last visited Nov. 19, 2021).

up harmful algal blooms, with an emphasis on nutrient reductions, or must improve the ability to predict and monitor harmful algal blooms.[20] Key funding considerations include whether the project:

- Is innovative,
- Avoids environmental harm,
- Is scalable,
- Has water quality benefits,
- Is ready to construct, and
- Is geographically located in an area with a water quality restoration plan (reasonable assurances plan or BMAP).[21]

As of June 2021, DEP allocated the funds in this grant program towards 20 innovative technology projects totaling $14.9 million. DEP has given the grants to local governments, universities, and water management districts to develop and test the technologies in locations throughout the state.[22] Of the 20 projects, seven are dedicated to nutrient reductions; nine are focused on addressing algae in waterways through algicides, nanobubble technology, soundwaves, and mechanical harvesting; and four are designed to identify how to better predict formation of algal blooms.[23]

## III. Effect of Proposed Changes:

The bill contains whereas clauses that acknowledge the following:

- Governor DeSantis created the Blue-Green Algae Task Force to improve water quality for the benefit of all Floridians;
- The task force and the Department of Environmental Protection (DEP) are working together to pilot innovative technologies to eliminate harmful algal blooms and clean waterbodies in this state;
- Funding is necessary to implement a long-term program to clean waterbodies that are high in nitrates and nutrients; and
- DEP is responsible for cleanup of this state's waterbodies.

**Section 1** names the act "Implementation of Long-term Solutions for Cleaning Florida's Water Bodies Act."

**Section 2** directs DEP to address the growing threat to the general public from harmful algal blooms by:

- Procuring innovative technologies to physically remove harmful algae, toxins, and nutrients from water bodies;
- Providing resources to reduce harmful algal blooms;

[20] DEP, *Blue Green Algae Task Force*, https://www.protectingfloridatogether.gov/sites/default/files/documents/210623_BGATF-Materials-Web.pdf (last visited Nov. 19, 2021).
[21] *Id.*
[22] *Id.*
[23] DEP, *Innovative Technologies*, https://www.protectingfloridatogether.gov/sites/default/files/documents/DEP%20Innovative%20Tech%20Presentation.pdf (last visited Nov. 19, 2021).

- Providing the best available technology for long-term cleanup of harmful algal blooms; and
- Developing a plan for emergency response action.

The bill directs DEP to give preference to innovative technologies that:
- Reduce the nitrates and toxins fostering harmful algal blooms,
- Are scalable, and
- Are proven to improve water quality in freshwater bodies.

**Section 3** provides that the effective date is July 1, 2022.

## IV. Constitutional Issues:

A. Municipality/County Mandates Restrictions:

None.

B. Public Records/Open Meetings Issues:

None.

C. Trust Funds Restrictions:

None.

D. State Tax or Fee Increases:

None.

E. Other Constitutional Issues:

None.

## V. Fiscal Impact Statement:

A. Tax/Fee Issues:

None.

B. Private Sector Impact:

Businesses providing solutions to harmful algal blooms may see a positive fiscal impact from grants provided pursuant to this bill.

C. Government Sector Impact:

A grant program addressing harmful algal blooms may have a negative fiscal impact on the state, but water quality improvements may have a positive impact in the long term.

## VI. Technical Deficiencies:

None.

## VII. Related Issues:

None.

## VIII. Statutes Affected:

None.

## IX. Additional Information:

A. Committee Substitute – Statement of Changes:
(Summarizing differences between the Committee Substitute and the prior version of the bill.)

None.

B. Amendments:

None.