

Source Water Management and Mitigation Strategies in Ohio

Ruth Briland

February 5, 2020

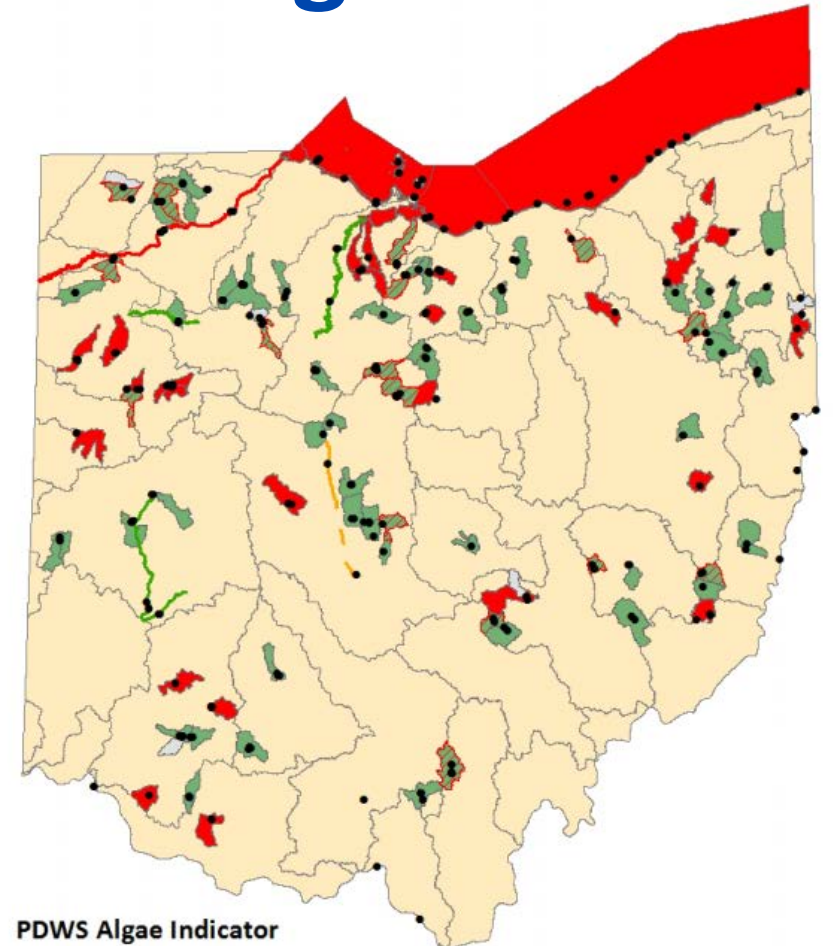


Overview

- HAB response and program integration
- Monitoring tools and training
- Research efforts
- Case Studies (public drinking water systems, PWS)
 - Wilmington PWS: Alternative water sources
 - Akron PWS: Reservoir management and source water protection
 - Cadiz PWS: Tappan Lake Nutrient Reduction Initiative
 - Celina PWS: Treatment train wetlands

HAB Response and Program Integration

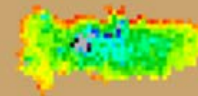
- PWS HAB Rules (OAC 3745-90) specify compliance monitoring and treatment techniques
 - HAB Treatment Optimization and HAB General Plan
- Drinking Water Beneficial Use Assessment
- Source Water Protection Plan
- 9-Element Plan and Section 319 Grants



PDWS Algae Indicator

Monitoring Tools and Training

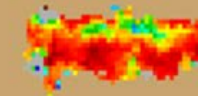
- Water quality monitoring and analytical equipment
- HAB response and technical assistance
- Satellite imagery
- Phytoplankton identification and reservoir management workshops
 - Stone Lab, Lake Erie: Aug 2020
 - OTCO: June 2020



Jun03



Jun06



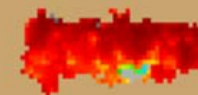
Jun15



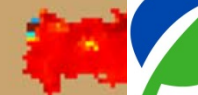
Jun16



Jul04



Jul05



Jul10



Jul18



HAB Research Efforts

- Harmful Algal Bloom Research Initiative (HABRI, ODHE)

<https://ohioseagrant.osu.edu/research/collaborations/habs>



Track Blooms
From the Source



Produce Safe
Drinking Water



Protect
Public Health



Engage
Stakeholders

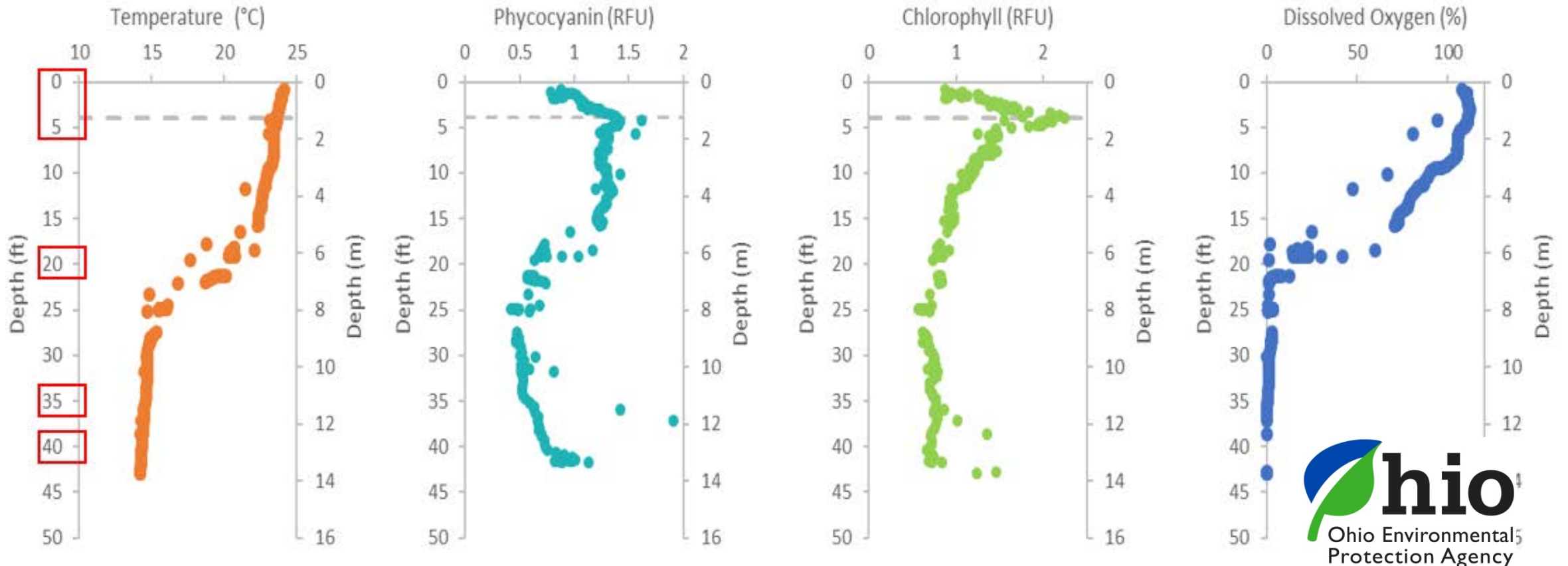
– Algaecide selection and targeted application (Dr. Cutright, U Akron)

HAB Research Efforts

- Harmful Algal Bloom Research Initiative (HABRI, ODHE)
 - Efficacy of ultrasound/sonication (Dr. Weavers, OSU)
 - Algaecide selection and targeted application (Dr. Cutright, U Akron)
- Ohio Water Development Authority Grant
 - U. Akron and Akron PWS
- USGS Water Science Center
 - Microcystin-production and statistical modelling (Dr. Francy)
- USEPA Office of Groundwater and Drinking Water
 - Comprehensive Performance Evaluation (Tom Waters)

Wilmington PWS – Caesar Creek Lake

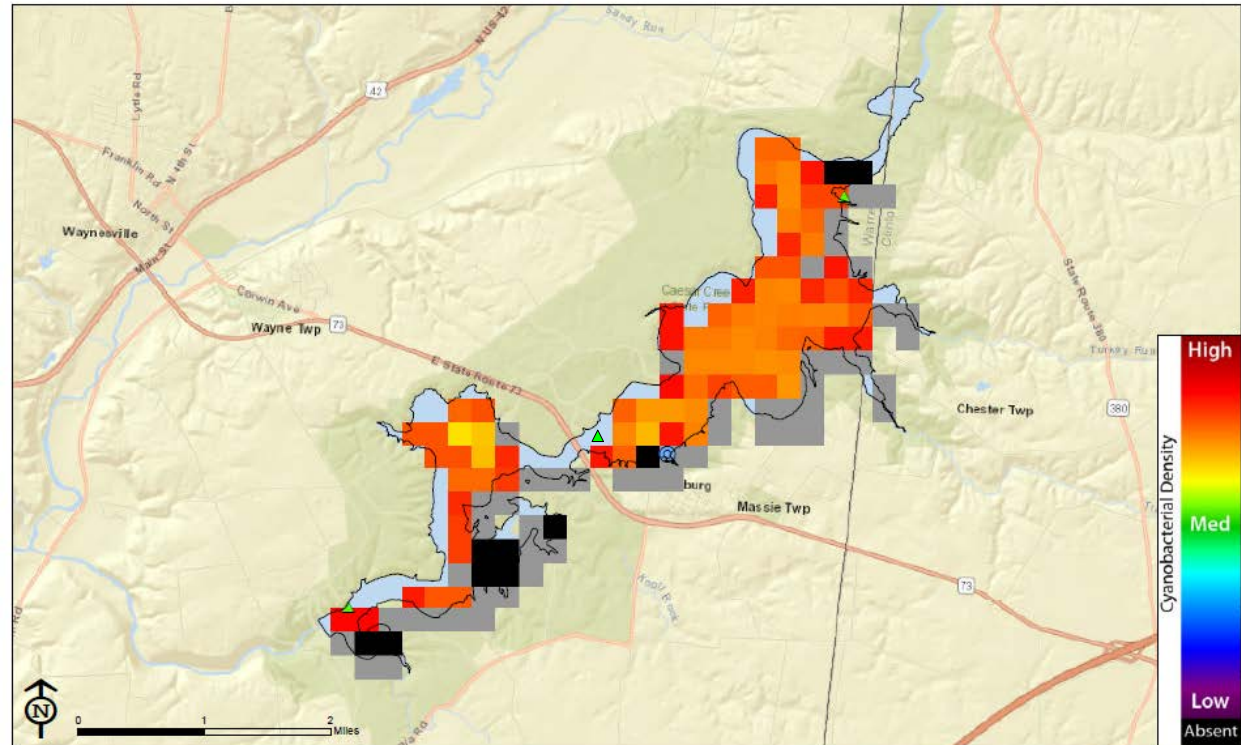
Avoidance strategy (multiple intake depths, alternative sources)



Wilmington PWS – Caesar Creek Lake

Program integration and source water monitoring

- Source water assessment (OEPA-DSW)
- Recreation, beach sites (ODNR)
- Comprehensive performance evaluation (OEPA, USEPA-ORD)
- Source Water Protections Coordinator (PWS)
- HAB satellite imagery (NOAA)



Harmful Algal Bloom (HAB) Satellite Imagery
NOAA - NOS, Copernicus Sentinel-3

This data product is experimental. Cyanobacteria detections should be confirmed and may not indicate presence of cyanotoxins.

Learn more about HABs at ohioalgaefinfo.com
Find beach advisories and sampling data at <http://publicapps.odh.ohio.gov/beachguardpublic>

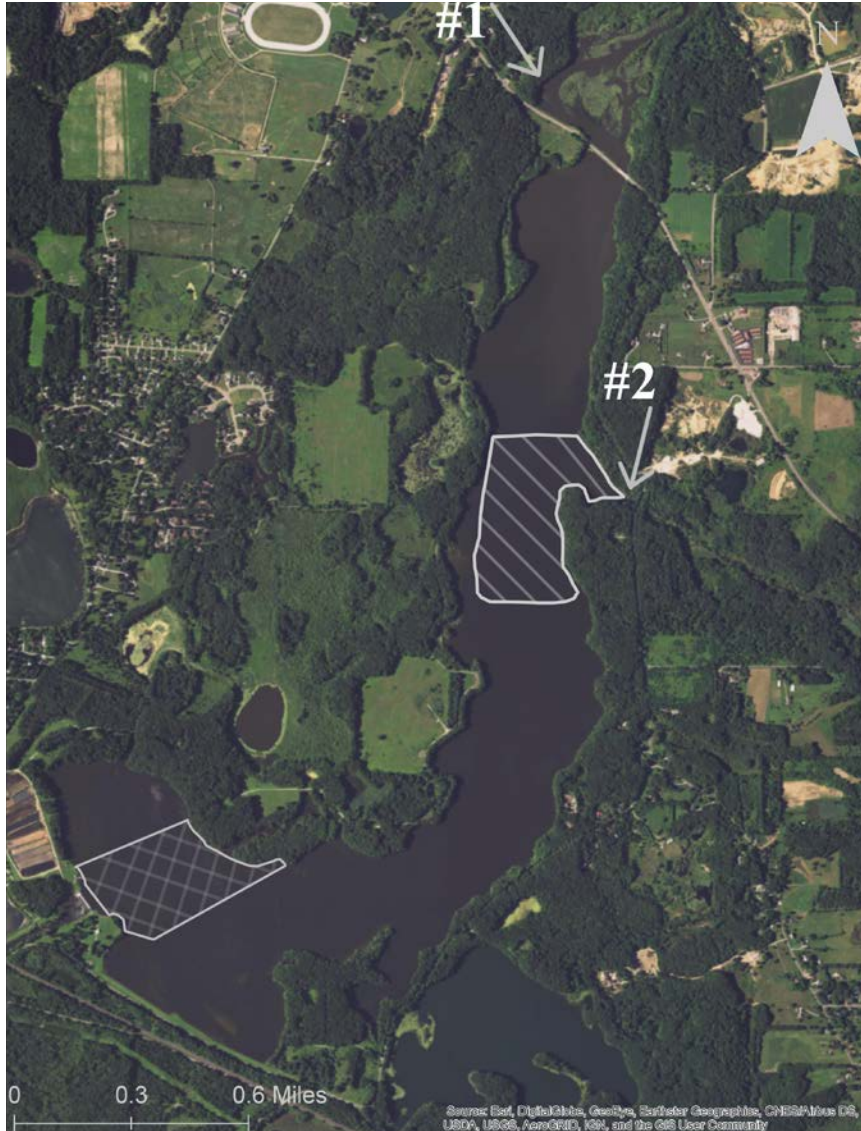
Wilmington PWS – Upground Reservoirs



Model: Hydro Bioscience Quattro-DB
Marketed by: Sonic Solutions Northampton, MA
Note: NSF 61 certified for use in drinking water source



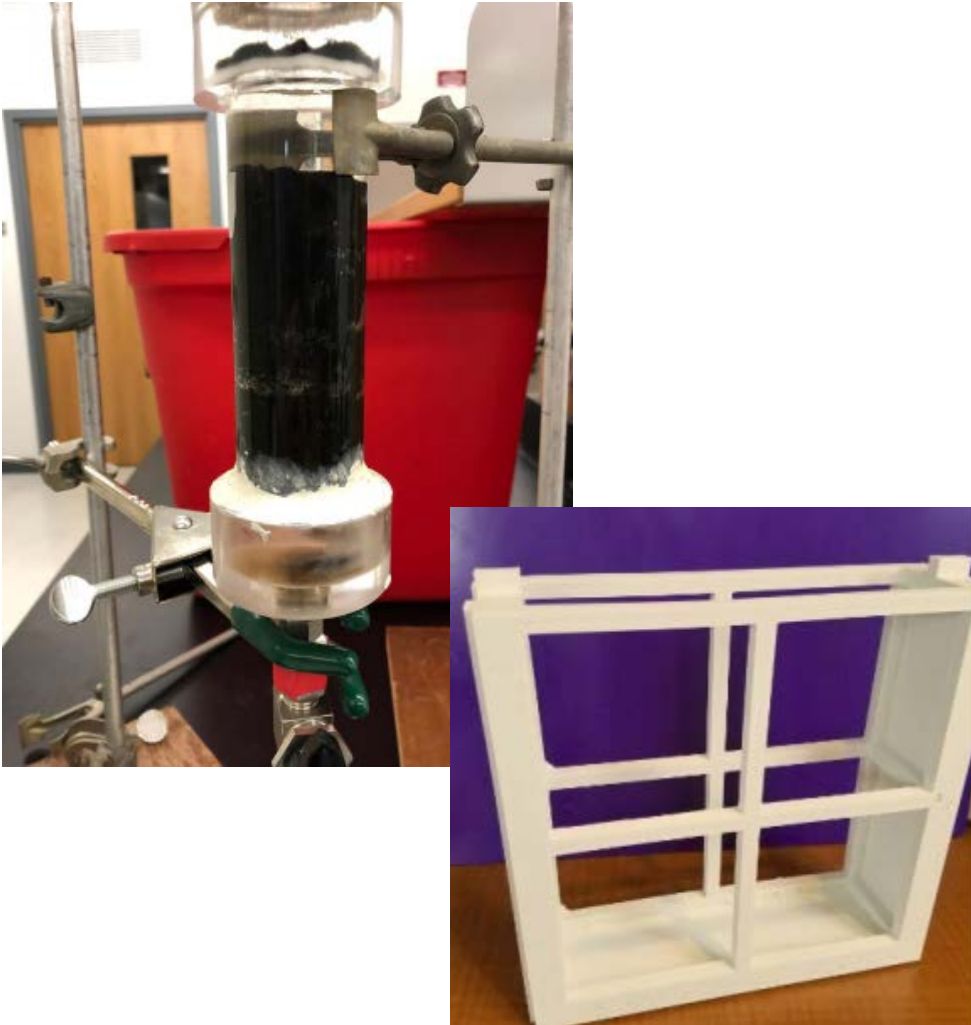
Akron PWS – U. Akron (HABRI Grant)



- Algaecide selection and targeted field application
 - Bench-scale experiment with common copper and peroxide products to assess efficacy and determine dose
 - Field scale algaecide application with control area

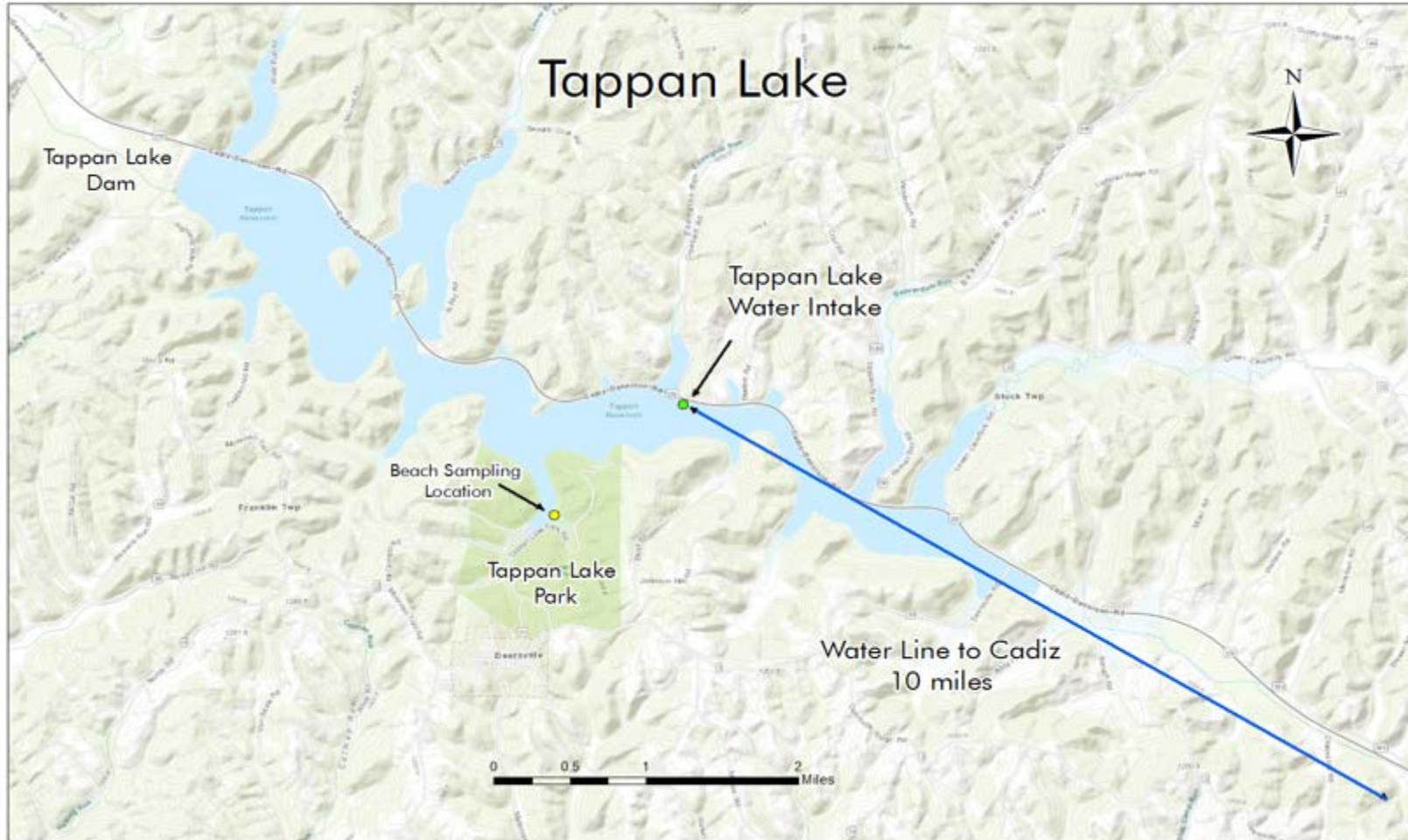
Crafton 2018; Crafton et al. 2019

Akron PWS – U. Akron (OWDA, 319 Grant)

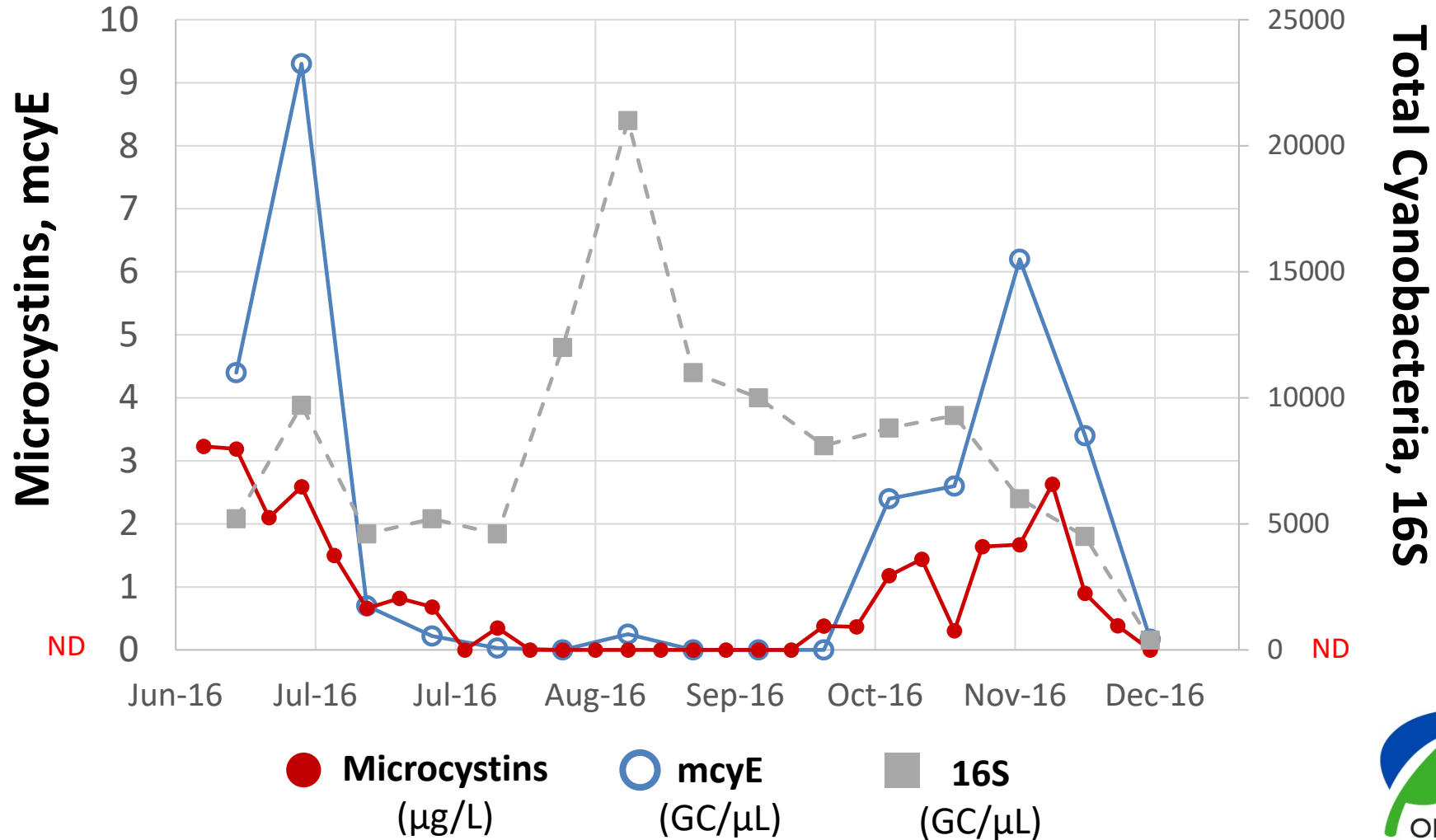


- Nutrient reduction with drinking water treatment residual (Al , PAC)
 - Bench-scale experiment to demonstrate PO₄ uptake
 - Develop structure for passive flow and phosphorus removal in stream

Cadiz PWS – Tappan Lake



Cadiz PWS – Microcystins

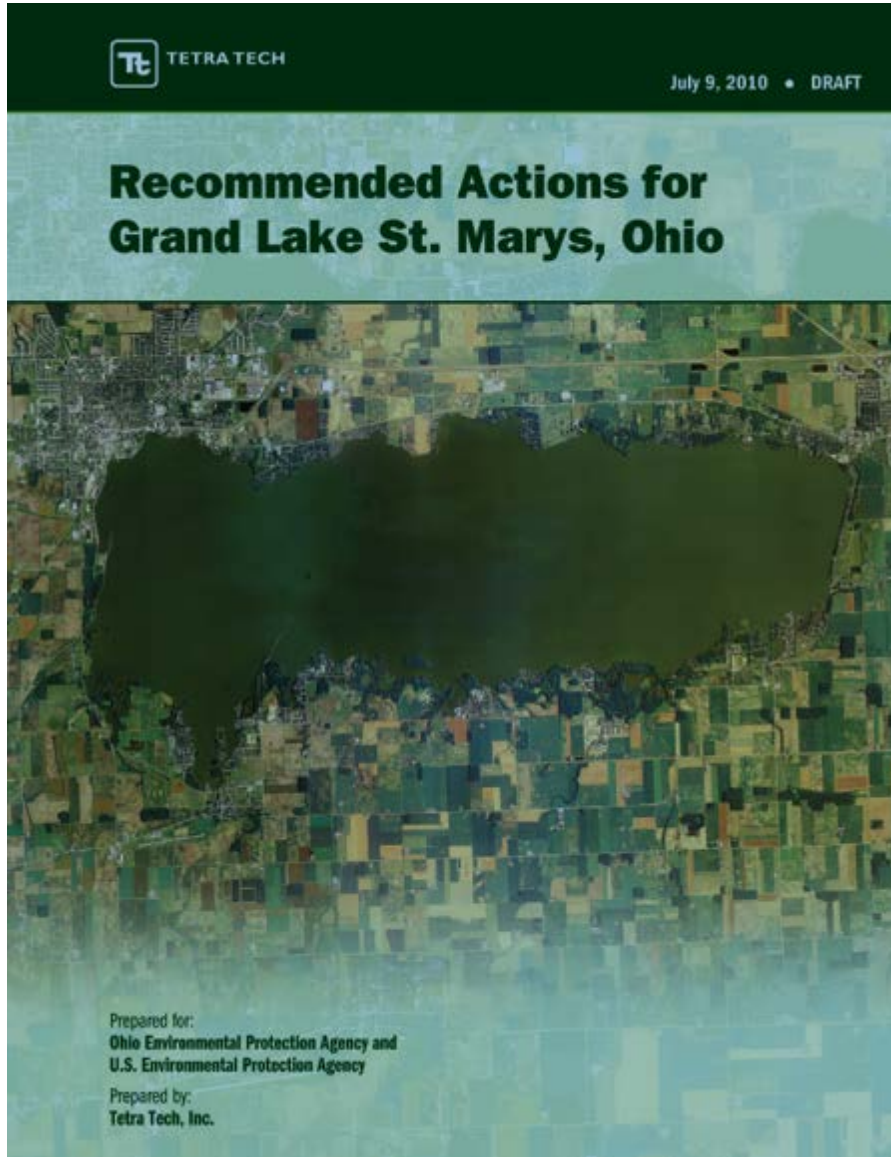


Cadiz PWS - Tappan Lake Nutrient Reduction Initiative (TLNRI)

- Collaboration to reduce nutrients and mitigate HABs
- Alternative TMDL



Celina PWS – Grand Lake St Marys



Recommended Actions:

In-lake

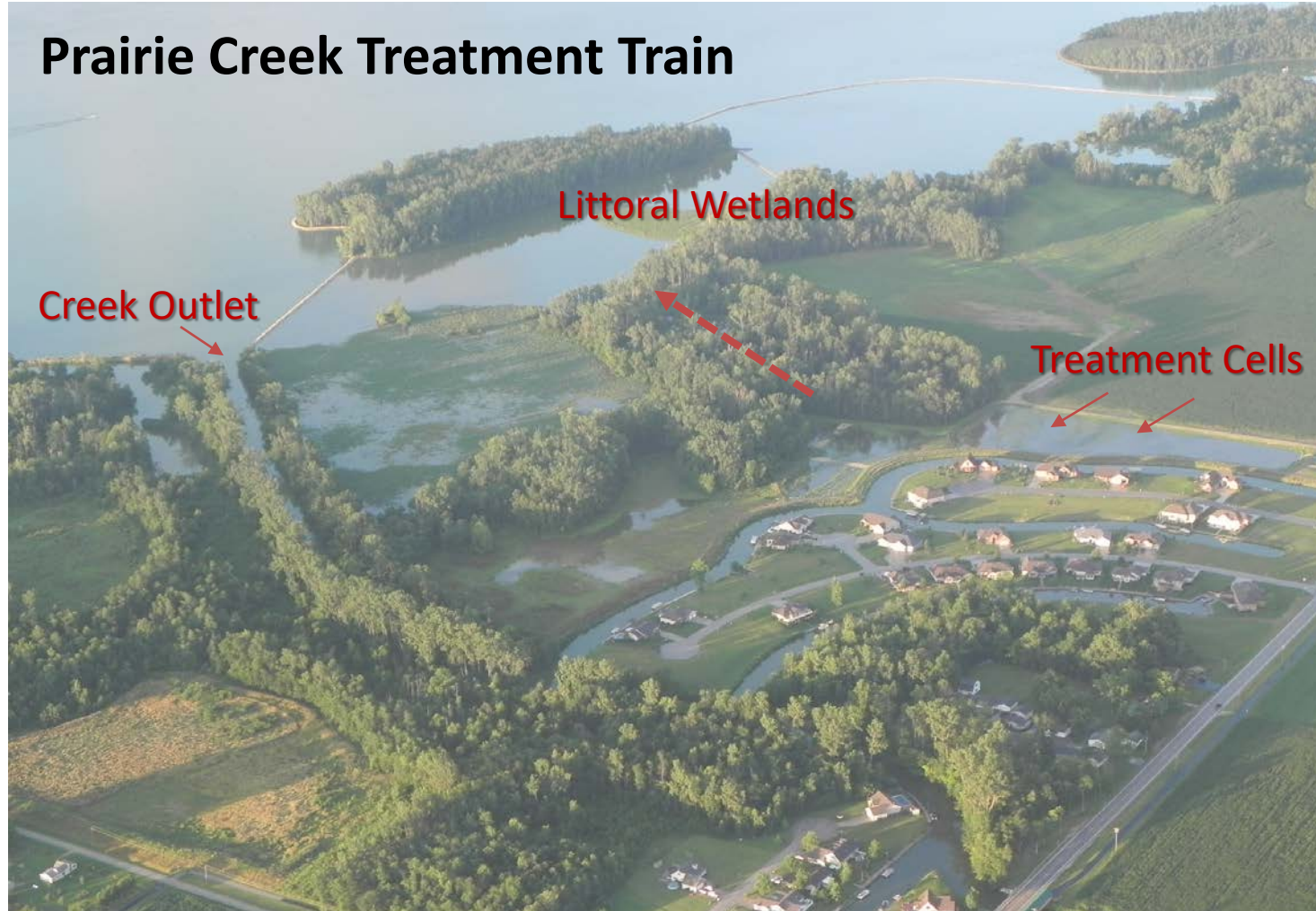
- Lake treatment with alum
- Dredging sediments
- Site specific aeration

Watershed

- Wetland treatment trains
- Education and outreach
- Farm conservation planning
- Installation of conservation practices

Celina PWS – Grand Lake St Marys

Prairie Creek Treatment Train



lakeimprovement.com

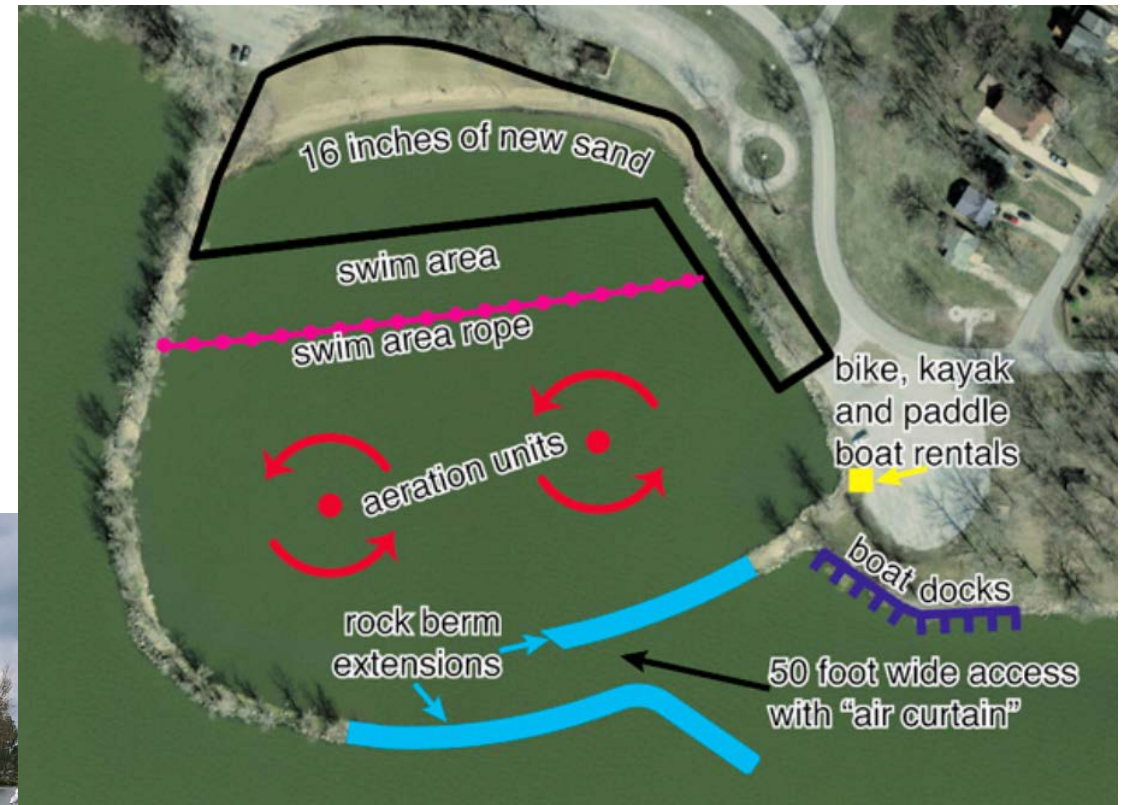
Treatment Train
Wetlands



Celina PWS – Grand Lake St Marys

Beach, recreation area

- Isolate beach embayment
- Dredge nutrient-rich sediment
- Aeration units



Western Lake Erie HABs

- Great Lakes Water Quality Agreement, Annex 4 – Phosphorus Loading Targets
- Ohio's Domestic Action Plan - draft (<https://lakeerie.ohio.gov/>)
- H2Ohio Water Quality Plan (<http://h2.ohio.gov/>)
 - Phosphorus reduction best practices
 - Creation of wetlands

P loading Targets: <https://www.epa.gov/sites/production/files/2015-06/documents/report-recommended-phosphorus-loading-targets-lake-erie-201505.pdf>



Questions?

HABs in Recreational Waters: www.ohioalgaeinfo.com

HABs in Drinking Water: <https://epa.ohio.gov/ddagw/HAB>

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Western Lake Erie HABs

- Great Lakes Water Quality Agreement, Annex 4 – Phosphorus Loading Targets

	Spring (Mar-July)	Annual
Western Basin Cyanobacteria – Bloom biomass less than or equal to 2004 or 2012 9 years out of ten, and/or reduce risk of nearshore localized blooms		
Maumee River		
Total Phosphorus load	860 MT*	
Dissolved Reactive Phosphorus load	186 MT*	
Other Western Basin Tributaries and Thames River		
Total Phosphorus load	40% reduction*	
Dissolved Reactive Phosphorus load	40% reduction*	
Central Basin Hypoxia – Aug –Sept Average Hypolimnetic Oxygen of 2 mg/L or more		
Total Phosphorus load to Western and Central Basins, including Detroit River and atmospheric load)		6000 MT**
Eastern Basin <i>Cladophora</i> – insufficient information to establish target		

<https://www.epa.gov/sites/production/files/2015-06/documents/report-recommended-phosphorus-loading-targets-lake-erie-201505.pdf>