

# 2018 Forecast Western Lake Erie Cyanobacterial Harmful Algal Bloom

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*With forecast results from*

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

**Additional input by NOAA NWS Ohio River Forecast Center**

Lake Erie  
July 2016



**NC STATE  
UNIVERSITY**

**HEIDELBERG UNIVERSITY**



**M UNIVERSITY OF MICHIGAN**



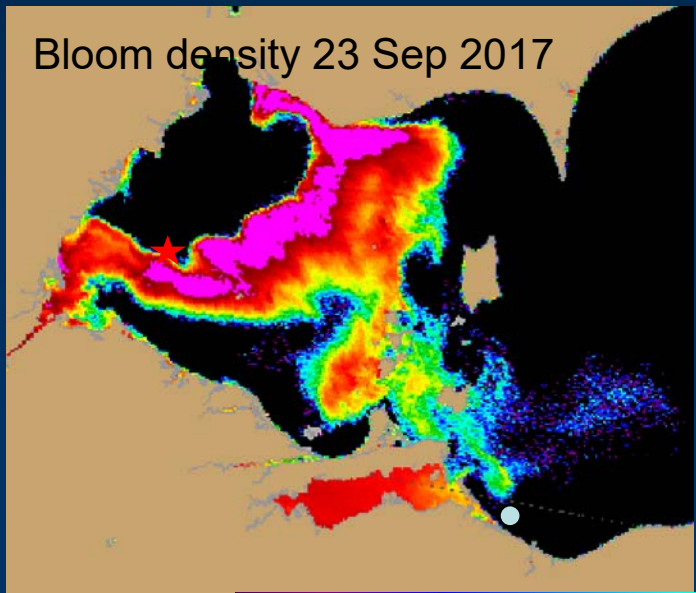
**CARNEGIE  
INSTITUTION FOR  
SCIENCE**

**Stanford  
University**

# 2017: (8) extensive cyanobacteria bloom



Maximum bloom  
23 Sept 2017



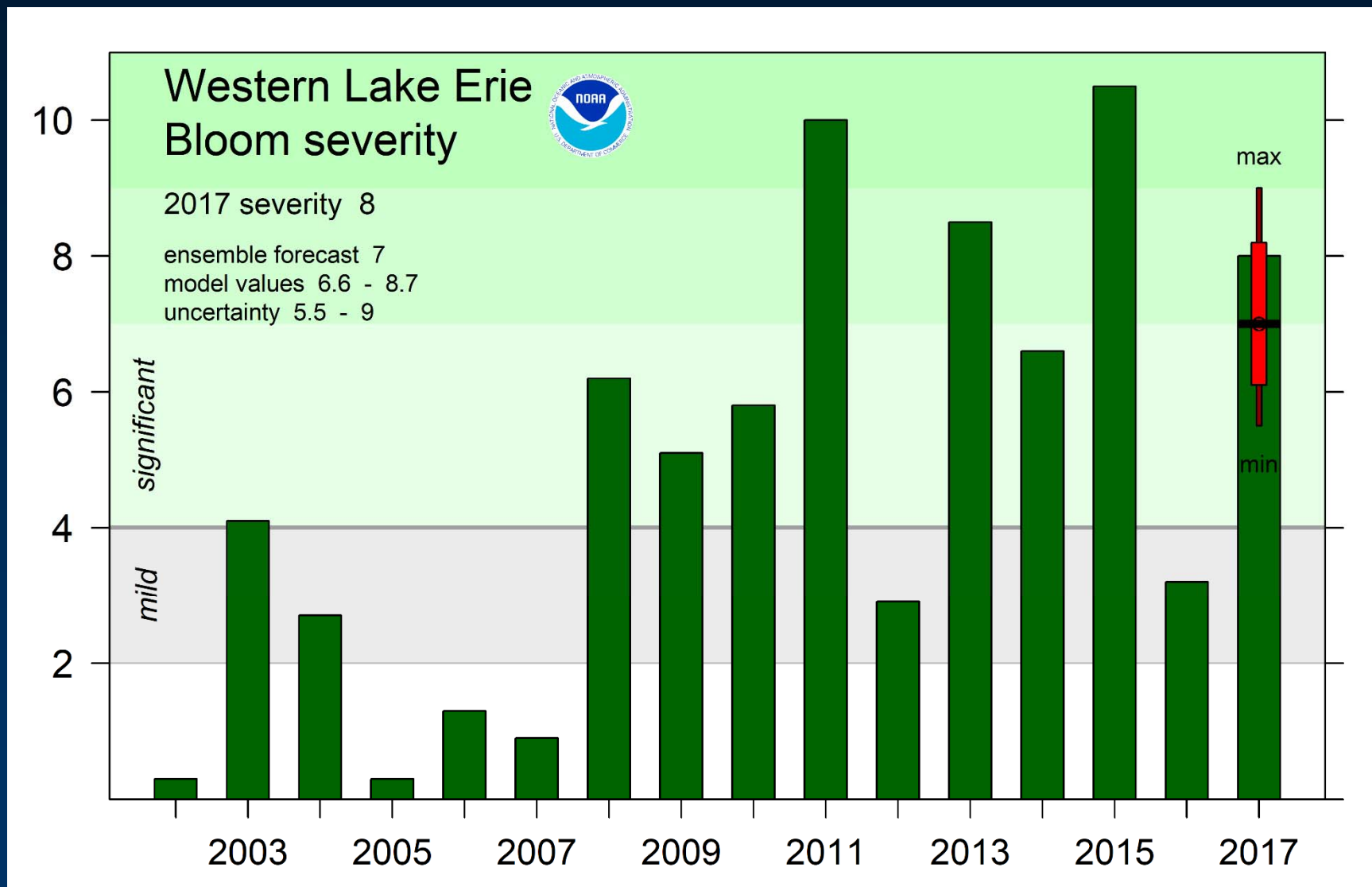
Sep 22, Maumee River, Toledo,  
NOAA/GLERL



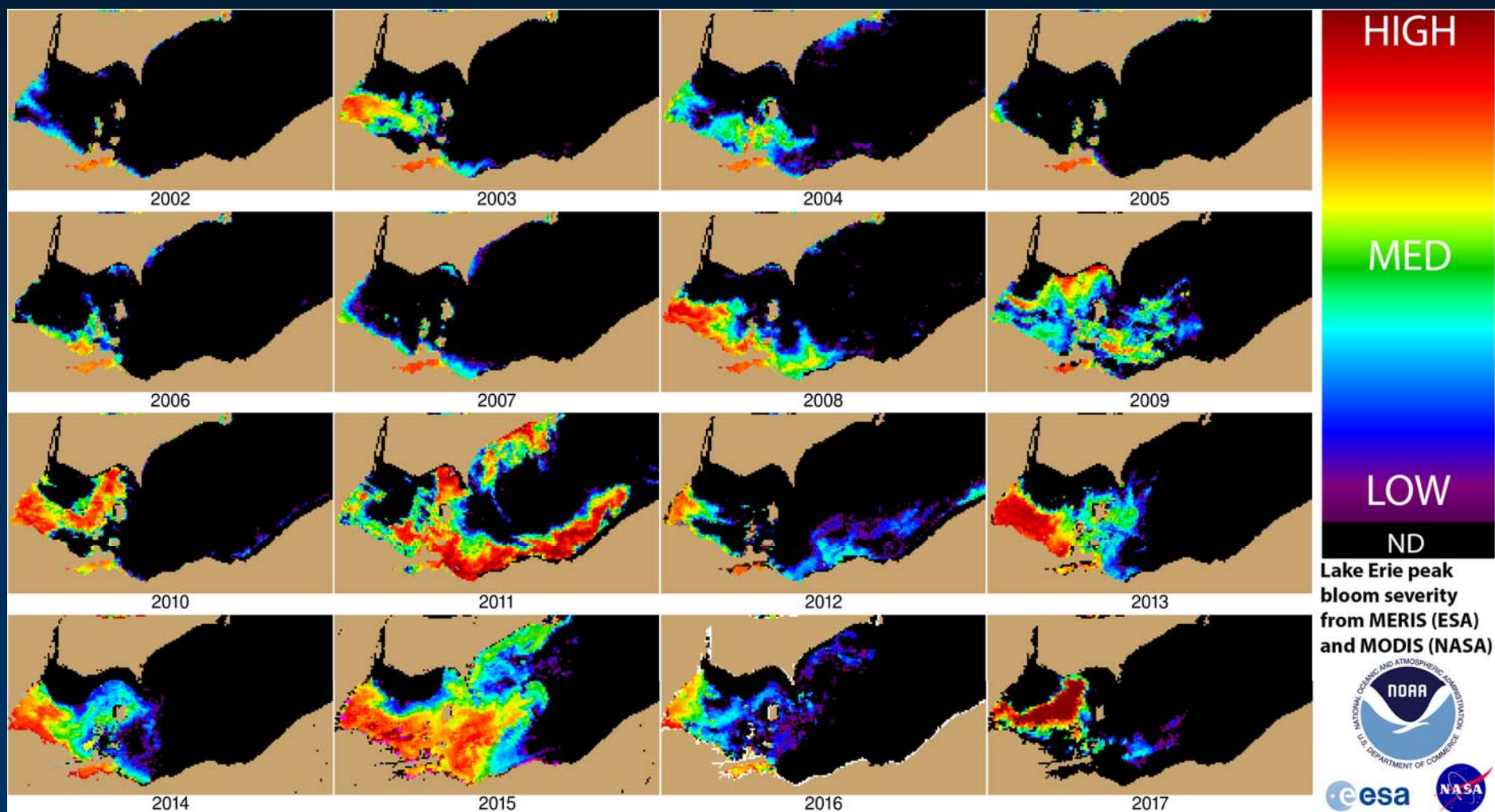


# 2017 Forecast: 8 severity

Large and consistent with forecast



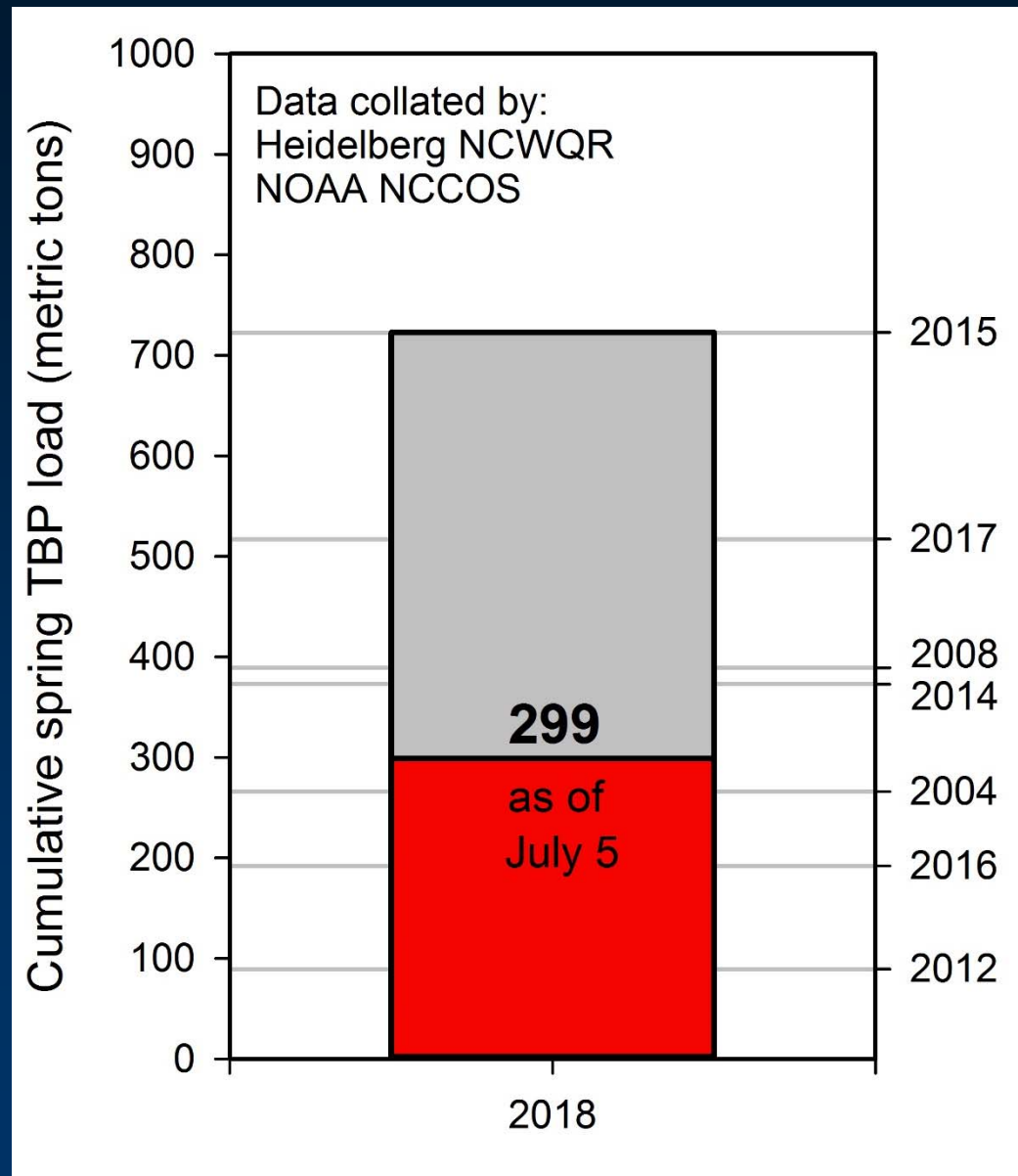
# Peak bloom extent from satellite 2002-2017



## 2018 Ensemble of six models

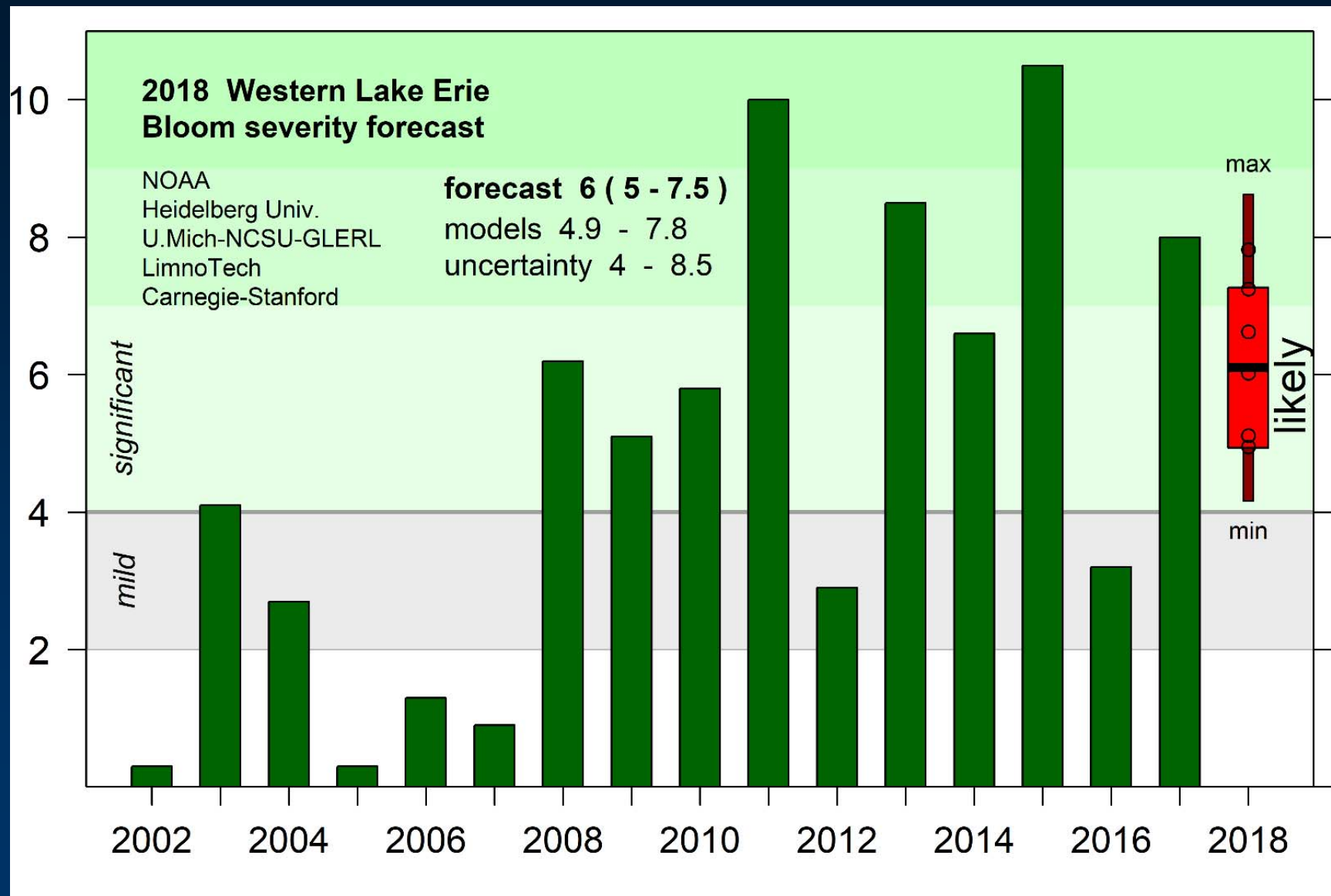
- NOAA: P2, and NOAA-TBP
  - P2 is mechanistic, NOAA-TBP is Empirical statistical-heuristic using discharge and bio-available P from March to early summer
- UMich/NCSU/GLERL-Bayes
  - empirical Bayesian model relating spring phosphorus loading to multiple estimates of HAB size
- LimnoTech WLEEM and Response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

## 2018: Bio-available Phosphorus



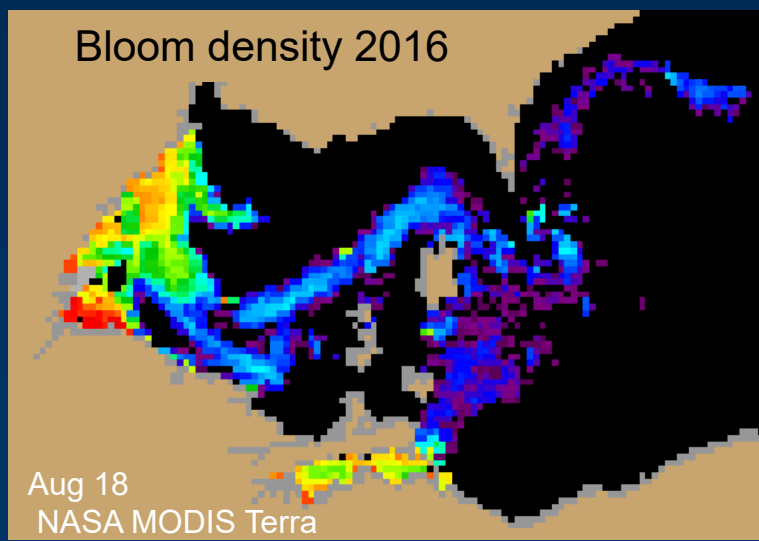
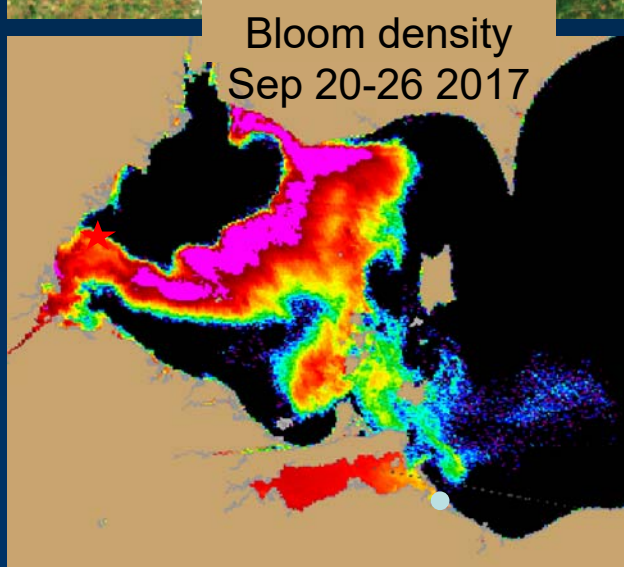
Little change over July, weather systems favor dry, slightly over 300 m.tons of phosphorus

# 2018 Ensemble Forecast





# 2016 moderate bloom (3.2) compared with 2017 (8)





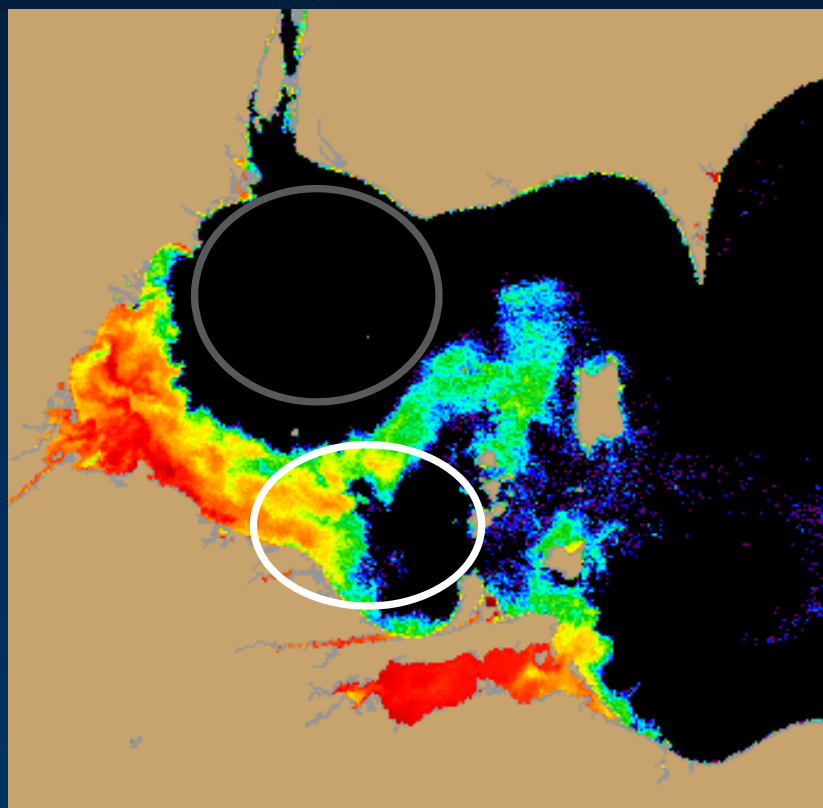
**Context: Even a bad year like 2013,  
The worse did not reach islands (or central basin)**

**No problem for Perry Bicentennial!**

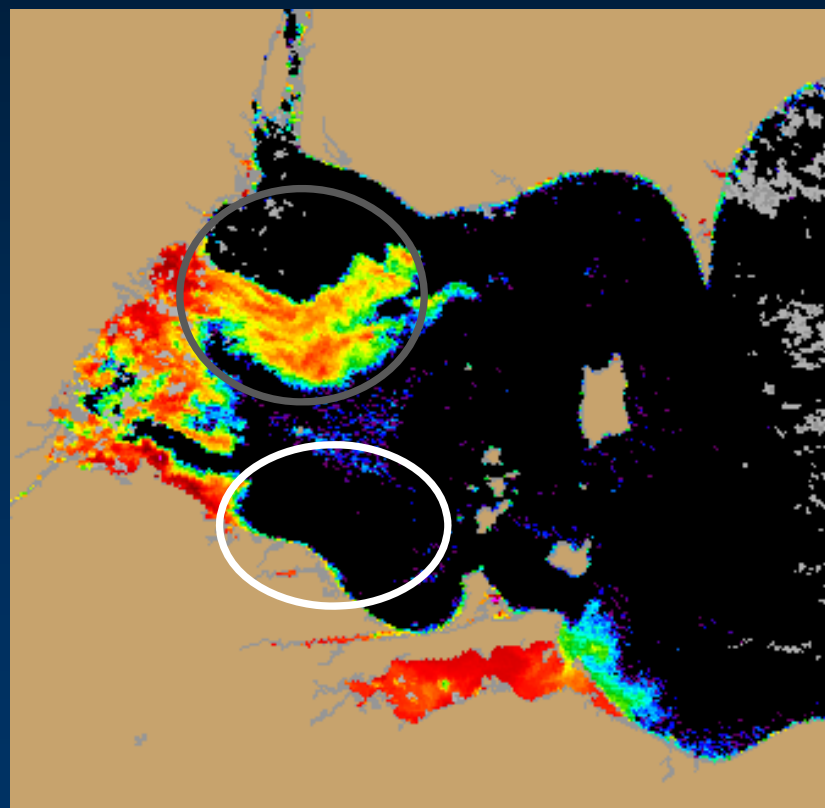


# Conditions vary greatly in the lake, even between similar years

Sep 17, 2008



Sep 12, 2010



High

Med

Low

# **Sentinel-3a (Ocean Land Colour Imager, OLCI): Increased use this year. First new satellite since we started in 2009**

Launched in 2016  
by European  
Space Agency for  
European Union  
Copernicus  
project

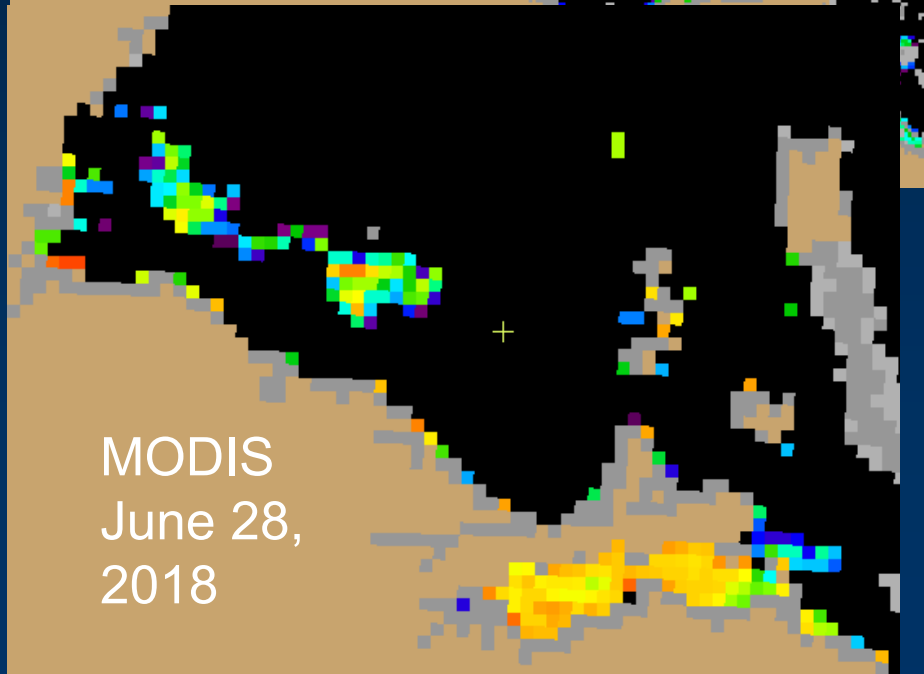
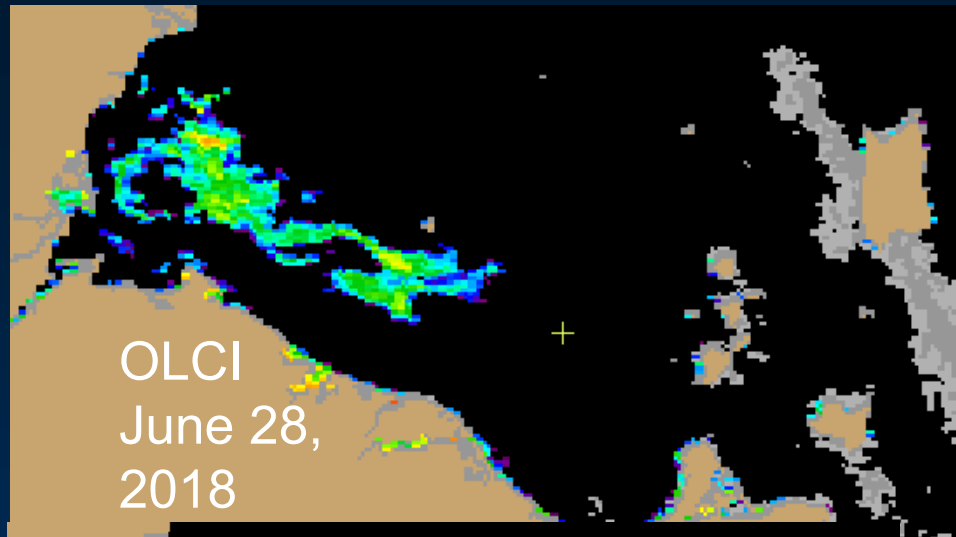
Sentinel-3b with  
OLCI launched in  
April, every day  
next summer!



Image: ESA/ATG Medialab / Item 1 of 24



# OLCI used more frequently, improvements in data (calibration updates, etc.)



# Monitor the lake with the NOAA Lake Erie Bulletin 10<sup>th</sup> year, and 2<sup>nd</sup> year of official NOAA product



## Lake Erie Harmful Algal Bloom Bulletin

29 June, 2018, Bulletin 03

### Analysis

Cyanobacteria is present in Lake Erie at low concentrations. *Microcystis* is present in the Maumee Bay area of Lake Erie. Satellite imagery (6/28) indicates detectable concentrations in Maumee Bay, alongshore the Ohio Coast east of Sandusky, extending offshore from North Maumee Bay to Brest Bay, extending past West Sister Island. *Keep pets and yourself out of the water while the bloom is forming.* Measured toxin concentrations are still below recreational thresholds throughout the bloom extent. The estimated threshold for cyanobacteria detection is 20,000 cells/ml.

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

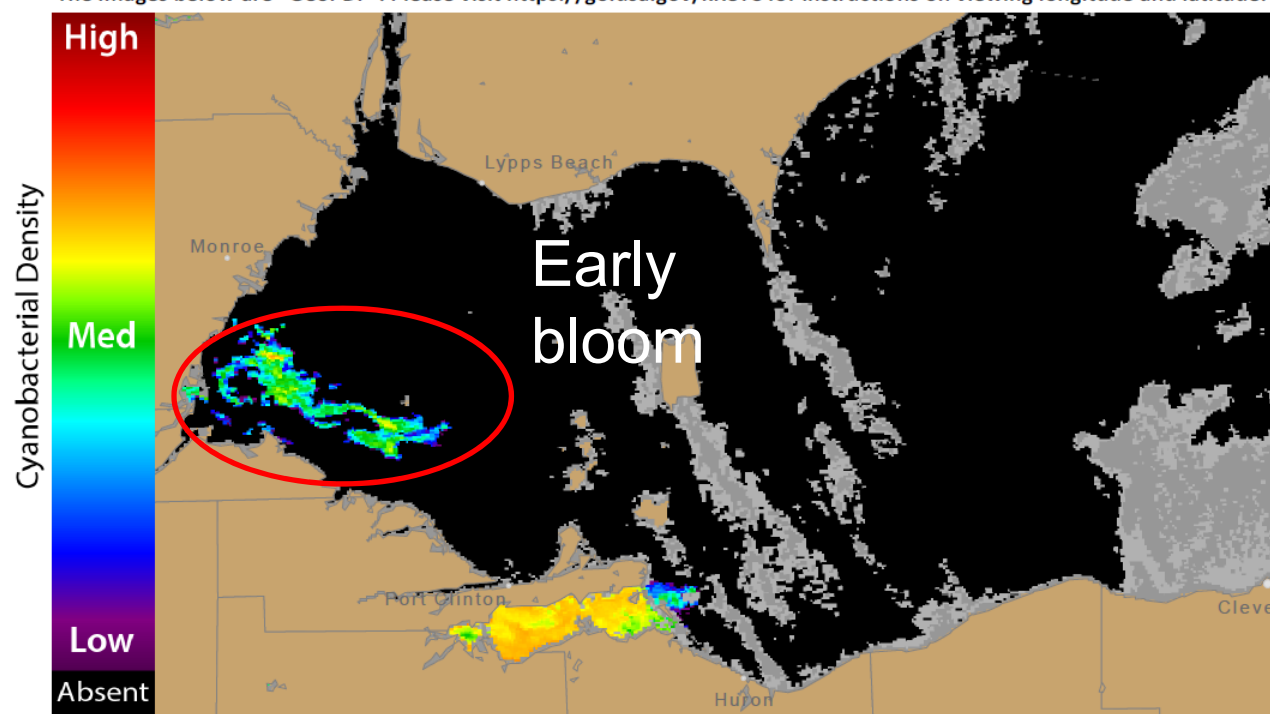
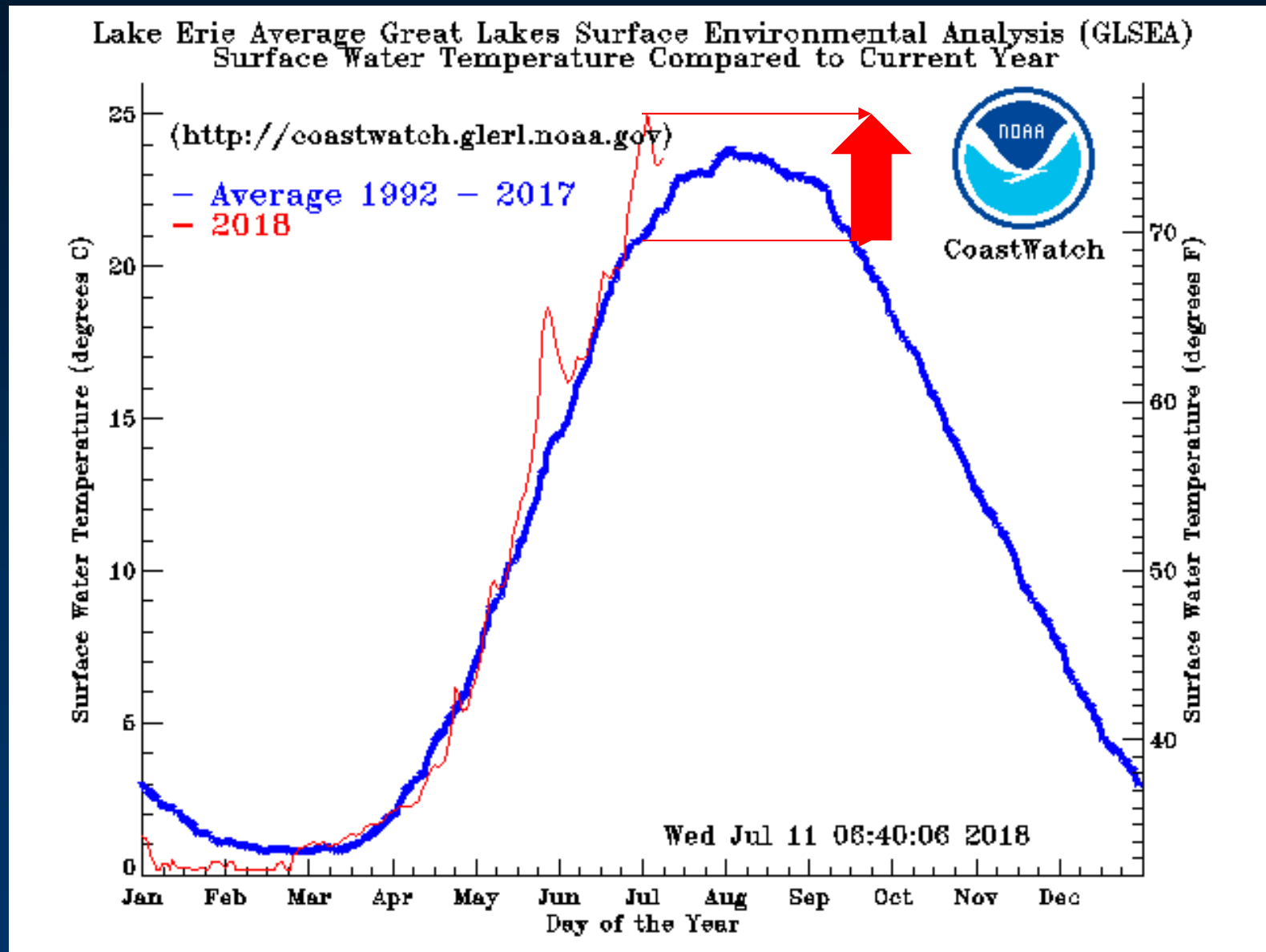


Figure 1. Cyanobacterial Index from modified Copernicus Sentinel 3 data collected 28 June, 2018 at 11:23 EST. Grey indicates cloud cover. The estimated threshold for cyanobacteria detection is 20,000 cells/ml

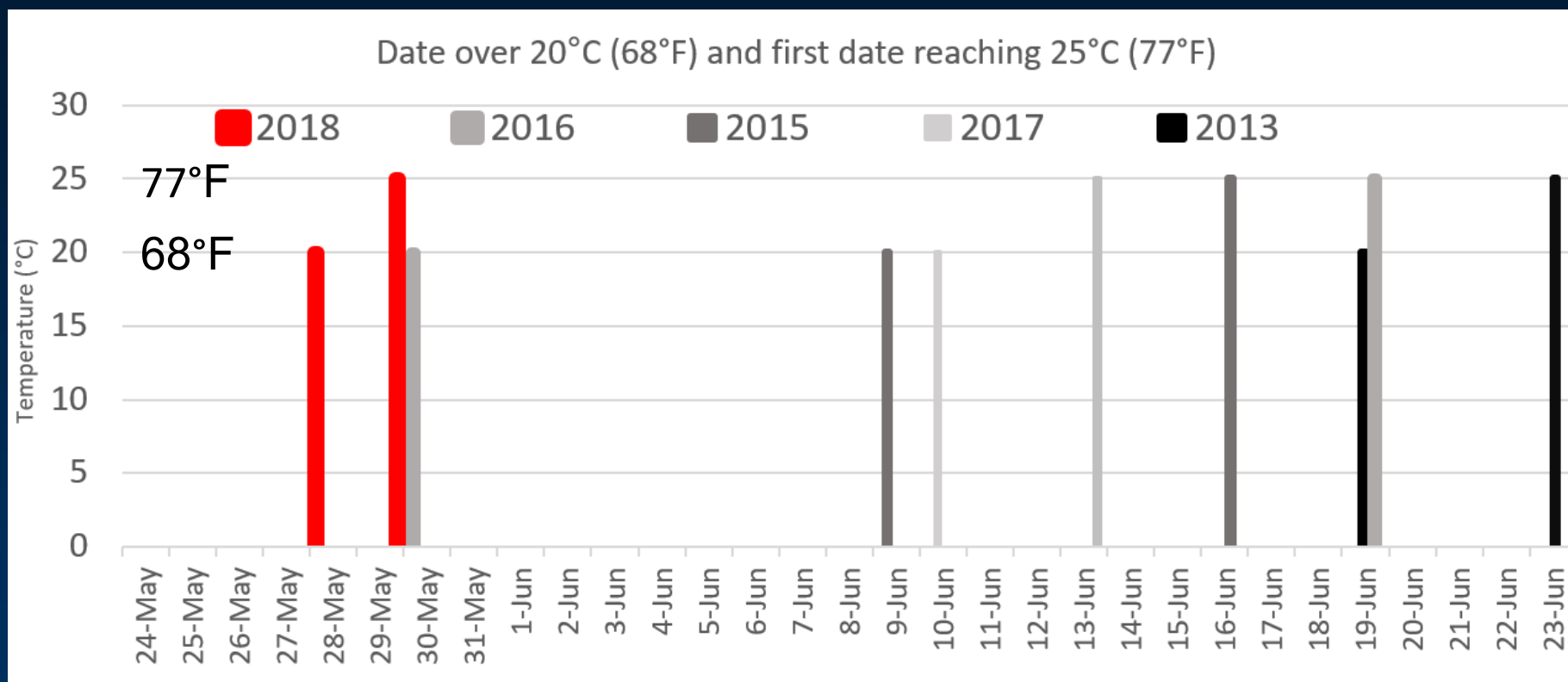
[coastalscience.noaa.gov/research/habs/forecasting](https://coastalscience.noaa.gov/research/habs/forecasting)

# Lake Erie is warmer this year





## Early warming, may start bloom early but does not mean a worse bloom



LimnoTech buoy, data from NOAA NDBC and GLOS

*Microcystis* (cyanobacteria) grows in warm water,  
but is limited by the amount of phosphorus

# 2018 Forecast

**severity 6 bloom (5 – 7.5 likely range).**

**smaller than 2017 large (8) bloom.**

**Warm water does not mean a bigger bloom. Phosphorus is critical.**

**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)**

