From Kiyoko Yokota the President

Happy Lakes Appreciation Month, NALMS friends! This is the time of the year that we enjoy the lakes, reservoirs, and ponds the most.

Otsego Lake in NY (yes, there is another beautiful Otsego Lake in MI) is the headwater of the Susquehanna River and the northernmost end of the Chesapeake Bay watershed. It was considered meso-oligotrophic (moderate to low in productivity) in 2013 when I started teaching at the State University of New York at Oneonta. It was already invaded by several aquatic invasive species (AIS) including Eurasian watermilfoil, curly leaf pondweed, and zebra mussels (ZM). Some considered the increased water transparency (what I consider to be "fake oligotrophication" – increased filter feeding by ZM suppressing the standing phytoplankton biomass and therefore superficially increasing Secchi depth and decreasing chlorophyll-*a*) favorable, while others were concerned about the long-term effects of the invasion documented in the North American Great Lakes.

An ecological tipping point was reached on 27 July 2022 – Otsego Lake started to have recurrent toxigenic cyanobacterial blooms (aka, harmful algal blooms or HABs, although as a biology professor, I insist that cyanobacteria are prokaryotes and therefore not algae!). Otsego Lake blooms at times resulted in multiple independent reports of irritated eyes, nose, and throat by people working on or near the lake, even in the absence of the typical pea-soup green appearance. Now we must consider cyanobacterial blooms in planning lake work in addition to the weather and other constraints.

The Otsego Lake community was shaken. The lake that looked pristine in recent years due to the increased water transparency suddenly turned out to be "toxic." Many seasonal houses on the lake have been using lake water as their sole water source, often with an in-home treatment system designed to reduce pathogenic bacteria and protists but not cyanotoxins. New York State advises against using any surface water for drinking unless it is treated by a public water treatment plant, and people who use household systems to treat surface water for drinking are doing so at their own risk.

I was shocked during the oral presentation by Sarah Ryan (Environmental Director/Emergency Management Director of Big Valley Band of Pomo Indians) at the 13th National Water Quality Monitoring Conference in April 2023 to learn that the researchers found **whole filaments of cyanobacteria**, not just cyanotoxins, in the tap water of homes on Clear Lake that was drawn from the lake and filtered through in-home treatment systems. The results are now published as an original research article in a peer-reviewed journal (Stanton et al. 2023), and I thank the authors for conducting this important study that shed light on how HABs disproportionately affect drinking water safety for those who do not have access to public water lines or deep wells.

In early May I participated in the annual New York State Federation of Lake Associations (NYSFOLA, a NALMS affiliate) annual meeting at Lake George, NY (a large oligotrophic lake also affected by HAB), along with members of OLA and the nearby Canadarago Lake Improvement Association (CLIA). I was very happy to see the first-time participants finding the same "lake connectedness" throughout the meeting. Fred Lubnow and Chris Mikolajczyk (NALMS past president) introduced the NYSFOLA members to the CWA Section 314 advocacy work by the NALMS 314 Working Group. A few weeks later, I was invited as an instructor for the inaugural weekend Lake School by the Pocono Lake Ecological Observatory Network (PLEON) at Lacawac Sanctuary in Lake Ariel, PA. NALMS Region 3 Director Beth Norman put together an excellent program that combined field, classroom, and lab components that covered important concepts that I teach in an upper-level limnology course. NALMS Student Director Lauren Knose taught the highly anticipated HAB module on the last day, culminating with a skillful demonstration of cyanotoxin testing.

I have now joined many of you who are directly engaged in dealing with HABs in a nearby waterbody. I keep empty jars and rubber gloves in my car for opportunistic sampling, and I have invested in a portable microscope, which already helped decipher the identity of a suspected bloom at a popular swimming beach (Figures 1-3).

HABs are a serious global water resource challenge that affects both freshwater and marine systems but, I as a limnologist, am very much encouraged by many breakthrough research findings that are helping us better understand the bloom mechanisms every day, which lead to more targeted and effective management. I hope that this issue of *LakeLine* provides you updated knowledge and inspirations shared by many NALMS members who are working on the frontline of HAB management.

Figure 1. A Microcystis bloom on 12 September. Photo: Holly Waterfield (CLM).

Figure 2. A suspected bloom on 11 June 2023 led to a beach closure – it turned out to be accumulated pollen. Photo: Kiyoko Yokota.

Reference

Stanton, B., A. Little, L. Miller, G. Solomon, S. Ryan, S. Paulukonis and S. Cajina. 2023. Microcystins at the tap: A closer look at unregulated drinking water contaminants. AWWA Water Science. 5(3):e1337. doi:10.1002/aws2.1337.

Kiyoko Yokota, Ph.D., CLM is a limnologist at the State University of New York (SUNY) Oneonta, USA. She graduated from Saint Cloud State University in Minnesota with B.S. in biology with ecology emphasis (summa cum laude) and qualified as an associate professional engineer while working for a civil engineering consultancy in Tokyo, Japan. She was responsible for environmental assessment and water quality forecasting and management projects for new and existing reservoirs, lakes, and rivers. After earning a Ph.D. in ecology, evolution, and behavior at the University of Minnesota – Twin Cities, Kiyoko completed a short-term postdoctoral training at Netherland Institute for Ecology (NIOO-KNAW) before she started teaching full-time, starting at the University of Tampa in Florida. Kiyoko's service to NALMS includes Region 2 Director (2015-18), Student Programs member (2016-present), Government Affairs Committee member (2018-20), Membership ad-hoc Group member (2018), and Professional Certification Program Lead (2018-2022) and member (2018-present). Her research interests include phytoplankton (incl. cyanobacterial bloom) dynamics, microplastic-phytoplankton interaction, biogeochemical cycling, and the impact of climate change on lakes. Aside from her academic position as associate professor of biology at SUNY Oneonta, Kiyoko serves as the technical advisor for the Otsego Lake Association (Cooperstown, NY) and a member of the Water Resources Working Group of the New York State Climate Impact Assessment.

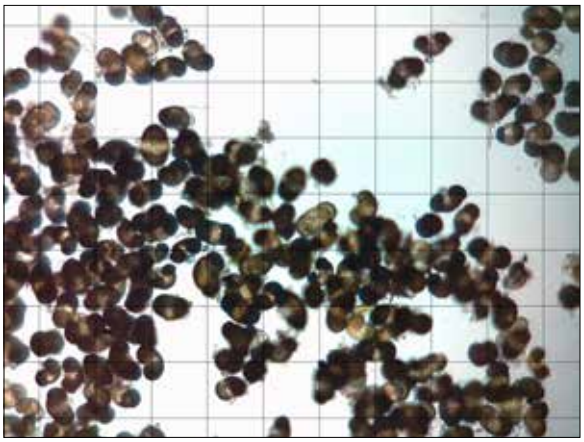

Photo 3. Pollen grains. Each grid in the photomicrograph is 100 µm x 100 µm. Photo: Kiyoko Yokota.