

# Ohio Department of Higher Education Harmful Algal Bloom Research Initiative

## AGENCY DRIVEN PRIORITIES INFORM MANAGEMENT

### Ohio Environmental Protection Agency:

Strategies and tools to evaluate or mitigate HABs and protect (improve) drinking water source quality

- Reservoir management projects that assess the efficacy of cyanobacteria control (e.g., algaecides, ultrasound) and/or nutrient reduction (e.g., alum treatments to upground reservoirs, diversion/treatment train wetlands). Prioritize projects that include objective to develop reservoir management plans with Public Water Systems (PWS).
- Efficacy studies (pilot demonstrations) of emerging technologies and support for transfer of technology to PWS and/or recreational waters. Prioritize technologies for use in drinking water sources with NSF/ANSI/CAN standard 60/61 certification.
- Projects that couple mitigation strategies with land use best management practices and/or integrate with larger source water protection projects.
- Data analytics tool for water quality monitoring data that will improve timeliness and efficiency to evaluate and share data

Identification, occurrence, and environmental drivers of emerging cyanotoxins in waters throughout Ohio

### Ohio Department of Natural Resources:

Research focused on assisting in identifying, constructing, and managing wetland restoration projects for the purpose of nutrient and sediment reductions that lead to a reduction in HABs, including:

- How to construct an effective wetland (e.g., site selection, characteristics for an effective wetland, etc.)
- Comparing the pros and cons of wetland management styles that focus on wildlife vs ecosystem functions
- Effectiveness of coastal wetland types at removing nutrients and sediments
- Social science - What do private landowners need to install wetlands vs planting crops? (non-coastal Lake Erie watershed counties specifically)
- Role of legacy Phosphorous in newly constructed wetlands
- Temporal dynamics of wetland function with age - effectiveness at year 1 vs year 5+
- Effectiveness of various plant communities at removing nutrients (N & P)
- Hydrological management regime of wetlands - what is the best management style for seasonal filling and holding times?
- Effect on nutrient sequestration when using seasonal vs continual pumping regimes

## Ohio Department of Agriculture:

### Manure-related research questions:

- Amount, proportion, and distribution of manures, chemical fertilizers, and biosolids land applied in the WLEB?
- What does the literature say about the effectiveness of various manure management practices, application methods, application timing, and associated (appurtenant) practices on nutrient loss and runoff for nitrogen and phosphorus? Summarize the existing research and develop research where there are gaps.

### Drainage retention/detention practice (e.g., ponds, basins, wetlands, enhanced waterways, two-stage ditches) research questions:

- Develop best design parameters of nutrient reduction wetlands to be employed within the agricultural drainage system (e.g., retention time, plantings, etc.)
- Acreage need and cost to implement in order to reduce nutrient loading (e.g., field scale, subwatershed, basin)?
- Investigate available and potential implementation and funding drivers to maintain conservation practices for load reduction and water quality benefits (e.g. conservation works of improvement)

### Nutrient application method questions:

- Develop farm operation cost-benefit analysis of subsurface nutrient placement practices including analysis of agricultural economic inputs and yields.
- Development of a smaller dragline system to accommodate smaller farms and cropping systems.

### Agricultural adaptation to climate change effects on nutrient runoff

- Rainfall patterns last 30 years and implications for stormwater management on agricultural landscape?
- Recommendations for incorporation of climate adaptation practices into farm conservation planning?
- Update precipitation curves to use for agricultural conservation practice design.

### Soil Testing

- Compare current OSU/industry recommendations for nitrogen against soil tests developed to evaluate available nitrogen during the growing season (e.g., Solvita, Haney, etc.)

### H2Ohio program delivery and outcomes questions:

- Analysis of factors resulting in varying levels of participation by watershed and county (e.g., outreach methods, staffing, partnerships, producer attitudes, etc.)

## **Lake Erie Commission:**

- Model research to analyze the effectiveness of H2Ohio/Ohio DAP for nutrient reduction in the Maumee watershed/across the Lake Erie watershed in Ohio
- Paired or pilot watershed studies looking at the effectiveness of concentrated BMPs
- Cost effectiveness of the 'top ten' H2Ohio BMPs or any other research looking at elements of the cost curve approach to determining which BMPs to support.
- Development of additional BMP options for reducing DRP.

## **Ohio Department of Health (listed in order of priority):**

- Prevalence and occurrence of all cyanotoxins (other than microcystin) in lakes, ponds and springs used for recreation and private drinking water supplies. These systems are commonly shallower and have less water volume and may be more susceptible to the formation of algal blooms.
- Health effects of consumption of low levels of cyanotoxins through drinking water and recreational exposure (including incidental ingestion, inhalation and dermal contact) on sensitive populations including children, pregnant women, and nursing mothers, and the ability to eliminate toxins after exposure.
- Impact of total body burden from exposure to multiple cyanotoxins and occurrence of chronic disease, including impacts to neurological and metabolic functions.
- Transfer and persistence of cyanotoxins into plants and the food chain, resulting impacts on sport fish populations, residence time of cyanotoxins in sport fish, and the health effects of sport fish consumption containing cyanotoxins.
- Persistence and distribution of cyanotoxins in beach sand and shoreline environments from HAB contaminated water and waterfowl droppings.
- Evaluation of health impacts to dogs or other pets from exposure to cyanotoxins, diagnosis and responsive treatment, and elimination of toxins after exposure.
- Cost effective treatment technologies for:
  - a. smaller scale (lower volume) drinking water treatment systems such as ponds or springs
  - b. point of use removal for low level detections of cyanotoxins in drinking water
- Development and validation of a rapid, portable, cyanotoxin in water field test kits.