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November 22, 2019

Re: *DRAFT Implementation of the Turbidity Criterion for the Protection of Coral Reef Resources, Cyanotoxin Criteria/Advisory Thresholds, and Numeric Nutrient Criteria*

Dear Ms. Sutton:

Thank you for the opportunity to comment on this *DRAFT Implementation of the Turbidity Criteria for the Protection of Coral Reef Resources, the Cyanotoxin Criteria/Advisory Thresholds, and the Numeric Nutrient Criteria*. We commend the Department for their recognition that the current turbidity limits are not protective of sensitive marine environments and we applaud this effort to adopt a science-based standard to protect Florida's precious and imperiled coral reef ecosystem, along with the effort to adopt a quantitative cyanotoxin standard to protect human health and quality of life in the state of Florida. We also appreciate the Department's willingness to add additional public workshops throughout the state. Providing a public forum for comments is essential to capturing public input in the decision-making process.

We are generally supportive of the proposed draft turbidity criterion and are strongly supportive of advisories issued for cyanobacteria in Florida's recreational waters. However, we would like to raise several suggestions and some concerns regarding the Draft Implementation:

Turbidity Criteria

I. Calculation of Background Turbidity Levels

While the newly proposed turbidity standards are a significant improvement in protection for coral reefs based on best available science, we are concerned about the calculation of background turbidity levels. The critical component in the success of this implementation is ensuring that the calculation of "background" turbidity levels is accurate, relevant, and properly applied.

One of our primary concerns is that "background" calculations may be skewed such that the apparent difference between compliance and background samples are no longer protective of coral reefs. We are not entirely clear from the draft standards how these background levels will

be calculated, as the pre-project baseline range is described with an unspecified number of measurements during tidal cycles and two different confidence intervals (upper 90% confidence interval of the mean difference between minimum and maximum turbidity for 3-4 pre-project tidal cycle measurements at surface and bottom; upper 95% confidence interval of the mean difference between minimum and maximum turbidity for 5 or more pre-project tidal cycle measurements at surface and bottom). With these two ranges, pre-project studies may not be conducted with an accurate number of samples to determine the natural variability of a site.

For pre-project baseline range establishment, we recommend that at least a year of pre-project samples are collected. This is particularly important to capture natural variability ranges through seasons, storms, tides, current flow changes, and other factors that might influence pre-project background levels, especially for long term construction projects that stretch across multiple seasons. At an absolute minimum, the pre-project conditions should reflect the proposed length of time of the construction project.

We support the inclusion of compliance samples taken during the project. For these samples, protocols for locating the appropriate sites should be addressed to ensure that projects remain protective of coral reef habitat. We recommend considering the use of drones or remote sensing to achieve this, as well as more third-party oversight of monitoring. For example, we published a [remote sensing paper](#) in 2015 about the Port Miami project's turbidity plumes. The lead author, Brian Barnes, has the capacity to translate remote sensing information into NTU levels given the proper calibrations based on location, sediment type, and in situ monitoring data. This is just one possible solution, and we are confident that more options exist to solve the issue of compliance samples.

We support the addition of the narrative that applies this standard to all waters, as well as the narrative for areas with corals, worm rock, and hardbottom communities. Assessment of natural levels of sedimentation and light levels so as not to impair normal growth, function, reproduction, or recruitment of aquatic life in all waters, as well as the limitation of turbidity beyond the natural range of background conditions in Florida Reef Tract areas is critical to the health of these ecosystems.

II. Consideration of Sediment Type and Other Factors in Dredging Sediment

From the presentation at the Public Workshop, along with the Turbidity Implementation Document and the Turbidity Technical Support Document, it is unclear whether the sediment type and grain size will be required as part of the establishment of pre-construction background for permits. Section 1.4, Outstanding Florida Waters Considerations of the September 2019 version of the Turbidity Implementation Document mentions that the establishment of "natural background" may be based on paleolimnological examination of sediment cores or examination of geology and soils, but this does not seem to be required. We recommend that baseline levels are collected with the same type of sediment as will be/is produced during dredging. Sediment released by dredging activities can be different from naturally occurring sediment (Jones et al., 2016). Dredging sediment is often more fine-grained than natural coarse sediment, and these

fine particles can cause higher turbidity (Fourney and Figueiredo, 2017), can take longer to settle out of the water column, can be distributed further (Duclos et al., 2013), and are more harmful to corals (Duckworth et al., 2017; Jones et al., 2015; Nugues and Roberts, 2003; Weber et al., 2006). This could also be the result of dewatering or overflowing scows with water full of the finest sediment particles directly on the reef area. Dredging can also release sediment from deeper strata than might be disturbed by natural events, generating additional sediment not already existing in the system and with distinct mineralogies compared to those found in reef environments (Saussaye et al., 2017; Swart, 2016).

Releasing dredging sediment may also result in acute acidification and/or eutrophication, and, particularly in areas such as shipping channels or ports (Nayar et al., 2007), may also release unwanted contaminants (Eggleton and Thomas, 2004; Jones, 2011; Su et al., 2002), sediment-borne pathogens (Hodgson, 1990; Voss and Richardson, 2006; Weber et al., 2012), or related immune impairment agents.

We therefore also recommend that acidification, eutrophication, contaminant, and pathogen testing also be performed on samples taken during dredging, as these may impact the relative lethality of the sediment released near sensitive environments. Contaminated, fine, or highly eutrophied sediment may require an even lower standard than other types of sediments to be protective of benthic environments.

III. Qualifications of Turbidity Contractors

Qualifications of turbidity contractors was not addressed in the revised draft. We recommend that specific qualifications are required for turbidity monitors, including those conducting baseline analysis, monitoring during the project duration, and after the fact surveys. We also recommend that third-party oversight be implemented and/or improved as a quality control mechanism.

The Air and Water Research Task 1 report points out that, during the Miami Harbor expansion, the major turbidity monitoring contract went to a group with questionable qualifications in turbidity monitoring. The report states, “[t]urbidity monitoring shall be conducted by individuals with prior experience in turbidity monitoring for major dredging projects.” [But] this review can find no details on International Towing and Salvage LLC or their experience or whether they are even in business. No details were provided as to the nature of experience, whether monitoring was deemed “successful”, or the complexity or technical knowledge the contractor should have had.”

IV. Recommended Scientific Studies for Review

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Cyanotoxin Criteria/Advisory Thresholds

I. Calculation of Recommended Cyanotoxin Criteria/Advisory Thresholds

While the newly proposed cyanotoxin thresholds are a significant effort to protect human health based on best available science, we are concerned about the calculation of these cyanotoxins, the routes of ingestion and volume of ingestion used in the calculation, and the types of cyanotoxins analyzed to develop this calculation.

The current standard in Florida is based on the presence of cyanobacteria. If a bloom is present, advisories are posted, samples are taken and tested for chlorophyll *a*, the type of algae is determined, and if it is a type capable of producing a toxin, the level of toxin being produced is analyzed and the results are posted. The new recommendations focus on a quantitative level of cyanotoxins. The 2016 criteria (4 µg/L microcystin, 8 µg/L cylindrospermopsin) developed a calculation with a reference dose that included multiple routes of exposure. We understand that the proposed 2019 criteria (8 µg/L microcystin, 15 µg/L cylindrospermopsin), are, as with the 2016 criteria, based on the EPA's evaluation of the health effects of microcystins and

cylindrospermopsin as detailed in the *Health Effects Support Document for the Cyanobacterial Toxin Microcystins* (U.S. EPA 2015) and *Health Effects Support Document for the Cyanobacterial Toxin Cylindrospermopsin* (U.S. EPA 2015). We also understand, from the EPA's May 2019 Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin document, that the reference dose used in the calculation for microcystin is based on rat exposure to microcystin-LR (considered to be the most frequently occurring and most toxic congener of microcystin evaluated) in drinking water, and the reference dose for cylindrospermopsin is based on a study of mice exposed to the cylindrospermopsin in drinking water. Additionally, we know that these are based on the critical effects of each of these cyanotoxins: slight to moderate liver lesions with necrosis, increased liver weight and enzymes associated with tissue damage (microcystin): adverse effects on kidneys, including decreased urinary protein concentration and increased relative kidney weight (cylindrospermopsin).

The proposed thresholds represent careful scientific studies and calculations based on these studies; however, in an effort to create a quantitative standard, we accept much presumption on the routes of ingestion, the volume of cyanotoxins that can be ingested before health is affected, and the risk to human health that cyanotoxins present.

II. Routes of Ingestion

This calculation only takes ingestion while swimming into account. Exposure to cyanotoxins can also occur dermally and through inhalation of aerosolized particles. These routes are not taken into consideration, as EPA states, because adequate effects data are not available. The relative source contribution that was a part of the 2016 recommendations has been removed, to focus on the ingestion.

III. Volume Ingested

The study used to calculate volume ingested (Dufour 2017) analyzed participants between the ages of 6 and 81; no children younger than 6 were involved in the study. Based on this, the calculation includes a mean body weight for children ages 6-10 (31.8 kg or 70 pounds). This leaves many smaller children at risk, not to mention dogs, many of whom are likely to be less than 70 pounds and to ingest greater volumes of cyanobacteria through many different routes. As stated in the EPA's Recreational Water Quality Criteria in 2012: "Relative to body size, children breathe more air and ingest more food and water than adults (U.S. EPA, 2003). Children also exhibit behaviors that increase their exposure to environmental contaminants, including increased head and body immersion in recreational waters (U.S. EPA, 2010a; Wade et al., 2006, 2008) and hand-to-mouth contact (Xue et al., 2007). The immature immune systems of children can also leave them particularly vulnerable to the effects of environmental agents (Pond, 2005). Children also stay in the water longer than adults (Wade et al., 2006, 2008) and often times ingest more water (Dufour et al., 2006)." Studies that include children under 6 should be conducted, similar to the EPA's NEEAR epidemiology studies for fecal indicator bacteria (FIB).

IV. Many Cyanotoxins not Analyzed as Part of the Calculation

These criteria are the results of analysis of the effects of microcystin and cylindrospermopsin; however, many more cyanotoxins, known and unknown, have not been analyzed. Cyanotoxins such as beta-N-methylamino-L-alanine (BMAA) have been indicated as a risk in the development of neurodegenerative diseases and have been found in south Florida waters (Brand et al. 2011), but are not analyzed as part of this study. It may be that no amount of exposure to cyanotoxins is safe.

Given that there is much that remains to be understood about cyanobacteria and cyanotoxins, we urge you to develop a standard that includes guidelines for both cyanobacteria and cyanotoxins. Measurements of chlorophyll *a* should not be triggered by the sighting of a visible bloom, but should be part of a regular water quality monitoring effort, as with the Florida Healthy Beaches program. Swimming advisories should be issued when a bloom is sighted during part of regular sampling, when chlorophyll *a* is greater than 10 µg/L, as stated in Table 2-1, WHO (2003a) Recreational Guidance/Action Levels for Cyanobacteria, Chlorophyll *a*, and Estimated Corresponding Microcystin Level in the EPA's May 2019 Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin document) or when cyanotoxins are detected. This includes consistent, clear, and obvious posting of signage at recreational areas to indicate that cyanobacteria are present, and consistent, clear, and obvious notification to the public, beyond posting it on the Department of Health website. If there is an absolute need to quantify the level of cyanotoxin in order to issue advisories as part of regular monitoring for blooms and measurement of chlorophyll *a*, we recommend the 2016 calculations, which included different routes of exposure and resulted in lower levels of cyanotoxins proposed as a threshold.

Numeric Nutrient Criteria

I. The Florida Algae Crisis and the Lake Okeechobee Experience

In 1969, a USGS report found that agriculture in the Lake Okeechobee watershed was dumping fertilizer into the Lake. The Legislature commissioned a Report on the Eutrophication of Lake Okeechobee in 1976, which determined that action to reduce fertilizer loading was urgently needed to prevent algae outbreaks in the Lake. An Interim Action Plan to reduce fertilizer loading into the Lake was adopted in 1979. Since that first plan, multiple permits, plans, and reduction goals for fertilizer, sewage, and manure (FSM) have been implemented during the 1980s, 1990s and into the 2000s. Despite this, FSM pollution has continued to accumulate in the bed of the Lake and continues to increase, while massive algal blooms have continued to occur. In 2005, an unprecedented massive toxic algae outbreak covered most of Lake Okeechobee, rendering contact with the water unsafe and triggering warning signs where Lake Okeechobee water was conveyed into the Caloosahatchee and St. Lucie Rivers. In 2007, the Legislature responded to the crisis by deleting the statutory finding that fertilizer pollution was causing algae outbreaks in the Lake. Ch. 2007-253, Laws of Florida. FSM pollution of the

Lake then continued to increase. In 2018, phosphorus fertilizer loading into Lake Okeechobee reached almost 1046 tons, almost 10 times higher than the legal limit. In 2018 and 2019, massive toxic algae outbreaks in Lake Okeechobee and the Caloosahatchee and St. Lucie Rivers caused widespread fish and wildlife kills, killed numerous dogs that had swum in the rivers, and sickened numerous residents of the areas around those rivers.

Across four decades of state plans and programs to sharply reduce fertilizer discharges into Lake Okeechobee, fertilizer discharges increased by a factor of 10, triggering the worst water contamination crisis in Florida history. Reform is needed.

II. Fertilizer, Sewage, and Manure (FSM) Pollution Rules Adopted by DEP in 2012¹

In 2012, as a result of a lawsuit by Conservation organizations, FDEP adopted a set of extraordinarily complex administrative rules dealing with FSM pollution. See Fla. Admin. Code R 62-302 and 62-303. Instead of imposing enforceable limits on FSM pollutants, the rules call for extensive biological studies and then a planning process if FSM pollutants are eventually proven to be causing harm. In summary, the rules are a maze of chutes and ladders, with detailed processes for triggering various ecological studies of each segment of lake and stream to determine whether algae outbreaks are causing substantial harm, and then to whether it can be proven that the outbreaks were actually triggered by FSM pollution.

If actual substantial harm is eventually found, the only result is a planning processes that lead to Basin Management Action Plans (BMAPs). BMAPs are largely collaborations of the operators of FSM pollution sources, and the only consequence of the failure of the plan to actually curb FSM pollution is a requirement to report the failure. Where BMAPs were hoped to be practical mechanisms to reduce FSM pollution, they have in fact functioned as a “Get Out of Jail Free” card for agriculture industries and other sources of as FSM pollution, while our waters continue to be degraded. The FSM rules have been implemented over the past seven years, during which time, widespread massive algae outbreaks have taken place on the St. Johns River, and in other rivers and lakes throughout Florida.

The continuing algae crisis is the most serious environmental crisis in Florida’s history, and it is a result of the failure of the State and FDEP to require FSM pollution sources comply with pollution limits. Last month, state’s Blue Green Algae Task Force, released its “Consensus Report.” It found that the algae crisis is likely to worsen, and attributed the crisis to agricultural fertilizer and manure control programs have been ineffective, to on-site sewage disposal and sewage overflows, and to BMAPs that are not implemented or even monitored.

III. Proposed Protocols to Implement Existing Rules Concerning Fertilizer, Sewage, and Manure (FSM) Pollution

In the context of that ongoing crisis, FDEP is proposing a methodology for implementing the FSM pollution rules in Fla. Admin. Code R 62-302 and 62-303. The methodology sets out the processes by which the complex system of Chutes and Ladders in those rules are implemented. Almost all FSM pollution is discharged to streams and rivers that then flow into lakes and estuaries. For that reason, FSM rules and the process for implementing them in streams and rivers is the most critical component of FSM controls.

Attached as Appendix A is a flow chart setting out the processes set forth in the methodology for implementing the streams sections of the FSM rules. The flow chart demonstrates that for flowing waters, ecological studies of various flora and fauna are required for every affected segment of the stream before a finding can be made that FSM pollution will trigger or is triggering an algae outbreak. Even when that finding is made, further additional studies are needed to prove that the cause of the problem is FSM pollution. The most this methodology can eventually accomplish is trigger a Basin Management Action Plan planning process. This methodology endorses the emerging excuse advanced by the agricultural industries responsible for the 2018 algae outbreak that devastated Lake Okeechobee and the Caloosahatchee and St. Lucie Rivers.

In 2018, phosphorus fertilizer discharges into the Lake exceeded legal limits by a factor of 10, but the agricultural industries responsible for the disaster claim that the algae outbreak resulted not from their fertilizer pollution but from a hurricane. The proposed methodology at 6.10(3) appears to endorse this excuse by stating that extraordinary events cannot be counted when assessing the degree of contamination of any water body. Heavy rainfall from tropical cyclones is a natural feature of Florida's climate and algae outbreaks triggered by them cannot be ignored. Massive toxic algae outbreaks associated from extreme rainfall should not be mischaracterized as weather events.

The implementation proposal should require immediate action in response to massive algae outbreaks. Immediate reform is needed to address the ongoing algae crisis, which the Blue Green Algae Task Force found will worsen. The proposed implementation document requires in sections 6.3 through 6.9 that multiple studies across multiple years are necessary to determine that controls on FSM pollution are needed. Massive algae outbreaks are rapidly increasing in number, size, and duration. For that reason, the implementation document should include a new section 6.11 requiring an immediate finding that FSM rules have been violated whenever an algae outbreak occurs covering 250 acres of lakes or estuaries, or covering one mile of streams or river courses.

Florida has the opportunity to more sustainably address the ongoing degradation of our waterways and wildlife habitat as part of the Triennial Review process. Unfortunately, the proposed changes will only repeat history and result in more study and little improvement.

Summary

We support this more protective standard to protect our sensitive marine environments, along with human health, and we thank FDEP staff for their time and careful attention to this matter, including the public meetings, the inclusion and careful consideration of comments during the public meeting and comment period, and the modifications made to the calculation of turbidity background levels, the compliance samples, and water column variations.

However, we also strongly recommend that the Department considers our recommendations in a much-needed effort to reverse the ongoing degradation of Florida’s waterways. Comprehensive reform is critical to sustainably address fertilizer, sewage and manure pollution and to reduce toxic blue green algae. Floridians deserve clean water.

Thank you for the opportunity to provide this additional feedback.

Sincerely,

Waterkeepers Florida





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