Brawley Consulting Group, LLC

Land Conservation and Management Services

Memo

Date: August 31, 2024

To: Ball Pond Advisory Commission

From: Brawley Consulting Group

Re: Results of Lake and Cyanobacteria Monitoring of August 27, 2024

Dear BPAC Members:

On August 27, 2024, the Brawley Consulting Group visited Ball Pond to conduct monthly water quality and cyanobacteria monitoring as part of the ongoing lake management program. We are grateful for use of the vessel provided by George Buck and on-the-water support provided by Frank Yulo. Both are BPAC members. Data and sample collection methods have been described in previous memos.

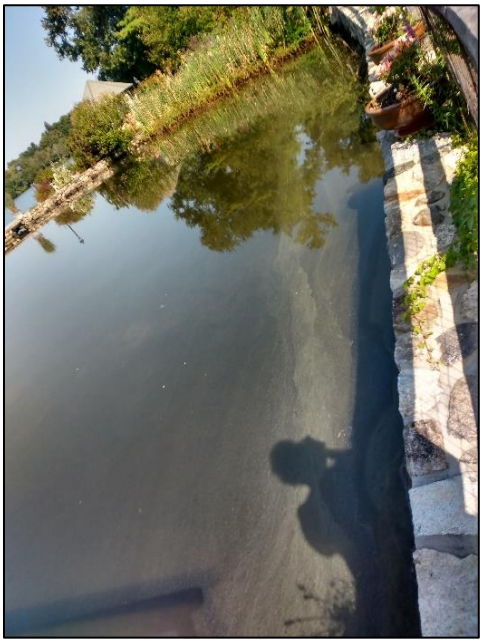

Figure 1. A cyanobacteria algal bloom photographed on August 27, 2024. Photo credits: Elissa Johnson.

Summary: Cyanobacteria cell concentrations on August 27th in the open water sampling site were low. Conditions in the water column were consistent with those observed earlier in the season with oxygen concentrations of <1 mg/L occupying a large portion of the water column below the thermocline. Open water conditions did not pose a public threat from harmful algal blooms. There was, however, a report and photo-documentation of an algal bloom in the northeastern shoreline on the same day (Fig. 1).

Water Column Conditions

The total depth at the sampling site on August 27th was measured at 15 meters. Secchi disk transparency is a surrogate for the level of organic (e.g., algae) and inorganic (e.g. silt or clay) material suspended in the water column. Secchi transparency on August 27th was a season high 3.15 m which is a 1.05-meter increase over Secchi disk transparency last measured on July 21st.

On August 27th, water temperatures decreased from 26.3°C near the surface to 23°C by 4 meters. The rate of temperature decrease accelerated between 4 meters and 8 meters where a temperature of 8.7°C was recorded. The thermocline was situated between 5 and 6 meters of depth where the temperature decreased from 21.3 to 14.4°C (Fig. 2). Below that, temperatures gradually decreased to 7.1°C by 10 meters of depth and to 6.7°C by 15 meters of depth.

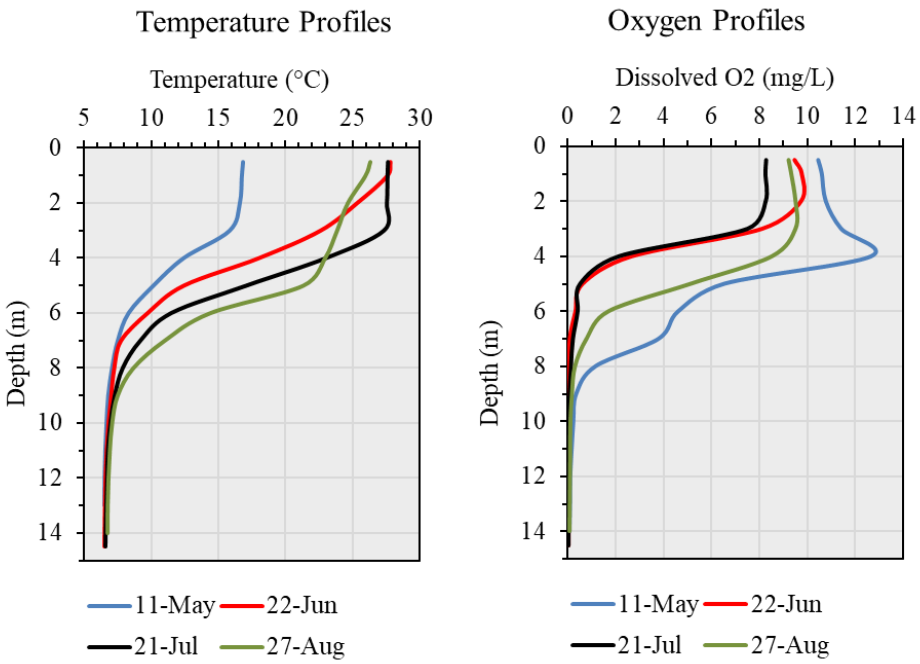

Figure 2. Temperature (left) and dissolved oxygen (right) profiles for Ball Pond from May 11 to August 27, 2024.

Oxygen concentrations were between 9.2 and 8.5 mg/L in the top four meters of the water column. Those rapidly decreased to <1 mg/L by 7 meters of depth, i.e., which was below the thermocline but above the lower metalimnetic boundary. Anoxic conditions were observed from that layer to the bottom of the water column.

Algae and Cyanobacteria Community

Twenty-six algal genera were identified in the samples collected on August 27th. The taxonomic groups with the greatest richness (number of genera identified) were the Chlorophyta (aka green algae) with 12 identified genera. Cyanophyta (aka cyanobacteria or blue-green algae) and Bacillariophyta (aka diatoms) were represented by at 5 and 4 genera, respectively. Four other taxa were represented by 2 or less genera.

The cell concentration in the top three meters of the water column, where the integrated sample for the algal count was collected, was approximately 3,849 cells/mL, of which approximately 62% were cyanobacteria cells. The cyanobacteria cell concentration

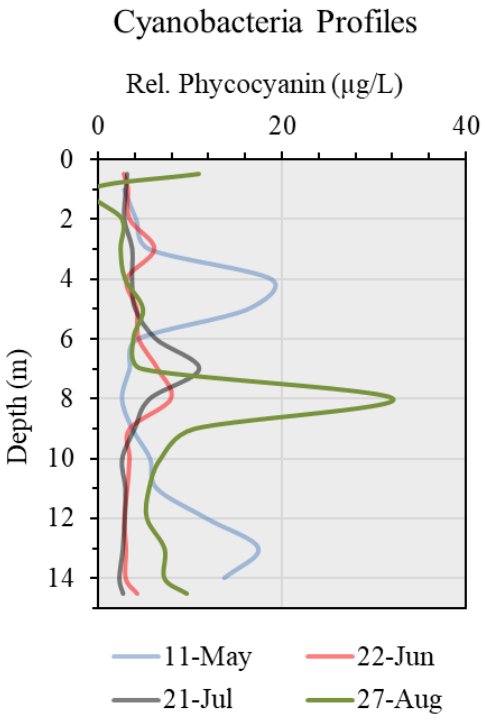

Figure 3. Relative phycocyanin profiles in Ball Pond from May 11 to August 27, 2024.

of 2,376 cells/mL was lower than that in June and July, and similar to the May concentration. The dominant cyanobacteria genus was *Dolichospermum spp*.

For comparison, the State's guidance document for municipalities with regards to beach closures due to harmful algal blooms uses a threshold 20,000 cyanobacteria cells/mL below which is considered not to present a risk to public health and consistent with Visual Rank Category 1 condition. Visual Rank Category 3 are observable blooms and characterized by cyanobacteria cell concentrations of >100,000 cells/mL. Contact with blooms should be avoided by people and particularly pets who might later ingest cyanobacteria while grooming themselves.

The relative cyanobacteria biomass was also low in the top seven meters of the water column but increased to a season maximum at 8 meters of depth before decreasing to levels that were only slightly higher than those near the surface (Fig. 3).

Conclusions

Open water cyanobacteria concentrations were low and did not present a potential public health threat from harmful algal blooms. However, blooms were photo documented along the shoreline on the same day. Cyanobacteria cell concentrations in blooms can be in the 100s of 1000s or more. Caution should be used in near-shore areas and coves where cyanobacteria blooms can form. Cyanobacteria blooms should be reported and documented (date, time, etc.) and contact with blooms avoided by people or pets.

The protracted period of anoxic conditions near the bottom of the water column results in the loading of phosphorus into those waters. This is a likely contributor to the maximum concentrations of cyanobacteria at deeper depths where they can take advantage of the elevated phosphorus levels.

Literature Cited

Connecticut Department of Public Health and Connecticut Department of Energy and Environmental Protection. 2023. Guidance to Local Health Departments for Blue–Green Algae Blooms in Recreational Freshwaters. See https://portal.ct.gov/-/media/dph/ehdw/blue-green-algae-blooms/guidance-to-lhd-for-blue-green-algaeblooms.pdf