

The Ohio Water Table

A Publication of the Water Management Association of Ohio

No. 139 / Quarterly

Research Highlights from State of Ohio Water Resources Center

The project titled “**Spatial and Temporal Dynamics of Non-Point Source Pollution**” aimed to identify the hydrologic and land surface characteristics that influence the spatial and temporal dynamics of non-point source (NPS) pollutants (nitrogen and phosphorus, in particular). The project outcome will lead to identification of Critical Source Areas (CSAs) in a watershed, which offers an opportunity to prioritize and tailor conservation practices that will better protect water quality and reduce costs and transform a purely NPS problem into a quasi-point source problem.

This study used the Upper Big Walnut Creek (UBWC) watershed in central Ohio as a case study. The watershed was divided into subbasins (Figure 1) in order to identify critical nutrient source area. Hydrological modeling was done using the latest release of SWAT model, SWAT2012, which includes a synthetic weather generator and improvements to simulation of nutrient cycling. Spatial modeling indicated that the top sixth of subbasins were responsible for contributing 52% of the total nitrogen and 55% total phosphorous. Modeling of variation of loadings over time revealed that three months, February, March, and October account for seven of the top ten contributing months. When examining the spatial-temporal interactions (subbasins and time), the top sextile represents 62% (Nitrogen) and 65% (Phosphorus) of the nutrient load, and an even higher percentage than both of these individually. Figure 2 (page 3) indicates the interaction of both time and space. Vertical features on these plots indicate consistent spatial response at a given time. February, March, October, November and December all show stronger contributions across all subbasins. Horizontal features indicate a given subbasins contribution to NPS pollution across time. Subbasins 20,21,22 and 32 all show high levels of contribution regardless of time. Based on our results, implementing best nutrient management practices that address both spatial and temporal issues could be a more efficient method of addressing nutrient pollution.

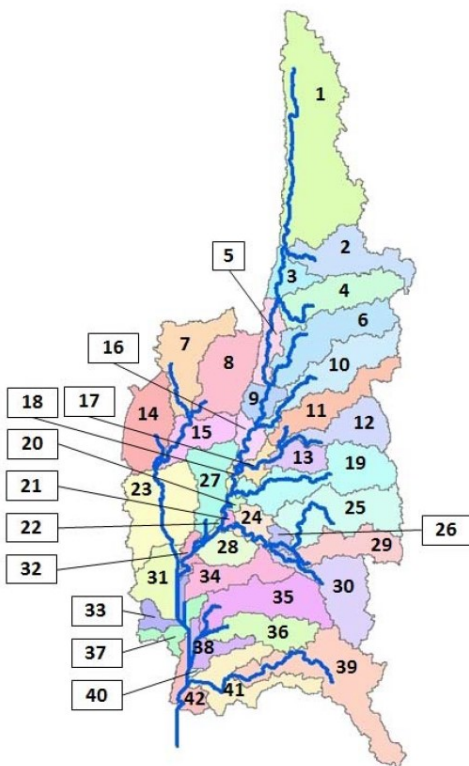


Figure 1 Subbasins of UBWC watershed used in our study



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President's Column

Alex Covert, WMAO 2016-2017 President



Moving day is almost here. After approximately 17 years, the U.S. Geological Survey (my place of work) is packing up their Erlenmeyer flasks, acoustic Doppler current profilers, and DH-81 surface-water samplers and relocating. The distance is short (about ¼ mile) but the journey is long. We've all been through it – whether personally or professionally and in doing so, we've seen, first-hand, the large amount of stuff that can accumulate.

In an effort to declutter, we are forced to sort through a mountain of non-essential items: bent paper clips, empty manila folders, and dried-up ink pens. But sift through enough junk, and you just might stumble upon a few hidden gems. Things like your original Federal employee ID card

(I had hair?) or that slide rule that was handed down to you from a past colleague (did folks really use these?), or even... a box filled with silver, lapel pins shaped like water buffalos (apparently, someone makes their living manufacturing such a thing).

These pins, collectively, symbolize over 540 years of water-resources knowledge. They are the badges of a highly regarded subgroup of WMAO members – the Water Buffalos. These folks are active or former WMAO members with at least twenty (20) years of service and have actively participated in the Association while contributing to Ohio's water resources community. They are (or represent) the history of water resources in Ohio – something that is needed if we are to “move” towards the future. I would like to personally thank the Water Buffalo members for their continued presence and participation in the Water Management Association of Ohio.

“I would like to personally thank the Water Buffalo members for their continued presence and participation...”

WMAO Water Buffalo

S. Alex. Covert

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Daniel	Hill
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Scot	Hindall
John	Hoopingarner
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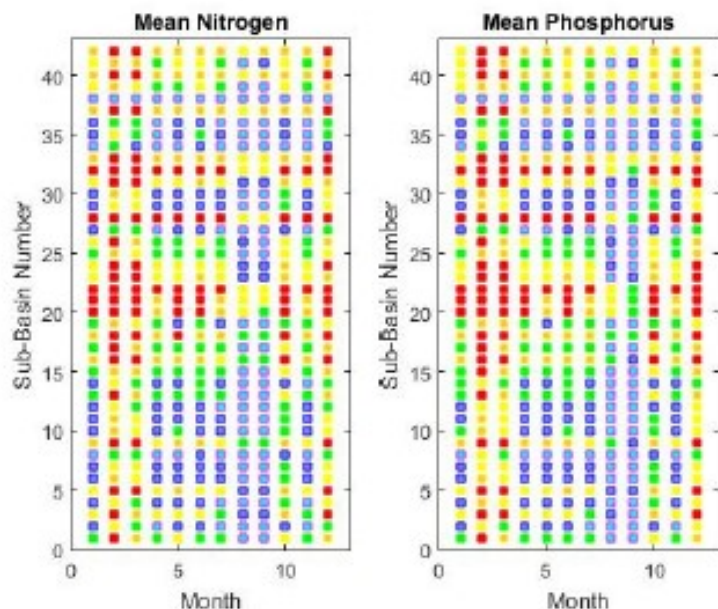
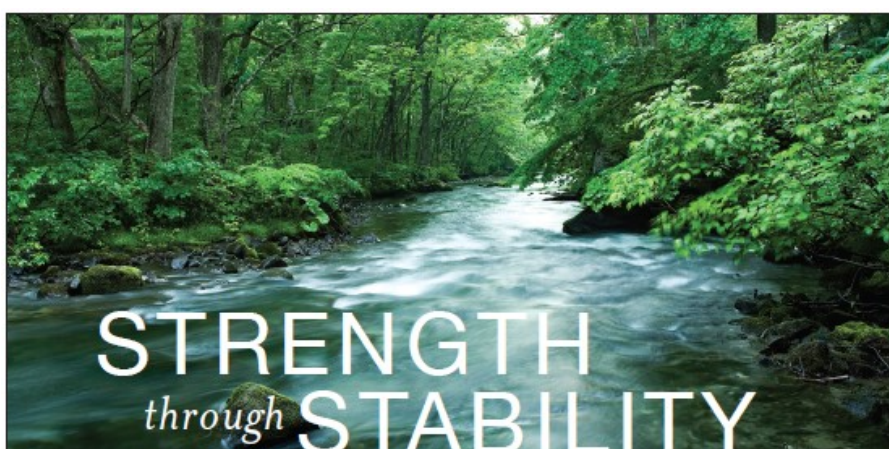


Figure 2 Monthly Mean Nitrogen and Phosphorus Load among 42 Subbasins and 12 Months in UBWC. Vertical features indicate times of year of interest whereas horizontal features indicate areas within the catchment that consistently contribute to NPS. Red are top six contributors.

Researcher Profile: Dr. Gajan Sivandran is a watershed hydrologist/hydrodynamic modeler, fluid dynamics, focus on climate change, ecology, land management. His research focuses on semi-arid environments, where spatial and temporal variability in soil moisture is the primary control on the hydrologic cycle and ecological function, the dynamic feedbacks between hydrology and ecology.



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Ohio Dam Safety Organization



Legislator Field Trip to Lake White Dam

By **Mike Rowland**, ODSO President-Elect

In keeping with our mission of actively promoting dam safety in the State of Ohio, on August 30, the Ohio Dam Safety Organization held a field trip for state legislators at Lake White Dam in Waverly, Ohio.

ODSO had been meeting with individual legislators over the past six months to build support for this event.

Attending were Rep. Andy Thompson of Marietta, Rep. Tim Schaffer of Lancaster, Rep. Terry Boose of Norwalk, Rep. John Becker of Loveland and Rep. Michael Sheehy of Toledo. In addition, a number of legislative aides made the trip. The day

began with a brief introduction of the ODSO members in attendance. Scott Jerome then discussed the elements of dams. Rob Kirkbride, ODSO's past president, reviewed the Lake White Dam project, including the seepage event which triggered the cutoff wall. At this point, we headed to the site and met with ODOT and ODNR project personnel to learn about the construction project. We got lucky with the weather, as there wasn't a cloud in the sky. The group traveled along the crest of the dam stopping to observe the spillway improvements, the new lake drain control tower, the RCC overtopping protection and the inboard wave protection. The group asked many good questions and came to appreciate the magnitude of the state's investment in dam

safety at Lake White. Afterwards, we returned to Waverly and enjoyed lunch. During lunch, Mike Rowland discussed the classification of dams in Ohio and presented a map depicting the number and locations of dams across the state. Steven Riedy, with the support of his company, produced and handed out more detailed maps illustrating dams by legislative districts. This elicited much discussion and led to a good conversation as to the number of dams that are privately owned in contrast to other infrastructure such as roads and bridges. Jeff Brooks wrapped up the day with a brief review of dam safety events outside of Ohio, especially the recent flooding and associated dam failures in South Carolina.

"...the field trip was well received and the representatives seemed to enjoy learning a little bit more about dam safety."



Figure 1 Rob Kirkbride reviewing the Lake White Dam project.



Figure 2 Attendees in front of the dam spillway.

All indications were that the field trip was well received and the representatives seemed to enjoy learning a little bit more about dam safety. This field trip could not have happened without the support of many ODSO members. A special thanks to Steven Riedy who took the lead on reaching out to the state representatives, to Rob Kirkbride who led the tour of the dam, to Dan Murphy and Mia Kannik who did a great job of explaining Ohio's rules to the legislators, to Dan Pizzino who spearheaded transportation and to Lori Gillett who provided hard hats and safety vests for the group. Lastly, a big thanks to ODOT and ODNR who allowed us access to their construction project. If you are interested in learning about the Lake White Dam seepage event and ODNR's emergency response, plan on attending the dam safety session at the WMAO Conference in November.

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Voices for Water

45th Annual WMAO Conference
Crowne Plaza North, Worthington/Columbus, Ohio
November 9 - 10, 2016



We never know the worth of water till the well is dry.

Thomas Fuller (1608 – 1661), English preacher, historian, scholar, and a voice for water.

	Voices for Water Wednesday, November 9, 2016			
8:00 - 8:30	Registration & Coffee - Foyer 1 & 2			
8:30 - 10:00	Welcome and Introduction - Ballrooms 3 & 4 Keynote Address: A Slithering Success Story: Rapid Recovery and Delisting of the Lake Erie Watersnake (Kristen Stanford, The Ohio State University)			
10:00 - 10:15	Break - Foyer 1 & 2			
	Ballroom 1 & 2	Ballroom 3	Ballroom 4	Salon B/C
10:15 - 11:45	Ohio Lake Management Society Case Studies	Education	Watersheds	
10:15 - 10:45	Buckeye Lake Update (Mike Gallaway, Ohio EPA)	Project WET - Ohio Update (Dennis Clement, Ohio EPA)	Implementation Planning for 319 Grants (Greg Nageotte, Ohio Dept. of Agriculture)	
10:45 - 11:15	Nutrient removal by constructed and restored wetlands in the Maumee River watershed of northwest Ohio (Douglas Kane, Defiance College)	Panel Discussion: Who works for water? (Carolyn Watkins, Ohio EPA; Ebony Hood, Northeast Ohio Regional Sewer District; Karen Thomas, City of Dayton Water Department)	Breaking the Boundaries (Amy Cameron, Warren County Soil and Water Conservation District)	
11:15 - 11:45	Charter Boat Captains Help to Monitor Lake Erie Water Quality (Justin Chaffin, The Ohio State University)		Evaluation of watershed land use and water quality in Mill Creek, Youngstown, Ohio. (Felicia Armstrong, Youngstown State University)	
11:45 - 1:15	Awards Luncheon - Ballrooms 3 & 4			
1:15 - 2:45	Ohio Lake Management Society Cyanotoxins	Dam Safety	Stream Restoration	
1:15 - 1:45	Microcystin Dynamics in Western Lake Erie (Darren Bade, Kent State University)	Which Project Should We Work On? A Risk-Based Approach (David Moore, Tetra Tech)	Stream Daylighting at Cottage Grove Park (Judith Mitchell, Davey Resource Group)	
1:45 - 2:15	qPCR Analysis for Cyanotoxin Screening (Heather Raymond, Ohio EPA)	Fragility Analysis for Flood Protection of Berms (Ahmed Dababneh, RIZZO Associates)	Stream Restoration Using Instream Bioreactors (Kurt Keljo, Franklin Soil and Water Conservation District)	
2:15 - 2:45	The Effect of Aeration and Destratification on Water Quality and Microcystin Concentrations in a Small Suburban Lake (Martin Hilovsky, EnviroScience, Inc.)	Seepage Concerns at Lake White Prompts Emergency Response (Rob Kirkbride, Stantec, and Jeremy Wenner, ODNR)	Capturing the Entire Watershed Through Stormwater Retrofits (Joshua White, Civil & Environmental Consultants, Inc.)	
2:45 - 3:15	Break - Foyer 1 & 2			
3:15 - 4:45	Ohio Lake Management Society Beneficial Reuse of Dredged Material	Wastewater	Monitoring & Assessment	Careers in Water Resource: Professional and Student Networking Event
3:15 - 3:45	Panel Discussion: Beneficial Reuse of Dredged Material Program Overview (Pam Allen, Ohio EPA; Joe Cappel, Toledo-Lucas County Port Authority; John Hull, Hull and Associates; Jim White, Port of Cleveland; Rui Liu, Kent State University)	Beneficial Use of Algae for Sustainable Wastewater Treatment, Five Year Treatment System Performance Update (Matt Gramza, Civil & Environmental Consultants,	Volunteer Stream Quality Monitoring: Fostering Community Engagement in Ohio's Scenic Rivers (Matthew Smith, Ohio Department of Natural Resources)	
3:45 - 4:15		Comparison of Batch Disinfection of Residential Wastewater with Chlorine and UV for On-site Irrigation (Kun Liu, The Ohio State	Integrating remote sensing images for in-season nitrogen management (Sami Khanal, The Ohio State University)	
4:15 - 4:45		Treating High Salt Wastewater with Sand Bioreactors (Kristen Conroy; the Ohio State University)	Freshwater Mussels – The Not So Silent Sentinels for Water Quality (Michael Hoggarth, Stone Environmental)	
5:00 - 6:00	Reception & Poster Session - Foyer 1 & 2			

5:00 - 6:00	Reception & Poster Session - Foyer 1 & 2
	POSTERS Phosphorus Removal in Restored Streams Measurements of water surface variables in anticipation of the Surface Water and Ocean Topography mission SWOT and potential applications of SWOT for water resource management in Ohio Climate Change Impact on Ice Jam Flooding across the Northern Belt of USA Using Oxygen Isotope Ratios to Differentiate Sources of Phosphates Entering the Western Basin of Lake Erie Winter Warming of a Wastewater Treatment System using a Greenhouse Heat Recovery System Modelling the effects of green infrastructure on stormwater reduction at a catchment scale Forecasting Harmful Algal Bloom for Western Lake Erie using Data-Driven Machine Learning Techniques Algae Bloom Forecasting Model for Western Lake Erie using Genetic Programming Reducing Harmful Algal Blooms in the Lake Erie Watershed: Investments in Nutrient Reduction from Non-Point Sources, 2010-2015 Exploring the Benefits and Practicality of Two-Stage Ditches Modelling a short section of the Lower Olentangy River surface profile using new, high-resolution bathymetry data Treatment of Cyanotoxins in Source Waters Using Recycled Plastic Pressure and Frequency Effects on Self-cleaning Piezoelectric Membranes Bacterial Denitrification and Phosphate Absorption in Agricultural Wastewater DRASTIC at 30: Ohio Born, Worldwide Applications, Still Going Strong Water Resources Management of Large River Basins in Changing Climate
6:00- ?	Attendee Networking Event - Salon B/C





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	Voices for Water Thursday, November 10, 2016			
8:00 - 8:30	Registration & Coffee - Foyer 1 & 2			
	Ballroom 1&2	Ballroom 3	Ballroom 4	Salon B/C
8:30 - 10:00	Ground Water	Agriculture	Storm Water	
8:30 - 9:00	Flowing Wells in Northwest Ohio (Curtis Coe, Ohio Department of Natural Resources)	Blanchard River Watershed Demonstration Farms Network (Aaron Heilers, Ohio Farm Bureau)	Residential Green Infrastructure (John Herchl, CDM)	
9:00 - 9:30	Arsenic in Groundwater of Licking County, Ohio: An Investigation That Combined Public Awareness and Scientific Investigation (Mary Ann Thomas, US Geological Survey)	Phosphorus Displacement by Herbicides: A New Source of Dissolved P for Lake Erie (Christopher Spiese, Ohio Northern University)	Stormwater Green Street Retrofits: Lessons Learned and Expected Outcomes in Ohio (Ryan Winston, The Ohio State University)	
9:30 - 10:00	Short-term influence of coal mine reclamation using coal combustion residues on groundwater quality (Cheng Chin-Min, The Ohio State University)	Reducing Nutrient Flows to Lake Erie in Ohio: An Inventory and Alternative Policy Approaches (John Hoornbeek, Kent State University)	Getting Back to Nature in Stormwater Management: The Benefits of Stormwater Wetlands (Mark Dilley, MAD Scientist Associates)	
10:00 - 10:30	Break - Foyer 1 & 2			
10:30 - 12:00	Minerals Resources Management	Nutrients	Green Infrastructure	Conservancy Districts Meeting
10:30 - 11:00	Potential for Remediation of Coal Mine-Derived Acid Mine Drainage by Soil-Associated Microorganisms (Shagun Sharma, University of Akron)	Monitoring water quality in the Mohican Watershed (Ozeas Costa, Jr., The Ohio State University)	Hydrocarbons in Bioretention, as Measured by Carbon Isotopes (Abigail Tamkin, The Ohio State University)	
11:00 - 11:30	Mine Drainage Impact Assessment of Ohio Watersheds (Chad Kinney, Ohio Department of Natural Resources)	Ohio Nutrient Reduction Strategy: Determining Critical Ground Water Impact Areas (Michael Slattery, Ohio EPA)	A Neighborhood-Scale Green Infrastructure Retrofit: Experimental Results, Model Simulations, and Resident Perspectives (Anne Jefferson, Kent State University)	
11:30 - 12:00	Appalachian Ohio Clean Watershed Initiative: Expanded Scope, Scale, and Geography (Marissa R. Lautzenheiser, Rural Action & Jennifer Bowman, Ohio University)	Nutrient Mass Balance for Selected Ohio Watersheds (Dale White, Ohio EPA and Josh Griffin, Ohio EPA)	Is Black the New Green? Exploring the Impact of Biochar Amendments on Water and Nutrient Retention in Vegetated Roofs (Ishi Buffam, University of Cincinnati)	
12:00 - 1:00	Lunch and WMAO Annual Meeting - Ballrooms 3 & 4			
1:00 - 1:30	WMAO Division Board Meetings			
1:30 - 3:00	Public Water Systems	Floodplain Management	Water Resources Management	State Agency Coordinating Group Meeting
1:30 - 2:00	Evaluating Risks in a Source Water Protection Area – Modernized Methodologies (Aaron Colson, City of Dayton)	Early Flood Warning System for the Community Safety against Flood Hazard Using High Resolution Datasets: A Case Study of Coastal Region of Lake County, Ohio (Suresh Sharma, Youngstown State University)	Impact Assessment of Water Resource Use (Eric Mbonimpa, Air Force Institute of Technology)	
2:00 - 2:30	Establishing a Source Water and Reservoir Monitoring Program (Jeff Kauffman, Del-Co Water Company, Inc.)	Ohio Silver Jackets (Ashley Stevens, US ACOE)	Ohio EPA – A Guide to Online NPDES Permit Applications (Jamie Roberts, Ohio EPA)	
2:30 - 3:00	Asset Management for Public Water Systems (Susan Schell, Ohio EPA)		The Changing Value of Water and the Role of Water Technology Collaboration in Accelerating Water-Tech Development and Adoption (Bryan Stubbs, Cleveland Water Alliance)	
3:00 - 3:15	Break - Pavilion			
3:15 - 4:45	Water Film Festival and Ice Cream Social - Pavilion			



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WMAO Member	[] \$240	[] \$140 [] Wednesday
Nonmember**	[] \$280	[] \$155 [] Thursday
Student	[] \$50	[] \$35
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[] Check here if you will only be presenting and will not be attending any other sessions or conference activities including meals (no registration fee).

** [] Check here if you would like \$40 of this registration fee applied towards a discounted 2016 WMAO membership (one time offer per member).

*** Must be retired from water profession and 65 years of age with 5 years of membership in WMAO (subject to verification).

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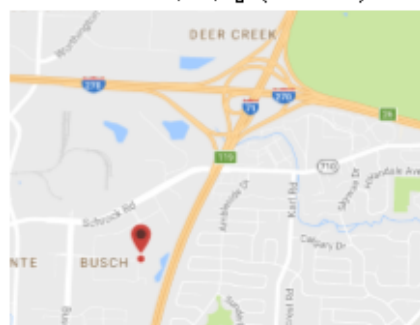
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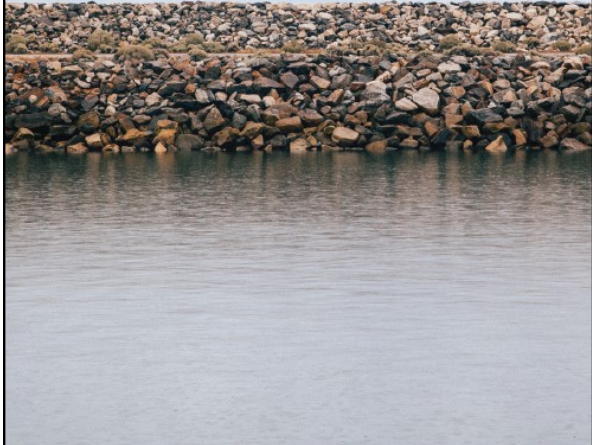
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VISION: The Water Management Association of Ohio will be the most effective and respected independent water resources organization in Ohio.

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

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