2017 Western Lake Erie Harmful Algal Bloom (HAB) Forecast

Issued: 13 July 2017

Forecast summary: A cyanobacteria HAB of 36,800 metric tons (MT) is predicted for the western basin of Lake Erie in 2017, with a 95% predictive interval of 24,400 to 47,800 MT. The bloom size over the last decade (2007-2016) has averaged 22,000 MT, such that this year's bloom is likely to be above average. The prediction is based on a probabilistic model developed by a team of researchers at UM, NCSU, and NOAA GLERL. This is one of three models used to develop an ensemble bloom prediction (the other models being developed by LimnoTech and NOAA NCCOS).

Forecast details: This forecast is based on an empirical Bayesian model (Obenour et al., 2014; Bertani et al., 2016) relating bloom size (MT dry weight) to spring total phosphorus load (MT/mo). The model also reflects the lake's apparent increasing susceptibility to HABs (i.e., less load is required to generate large blooms now than a decade ago), possibly due to invasive species, internal nutrient loading, and/or climate change. The model has been calibrated to 13 years of bloom observations developed by NOAA from satellite imagery (Stumpf et al., 2012) and by the University of Toledo from in-lake measurements (Bridgeman et al., 2013). The 2017 bloom forecast can be compared to historical blooms and TP loads, as shown below:

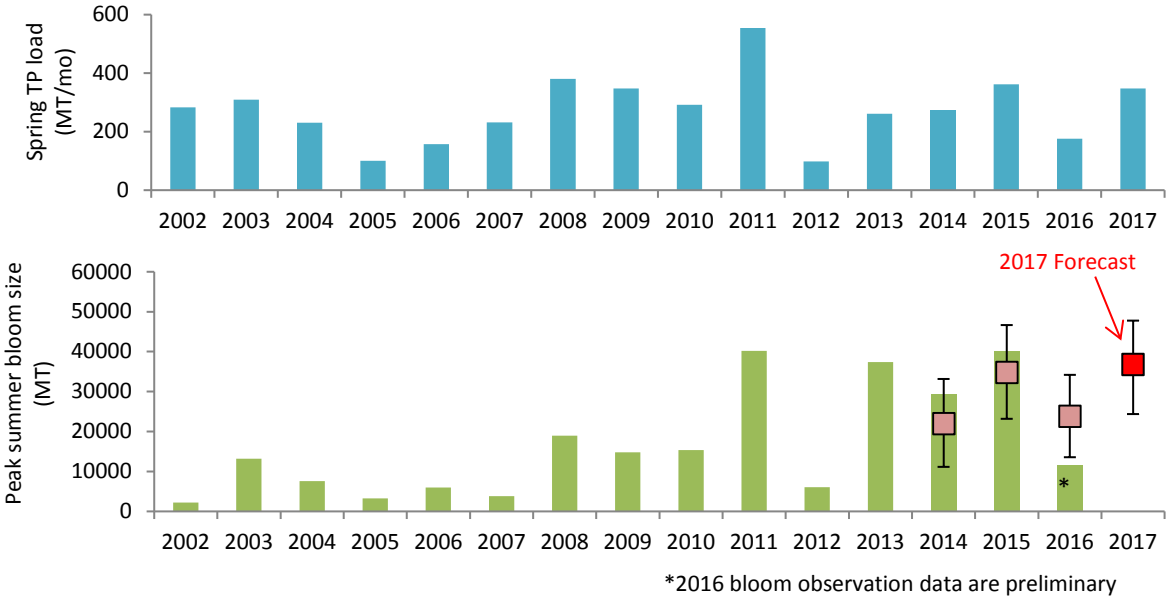

Figure: Spring phosphorus loads (top) and mean bloom observations with forecasts (bottom). Error bars represent 95% predictive intervals.

Forecast motivation:

HABs, which are stimulated by nutrient loading from agricultural and urban sources, can produce toxins that are harmful to humans and other animals. HABs are also often responsible for taste, odor, and/or aesthetic problems, which discourage outdoor recreation and tourism. In Lake Erie, the magnitude of HABs has been increasing in recent years (Michalak et al., 2013; IJC, 2014; Wynne & Stumpf, 2015), compromising drinking water supplies, and raising concerns among water resources managers and the public. Large algal blooms also contribute to hypoxia (low dissolved oxygen) in Lake Erie, which severely reduces the viable habitat of many fish species (Scavia et al., 2014). The purpose of this forecast is to alert water resources managers and the public to the potential severity of the annual HAB bloom, which typically peaks in August or September.

Additional Lake Erie HAB resources:

Additional Western Lake Erie HABs resources are available through NOAA GLERL (http://www.glerl.noaa.gov/res/HABs_and_Hypoxia/), including:

1. HAB tracking and forecasting information is summarized through the NOAA *Experimental **HABs Bulletin***, which is updated regularly throughout the summer:

   https://nccospublicstor.blob.core.windows.net/hab-data/bulletins/lake-erie/current/bulletin_current.pdf

2. Detailed 5-day forecasts of the spatial distribution of Lake Erie HABs, based on remote sensing, monitoring, and hydrodynamic modeling, are available from the *Experimental **HABs Tracker**:*

   https://www.glerl.noaa.gov/res/HABs_and_Hypoxia/habTracker.html

3. GLERL also performs weekly, on-lake water quality sampling, including **Microcystin (toxin)** measurements, which may be found here:

   http://www.glerl.noaa.gov/res/HABs_and_Hypoxia/WLEMicrocystin.html

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