

The Ohio Water Table

A Publication of the Water Management Association of Ohio

No. 137 / Quarterly

A Management Challenge: Water Quality in Residential—Neighborhood Ponds

Reprint with permission from Summer 2015 *Your Pond Update*, Ohio State University Extension; by **Eugene C. Braig IV**, Program Director

I've recently been musing, and that is a dangerous prospect for anybody paying attention; it places you at risk for an outburst of semi-technical, limnological verbosity. So, here goes...

Regarding programming for pond management, there is a huge body of literature targeted to small ponds and do-it-yourself management by individual property owners. Similarly, larger sites get a great deal of attention and are often actively and professionally managed by government entities—municipality, county, state, and even federal—for the benefit of the general public. Those bigger sites are often given the title of “lake” or “reservoir.” However, somewhere in between are water bodies of small to moderate size that are privately owned and managed, either spanning multiple individual lots or situated on the common property of a homeowners association (HOA). Unfortunately, the pond-management interests of stakeholders in such sites receive relatively little attention. This quarter’s article will discuss residential ponds, especially those that serve stormwater-management functions, and represents an early effort to target some material to those private pond and lake sites with multiple owners/stakeholders.

The Nature of the Challenge

Stormwater basins span a diverse range of form and function. The term implies a pond or basin that has been engineered and built to buffer flooding by detaining stormwater before overwhelming the capacity of local streams. Some only serve temporary water-detention and are periodically dry. Those called retention ponds (or “wet ponds”) generally maintain a permanent pool of water. Many also provide the valuable service of absorbing problematic sediment, nutrients, and other pollutants from surface runoff before they can reach natural surface waters (i.e., “water-quality ponds”). The Ohio Department of Natural Resources (ODNR 2014) summarized this function well enough:

Water quality ponds are stormwater ponds designed to treat runoff for pollutants and control increases in stream discharge and bedload transport. ... Water quality ponds remove pollutants by settling, chemical interaction and biological uptake by plants, algae and bacteria. The efficiency of settling suspended solids and the ability to treat dissolved pollutants is improved

Continued on Page 3



Inside this issue:

<i>President's Column</i>	2
<i>A Management Challenge (continued)</i>	3
<i>WMAO Scholarship</i>	6
<i>WMAO Scholarship Golf Outing</i>	7
<i>Research Highlights from Ohio Water Resources Center</i>	8
<i>WMAO Annual Conference Save the Date</i>	10
<i>WMAO Board of Directors</i>	12

President's Column

Alex Covert, WMAO 2016-2017 President



I channeled my inner-Clark Griswold, a couple weeks ago, and embarked on the all-American dream of taking a family road trip. My daughters and I didn't quite make it to Walley World, the Grand Canyon, or even Indianapolis for that matter. Instead, we stayed local and focused on the southwest part of Ohio - visiting places like Clifton Gorge State Nature Preserve, Jungle Jim's International Market, and the Cincinnati Museum Center. Rather than get ourselves into a continuous series of unfortunate scenarios, my children got a continuous earful as I related even the most unsuspecting of activities to water.

Clifton Gorge State Nature Preserve is a 2-mile stretch of the Little Miami State and National Scenic River in Greene County. It is a wonderful example of the beauty, power, and persistence of water - a deep, narrow channel of bedrock that has been cut by post-glacial flows. This location is literally made of water and didn't take

much imagination for my girls to see what water is capable of doing.

Next, we visited Jungle Jim's International Market, a 200,000+ square feet supermarket in Fairfield, Ohio. It has been described as a theme park of food due to the number of unusual displays throughout the store. You can also find a gigantic produce department, live seafood tanks, and one of the largest wine selections in the United States - all of which depend heavily on... you guessed it. Water. From quantity to quality, I made sure that my daughters understood the importance of water in virtually everything we buy.

Lastly, we stopped at the Cincinnati Museum Center, a one-of-a-kind, multi-museum complex housed in the historic Union Terminal train station. The Center is home to the Cincinnati History Museum and the Museum of Natural History & Science to name just a couple. Both offer educational opportunities relating to water - from the history of Cincinnati's growth on the Ohio River to the replica of an underground stream and waterfall. Seeing how water has influenced a large city like Cincinnati and how it continues to shape a hidden world, right beneath our feet, was a superb lesson to learn.

I admit that I am more familiar than most with the water-related themes that my family discussed during our short trip but, I never get used to just how immensely important water really is. It is a fragile and powerful resource - interconnected by many people and countless uses. It is, quite literally, a necessity for life and it is up to people like us and an organization like WMAO to help keep water-related issues at the forefront of people's minds. Thank you for being a part of the Water Management Association of Ohio!

Gotta get going, now. I have to return my cousin Eddie's RV...

"...I never get used to just how immensely important water really is. It is a fragile and powerful resource - interconnected by many people and countless uses."

S. Alex. Covert



COMPLETE WATER QUALITY SOLUTIONS

- ♦ Innovative, De-stratifying Decorative Fountains
- ♦ Wetland Experts
- ♦ Achieve Greater Energy Efficiency
- ♦ Non-Chemical & Natural Strategies

WATERSMITH
OUTFITTING AMERICA'S FINEST PONDS AND LAKES

2624 N. U.S. Highway 68, Urbana, OH 43078
1-800-634-7434
watersmithsystems.com

with the addition of wetlands and permanent pools. Water quality ponds are often designed to provide flood control by including additional detention storage above the volume specified in this practice.

...Water quality ponds are appropriate for residential, commercial and industrial areas... [and] can be used to address water quality and stream stability concerns.

Deliberately retaining problematic sediment and nutrients from the developed landscape that a pond is engineered to serve creates substantial management challenges by inviting issues related to cultural eutrophication. (Cultural eutrophication is an academic-sounding way of saying that a water body is hastened towards functional old age by human activity.) Of course, eutrophication can be mitigated by implementing select management practices. This initial article will only address permanently flooded sites, including retention or “wet extended detention” (ODNR 2014) ponds and borrow-pit lakes.



Figure 1: Westlake, a reclaimed borrow pit near Sidney, OH (Eugene Braig 2015).

Managing Water Quality in Retention and Other Residential Ponds

These sites are human-made and intensively managed to serve human interests, so consider managing to deliberately and sustainably best serve the site’s intended goals and functions, even where management might sometimes differ from the function of more natural systems.

Ohio’s standards for stormwater management, specifically section 2.6 within Chapter Two: Post-Construction Stormwater Management Practices (ODNR 2014), offer excellent guidelines for design and construction of stormwater ponds to both maximize effective function and manage eutrophication. ...And borrow-pit lake bathymetry is generally outside the control of residential developers (Figure 1); glaciation certainly is (for those rare residential developments along natural kettle lakes). Thus, instead of pond design and construction, we will discuss some aspects of managing existing pond/lake sites.

The reduction or management of nutrient loads and sediment accumulation—the primary drivers of eutrophication on such sites—is the essence of management. Some additional maintenance may be required for pond sites that are regulated to serve stormwater management (Table 1).

One nice feature of HOA’s regarding the management of a watershed: HOA’s typically have the ability to impose rules over some activities of their residents and on their landscapes. Feel free to develop rules with objectives to improve water quality or sustain the functionality of your pond/lake. It’s often a good idea to create a pond/lake committee with the specific function of making management recommendations to the HOA at large for the pond/lake site in general and its fisheries (if present).

Ponds accumulate sediment over time; stormwater ponds, especially so. As the stormwater-management functions related to pond volume are lost, the pond will ultimately need to be dredged of excess sedimentation (Figure 2).

Table 1: Typical maintenance activities for water-quality ponds (from ODNR 2014). While Ohio’s stormwater standards only recommend semi-annual inspection for invasive plants, that particular activity could be almost constant as residents use the site. New invasions should be dealt with as rapidly as possible to avoid the formation of dense, monotypic stands.

Schedule	Management activity
Monthly	Mow embankment and clean trash and debris from outlet structure. Address any accumulation of hydrocarbons.
Annually	Inspect embankment and outlet structure for damage and proper flow. Remove woody vegetation and fix any eroding areas. Monitor sediment accumulations in forebay and main pool.
Semi-annually	Inspect wetland areas for invasive plants.
3–7 years	Remove sediment from forebays.
15–20 years	Monitor sediment accumulations in the main pool and clean as pond becomes eutrophic or pool volume is reduced significantly.

Unfortunately, moving earth tends to be an expensive proposition. Be certain your HOA is financially prepared as the need approaches, taking the disposal of dredge material into consideration. Table 1 provides some preliminary guidance for planning. You can fine-tune expectations for your site as you discover how it behaves within its unique landscape setting.

New-home builds are common features to the watersheds of new residential ponds or lakes. An HOA may want to specify requirements for sediment and waste management on construction sites within a basin’s watershed and try to impose fines for non-compliance. Some best management practices may already be required by local ordinances, so feel free to be that watchdog regarding construction around your own lake/pond.



Figure 2: One of the Foxwood Villa stormwater ponds in the midst of a dredge operation (City of Toledo Engineering Service 2015)

Phosphorus (P) is most often the most limiting nutrient in freshwater; aquatic green stuff (plants and algae) is usually “hungry” for soluble P, so relatively small increases in the availability of that nutrient can press an aquatic site towards eutrophication. An HOA can consider restricting the application of P to landscaping within a watershed. Most residential lawn fertilizers available in Ohio now deliberately omit P, but P is still available in turf-starter fertilizers. Consider only permitting the application of P to new lawns or requiring a soil test before application. Phosphorus is more soluble from pond sediments in the absence of dissolved oxygen. Consider diffuser aeration in deep water to help manage the release of excessive P from sediments.

Consider tolerating some coverage by submerged aquatic plants (the classic “seaweeds”) to both augment water quality and provide the right level of predator–prey interaction for pond fisheries. Up to 20% coverage is appropriate to most permanently inundated sites. You can find some initial recommendations for species selection and establishing beds of aquatic vegetation provided by Lynch (2006), ODNR (2014), and the Missouri Department of Conservation (2015). I intend to provide more detail on this subject with a later newsletter.

Sport fisheries will be at much greater risk to winter kill in nutrient-rich, shallow ponds. Austin et al. (1996) recommend at least 25% of a pond be greater than 8 feet deep throughout most of Ohio (12 feet deep in the north of the state) to provide sufficient refuge for fish (differing slightly from recommendations in ODNR 2014). If you don't have sufficient depth and a surface area of at least one half acre, it will be more difficult to successfully manage a self-sustaining fishery.

Choose Your Battles

The site's primary function—especially detention of water and pollutants—must take priority if it conflicts with other intended uses, whether those other uses serve aesthetics, recreation... whatever. If the site's design serves the surrounding landscape as intended, but the design isn't likely to support a sport fishery, for example, don't expect it to do so. Don't plant ornamental woody vegetation on engineered earthen dikes or dams. Don't plant ornamental wetland vegetation where it might clog or otherwise impede the effectiveness of an outflow structure. Etc.

Supplemental management actions should reflect compromise to at least partially recognize the expectations of each user/owner/stakeholder. Of course, doing so potentially subjects a site to the "too many cooks—spoiled broth" cliché. Once again, consider forming a designated committee to advise pond/lake management.

Management of nuisance vegetation with herbicides carries some risk and potential for liability. While herbicide applications by individual Ohio citizens within product-label guidelines are permitted on private pond sites, no individual resident should take it upon him/herself to apply herbicides to common property or a shared pond/lake. If weed management via herbicides is determined to be an appropriate action for your common property, hire a licensed applicator.

Regarding all of the above, your local Soil and Water Conservation District (SWCD) office is often a good place to check on local regulations and successful pond/lake management practices in the area. Develop a good relationship with your local SWCD staff and county's Extension educators. ...And, as always, feel free to drop me a line with any of your specific pond-management questions.

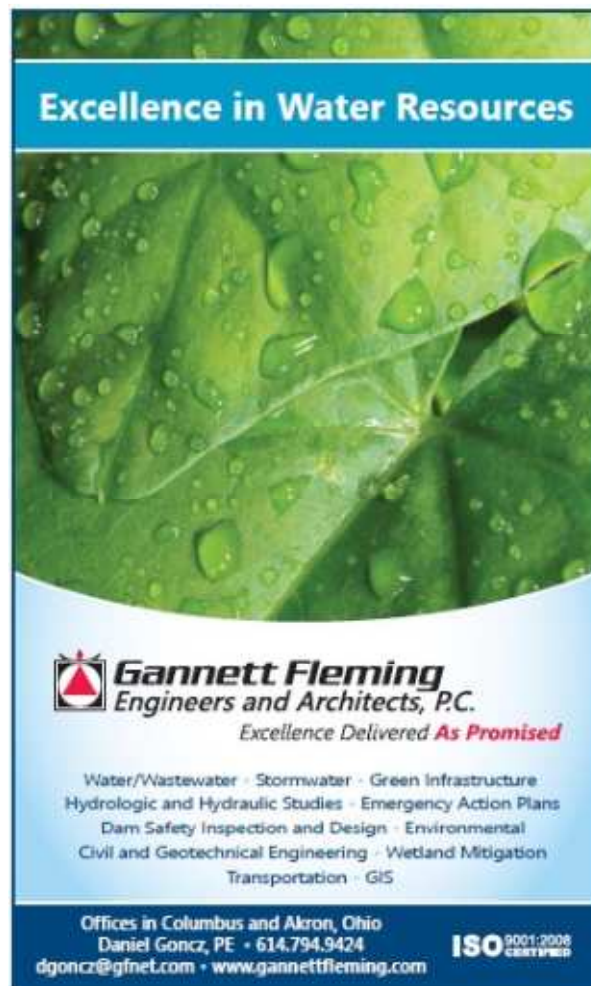
References

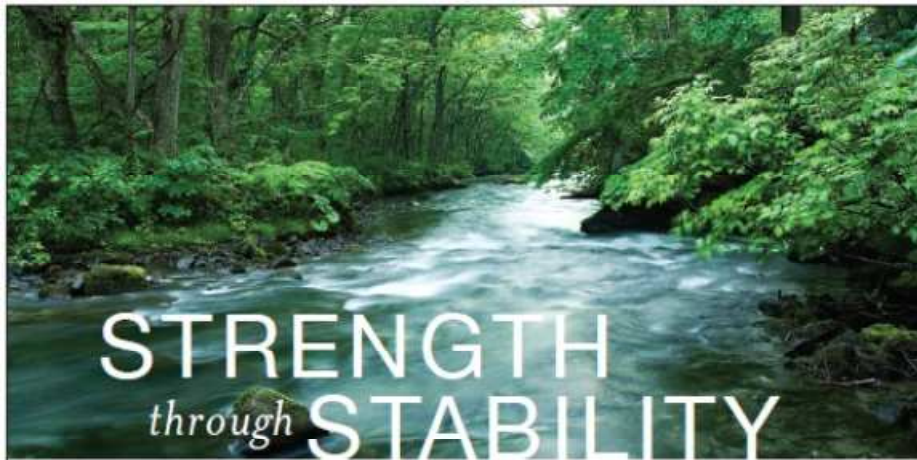
Austin, M., H. Devine, L. Goedde, M. Greenlee, T. Hall, L. Johnson, and P. Moser. 1996. Pond management handbook: a guide to managing ponds for fishing and attracting wildlife. Ohio Department of Natural Resources, Division of Wildlife, Columbus, OH.

Lynch, W. E. Jr. 2006. Benefits and disadvantages of aquatic plants in ponds, extension fact sheet A-17-06. School of Environment and Natural Resources, Ohio State University Extension, Columbus, OH.

Missouri Department of Conservation. 2015. How to establish aquatic plants in your pond, FIS004. Conservation Commission of the State of Missouri, Jefferson City.

Ohio Department of Natural Resources (ODNR). 2014. Rainwater and land development: Ohio's standards for stormwater management, land development and urban stream protection, 3rd edition. ODNR Division of Soil and Water Conservation, Columbus.






STRENGTH
through **STABILITY**

YOU DESERVE MORE

Davey Resource Group is rooted in decades of experience. Our highly qualified team of biologists, restoration ecologists, environmental planners and regulatory specialists are trained to respond to your needs by providing resourceful services and innovative solutions.

John Kusnier / *Project Developer*
800.828.8312 x8059 (office)
419.787.4153 (mobile)
John.Kusnier@davey.com

DAVEY 
RESOURCE GROUP
A Division of The Davey Tree Expert Company

WMAO Scholarship

\$1,000 College Scholarship for tuition, fees, and books

Applications due April 29, 2016

Click [here](#) for more information and online application.



The Water Management Association of Ohio proudly announce the
16th Annual WMAO Scholarship Golf Scramble
Friday, June 24, 2016 at 9:30 a.m.
National Golf Links (South Charleston, OH)

You are cordially invited to attend the Sixteenth Annual WMAO Scholarship Golf Scramble to benefit the WMAO Scholarship Fund. The cost is \$60 per person or \$240 per team and includes green fees, cart, beverages, burgers & brats after the round and prizes. We encourage teams or individual golfers of all skill levels to register and participate.

Hole Sponsorship is \$50

Event Sponsorship is \$150

The Scholarship Fund value continues to increase from the generous supporters of WMAO through the registration fees, and hole and event sponsorships. Sponsors will have a sign with their company name and logo on one or more of the 18 holes. All Sponsors will be recognized at the opening and closing ceremonies. All sponsorship monies go directly to the scholarship fund established in 2003 with the Columbus Foundation. Contributions of any amount are greatly appreciated and tax deductible. (Sponsorship does not include costs for golf).

Contact Jim Shoemaker (City of Dayton) at 937-333-3727 or 937-545-5072 if you have any questions.

Make checks payable to WMAO (no cash or credit cards) and remit Registration/Sponsorships by June 20, 2016 to:
WMAO Scholarship Golf Scramble
8584 E. Washington St. #206
Chagrin Falls, OH 44023

Visit the WMAO website for the [registration form](#)

National Golf Links:

276 Clubhouse Drive, South Charleston, OH 45368
Phone: 937-568-9660 or 877-730-7676

<http://nationalgolflinks.org/>

Directions:

From Columbus: Take I-70 west bound to exit 66. Turn left onto Route 54 through S. Vienna to Route 40. Turn right onto Route 40 west and pass Buena Vista Rd. The next road on your right is Clubhouse Drive.

From Dayton: Take I-70 east to exit 62 and make a right turn onto Route 40 east. Go approximately 2 miles and make a left turn onto Highway Outpost Rd. Then turn left onto Route 40 westbound to Clubhouse Drive (first road to your right).

ENVIRONMENTAL, ENGINEERING AND
FUNDING SOLUTIONS SINCE 1980



we know the way

www.hullinc.com

Research Highlights from State of Ohio Water Resources Center

The Ohio Water Resources Center is a federally authorized center situated at The Ohio State University. We fund State relevant water related research. Below are highlights from a recently completed project conducted by Dr. Anne Jefferson, Assistant Professor in the Department of Geology at the Kent State University. If you are interested learning more about our research projects see the Ohio Water Resources Center webpage at wrc.osu.edu

These results suggest that redox chemistry is active within the constructed riffles in the restoration and is likely caused by dissolved oxygen gradients along flowpaths...

The overall objective of her project titled **“Characterizing stream restoration’s water quality improvement potential through hyporheic exchange enhancement”** was to evaluate how stream restoration affects hyporheic exchange, and therefore water chemistry. Such understanding is crucial for deciding where stream restoration is appropriate to meet management objectives, designing restoration projects to meet those objectives, and evaluating whether restorations are successful.

Overall this study has discovered a dynamic environment in the hyporheic zone of restored streams, with changing hydraulic conductivity and strong chemical gradients. In the stream where sediment inputs were restricted by an upstream dam, hydraulic conductivity did not change at the reach scale over a 5 month period, as opposed to a stream with unrestricted sediment input where hydraulics conductivity declined over 15 months following restoration. Despite these dynamics, neither restored reach effected a change in surface water chemistry, as measured by baseflow grab samples analyzed for nitrate and other anions. Pore water collected from piezometers (Figure 1) revealed one important trend. Manganese concentrations were greatest in the head or upstream end of riffle 2 and 3, and in the middle of riffle 1, in each case as much as ten times higher than the surface water (Figure 2).

These results suggest that redox chemistry is active within the constructed riffles in the restoration and is likely caused by dissolved oxygen gradients along flowpaths through these structures.

In summary, hyporheic exchange was not significant enough to modify the water quality signal resulting from upstream land use and geology. This could either be the result of insufficient hydraulic conductivity; the observed weak upwelling and downwelling; or short restored reach length. While the study was limited to two sites and approximately one year of data, the results suggest that stream restoration practices may not induce sufficient hyporheic exchange to improve downstream water quality.



Figure 1 Dr. Jefferson's student collecting samples.

Researcher Profile: Dr. Anne Jefferson’s lab works on watershed hydrology, groundwater-surface water interactions, and landscape evolution in human-altered landscapes. Current projects focus on green infrastructure, stormwater management, and stream restoration. Much of her research is field-based, but her group also makes use of stable isotope analyses, geographic information systems (GIS), and hydrologic modeling.

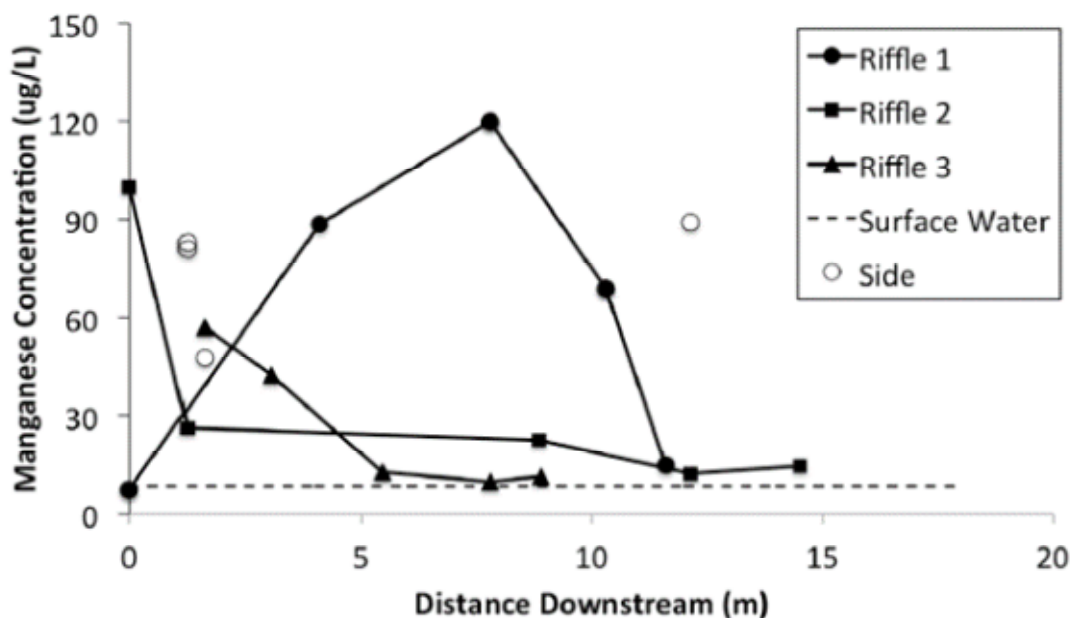


Figure 2 Manganese concentrations from pore water 15---30 cm below the streambed surface at Kelsey Creek.



BSA ENVIRONMENTAL SERVICES, INC.

Over 20 years of Superior Aquatic Microbiology Services!



- Phytoplankton Identification
- Biovolume & Biomass
- Chlorophyll Analyses
- Algal Systematics
- Cyanotoxin Analyses ELISA & HPLC

- Epifluorescence Microscopy
- Microphotography
- Taste & Odor Algae
- Vouchers (Slides/Digital)
- Express Service Available










Contact us today for additional information or a quotation!

216-765-0582 • 23400 Mercantile Rd. #8, Beachwood, OH 44122 • www.bsaenv.com

Save the Date!

WMAO 45th Annual Meeting and Symposium

Voices for Water

November 9 & 10, 2016

Crown Plaza - Columbus North / Worthington,
6500 Doubletree Ave, Columbus OH 43229

Look for Call for Abstracts in May



AQUA DOC

Complete Lake & Pond Management

- Customized Algae & Weed Treatment Programs
- Award Winning Waterscape Design & Installation
- Biologists, Aquatic Specialists on Staff
- Serving All Ohio Waters Since 1983



Free Consultations – Call Today!

440-286-7663 or Toll Free 800-689-5253



10779 Mayfield Road Chardon, Ohio 44024

www.aquadocinc.com

Most Major Credit
Cards Accepted

HARMFUL ALGAL BLOOM TESTING & BEYOND

Comprehensive Monitoring Plans

DIY Sampling Kits

24-HR Turnaround Analysis

Wetland & Stream Management

Stormwater Management

Environmental Compliance

STAY ON TOP of Ohio EPA Regulations.

24-HR CYANOTOXIN TESTING

- Microcystin LR, Anatoxin-a, Saxitoxin & Cylindrospermopsin Testing by ELISA Methods
- DIY Sampling Kits with Prepaid Shipping
- Phytoplankton & Periphyton Identification & Quantification
- Qualitative Scans for Potentially Toxic Cyanobacteria
- Algal Biovolume Measurements

OTHER LABORATORY & ANALYSIS SERVICES

- WET Testing
- TIE/TRE Testing
- WER Testing
- Sediment Testing

ECOLOGICAL SERVICES

- Wetland & Stream Management
- Stormwater Management
- Environmental Compliance
- Environmental Permitting



Call today for a quote! **800.940.4025**
EnviroScienceInc.com
info@EnviroScienceInc.com

PURE

engineering results

ftch Fishbeck, Thompson, Carr & Huber, Inc.
 engineers | scientists | architects | constructors
 Columbus | Cincinnati | 800.456.3824 | ftch.com

in

Civil & Environmental Consultants, Inc.

- ▶ Geotechnical Engineering
- ▶ Dam Safety Engineering
- ▶ Water Resources
- ▶ Surveying Services
- ▶ Construction Materials Testing
- ▶ Environmental Services

Contact:
 Matt Gramza, P.E., CFM
mgramza@cecinc.com
 800-759-5614

Ohio Offices:
 Cincinnati, Columbus, Toledo

www.cecinc.com
 locations nationwide

WATER MANAGEMENT ASSOCIATION OF OHIO

8584 E. Washington St. #206
Chagrin Falls, OH 44023

330-466-5631, admin@wmao.org
Dana Oleskiewicz, Administrative Director

www.wmao.org

The Water Management Association of Ohio (WMAO) is the one organization dedicated to all of Ohio's water resources.

VISION: The Water Management Association of Ohio will be the most effective and respected independent water resources organization in Ohio.

MISSION: The Water Management Association of Ohio promotes the comprehensive understanding, conservation and multifaceted use of Ohio's water resources.

Permission to reprint with credit to WMAO.



2016 WMAO Board of Directors

Alex Covert	sacovert@usgs.gov
Joe Bonnell	bonnell.8@osu.edu
Boris Slogar	bslogar@mwcd.org
Gregory Nageotte	greg.nageotte@agri.ohio.gov
Stuart Ravary	stuartravary@stoneenvironmental.com
Tim Howdyshell	thowdyshell@aep.com
Shawn Arden	sarden@emht.com
Darren Bade	dbade@kent.edu
Mark McCabe	mark_mccabe@gspnet.com
Stephanie Singer	ssinger@defiance-county.com
Larry Antosch	lantosch@ofbf.org
Eugene C. Braig IV	braig.1@osu.edu
Craig Smith	craig.smith@epa.ohio.gov
Scot Hindall	scot.hindall@dnr.state.oh.us
John Hoopingarner	jhoopingarner@mwcd.org
John Lenhart	lenhart.49@osu.edu
Jim Shoemaker	james.shoemaker@daytonohio.gov
Kari Mackenbach	kmackenbach@msconsultants.com
John Herchl	herchljf@cdmsmith.com
Tom Allen	ptallen111@insight.rr.com

President
Vice President
Past President
Treasurer
Secretary
Division Director—Dam Safety (ODSO)
Division Director—Floodplain Management (OFMA)
Division Director—Lake Management (OLMS)
Division Director—Stormwater Management (OWSA)
Division Director—Watershed Management (OWPA)
Director—Agriculture
Director—Education
Director—Groundwater
Director—Mineral Resources Management
Director—Navigation & Recreation
Director—Research & Data Management
Director—Water & Wastewater
Director-at-Large
Director-at-Large
Director-at-Large

