

2019 Forecast Western Lake Erie Cyanobacterial Harmful Algal Bloom

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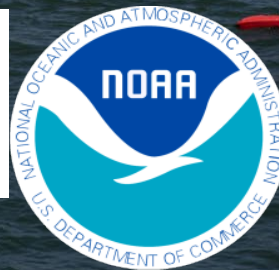
Derek Schlea, **John Bratton**, LimnoTech

Erik Davenport, NOAA NOS

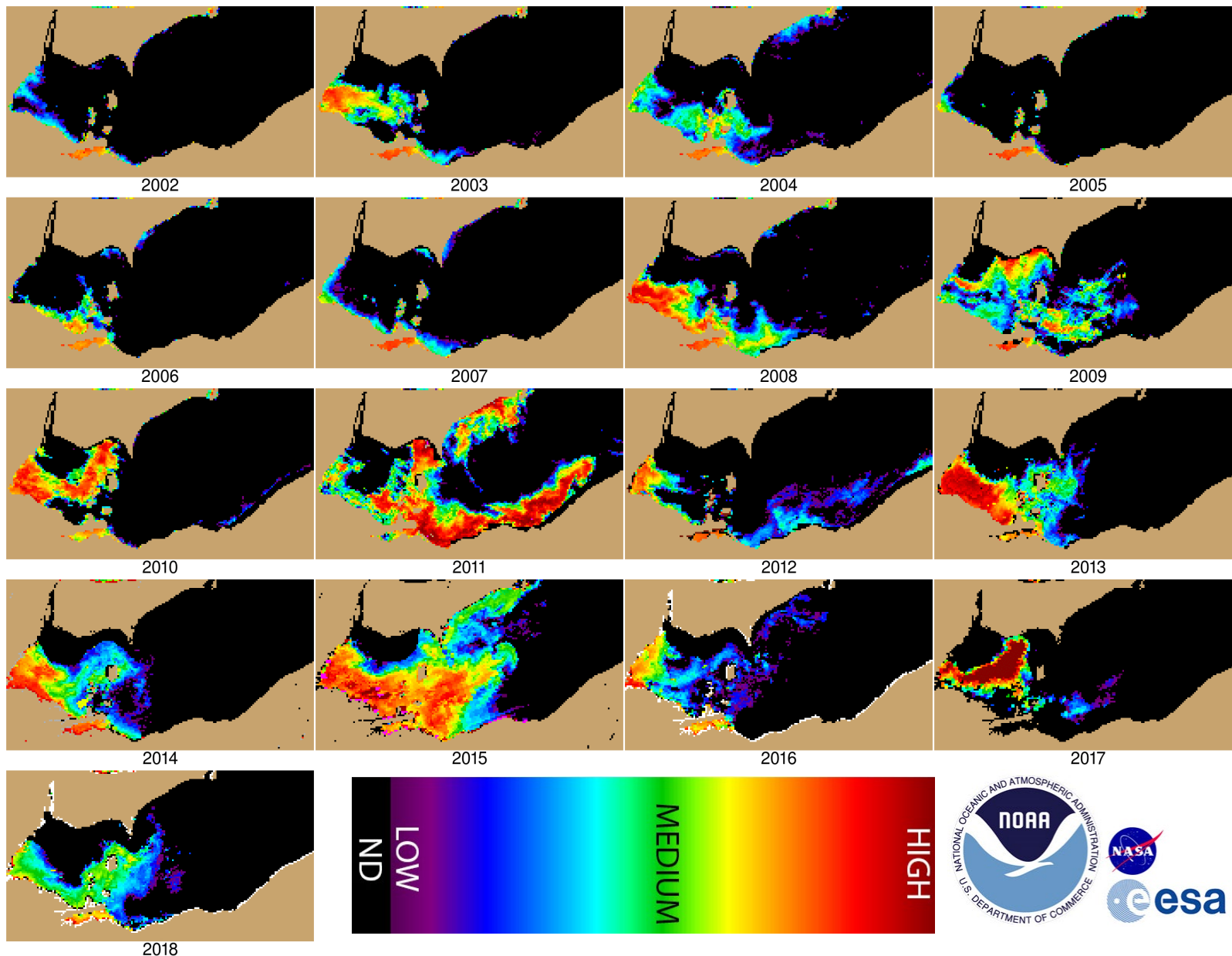
And support by **Ohio Sea Grant** and **OSU Stone Lab**

Additional input by NOAA NWS Ohio River Forecast Center

Ohio Sea
Grant



Peak of each bloom 2002-2018



2018, Unusual

Forecast was high (6 vs 3.6 actual)

Earliest start to bloom (late June)

Earliest ending of a bloom (high winds in September)

(most years the bloom peaks in September)

Models in ensemble
differed.

The images below are "GeoPDF". Please visit <https://go.usa.gov/xReTC> for instructions on viewing longitude a

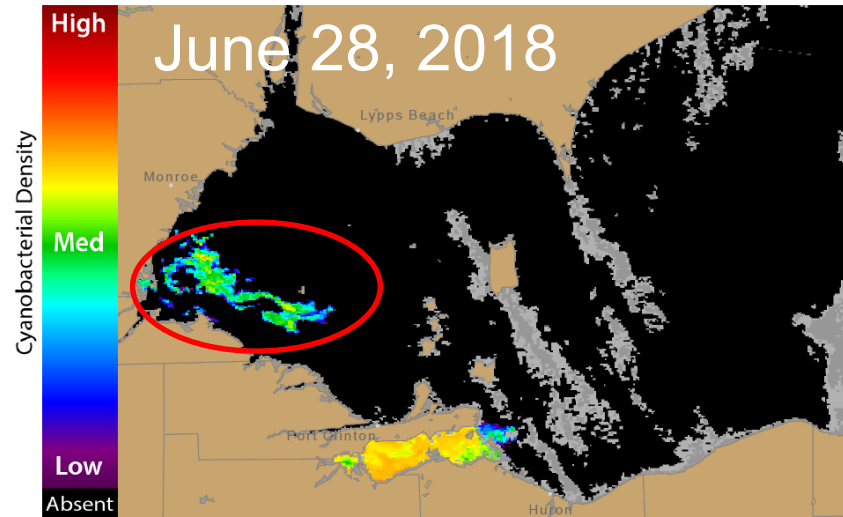
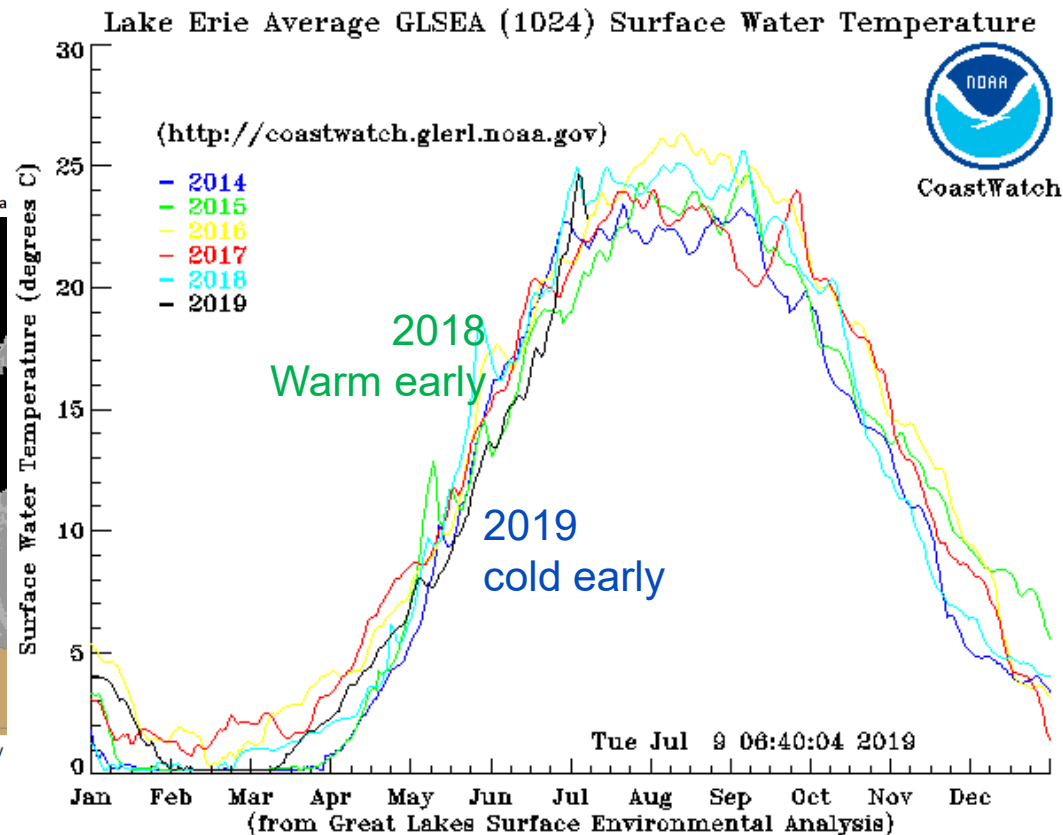


Figure 1. Cyanobacterial Index from modified Copernicus Sentinel 3 data collected 28 June, 2018 at 11:23 EST. Grey The estimated threshold for cyanobacteria detection is 20,000 cells/ml

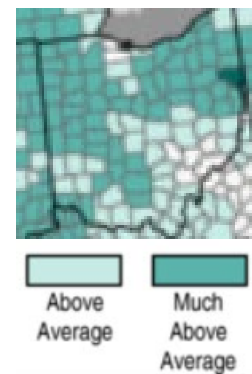


Wet spring (2nd wettest May, Apr-Jun >>average)

High discharge

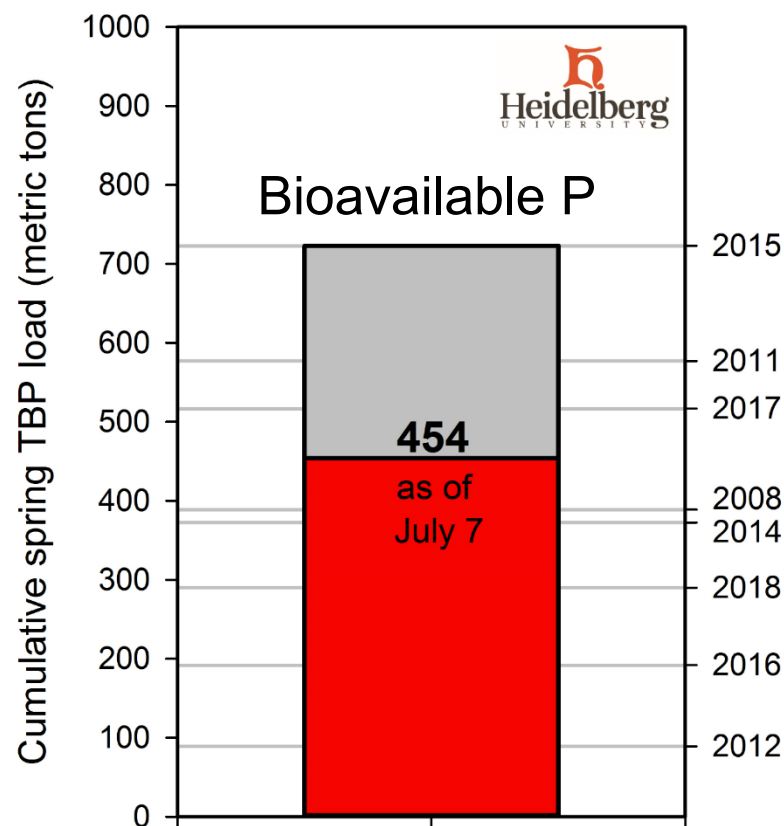
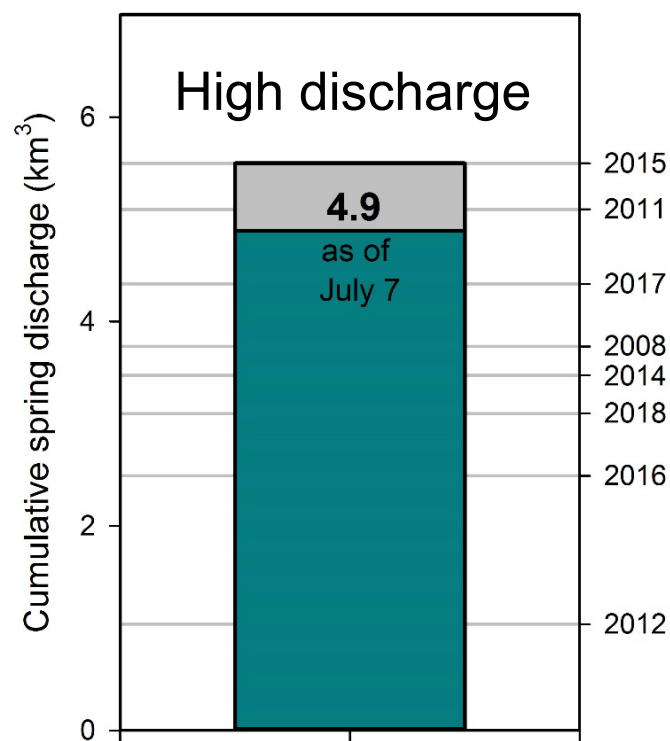
Lower concentration of bioavailable phosphorus (TBP) than recent years

Still relatively high TBP



2019

www.ncdc.noaa.gov/temp-and-precip/

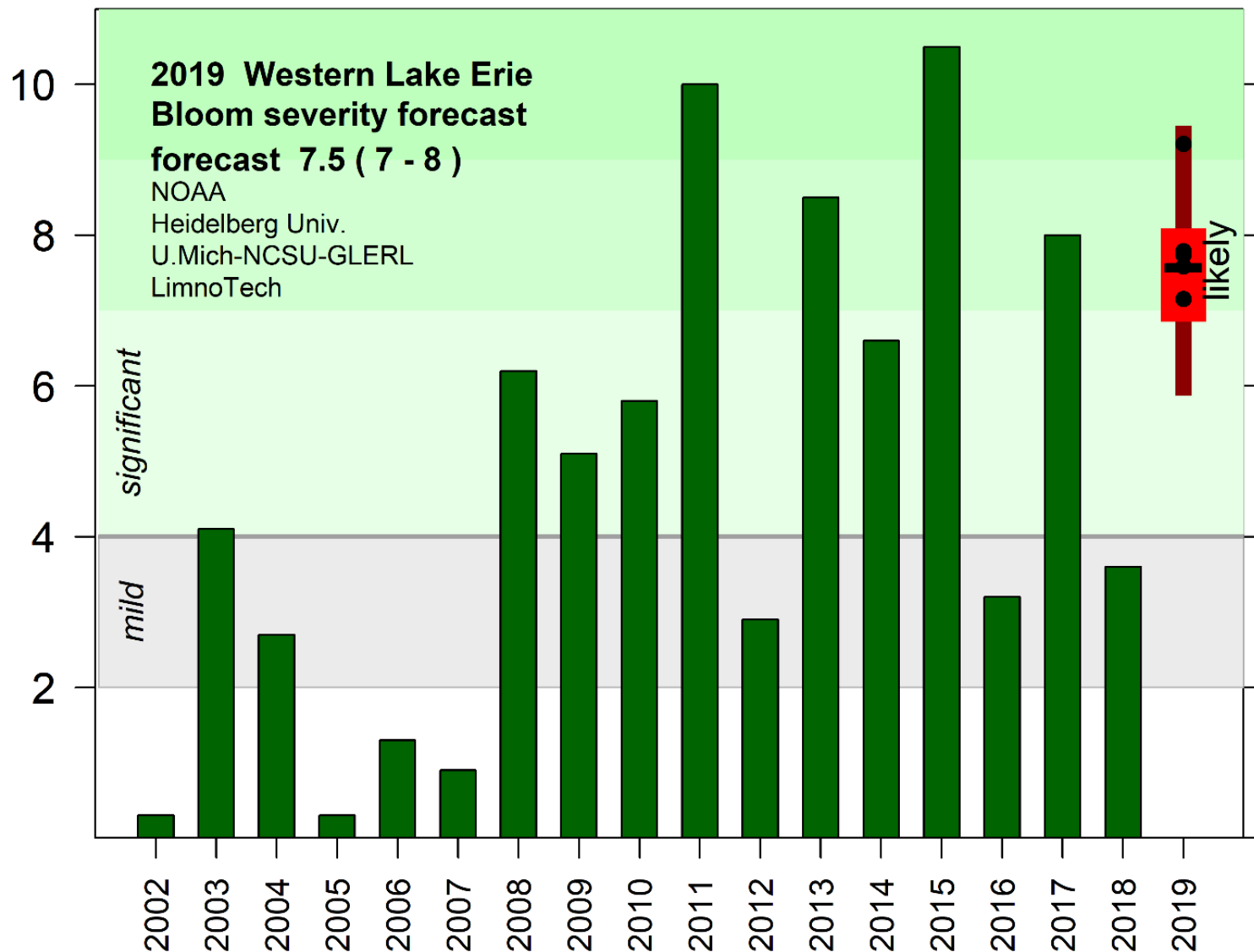


2019 Ensemble of models models

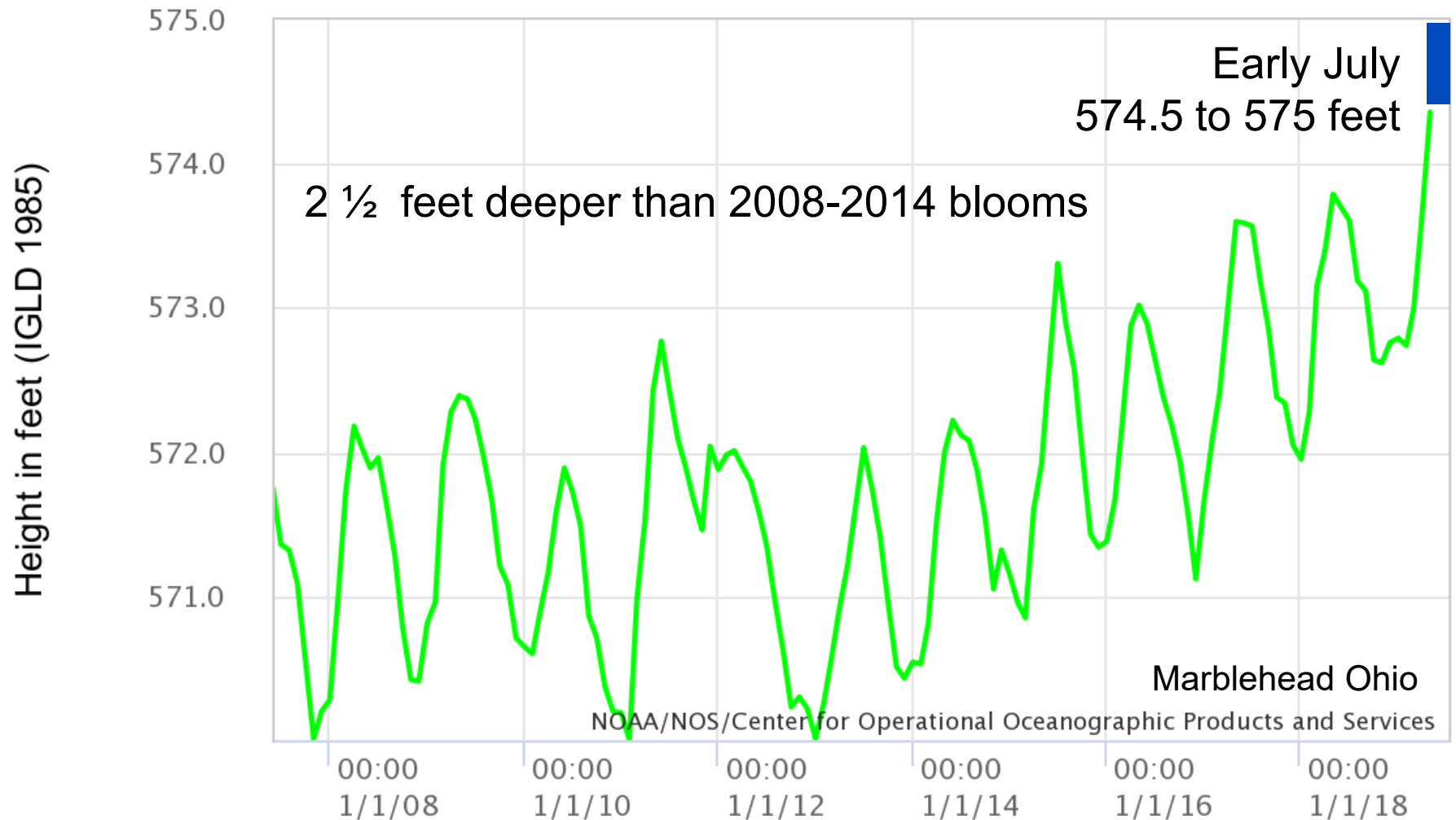
- NOAA: NOAA_TBP, P2
 - NOAA-TBP is Empirical statistical-heuristic using discharge and bio-available P from March to early summer, P2 is mechanistic
- UMich/NCSU/GLERL-Bayes
 - empirical Bayesian model relating spring phosphorus loading to multiple estimates of HAB size
- LimnoTech WLEEM and Response Load
 - Process-based Fine-scale 3D linked hydrodynamic-sediment transport-advanced eutrophication model

Western Lake Erie 2019 Bloom Forecast

severity of 7.5 with uncertainty of 6-9



Other factors to consider Lake Erie (and other Great Lakes) at record water levels

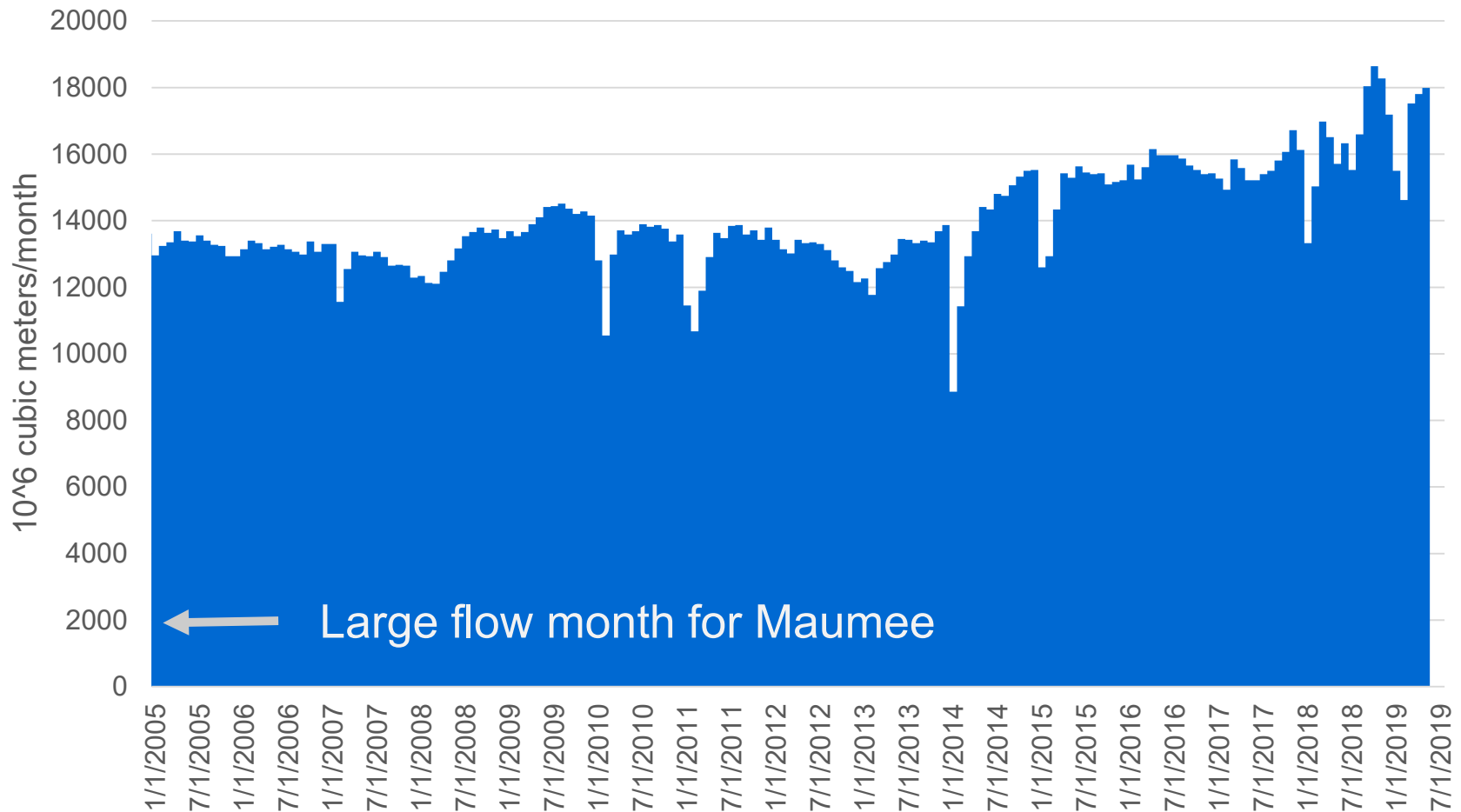


Detroit River,

about 30% more water than 2005-2014

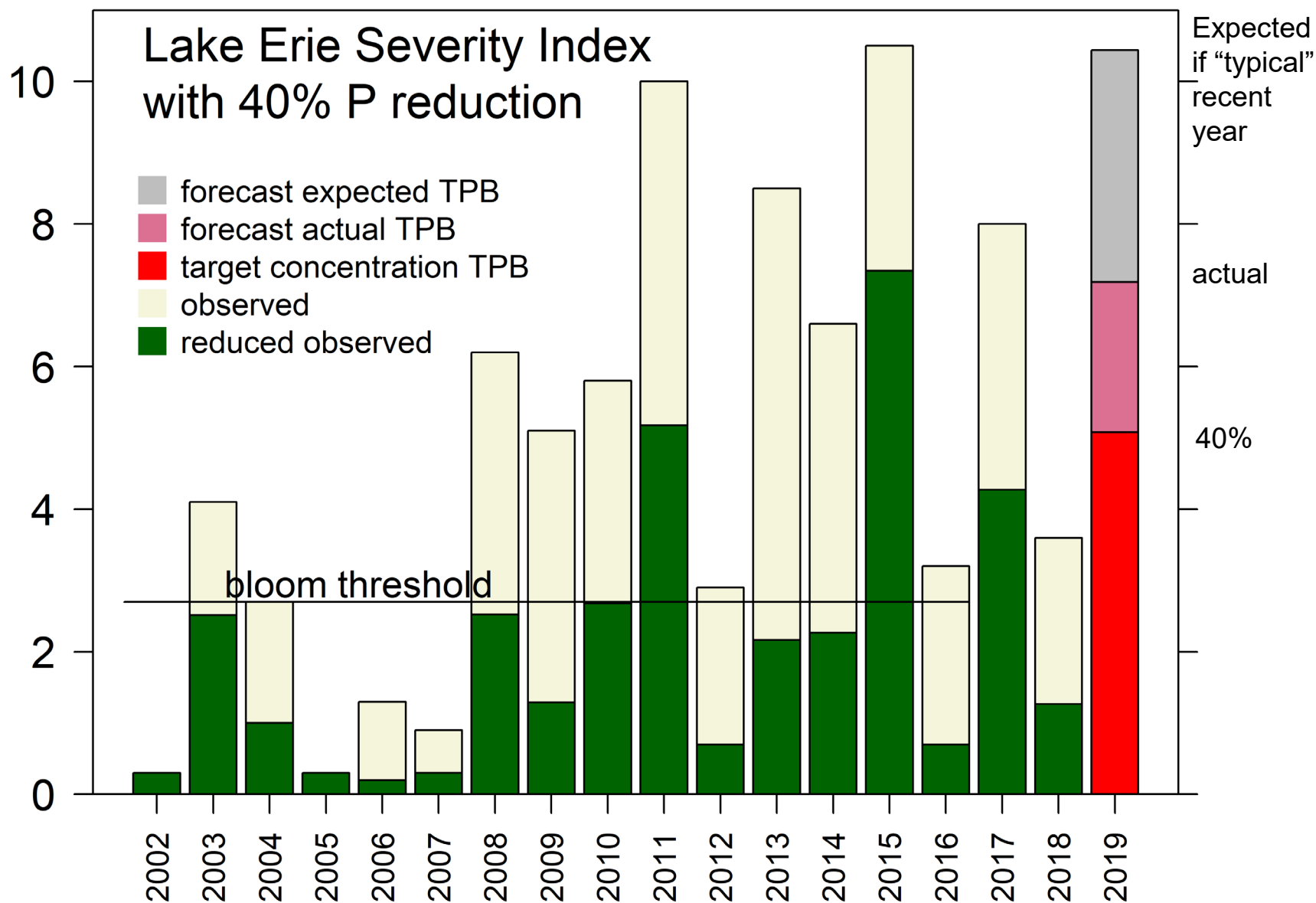
15% above 2015-2018

Detroit River flow DTR approx 10^6 m³



US Army Corps of Engr data

Potential impact of 40% phosphorus reduction



Monitor the lake with the NOAA Lake Erie Bulletin 11th year, and 3rd year of official NOAA product



Lake Erie Harmful Algal Bloom Bulletin

01 July, 2019, Bulletin 01

Analysis

Satellite imagery from 6/28 shows cyanobacteria is present in Lake Erie's western basin, touching the shoreline of Maumee State Park and extending 6 miles offshore from Maumee Bay. Recent sampling (6/17) indicates measured toxin concentrations are below detectable limits throughc blooms are pre

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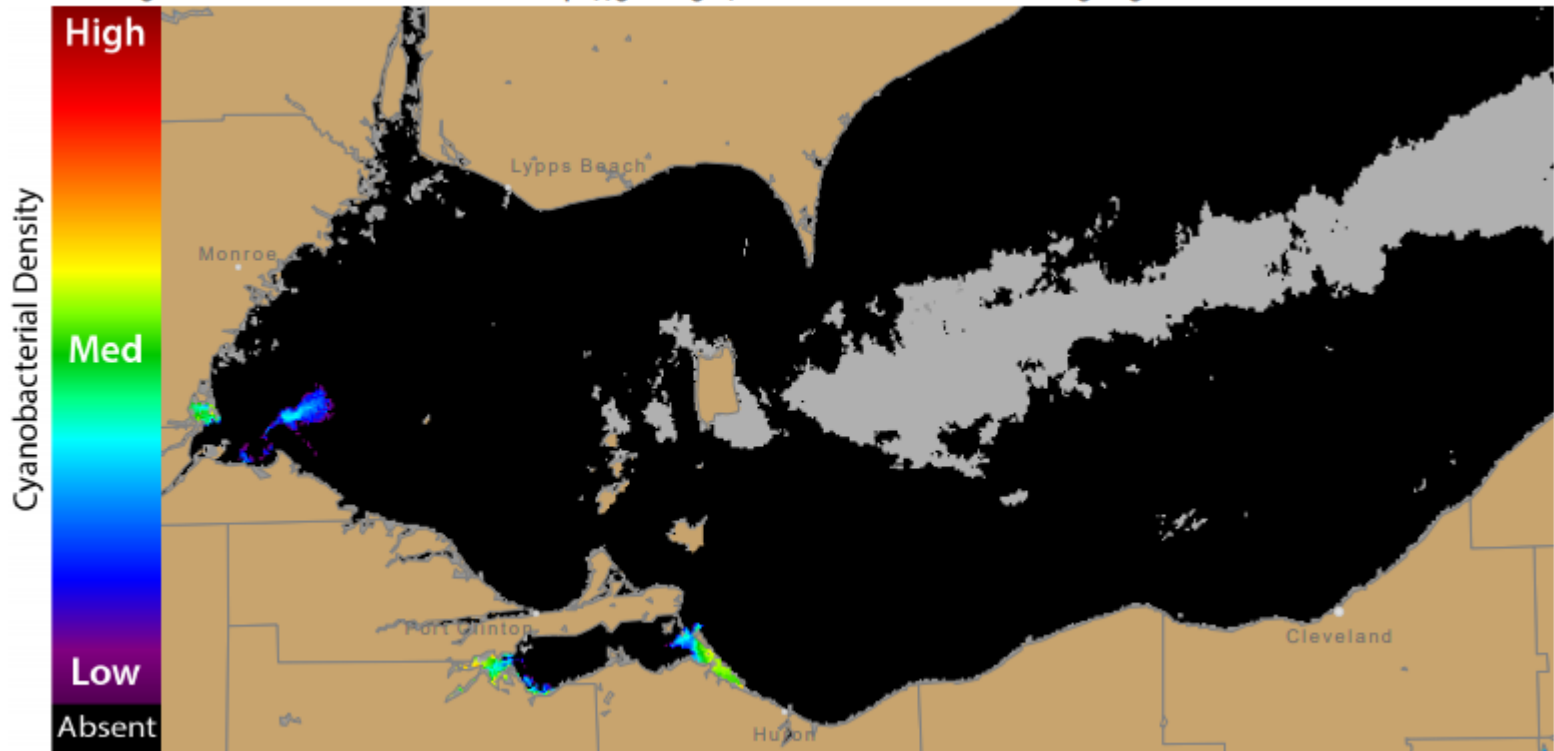


Figure 1. Cyanobacterial Index from modified Copernicus Sentinel 3 data collected 28 June, 2019 at 12:01 EST. Grey indicates clouds or missing data. The estimated threshold for cyanobacteria detection is 20,000 cells/ml

2019 Forecast

**severity 7.5 (7-8), possible range of 6-9.
more severe than 2018.**

**Discharge and TPP were equal to 2011, but
bioavailable phosphorus is down.**

**Uncertainty from high lake levels (residence
time and dilution effect may reduce actual
severity by 10%)**

**As always: Bloom impact on western basin
varies with wind.**

Much of the lake will be fine most of the time.

Updates from Bulletin (and other sources)