toxic effects to fish, zooplankton, aquatic macroinvertebrates, wading birds, and other aquatic vertebrates (Havens 2008).

Occurrence of cyanobacteria blooms correlate positively to total nitrogen and total phosphorus in lakes, rivers, and coastal ecosystems in many regions (Pearl 1988). However, factors promoting cyanobacteria blooms and toxin production can also include variables other than macronutrients including water temperature, water transparency, reduced CO_2, elevated pH, abundant iron and dissolved organic matter, and zooplankton grazing dynamics (Havens 2008). In Florida waters eutrophication and impairment from nutrient pollution has increased dramatically. Since 2010 the watershed acreage in Florida under active Basin Management Action Plans, primarily for nutrient pollution, has gone from about three million acres to over 13 million acres by 2016 (FDEP 2017).

Prediction, detection, identification, and monitoring of cyanobacteria have improved dramatically
Cyanobacteria taxa identification, monitoring for relative abundance and methods for toxin sampling, and identification have improved dramatically over the past decade in Florida. USGS conducts continuous and periodic determination of phycocyanin, a pigment produced by cyanobacteria, in several locations in Florida. Phycocyanin as measured by relative florescence units (RFUs) can be used to estimate cyanobacteria biovolume and assist in the development of threshold water quality criteria for cyanobacteria by FDEP (Almuhtaram 2018).

U.S. EPA final guidelines for microcystin and cylindrospermopsin issued in May 2019 vs. 2016 Draft Guidelines
EPA determined that the recent 2019 guidelines issued for recreational exposure to microcystin and cylindrospermopsin could be used for both swimming advisories and as new water quality standards by the States. If adopted under section 303(c) of the Clean Water Act, the standards could be used for Clean Water Act Purposes. In the latter context, we suggest adopting the EPA draft 2016 recreational guidelines for microcystin (4 µg/l) and cylindrospermopsin (8 µg/l) thresholds as new Florida water quality standards through the Florida Triennial Review process. We feel the lower 2016 toxin thresholds are appropriate due the increased frequency, duration, and severity of cyanobacteria blooms in Florida. We suggest that it is important to consider cyanotoxins independent of nutrients to further refine the relationship of nutrients and other hydrological variables to cyanobacteria blooms.

Waterkeepers Florida respectfully request that FDEP initiate rulemaking and promulgate water quality standards for cyanobacteria and the associated toxins microcystin and cylindrospermopsin as appropriate in Chapters 62-4, 62-302; 62-303; 62-304 as part of the FDEP Triennial Review process.

Thank you for your consideration.

Please contact us at 904-256-7591 or at lisa@stjohnsriverkeeper.org.

Respectfully,

ST. JOHNS RIVERKEEPER®

Lisa Rinaman

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