NOAA Western Lake Erie Harmful Algal Bloom Seasonal Assessment

16 November 2022

The 2022 western Lake Erie cyanobacterial bloom had a severity index (SI) of 6.8, which is considered moderately severe. The SI captures the amount of biomass over the peak 30-days of the bloom and is calculated using satellite imagery to assess bloom biomass and spatial extent. The *Microcystis* bloom developed in mid-July and reached a peak in late Aug, lasting for several weeks through mid-Sep. Elevated winds in Sep reduced surface concentrations, but did not terminate the bloom. Unlike previous years, the bloom switched from *Microcystis* to *Dolichospermum* in early-Oct, with high cyanobacterial concentrations persisting through early Nov, resulting in a much longer bloom than usual. While *Dolichospermum* can produce toxins, monitoring conducted by NOAA's GLERL measured very low amounts of the microcystin toxin during the Oct bloom.

The 2022 bloom (SI of 6.8; 416 square miles) was less extensive than in 2021 (SI of 6; 530 square miles), but was more concentrated, causing the 2022 bloom to be more severe. The forecasted bloom severity was underestimated at a severity of 4-5.5 (see update on Aug 3). The forecast used an ensemble of different models, each of which include phosphorus loading into the lake during the spring and early summer (Mar-Jul). In 2022, the bloom peak lasted for many weeks which increased overall bloom severity as compared to previous years when the bloom peak lasted for no more than two weeks. Discrepancies between the forecast and the final bloom severity suggest the current models are missing a component of bloom dynamics. We will continue our assessment of the models in order to make improvements to the forecast and severity metrics.

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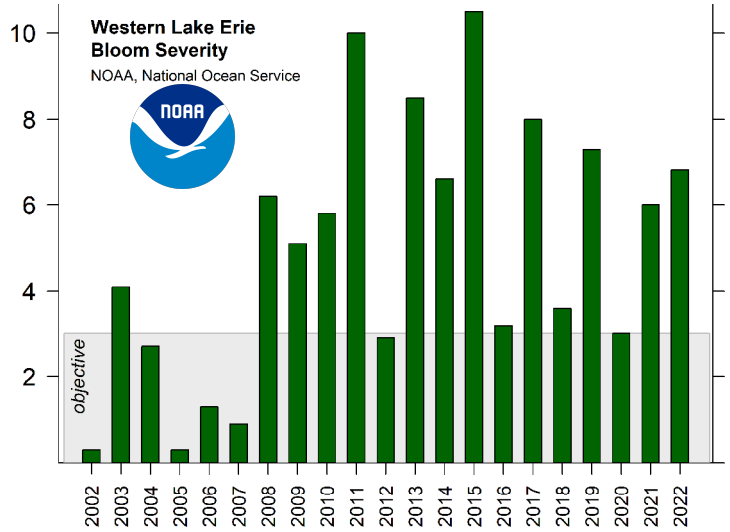

Figure 1. Bloom severity index (SI) for 2002-2022. The SI is based on the amount of biomass over the peak 30-days. The 2022 bloom had a severity of 6.8.

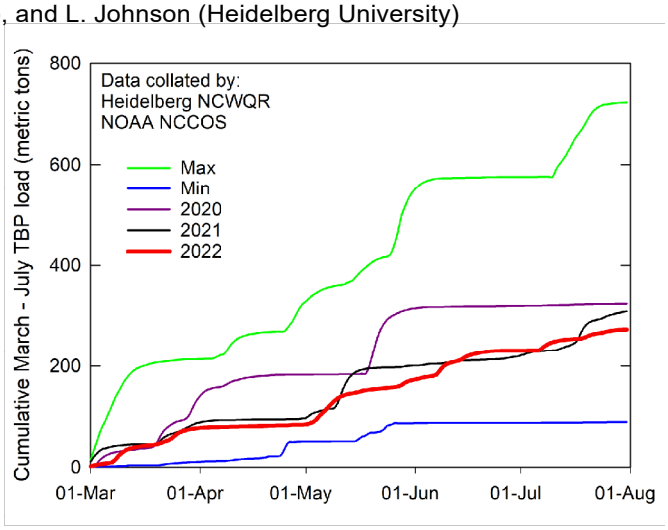

Figure 2. Cumulative total bioavailable phosphorus (TBP) loads for the Maumee River (based on Waterville, OH). Each line denotes a different year. 2022 is in red. TBP loads in 2022 were similar to 2021 (black line).

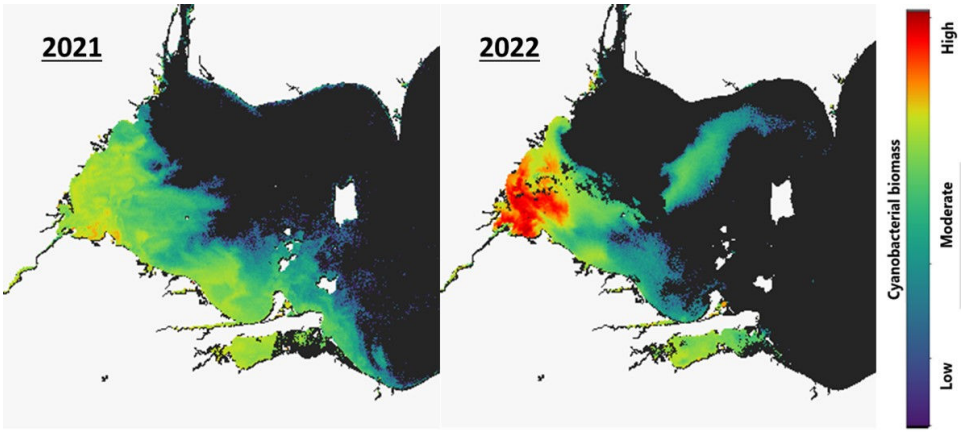

Figure 3. The *Microcystis* bloom in western Lake Erie at the bloom peak in Aug 30-Sep 8, 2021 (left) and Aug 20-29, 2022 (right). The images are derived from the Copernicus Sentinel-3 mission provided by EUMETSAT. Blue indicates low concentrations that would not be obvious to the eye. Areas that are red had greater likelihood of scum formation. While 2021 had a larger bloom area, most of this was at low concentrations. In contrast, the 2022 bloom had a larger area of high concentrations at the bloom peak.

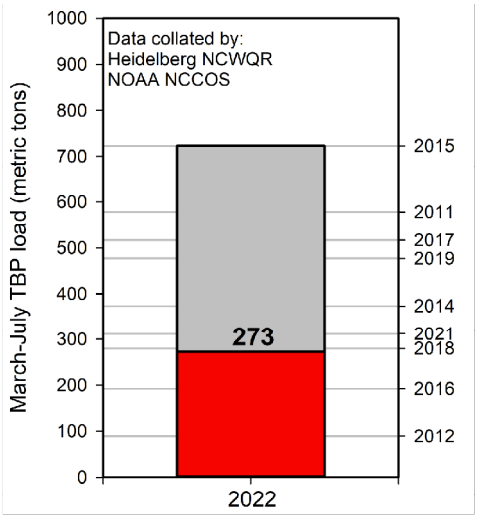

Figure 4. Total bioavailable phosphorus (TBP) load accumulated from the Maumee River near Waterville, OH from Mar-Jul 2022. The right axis denotes the TBP load from selected previous years. 2022 TBP loading was similar to 2018 and 2021.

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