WMAO
Water Management Association of Ohio

46th Annual WMAO Conference

Partnerships at the Confluence of Challenge and Opportunity

November 1 - 2, 2017

Crowne Plaza North, Worthington/Columbus, Ohio

Conference Proceedings

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Wednesday November 1, 2017

Keynote Address

Title: Partnering for Wetland Conservation
Author: Josh Knights, The Nature Conservancy.
Biography: Josh Knights leads a team of experts dedicated to conserving Ohio's landscapes for people and nature. Under his direction, The Nature Conservancy led the ballot campaign to renew the $400 million Clean Ohio Fund, secured the final financing needed for the state's acquisition of the 16,000-acre Vinton Furnace State Forest, and launched the first statewide mitigation program to protect streams and wetlands. Josh was appointed by the President of the Ohio Senate to serve on the Great Lakes Compact Advisory Board and by the Governor to serve on the Ohio Recreation and Resources Commission. In 2013, he received the Green Leader award from the Mid-Ohio Regional Planning Council for his team's work with the General Assembly to secure $100 million for the Clean Ohio Fund. Since 2014, he has served on the board of the Ohio Travel Association. Prior to returning to his home state, Josh headed corporate partnerships at the Conservancy's headquarters in Arlington, Virginia. He previously worked on international trade policy in Washington, D.C., at the U.S. Chamber of Commerce and the law firm of White & Case. Josh lives with his wife Lara and their two children in Columbus, Ohio.

Session 1 (10:15)

Concurrent 1 (10:15) – Groundwater

Title: Evaluating Risks in a Source Water Protection Area - Part II: Refining the Priority Setting Approach and Incorporating Risk Mapping
Author: Aaron Colson, City of Dayton Department of Water
Biography: Aaron Colson is the Environmental Risk Assessor for the Source Water Protection Program for the City of Dayton, Department of Water, Division of Environmental Management. Aaron started with the City of Dayton Department of Water as an Environmental Scientist in 2011. Previously, Aaron was an Advanced Level Environmental Compliance Specialist with the State of Georgia Department of Natural Resources. Aaron also held the positon as the Director of Environmental Services for the St. Croix Chippewa Tribe of Wisconsin. Aaron has a M.S. in Applied Plant Science, M.S. in Environmental Science and Policy, and a B.S. in Political Science and Environmental Studies.
Abstract: Primarily from two expansive urban well fields, the City of Dayton provides drinking water for approximately 400,000 customers daily. Adjacent to and co-mingled with groundwater production wells completed in the Great Miami River Buried Valley Aquifer are a variety of land uses with potential impact to source water quality. In 2015, the City expanded their drinking water protection strategy to better characterize and prioritize risks in a redefined 1-year time of travel area. Risk characterization and prioritization was extended to include the 5-year time of travel portion of the source water protection area.
The City is completing the initial ranking of risks to source water within the well field's 1-year time of travel areas using unique algorithms based upon the USEPA's Priority Setting Approach (PSA). The PSA developed specific to Dayton is achieved by detailed evaluation and incorporation of local hydrogeologic and land use data. This presentation provides an overview of data inputs that are required, sources of those inputs, and how the data is handled to rank various risks to the well fields using modernized methodologies. The application of GIS risk mapping using Infomaster software to update, present and archive results of the Dayton PSA activities is discussed. The tools available in Infomaster assesses the likelihood of contaminant release, and the severity of the release to production wells using data and algorithms imported from the PSA.

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Title: Private Well Education Expanded Through Partnerships
Author: Cindy Brookes, WSOS CAC, Inc/Great Lakes RCAP
Biography: Cindy Brookes is a Senior Rural Development Specialist for the Ohio Rural Community Assistance Program (RCAP). Her responsibilities include conducting the US EPA Private Well Grant program in Ohio, Indiana, Illinois, Michigan, and Wisconsin; administration of the Water Pollution Control Loan Fund for the Health

Departments in Crawford, Erie, Sandusky, Seneca and Wyandot counties. Also as a Rural Development Specialist she assists municipal and public water and wastewater systems with technical, managerial and financial assistance. Cindy has 25 years of experience working with the Sandusky River Watershed Coalition, Indian Lake Watershed and in family business focused on environmental remediation.

Abstract: The RCAP Private Well Assessment and Education Grant in partnership with University of Illinois Water Resource Center, National Groundwater Association, the Water Resource Council and National Environmental Health Association are focused on educating Homeowners using Private Wells as their drinking water source to better understand the basics of groundwater, well operation and source water protection. Through added partnerships the word of individualized and group education is offered to Private Well owners with hopes of improved source water protection for all that share our valued aquifers. Private Well Assessments, Homeowner Private Well Workshops and Sanitarian/Water Professional Trainings are offered through this grant along with webinars, podcasts, and on-line trainings from the Private Well Class.

The Private Well Assessments have led to a number of partnerships throughout the Great Lakes RCAP region with many different approached used to reaching homeowners with Private Drinking Water Wells. One such partnership in Indiana develops the Private Well Assessment further by devising a personalized testing program based on the section of the county in which the well is situated and based on identified sources of contamination.

Overall, this program has assisted nearly 200 residents better understand the well they operate since many were never raised or familiar with operating a well prior to owning their current well.

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Title: Investigating long-term biogeochemical dynamics in three, geochemicallystable Ohio aquifers

Author: Robert Danczak, The Ohio State University

Biography: Robert Danczak is a 5th year graduate student working toward his Ph.D. in the Department of Microbiology at The Ohio State University in the lab of Dr. Michael Wilkins. His primary field of research is investigating the relationship between microbial ecology and biogeochemistry in subsurface environments. He has examined geochemical fluctuations and microbial community dynamics during a snowmelt-driven hydrological perturbation in a shallow, alluvial aquifer and adjacent hyporheic zone located along the Colorado River. Recently, however, he has focused on studying the microbial contributions to arsenic mobilization throughout southern Ohio.

Abstract: Geochemical and microbial community dynamics are intimately linked, but the extent and ramifications of these linkages in groundwater systems are not fully understood. To better understand how microbially catalyzed reactions might drive geochemical processes in Ohio groundwater systems, we collected groundwater samples over the course of two years from Ohio Department of Natural Resources monitoring wells located in three counties throughout southern Ohio (Athens, Greene, Licking). Each well displayed a unique geochemical profile; for example, the well in Greene County exhibited high oxidation-reduction potential (ORP), while the Athens location was delineated by high iron and sulfate concentrations, and Licking by higher arsenic concentrations. Furthermore, the geochemistry in each location was significantly stable through time with few perturbations recorded over the course of two years. To investigate microbial community structure and how it relates to the geochemistry, we tracked a marker conserved through all bacteria, the 16S rRNA gene, in each well through time. These data revealed stable microbial community structures at each location, in a similar pattern to that observed for the complementary geochemical measurements. Expanding upon this relationship, we also determined that the microbial communities were as different from each other as observed in the geochemistry. Given that these contrasting communities suggested possible differences in functional potential between the wells, shotgun metagenomic sequencing was used to sequence the genomes of every organism within a given sample. Despite significantly distinct community structures and geochemical conditions between wells, the functional potential – particularly with regard to iron, arsenic, and sulfate reduction – was similar between locations. These results suggest the enzymatic potential for mobilization of iron, arsenic, and a range of other metals are present across diverse aquifer systems in southern Ohio. This potential is likely realized when subsurface geochemical conditions change (i.e. local hydrological shifts) and stimulate the activity of these microorganisms.

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Concurrent 2 (10:15) – Ohio Lake Management Society (OLMS)

Title: Opportunities for Improved Nutrient Management in Watershed Planning

Author: Jordan Rofkar, Hull & Associates, Inc.

Biography: Jordan has planned, coordinated, and led multiple restoration projects in northwest Ohio. He has experience working with local, state, and federal stakeholders in the Lake Erie basin and Maumee River watershed. Jordan serves as an author and peer reviewer.

Abstract: A Hull & Associates, Inc. team worked under contract with the International Joint Commission in 2016 to identify critical components of effective watershed management plans to manage nutrient pollution in Lake Erie. This team, in conjunction with the IJC Water Quality Board - Legacy Issues Work Group, inventoried 48 plans from inside and 32 plans from outside of the Lake Erie basin. In-depth evaluations of plans were completed for 20 and 12 plans, respectively. Among several findings, this analysis showed that there is not a consistent approach for developing watershed management plans within the Lake Erie subbasins and linking plans to downstream impacts. Details of the analysis, observations and recommendations will be shared to help improve watershed planning, implementation and measurements that will result in reduced nutrient loading. Speakers will discuss the value of having common components and consistency among plans to allow for targeted implementation efforts, progress evaluation, and adaptive management.

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Title: Ecoregional characteristics affecting the probability of dominance of Planktothrix spp. in the phytoplankton of Ohio lakes and reservoirs

Author: John Beaver, BSA Environmental Services, Inc.

Biography: John Beaver, Ph.D., a noted aquatic ecologist specializing in North American lake water quality.

Abstract: 69 Ohio inland lakes and reservoirs distributed between four USEPA level-III ecoregions were sampled for phytoplankton and water quality parameters during summer months (July-October) between 2010 and 2016. Canonical correlation analysis (CCA) revealed a strong association between high biomass of the toxin-producing cyanobacteria Planktothrix spp. and low light availability (high total suspended solids). Amongst the 69 lakes and reservoirs sampled for this analysis, two systems (Buckeye Lake and Grand Lake Saint Mary's) showed consistently high Planktothrix spp. biomass that was several orders of magnitude higher than other reservoirs, including nearby reservoirs within the same county. Geographic analysis of nutrient levels (total phosphorus and total nitrogen), total suspended solids and potential for ongoing turbulent mixing of the water column (surface area:depth ratio) showed that lakes and reservoirs in the Eastern Corn Belt Plains ecoregion appear to be at a greater risk of developing recurring blooms of Planktothrix spp. than other ecoregions, particularly those in the eastern part of the state. We will discuss historical factors that may have contributed to the dominance of Planktothrix spp. in select Ohio reservoirs, and compare our findings with environmental conditions in other Ohio reservoirs that are at risk for developing long-term dominance of Planktothrix spp. and other potentially toxic cyanobacteria species within the phytoplankton community. Planktothrix-dominated inland lakes and reservoirs will also be compared to western Lake Erie in the context of environmental conditions impacting water quality.

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Title: Identifying land management strategies for phosphorus reduction through modeling of historical water quality trends

Author: Anna Apostel, The Ohio State University (presented by Haley Kujawa)

Biography: **Anna Apostel** is a PhD student at the Ohio State University in the Food, Agricultural and Biological Engineering Department. She received her B.S. degree in Biology from Denison University and M.S. in Civil and Environmental Engineering from the Ohio State.

Haley Kujawa is a masters student in the Environmental Science Graduate Program at the Ohio State University. She received her B.S. in Biological Systems Engineering at Virginia Tech. Her masters research is under Dr. Margaret Kalcic in the Food, Agricultural, and Biological Engineering department.

Abstract: The return of algal blooms to the Western Basin of Lake Erie has refocused efforts to manage phosphorus loading to the lake, primarily from agricultural sources. Achieving new load reduction targets will require collaboration between stakeholders and scientists to identify and test the most significant and feasible agricultural management strategies. The science points to dissolved reactive phosphorus (DRP) as the primary culprit responsible for the recurrence and severity of these blooms; DRP loads have increased in past decades, providing a greater portion of bioavailable phosphorus to Lake Erie in the critical spring and summer months. While there has been a clear increase in the loading of DRP we are less certain of which land management factors were responsible for this trend. We use a refined a SWAT model of the Maumee River watershed combined with improved land management assumptions from extensive local stakeholder interaction to better understand how former management trends have influenced phosphorus loading trends in the region. Better understanding the connection between land management and phosphorus loading will permit more robust assessment of future implementation scenarios.

Concurrent 3 (10:15) – Ohio Dam Safety Organization (ODSO)

Title: Dam Breach Modeling - 2D or not 2D
Author: Matthew Gramza, Civil & Environmental Consultants, Inc
Biography: Matt Gramza is a Water Resources Engineer and Certified Floodplain Manager with more than 20 years of experience. He currently serves Civil & Environmental Consultants, Inc. as a Senior Project Manager. His project experience includes advanced stormwater management, floodplain management, riverine hydrologic and hydraulic analysis, stream restoration analysis and design, dam safety including dam breach analysis, and design engineering in the public and private sectors.
Abstract: This presentation will discuss the applicability of two-dimensional (2D) hydraulic modeling verses traditional one-dimensional modeling in the analysis of a dam breach and the associated inundation routing. It will highlight a couple of complex high hazard 2D dam breach simulation projects including an existing large upground reservoir with a nearly 6-mile long perimeter dam located along a major river floodplain and a proposed deep impoundment with both valley and perimeter dam characteristics. The project highlights will include watershed, reservoir and dam, and inundation zone characteristics, dam breach location selection and input parameters discussion, dam breach results and associated inundation mapping. Both high hazard projects required detailed dam breach analysis including extensive sensitivity model runs. Flood routing of the resulting critical Probable Maximum Flood (PMF) and sunny day breach scenarios for each breach location was calculated through the inundation zone utilizing un-steady flow 2D models. Detailed inundation mapping was created including critical structures labeled for flood and peak flood arrival time and maximum inundation depths. The dam breach results and inundation mapping were used to develop Emergency Action Plans in accordance with FEMA 64 Federal Guidelines for Dam Safety Emergency Action Planning for Dams. The project highlights will include conceptual dam breach simulation videos to show the breach migration and resulting flood inundation.

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Title: Bolivar Dam Major Rehabilitation Project
Author: Jeff Maynard, U.S. Army Corps of Engineers
Biography: Jeff is a 2002 graduate of West Virginia University Institute of Technology with a B.S. in Civil Engineering and is a licensed professional engineer in the state of West Virginia. He is a structural engineer with the U.S. Army Corps of Engineers Dam Safety Production Center and Dam Safety Modification Mandatory Center of Expertise. He has been with the Corps for 21 years where he has worked on many large civil works projects throughout the Huntington District and across the country. He is currently the Lead Project Engineer on the recently completed Bolivar Dam Major Rehabilitation Project in Bolivar, OH and the Dover Dam Dam Safety Assurance Project in Dover, OH. Jeff lives in Huntington, WV with his beautiful wife and 11 year old daughter who happens to have her eyes set on being an engineer like her daddy.

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Title: Dam Safety Emergency Action Plans(EAP) & Inundation Mapping
Author: Melissa Menerey, Ohio Department of Natural Resources
Biography: Melissa Menerey currently works with the ODNR, Division of Water Resources, Dam Safety Program where she reviews Emergency Action Plans (EAPs) for compliance with Ohio dam safety standards. She also coordinates outreach activities for dam owners, local officials, and county emergency management officials. She possesses a Master's Degree in Geography from Ohio University and is a Certified Floodplain Manager as recognized by the Association of State Floodplain Managers.
Abstract: All dams regulated by the Division of Water Resources are required to have a state approved Emergency Action Plan (EAP). Developing an EAP is the responsibility of the dam owner, however many partners including the County Emergency Management Agency, ODNR Dam Safety, and the National Weather Service all play key roles during a dam incident. This presentation gives a brief background on dam safety in Ohio and highlights key components for developing an EAP following guidelines from the Interagency Committee on Dam Safety (ICODS).

Session 2 (1:15)

Concurrent 1 (1:15) – Environmental Policy

Title: Proposed Changes to the Construction General Permits for Ohio
Author: Justin Reinhart, PE, Ohio Environmental Protection Agency

Biography: Justin Reinhart received his degree in Civil Engineering from the Ohio State University and is an Ohio Registered Professional Engineer. He has 20 years of experience engineering conservation practices from time with the Ohio Department of Natural Resources, Divisions of Engineering, Water, and Soil & Water Conservation and Ohio Department of Agriculture. He currently works with the Storm Water Technical Assistance program at Ohio EPA's Division of Surface Water.

Abstract: Ohio's current Construction General Permit expires in April of 2018. This permit covers stormwater discharged during construction and influences the design of stormwater controls that remain after construction as well. This session will cover the proposed changes to this permit, which are primarily in the area of post-construction stormwater controls. These changes are being proposed after a review of Ohio's precipitation records and approaches used by other states and after consideration of requirements aimed at maintaining the quality of Ohio's streams. Topics discussed will include changes to: Water Quality Volume calculation, the list of acceptable practices; crediting of green infrastructure practices and corollary changes to the Rainwater and Land Development standards and specifications.

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Title: Ecological Sanitation: Charting a Policy Pathway Forward - A Review of Land Application of Septage in Ohio

Author: Ben Howard, John Glenn College of Public Affairs

Biography: Ben Howard started in water resource management by serving in AmeriCorps in Barnstable County, Massachusetts. In Massachusetts he assisted with stormwater management and learned about wastewater's impact on drinking water sources and aquatic eco-systems. This led him to begin investigating ecological sanitation through networking and collaborating with the Rich Earth Institute in Vermont, the US leader in research and advocacy for use of human urine for its fertilizer value, and the Cape Cod Eco Toilet Center that showcases alternative toilet designs. After finishing AmeriCorps, he completed Compost Operator Training through the US Composting Council in August 2016 to gain a foundation in practical commercial composting operations, especially regarding bio-solids. While completing his research he studied conventional on-site sanitation through the Food, Agricultural, and Biological Engineering Department at OSU. He is excited to share his research that investigated the practice of land application of septage as a regulatory regime through which to return nutrients in human waste to soil, especially urine.

Abstract: Scholars and practitioners are increasingly exploring alternatives to current forms of sanitation services that are safe, cost-effective, water conserving, and nutrient capturing. Broadly speaking, these alternatives are considered ecological sanitation. This research project focuses on the regulatory hurdle to the core problem of how to get the nutrients in human waste back into the soil, rather than into our waterways. This study examines what factors affect the practice of land application of septage within the State of Ohio. Domestic septage, as defined by U.S. 40 Code of Federal Regulations Part 503, is the sludge, scum and liquid pumped most commonly from septic tanks, but also from cesspools, portable toilets and marine toilets (Center for Environmental Research Information (U.S.), 1995). This study employs a mixed methods approach, performing a logistic regression analysis of key variables characterizing the geography of Ohio's 88 counties, complemented by anecdotal commentary from key stakeholders collected via semi-structured interviews. Upon analysis, statistically significant results suggest that counties with many farms and lack of a convenient wastewater treatment plant for septage management are more likely to practice land application of septage. Another factor, though not at the statistically significant level, is the number of neighboring counties that allow land application of septage. These findings help identify favorable contexts in which to consider early adoption of ecological sanitation strategies. In addition, interviewed stakeholders identified compliance and educating the public as keys to successful land application of septage. Indeed, the efficacy of these compliance and education efforts could prove decisive in the uncertain regulatory future for land application of septage. This study discusses potential policy pathways forward for the expansion of ecological sanitation, highlighting the domestic septage regulatory regime as currently the most amenable framework for returning nutrients in human waste to the soil in the near term.

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Title: Important Changes to The TMDL Process – A Platform for Partnership

Author: Melinda Harris, Ohio EPA

Biography: Melinda Harris has more than 16 years of experience within the Division of Surface Water at Ohio EPA. Melinda is the supervisor of the Division's Total Maximum Daily Load (TMDL) Program, overseeing

development of TMDLs and compilation of the biennial Integrated Water Quality Monitoring and Assessment Report. Prior to this position, Melinda served as the Division's Rules Coordinator for more than 10 years. Melinda has a Bachelor of Science in Civil and Environmental Engineering and a Master of Science in Environmental Engineering Management from the University of Cincinnati.

Abstract: In 2001 Ohio EPA began implementing its TMDL process as mandated by the Clean Water Act. On March 24, 2015, the Supreme Court of Ohio determined that "A TMDL established by Ohio EPA pursuant to the Clean Water Act is a rule that is subject to the requirements of R.C. Chapter 119." On June 30, 2017, the Ohio State Legislature passed legislation clarifying that a TMDL is not a rule, and establishing important new opportunities for public participation and input in the process. Changes to the process, and the implications for future partnerships are described.

Concurrent 2 (1:15) – Ohio Lake Management Society (OLMS)

Title: Informing Drinking Water Intake and Treatment Managers by Observing Diel Vertical Distribution and Migration of HABs

Author: Eva Kramer, University of Toledo Lake Erie Center

Biography: I am a Master's student at the University of Toledo studying harmful algal blooms in Lake Erie. I have a B.S. in engineering from the University of Michigan and have previously worked on multiple research projects related to Great Lakes ecology.

Abstract: The increasing severity of Harmful Algal Blooms (HABs) in the Western Basin of Lake Erie necessitates investigation into new methods for protecting vital drinking water sources. The dominant HAB species in Western Lake Erie, Microcystis aeruginosa, has been shown to change its position in the water column according to time of day and wind mixing. The city of Toledo drinking water intake is located at mid-depth in the lake, therefore it may be possible to reduce intake exposure to Microcystis by increasing pumping rates when Microcystis is concentrated either at the lake surface or at the bottom. This would lower the concentrations of algal toxins that enter the water plant, protecting important drinking water resources and reducing treatment costs. 24-hour sampling events were conducted near the city of Toledo's drinking water intake in August of 2016 and 2017 to observe the vertical distribution and movement of HABs and other algal species. The results of these studies are presented and implications for drinking water management are discussed.

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Title: Harmful Algal Bloom Monitoring of Inland Lakes Using Satellite Imagery

Author: Ruth Briland, Ohio EPA

Biography: Ruth Briland is an environmental specialist in the new Harmful Algal Bloom (HAB) section within the Division of Drinking and Ground Waters at Ohio Environmental Protection Agency (DDAGW-OEPA) in Columbus, Ohio. She is a doctoral candidate at The Ohio State University, and her dissertation research examines how plankton and fish communities in Lake Erie respond to eutrophication and harmful algal blooms. She joined OEPA in August of 2016 and provides technical assistance for sampling, reservoir management, and recreational concerns to HABs.

Abstract: Harmful Algal Blooms in inland, freshwater systems are often caused by Cyanobacteria, which produce a unique pigment, phycocyanin. This pigment can be used to assess the concentration of Cyanobacteria through analytical methods and remotely with data sensors. When the sensors are mounted on satellites, they can provide an aerial picture of the Cyanobacteria concentration around the lake. This presentation will cover the basic principles of using remote sensing data for monitoring for Harmful Algal Blooms, address the benefits and limitations, and provide case study examples using a new data product provided by federal partner agencies, NOAA and NASA.

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Title: OH BUOY! (Fluoro)probing cHABS in western Lake Erie and the Maumee River using in-situ and in-vivo technology

Author: Douglas Kane, Defiance College

Biography: Doug Kane is a Professor of Biology in the Division of Natural Sciences, Applied Sciences, and Mathematics at Defiance College.

Abstract: The objectives of this project were to 1) to determine how accurate data buoys are at monitoring for cyanobacterial Harmful Algal Blooms cHABs (cHABs) and 2) use the Fluoroprobe to determine phytoplankton

group biomass in a variety of lake and river sites. Surface water samples (0-2 meter) were collected next to a data buoy located near Gibraltar Island throughout summers of 2015, 2016, and 2017 and analyzed for total chlorophyll and with a FluoroProbe to determine cHAB-specific chlorophyll. Additionally, on a subset of dates water was collected at every meter throughout the water column to determine vertical position of cHABs at several buoys in western Lake Erie. In addition, during 2017 4 sites on the lower Maumee River were monitored for Fluoroprobe-derived phytoplankton biomass and to determine if cHABS were present. Finally, microcystin assays were conducted to determine if these riverine cHABs were indeed toxic.

Concurrent 3 (1:15) – Water Level Changes

Title: How to Read, Interpret, & Use USGS Gage Data
Author: Kimberly Shaffer, USGS Ohio-Kentucky-Indiana Water Science Center
Biography: Kimberly is a Hydrologist with the U.S. Geological Survey and has a B.S. in Civil Engineering from the Ohio State University.
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Title: Measuring methane production and emissions in a peat bog in Ohio with fluctuating water level: comparison of disturbed vs. undisturbed areas.
Author: Camilo Rey-Sanchez, The Ohio State University
Biography: Camilo is a Ph.D. candidate in the Environmental Science Graduate Program (ESGP) and a masters student of Civil Engineering at the Ohio State University. He is a forest engineer from Colombia interested in studying gas exchange between the atmosphere and the biosphere. In particular, Camilo studies methane fluxes from wetlands. Before coming to OSU, Camilo worked in different projects in the tropical forest at the Smithsonian Tropical Research Institute (STRI) in Panamá. He also worked in the Andean Forest of Colombia at the University of El Rosario in Bogotá.
Abstract: Peatlands store large amounts of carbon but they also emit methane (CH4), a powerful greenhouse gas. Understanding the fluxes of CH4 in peatlands is important to predicting the greenhouse gas budget of the planet. Of particular interest are peatlands in the state of Ohio because the state is located in the southern edge of northern peatland distribution where only 2% of the original peatland area remains. The objective of this study was to determine changes in CH4 production and transport in disturbed vs. undisturbed peatlands in Ohio. To achieve this, we studied Flat Iron Bog, near Akron, Ohio, a reserve owned by the Nature Conservancy that has an undisturbed natural bog and a bog that has been disturbed due to draining and other human activity. We used pore-water sediment samplers "peepers" to monitor CH4 concentration at different depths in the soil and used non-steady state chambers to measure CH4 emissions at different sites within the disturbed and undisturbed areas in the bog. This information was used to create representations of zones of production and consumption of methane within the peat profile. We also monitored at multiple positions in the bog air and soil temperatures, relative humidity and water level depth using dip wells. We found high temporal variation in the fluxes of methane and associated CO2 net ecosystem exchange. The study addresses the difference on CH4 emissions between disturbed and undisturbed sites with a particular focus on the effect of changes in water level. The information from this study can be used to understand how disturbance can affect the natural dynamics of the carbon cycle and inform models of methane production that incorporate the effects of peatland disturbance on methane emissions.

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Title: Challenge and Opportunity: The Buckeye Lake Dam Rehabilitation Project
Author: Kevin Holtsberry, Ohio Department of Natural Resources
Biography: Kevin Holtsberry serves as a policy advisor to Director Jim Zehringer at the Ohio Department of Natural Resources with an emphasis on dam safety and emergency response. He has a Master's degree from Bowling Green State University and over a decade of experience in state government.
Abstract: In March 2015, the US Army Corp of Engineers released a report documenting that the nearly 200-year-old Buckeye Lake Dam was in danger of catastrophic failure, most probably without sufficient warning or evacuation time, putting 3,000 downstream residents at risk. The Ohio Department of Natural Resources (ODNR) faced tough choices: breaching the dam and draining the reservoir, thus removing an important recreational and economic attraction from the region, or a potentially controversial public infrastructure project estimated to cost $150 million and take five years, were among the options. Public safety concerns required action but a lack of

community consensus on solutions, and decades of often heated debate, plus a challenging budget environment, meant quick action would be difficult. The challenge also meant an opportunity: to bring safety, clarity and certainty to this unique landmark and not only protect at-risk residents, but position the Buckeye Lake region for growth in the years to come.
Under the leadership of Governor John Kasich and ODNR Executive Director James Zehringer, and with support from the Ohio General Assembly, the decision was made to replace the failing dam structure. ODNR's Division of Engineering rose to the challenge. Utilizing the Construction Manager at Risk (CMR) process, ODNR oversaw the emergency construction of a stability berm along the entire 4.1-mile dam. Using state of the art soil-mixing technology, a 43-foot deep seepage cut-off wall was then constructed under the berm. This work, Phase I, was completed just 15 months after the release of the Corp Report. With the cost now estimated at $110 million, the project was under budget and nearly a year ahead of schedule. This speed and effectiveness allowed ODNR to raise the water level two feet above winter pool in the Summer of 2016 and made a 2017 recreational boating season possible. Phase II is now under way, and on track for a completion date in late 2018, and the residents of Buckeye Lake are significantly safer today than they were in March of 2015.

Session 3 (3:15)

Concurrent 1 (3:15) – Mineral Resource Management

Title: 20 Years of Partnerships & Results: the Huff Run Recovery Part A
Author: Marissa Lautzenheiser, Rural Action
Biography: Ms. Lautzenheiser works with Rural Action as the Middle Tuscarawas River Watershed Coordinator. She coordinates watershed management projects throughout eastern Ohio and works with many local, state, and federal funding partners.
Abstract: The Huff Run Watershed was historically surface and underground mined for coal before regulations. The Huff Run Watershed Restoration Partnership was established in 1996 to assist in the reclamation of pre-law Abandoned Mine Land and accompanying Acid Mine Drainage. Celebrating over 20 years of efforts, the watershed group, with State and Federal Agency cooperation, has completed 20 remediation projects valued at over $6,000,000.

The restoration of Huff Run has been successful in improving chemical and biological water quality. Since AMD treatment was initiated, near neutral pH has been maintained in the Huff Run main stem. Pre-treatment metal pollution has decreased by 54% and watershed-wide fish species have jumped from 11 to 36. This success is in line with a holistic watershed approach - assessing existing conditions, ranking priority projects, and then successfully leveraging dollars with community support to systematically complete each of the projects. The work was done in line with sustainable development models, involving local leaders, residents, and community members to influence the process. Regular meetings of the community watershed group still happen, over 20 years after they began.

In recent years, attention has shifted to addressing non-AMD projects to finalize the restoration of Huff Run. Mitigation-required stream restoration in the lower 2 miles has relocated the Huff Run channel to adjacent floodplain area. This removed flow from legacy precipitate-encrusted substrates that have limited macroinvertebrate life and therefore fish recovery, further increasing watershed recovery potential. One of the two townships Huff Run flows through has adopted stream setback regulations, one of only two townships in the entire county to do so. The only incorporated village in the watershed recently implemented stormwater management projects such as rain barrels at public buildings and storm drain stenciling. Huff Run is a shining example of long-term commitment and ingenuity resulting in increased water quality.

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Title: Appalachian Ohio Clean Watershed Initiative (AOCWI) ArcGIS Online Watershed Planning Tool: Using Data to Foster Partnerships to Improve Water Quality across Ohio's Coal Bearing Region
Author: Jen Bowman, Ohio University's Voinovich School
Biography: Jen Bowman is the Director of Environmental Programs at Ohio University's Voinovich School. Jen holds a bachelor's degree in Environmental Geology and a master's degree in Environmental Geochemistry, both from Ohio University.

Abstract: Data from the ODNR, OEPA, DNAP, Total Maximum Daily Load (TMDL) Reports, and aerial imagery were used to create map layers. These layers show various watershed impairments at a Hydrologic Unit Code (HUC-12) scale, specific points of impairment, and areas of exceptional water quality within the service area. While this information is publicly available, much of the data needed to be digitized from paper reports and synthesized into GIS point feature layers. This platform brings each of these layers together for a clear overview of the sources of impairment and areas in need of preservation. Our goal is to improve water quality in Appalachia Ohio, by sharing this tool with organizations within the AOCWI service area, landowners, agencies, and water professionals will have access to water quality data to make informed management decisions.

Concurrent 2 (3:15) – Ohio Lake Management Society

Title: The study of Tappan Lake's Water Quality Monitoring influence in its community, through the collaboration of the Government, the Academia and the Private Sector
Author: Fernanda Craig, Muskingum Watershed Conservancy District
Biography: Environmental Scientist (Aquatic Ecology Specialist) and Water Quality Coordinator at the Muskingum Watershed Conservancy District.
Abstract: Water quality monitoring can involve analysis of physical, chemical and biological changes, due to anthropic activities, and natural phenomena. The purpose of each monitoring study can greatly vary; while one researcher might be interested in investigating the impact of a project in a body of water, another might be interested in developing new technology to improve the water quality. Data collected from one study can serve the needs of multiple stakeholders, across various organizations. Aiming to maximize the impact of the water conservation effort in our watershed, the Muskingum Watershed Conservancy District has developed partnerships, over decades, with the government, the academia and the private sector. Tappan Lake was taken as a case study to analyze the extent of the influence of its monitoring. Considering the dimensions of the Muskingum Watershed, and the characteristics of its water bodies, extensive limnological studies are often complex to plan and execute, making the participations of different organizations of fundamental importance. The involvement of local partners, specifically, has shown to be of significant impact, as they can more easily identify and characterize environmental issues, and propose mitigation plans, since their contribution directly affects their communities. A holistic approach to our collaborative monitoring, including regulatory and non-regulatory agencies, has shown to be effective on the decision-making processes. Each individual perceives, reacts and responds differently to actions on the environment in which they live. The responses or manifestations resulting from these perceptions (individual and collective), depends on their cognitive processes, judgments and expectations. In the study of ecology, we cannot ignore the complexity of human's interactions with one another, and with the environment. We must invest in the continuity of the learning process focused on the benefits of nurturing the relationship between the private sector, government and civil society, with the objective of improving sustainability efforts.

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Title: Using smart monitoring to meet the challenges of wastewater operators
Author: Ashley Dirou, Ayyeka
Biography: Ashley Dirou is Ayyeka's Regional Sales Manager (RSM) for the US Southeast and Midwest and is a Water and Wastewater professional with 10 years' experience. At the start of her career she spent three years selling Multitrode's advanced pump station technology to municipal operators across Florida, Ashley then went on to become an Account Manager at Barney's Pumps before assuming the position of Sales Manager at Star Controls Inc., an Ayyeka sales partner based in Coral Springs Florida. She enjoys focusing on remote data acquisition and management solutions within the environmental sector.
Ashley is a graduate from the University of Kentucky and now lives with her family in Boynton Beach, Florida.
Abstract: Remote monitoring technologies are ideal platforms to help wastewater operators address the challenges they face when managing this important human resource.

At Voices for Water, the 45th Annual Meeting and Symposium of the Water Management Association of Ohio (WMAO), Ayyeka proposes to discuss, as a case study for oral presentation, how it helped the Metropolitan Sewer District of Greater Cincinnati (MSDGC) optimize its extensive wastewater network that serves the needs of over 800,000 residents and businesses in the city.

The Industrial Internet of Things (IIoT)-based solution that Ayyeka installed for MSDGC assisted the municipality to prevent costly and contaminating combined sewer overflow (CSO) events which, in its case, would require the dispatch of vacuum trucks and specialized and costly antiseptic materials to clean up. The environmental and ecological impacts of CSO events have been widely studied and include both environmental pollution as well as damage to the health and diversity of fauna and ecosystems downstream of the overflow point.

Wastewater operators of all sizes can utilize remote monitoring to gain real-time oversight of critical network parameters such as water level as well as the concentration of corrosive and potentially lethal gases within the system such as hydrogen sulfide. In addition, they can monitor the operation of important system infrastructure such as pumps and receive immediate notifications in the event of impending system errors allowing remedial action to be taken before breakdowns occur.

Real-time monitoring through widely dispersed internet of things (IoT) based smart monitoring networks confer substantial benefits over traditional telemetric solutions and can greatly improve the abilities of wastewater operators to manage their resources to maximum effectiveness.

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Title: Alternatives to open-Lake disposal of dredged sediment
Author: David Emerman, Ohio Lake Erie Commission
Biography: David is responsible for the oversight and management of Ohio's dredged material program, in which he coordinates State efforts to promote and pursue the beneficial resuse of dredged sediment.
Abstract: Ohio's ban on open-Lake disposal of dredged sediment goes into effect July 1, 2020. Currently, seven of Ohio's Federal harbors utilize open-Lake as a disposal method of dredge sediment (totaling over 1.2 million cubic yards of material). Ohio is actively working with stakeholders to develop alternative disposal methods for that sediment. The proposed presentation would give a brief overview of where Ohio is at in the development of these alternatives and what is on the horizon.
The presentation will focus on two general categories of alternatives: wetlands creation projects and soil blending operation. Regarding wetlands projects, the presentation will touch on siting, design concepts, and environmental benefits. Regarding soil blending operations, the presentation will touch on current and developing regulations, logistical requirements, and product marketability.

Concurrent 3 (3:15) – Lake Erie Area Research Network

Title: Benefits and Opportunities of LEARN: The Lake Erie Area Research Network
Author: Emily Burbacher, Ohio Sea Grant
Biography: Emily has a background in aquatic ecology, having studied at The University of Toledo's Lake Erie Center, as well as at The Ohio State University's Aquatic Ecology Laboratory. Emily now is the LEARN and Curriculum Coordinator for Ohio Sea Grant.
Abstract: Communities, environmentalists, governments, academics, and corporations are increasingly recognizing that the availability of water as a clean and abundant resource could introduce conflicts over its use and misuse. Because of this, the connection between water, people, energy, agriculture, and climate is an important one. Unfortunately, because stressors such as climate change, land use, and population shifts operate on a large scale, the solution sets must also be grand. Therefore, our long-term goal is to better manage and sustain Lake Erie in light of human-driven stressors through the creation the Lake Erie Area Research Network or LEARN, a consortium of researchers and field stations. For LEARN to be successful it will require (1) the involvement of diverse skill sets, (2) tremendous assets, (3) collaboration, and (4) communication. The skill sets needed include (but are not limited to): engineers, social scientists, database managers, soil scientists, hydrologists, biogeochemists, agronomists, modelers, microbiologists, and ecologists. In 2016, we facilitated a two-day workshop, a series of webinars, and survey work to assess and discuss the needs of Lake Erie area researchers in order to establish the foundation for the LEARN consortium. From those initial discussions, our first task of the development of a network website as well as bylaws and network committees have been successfully ongoing. With over 50 researchers from 17 institutions around Ohio having invested their time into the development of this new Lake Erie consortium, we aim to continue the expansion of awareness and involvement in LEARN.

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Title: Single use plastics in the NEO area
Author: Jill Bartolotta, Ohio Sea Grant College Program
Biography: Jill Bartolotta is the Ohio Sea Grant College Program Extension Educator for Lake and Ashtabula Counties. She works with communities to conduct outreach and education about Lake Erie, identify community needs in regards to research, funding, or scientific expertise, develop partnerships to foster a collaborative approach to management of natural resource issues, and bring science into the decision-making process at the individual and community level.
Abstract: Given the growing saliency of plastic marine debris, and the impact of plastics on beaches and aquatic environments in the Laurentian Great Lakes, applied research is needed to support municipal and nongovernmental campaigns to prevent debris from reaching the water's edge. This study attempts to accomplish this goal examining the barriers and benefits to positive behavior for three plastic debris items in northeast Ohio's Lake Erie basin: plastic bags, plastic water bottles, and plastic cigar tips. An online survey and focus group were employed to gather data on the use and disposal of these plastic items in the Cleveland area, and to solicit recommendations on how to positively change behavior to reduce improper disposal. The results from this project will be used to inform a social marketing campaign broadcast throughout Cleveland in 2017, as well as to serve as a pilot for related research on plastic marine debris in other Great Lakes states.

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Title: Lake Erie algae, nutrient loading, and current research efforts
Author: Chris Winslow, Ohio Sea Grant
Biography: Dr. Chris Winslow received his B.S. from Ohio University and both his M.S. and Ph.D. from Bowling Green State University. Since 2004 Chris has been a fixture at Ohio State University's Stone Laboratory, first as an instructor and research supervisor, but now as the Director of both the Lab and the Ohio Sea Grant College Program. Prior to joining OSU and Ohio Sea Grant, Chris was an Instructor at BGSU (2002-09) and an Assistant Professor at Kutztown University of Pennsylvania (2009-11). His research training, experience, and efforts include numerous issues of critical importance to Lake Erie; e.g., nutrient loading, harmful algal bloom causes and impacts, dredging, fisheries management, invasive species, coastal community resilience and growth, and the impacts of climate change.
Abstract: A glimpse into the >50 projects currently managed by Ohio Sea Grant and OSU's Stone Laboratory with assistance from the University of Toledo (~$6,800,000). These research efforts aim to: (1) improve use of existing technologies and to develop new methods to detect HABs and their movements; (2) assess the health impacts of HABs and their associated toxins; (3) develop new treatment methods for contaminated drinking water that removes both algal particles and the toxins produced by cyanobacteria; and (4) assess the ability of land use changes to reduce nutrient inputs into aquatic ecosystems. Additionally, talk will highlight: (1) nutrient sources today, (2) our understanding of agricultural nutrient losses, (3) effective best management practices (BMPs), (4) farmer decisions, (5) possible strategies to move toward a 40% P reduction, and (6) information gaps and research needs.

Poster Session

Poster 1 - Title: Nitrification Through Sand Bioreactors
Author(s): Charlotte Bucy, The Ohio State University
Biography: Charlotte is a student in Biological Engineering at The Ohio State University. She is the secretary of Terraqua. Charlotte started working with the Soil Environment Technology Learning Lab in 2016 as an undergraduate research fellow.
Abstract: Turkey-processing wastewater contains large amounts of pollutants and organic matter that if discharged without treatment could cause harm to aquatic life. Sand bioreactors have been used to effectively to treat turkey wastewater, achieving –BOD—_5 removal percentages of up to 99.7% (Kang, 2007).
Turkey-processing wastewater contains high levels of both organic nitrogen and ammonia. Ammonia is a form of nitrogen that is toxic to aquatic life. Organic nitrogen degrades to ammonia and ammonia is converted through a 2-step process, to nitrate, a non-toxic form of nitrogen, through a process called nitrification. Sand bioreactors show potential to host the nitrification process (Widrig, 1996). The objective of this research was to investigate the

nitrogen transformations cycle of turkey-processing wastewater as it is treated through sand bioreactors. Four sand bioreactor columns were receiving one gal/ã€–ftã€—^2/day of turkey processing wastewater. The organic nitrogen breakdown and nitrifying ability of the sand bioreactor was determined by comparing the changes in TKN and ammonia concentration. Test results showed a high amount of ammonia in the raw turkey processing wastewater. The effluent of the filters had lower ammonia than the Ohio regulatory limits. The effluent also showed an increase in nitrate. These results show that organic nitrogen is decomposing and the nitrification process is occurring in the sand bioreactors. After the water is treated by the sand bioreactor, it is safe to discharge to a river or stream.

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Poster 2 - Title: Trade-offs between plant diversity and ecosystem function in restored and unrestored Lake Erie coastal wetlands

Author(s): Alan Coburn, The Ohio State University

Biography: Alan Coburn is a senior at the Ohio State University, originally from Green, Ohio. He will soon receive a B.S. in Environment and Natural Resources, Environmental Science with a specialization in Ecosystem Restoration. Throughout much of his time at OSU he has worked with the Pintor Lab, first as a research assistant, and now as an undergraduate researcher. Upon finishing his undergraduate thesis, Alan hopes to continue his education on wetland ecology and restoration.

Abstract: Coastal wetlands along Lake Erie have been dramatically altered by humans since the mid-1900s, disrupting important natural ecosystem functions including habitat provision for fish and wildlife, flood mitigation, and nutrient retention. Restoration actions, such as the removal of dikes in coastal wetlands in the western Lake Erie basin, aim to restore these natural processes. However, while the goal of dike removal is to restore long-term ecosystem functioning, there may be short-term trade-offs between restoring ecosystem function and maintaining biodiversity. For example, higher-than-optimal water levels and longer inundation periods following hydrological reconnection may decrease wetland plant diversity. This phenomenon would presumably have a negative impact on nutrient retention and primary productivity, thus affecting higher trophic levels in the wetland ecosystem and water quality in Lake Erie (e.g. higher levels of nitrogen and phosphorus). Preliminary water quality data from 6 restored and 6 unrestored wetlands at the Ottawa National Wildlife Refuge indicates that total nitrogen and total phosphorus levels were lower in restored wetlands than in unrestored wetlands in 2016. Also, preliminary water level data indicates that water levels were higher in restored wetlands than in unrestored wetlands in 2016. Analysis of 2017 data is expected to show similar patterns. Therefore, pending final analyses, we expect that wetland plant diversity and productivity will be lower in restored wetlands than in unrestored wetlands.

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Poster 3 - Title: Identifying short-term trade-offs between biodiversity and ecosystem function following restoration of Lake Erie coastal wetlands in Ottawa National Wildlife Refuge

Author(s): Elizabeth Berg, The Ohio State University

Biography: Elizabeth Berg is a second-year MS student in Dr. Lauren Pintor's aquatic ecology lab at Ohio State University in the School of Environment and Natural Resources. Her research interests include biodiversity-ecosystem function relationships, and wetlands.

Abstract: Coastal wetlands along the western Lake Erie basin (WLEB) have historically provided key ecosystem functions, such as capturing and retaining phosphorus and other nutrients from agricultural run-off that lead to harmful algal blooms (HABs). Most of the remaining Lake Erie coastal wetlands have been diked, severing hydrological connection and impairing ecosystem functions. Concern over the frequency and intensity of HABs in Lake Erie has led to recent efforts by multiple constituents to improve water quality in the WLEB. In particular, approximately 3000 acres of diked wetlands in and adjacent to Ottawa National Wildlife Refuge and the Crane Creek watershed within the Maumee AOC have or are undergoing reconnection to the Crane Creek estuary and Lake Erie. While restoring hydrologic connection to coastal wetlands may have long-term net benefits to the Lake Erie ecosystem, it may lead to short-term trade-offs between biodiversity and ecosystem function in restored wetlands. We measured water quality, macroinvertebrate diversity, and anuran populations in 6 restored and 6 unrestored wetlands during May-September in 2016-17. We predicted influxes of nutrients in restored wetlands would decrease macroinvertebrate diversity and have cascading effects on anuran populations. Interestingly, preliminary data indicated that total phosphorus and total nitrogen were actually lower in restored rather than in unrestored wetlands. While this may suggest that wetlands are not retaining nutrients following restoration,

macroinvertebrates are sensitive to high nutrients. Therefore, pending analyses of 2017 samples, macroinvertebrate diversity might increase in restored wetlands because of improved nutrient conditions. We predict that increases in macroinvertebrate resources will have a cascading positive effect on anuran populations. Although opposite our original predictions, decreased nutrient capacity, but improved biodiversity in restored wetlands would indicate a short-term trade-off following restoration.

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Poster 4 - Title: Epilimnetic mixing increases methane ebullition fluxes in a small eutrophic drinking water reservoir

Author(s): Leah Finegold, Oberlin College

Biography: Leah is a second-year student at Oberlin College studying Environmental Studies and Geology. Leah conducted water research this summer at VirginiaTech through the National Science Foundation's Research Experience for Undergraduates (REU) program.

Abstract: Inland waters are substantial sources of carbon (C) greenhouse gases to the atmosphere. Reservoirs, in particular, emit a large portion of inland water C emissions, generally in the form of methane (CH_4) bubble fluxes (ebullition) from the sediments. CH_4 ebullition can contribute the majority of reservoir C emissions; however, little is known how CH_4 ebullition responds to water management practices like epilimnetic aeration, a common technique to prevent harmful algal blooms in reservoirs used for drinking water supply and recreation. In summer 2017, we measured CH_4 ebullition rates in a managed eutrophic drinking water reservoir during two planned epilimnetic aeration mixing events, and observed an overall significant increase in ebullition rates after the first mixing event but only a marginal increase after the second. Our data suggests that epilimnetic mixing management may increase ebullition rates, but that any stimulation of CH_4 fluxes may be dependent on the duration and timing of mixing.

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Poster 5 - Title: Impact of land use on water quality of Mill Creek Watershed

Author(s): Manasa Koirala, Youngstown State University

Biography: Koirala Manasa is a graduate student in Environmental Science at Youngstown State University.

Abstract: Seasonality is a major factor influencing freshwater ecosystem dynamics in temperate regions. Diatom taxa attain peak abundances under different seasonal environmental conditions. This study aimed to track seasonal and environmental changes in diatom abundance and water quality parameters in a reservoir over the course of two years (July 2015 - July 2017). Three research questions were investigated: (1) What are water conditions associated with the particular species assemblage? (2) How do diatoms change with seasonal water changes? (3) How do seasonal changes and depth of samples impact biodiversity of overall diatom assemblages? Results are reported for vertical tow, van Dorn samples and suspended glass slides that were collected each month and analyzed in the lab. Biodiversity of diatom species assemblages were determined for each season and depth and analyzed using a multivariate ANOVA approach. A noticeable shift was observed in the relative abundance of diatom taxa occurred in the reservoir (Fragilaria-Asterionella-Aulacoseria). Both positive and negative correlations were found between water parameters and relative abundance of diatom taxa (e.g. correlations were found between temperature and Cyclotella ocellata and Aulacoseria granulate). The results of this study further reveal seasonal diatom dynamics in reservoirs, with ongoing monitoring efforts in this reservoir also useful to paleolimnological investigations.

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Poster 6 - Title: Wastewater nutrient removal in hydroponic/greenhouse system

Author(s): Kun Liu, The Ohio State University

Biography: Following the completion of a Bachelors degree in Water and Wastewater Engineering and a Masters degree in Environmental Engineering, Kun is pursuing a PhD in Environmental Science. Kun enjoys the innovative and practical work along with the lab and field.

Abstract: Wastewater hydroponic floating bed systems cultivating perennial ryegrass were tested for secondary treated wastewater effluent nutrient removal. Five types of hydroponic floats were built and tested in the laboratory and field. The nutrient removal from treated turkey processing wastewater in a hydroponic floating bench system in both pilot and full-scale greenhouse environment were also evaluated. The pilot greenhouse hydroponic tests achieved high removal of o-phosphate-P (48-69%) and ammonium-N (65-83%), but low in nitrate-N removal (23-26%). Algae interrupted the nutrient removal and inhibited grass production. The full-scale high tunnel greenhouse hydroponic bed prevented algae growth and resulted in healthy grass shoot and root mat development. Higher load

of nutrient uptake was achieved in full scale plant than in the pilot plant test. The hydroponic floating system using rye grass proved to be efficient in advanced nutrient removal after sand biofilter treatment.

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Poster 7 - Title: A new occurrence of Starry Stonewort in the Western Basin of Lake Erie
Author(s): Brittany Mullikin, Ohio Department of Natural Resources

Biography: Received a Bachelors of Science with a specialization of Marine and Aquatic Biology from Bowling Green State University. Currently employed by the Ohio Department of Natural Resources Division of Wildlife.
Abstract: Starry Stonewort (SSW) (Nitellopsis obtusa) is an invasive species of submerged aquatic macroalgae that can form dense mats. These mats can outcompete plant native species, interfere with fish and invertebrate life cycles, and inhibit recreation for boaters and fishermen. In recent years, SSW has spread throughout Indiana, Michigan, Minnesota, New York, Pennsylvania, Vermont, and Wisconsin. Occurrences in waters connected to Lake Erie were previously restricted to Erie, Pennsylvania and the Detroit River. We sampled vegetation using a MX Biosonics sonar unit to identify distribution and density, coupled with rake throws to determine species composition and relative biomass as part of a study to assess response of the vegetation community to Grass Carp (Ctenopharyngodon idella) herbivory. In July 2017, SSW was collected in north Maumee Bay, a new occurrence for Monroe County, Michigan and the Western Basin of Lake Erie. After initial tentative identification of SSW, the site was surveyed intensively to verify the presence of key identifying features (small, white, star-shaped bulbils). Continued monitoring of this site and additional surveys of surrounding areas are essential information for potential management.

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Poster 8 - Title: Visual Detection Thresholds of Lake Erie Walleye Under Different Types of Turbidity

Author(s): Andy Oppliger, The Ohio State University
Biography: My name is Andrew Oppliger and I am currently a third year undergraduate student at The Ohio State University pursuing a degree in Forestry, Fisheries, and Wildlife with a specialization in Fisheries and Aquatic Science. I have participated in undergraduate research all three years of my undergraduate studies and intend to continue my academic career by attending graduate school.
Abstract: Lake Erie is experiencing episodes of increasing algal and sedimentary turbidity which is expected to alter the visual ecology of Lake Erie Walleye (*Sander vitreus***)** due to changes to the visual environment. Knowledge of how individual Walleye react to changes in the visual environment will provide a framework for understanding expected community and population level interactions. One of the many parameters in which visual ecology is altered by fluctuating turbidity is visual sensitivity, or the ability of an animal to distinguish between an object and its background. Our objective was to determine if different types of turbidity (e.g. algal or sedimentary) differentially influence the visual sensitivity of Walleye. To determine how visual sensitivity is impacted by turbidity, we used optomotor response tests to establish visual detection thresholds for three different types of turbidity: algal, sedimentary, and a combination of the two. We found that visual detection thresholds were higher in the sedimentary treatment (mean NTU = 97.04) than the combination (mean NTU = 66.47) and algal treatment (mean NTU = 40.56). This indicates that algae may cause disruptions to vision at a much lower turbidity level than suspended sediment. In addition to being a top predator, Walleye are important for the Lake Erie sport fishing industry and Ohio's economy. Therefore, understanding the impacts of increasing anthropogenic turbidity levels on the visual ecology of Walleye provides insight into the dynamics of how Walleye respond to this stressor.

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Poster 9- Title: The Impact of Woody Debris on Intermittent Headwater Streams' Biological Integrity and Bank Stability

Author(s): Gabrielle Russell, Ohio University
Biography: Gabrielle is a masters student in the Environmental Studies Program in the Voinovich School of Leadership and Public Affairs at Ohio University. Her thesis explores the relationship between woody debris, biodiversity scores, and bank stability.
Abstract: This thesis project's primary goal is to explore the relationships between large woody debris (LWD), biological integrity and bank stability within intermittent headwater streams in the Alleghany Plateau ecoregion. Twenty streams throughout the ecoregion with similar drainage basins, gradient, and land use, were selected to determine correlations between the amount of naturally occurring LWD and biological index scores and relative

bank stability. The collected data will provide baseline data for sites located within the Marietta Unit of the Wayne National Forest that have been selected for the addition of LWD in order to increase bank stability and biotic integrity. Relationships between LWD, biological index scores, and relative bank stability may be helpful in providing information to the Wayne National Forest about expected outcomes of their ongoing project. This thesis will also add to the existing literature about the role of naturally occurring woody debris in headwater streams with the intention of influencing stream restoration practices.

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Poster 10- Title: Influence of Micronutrients on Nitrogen Fixation Rates in Northern Ohio Lakes
Author(s): Bethany Schmidt, Kent State University
Biography: Bethany Schmidt is a current M.S. Ecology student at Kent State University under Dr. Darren Bade. Her interests revolve around aquatic ecology and biogeochemistry, concentrating on the cycling of nutrients and biological processes and how they influence one another. In particular, she is studying cyanobacterial communities in lake systems and how macro and micro nutrients may tie into possible management techniques. She has worked collaboratively with the Geology Dept. at Kent State and with Bowling Green University in Lake Erie to examine the zooplankton community and monitor water quality. In 2013, Bethany received the Clinton and Olive Hobbs Scholarship in Plant sciences after performing extensive work in the Kent state Greenhouse where she focused on plant management and pesticide control. In conjunction, she is currently volunteering in a plant ecology lab that is examining the effects of herbivory on secondary defense mechanisms in plants. After graduating, Bethany hopes to improve the implementation of lake management practices for control of cyanobacteria and get involved in the monitoring and improvement of water quality both in lakes and streams.
Abstract: Nitrogen fixation is a biological process that converts inert dinitrogen gas into biologically available ammonium. In lake systems, certain cyanobacteria possess this ability to fix nitrogen, allowing them to continue growth when other reactive forms of nitrogen are diminished. The process of nitrogen fixation requires the enzyme nitrogenase, various cofactors, and an anaerobic region within the organism. Micronutrients including iron (Fe), molybdenum (Mo), and boron (B) serve either as cofactors in the nitrogenase pathway or help maintain the anaerobic condition necessary for nitrogenase to function. Nitrogen fixation and cyanobacterial growth could be limited by phosphorus (P), but pollution has often created situations where phosphorus is in excess. This leads to the question of whether micronutrients, due to involvement with nitrogenase and its functionality, could limit nitrogen fixation and cyanobacterial growth when phosphorus in abundant. To test this theory, a micronutrient addition bioassay experiment was conducted using water collected from 8 lakes around northern Ohio. A total of 5 treatments were applied to water from each lake as follows: a control and additions of P, P + Fe, P + Mo, and P + B with replicates. The acetylene reduction assay was used to estimate rates of nitrogen fixation in each treatment. In 5 of the 8 lakes, rates of nitrogen fixation increased significantly when additions of phosphorus were applied. However, the micronutrient additions involving iron, molybdenum, and boron did not significantly increase rates of nitrogen fixation when compared to the phosphorus-only treatment. In the 8 lakes examined, these three micronutrients do not appear to be limiting rates of nitrogen fixation.

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Poster 11 - Title: Correspondence of diatoms to seasonal changes in water parameters in Meander Creek Reservoir
Author(s): Derek Scott, Youngstown State University
Biography: I am from Cortland in Northeast Ohio, I am currently pursuing a Master of Science degree in environmental science at Youngstown State University. My interests in the environmental sciences include water quality and environmental regulations.
Abstract: Seasonality is a major factor influencing freshwater ecosystem dynamics in temperate regions. Diatom taxa attain peak abundances under different seasonal environmental conditions. This study aimed to track seasonal and environmental changes in diatom abundance and water quality parameters in a reservoir over the course of two years (July 2015 - July 2017). Three research questions were investigated: (1) What are water conditions associated with the particular species assemblage? (2) How do diatoms change with seasonal water changes? (3) How do seasonal changes and depth of samples impact biodiversity of overall diatom assemblages? Results are reported for vertical tow, van Dorn samples and suspended glass slides that were collected each month and analyzed in the lab. Biodiversity of diatom species assemblages were determined for each season and depth and analyzed using a multivariate ANOVA approach. A noticeable shift was observed in the relative abundance of diatom taxa occurred in the reservoir (Fragilaria-Asterionella-Aulacoseria). Both positive and negative correlations were found between water parameters and relative abundance of diatom taxa (e.g. correlations were found between temperature and

Cyclotella ocellata and Aulacoseria granulate). The results of this study further reveal seasonal diatom dynamics in reservoirs, with ongoing monitoring efforts in this reservoir also useful to paleolimnological investigations.

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Poster 12 - Title: Removal of Microcystin-LR Using Granular Activated Carbon: An Affinity and Capacity Assessment

Author(s): Kate Villars, The Ohio State University

Biography: Kate Villars is pursuing her M.S. in Civil, Environmental and Geodetic Engineering at OSU. She has worked as a technical contractor to the U.S. EPA and an engineer for the City of San Francisco implementing their recycled water program.

Abstract: Blooms of cyanobacteria in source waters often release extracellular toxins, the most common of which is microcystins. These toxins pose a human health risk when present above threshold levels in finished water; therefore, it is important that they are adequately addressed during the treatment process. One mechanism for removal of extracellular toxins is adsorption onto activated carbon. This process is often deployed through the dosing of powdered activated carbon early in the treatment process with subsequent removal of the carbon during sedimentation. While effective, this is a consumptive use of the purchased carbon product. Alternatively, several treatment plants in Ohio already maintain granular activated carbon (GAC) contactors, which are typically positioned after traditional coagulation, flocculation, sedimentation, and filtration processes. Others incorporate a biologically active layer of GAC within their sand filters. This research aims to assess the affinity and capacity of various GAC products as adsorbents for microcystin-LR. Equilibrium batch tests were conducted on seven different GAC products, which come from different source materials (bituminous coal, lignite coal, coconut, and wood). Tests were conducted using laboratory synthesized model water both with and without natural organic matter (NOM), which competes for adsorption sites. The wood based GAC showed the highest removal efficiency followed by a lignite coal based product, which is consistent with the literature. Future experiments will determine the breakthrough time for microcystin using rapid small-scale column tests with water with varying concentrations of competing NOM and empty bed contact times. GAC products will be characterized to determine their pore size distribution and methylene blue number to allow for comparison to untested products. The goal of this research is to develop guidelines to assist utilities using GAC to optimize algal toxin removal.

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Poster 13- Title: Using LES based Footprint Analysis to Determine Flux Measurement Sources over a Heterogeneous Surface

Author(s): Chante Vines, The Ohio State University

Biography: Chante Vines is a second year doctoral student pursuing Civil Engineering at The Ohio State University (OSU). She comes from Prince George's County, Maryland and holds a Bachelor's degree in Civil Engineering from Morgan State University.

Abstract: Wetlands are the largest natural source of methane emissions, the second most prevalent greenhouse gas in the nation. We set up an eddy covariance tower to measure methane flux from The Old Woman Creek (OWC) wetlands. The OWC wetland site, located in Huron, Ohio, is comprised of several different patch types including forest, open water, mud, and floating vegetation. Manual chamber measurements show that each patch type have very different flux rates and respond differently to hydrologic and climatic variation. The heterogeneity of the terrain makes it difficult to determine which patch type is responsible for the methane flux measured at the flux tower and to what degree the emissions from different patch types mix. However, footprint models can estimate downwind concentration from each source in a heterogeneous environment through decomposition of the flux measured at the central flux tower to its contributions from each patch type. Footprint models use a statistical phenomenological approach that is rather simplistic. For a more realistic approach that can fully account for the feedbacks created by atmosphere and surface interactions, we are using the Parallelized Large-Eddy Simulation Model for Atmospheric and Oceanic Flows (PALM). In this study, we will discuss the comparisons between The PALM LES footprint model and the simpler footprint model. We expect the LES model to distinguish better between the relative contributions of the different patch type to the overall flux.

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Poster 14 - Title: DRASTIC at 30: Ohio Born, Worldwide Applications, Still Going Strong

Author(s): Julie Weatherington-Rice, Bennet & Williams Environmental Consultants, Inc.

Biography: An Ohio Fracture Flow Working Group Project (OFFWG). The OFFWG dedicated their second special issue of the Ohio Journal of Science (June, 2006) to the modification of the Ohio DRASTIC process and the research and scientific considerations the Group incor

Abstract: DRASTIC is a mapping and evaluation tool that assesses the potential for ground water pollution by mapping seven different parameters. DRASTIC is an abbreviation of those seven parameters; D= Depth to water, R= Net recharge, A= Aquifer type, S= Soil type, T= Topography, I= Impact of the vadose zone and C= hydraulic Conductivity. First developed for US EPA by Ohio scientists, it was published in 1987 (Aller et al., 1987) and quickly spread worldwide in application. This poster presentation incorporates preliminary graphics that are being created for a paper being developed for publication on the historical acceptance and continued worldwide application of this ground water pollution prevention mapping process as DRASTIC reaches its 30th birthday. The tables and maps included on this poster document more than 400 DRASTIC projects from almost 70 countries on six continents that have been identified in the professional and scholarly literature, governmental and university publications. It is assumed that there have been other DRASTIC applications that have not resulted in archival publications and so are not included here. Early DRASTIC mapping applications were conducted exactly as defined by the US EPA publication, but quickly scientists began to modify the DRASTIC parameters to include conditions that they locally identified. Ohio's DRASTIC mapping project, now mostly completed, used both the original DRASTIC process and later a modification to include the impacts of fractures in the soils and glacial vadose zones (Weathertington-Rice et al., 2006). Other scientists applied DRASTIC and other models together to compare and contrast the results for their region. Still others simply wrote about the DRASTIC methodology. Additionally, the publication dates indicate that the application of DRASTIC mapping is just as robust today as it was when it was first developed.

Thursday, November 2, 2017

Concurrent 1 (8:30) – Partnership Building

Title: The Challenge of HABs in a Drinking Water Source Create Opportunity for Multi-Agency Cooperation

Author: Edward Pfau, Hull & Associates, Inc

Biography: Ed Pfau is a Principal Scientist with Hull & Associates in Dublin, Ohio. He has 25 years of experience in environmental toxicology and environmental risk assessment. He prepares and reviews human health and ecological risk assessments for brownfields, hazardous waste management units, Superfund sites, and other sites where hazardous substances or petroleum pose a potential or known environmental or regulatory concern. He conducts environmental fate and eco-toxicological evaluations as part of chemical safety assessments prepared to meet registration requirements for chemical manufacturers in the United States and Europe. He also works with public water systems to assist in the assessment of harmful algal blooms in water supplies and of lead in drinking water distribution systems. Before joining Hull, Ed was a senior toxicologist and risk assessor for the Ohio EPA, where he was responsible for rules development, technical guidance and critical review and approval of risk assessments under the Ohio Voluntary Action Program (VAP) and other programs. Ed has both Master's and Bachelor's degrees in Biology. He has served on several committees, including the ASTM E50.04 Voluntary Cleanup Task Group and the generic standards and risk assessment committee under the Ohio EPA VAP Multi-Disciplinary Board. He is an active member of the Society of Environmental Toxicology and Chemistry and the Society for Risk Analysis.

Abstract: The Village of Cadiz public water system (PWS) takes its raw water supply from Tappan Lake which is owned and managed by the Muskingum Watershed Conservancy District (MWCD). Being a surface water source, the Cadiz water plant is subject to the harmful algal bloom (HAB) monitoring and reporting rule issued as Ohio Administrative Code (OAC) 3745-90 effective June 1, 2016. The Rule requires a PWS to develop a written general plan if total microcystins concentrations reach certain trigger levels in the raw water, or when total microcystins are detected in any sample collected at a finished water sampling point or a distribution sampling point. The Cadiz

PWS has experienced detections of total microcystins in the raw water from Tappan Lake in the past and therefore, undertook to prepare a General Plan in 2016, including Source Water Protection Activities as required by the Rule.

Since the source water body, Tappan Lake, is under the management of MWCD and not the Cadiz PWS, the two entities have established a cooperative approach to monitoring and managing the lake water quality for potential HAB conditions. The MWCD is currently working under a cooperative agreement with the Ohio Department of Natural Resources (ODNR) and also in cooperation by agreement with the Carroll County and Harrison County Soil and Water Conservation Districts (CSWCD and HSWCD) for watershed management and water quality improvement projects. Therefore, the MWCD engages in activities for the protection of the watershed of Tappan Lake, with the support of the CSWCD and HSWCD.

The Village of Cadiz' Drinking Water Source Protection Plan emphasizes cooperation with these other government agencies to address nutrient issues in the source water. The presentation will describe the joint efforts of these parties in pursuing water quality improvement in Tappan Lake.

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Title: Examples of Source Water Protection Efforts in Southeastern Ohio

Author: Steven Saines, Ohio EPA

Biography: Steven J. Saines has been a geologist with Ohio EPA's Division of Drinking and Groundwaters for more than 20 years, where he has supported the division's ground water program goals. These primarily included: Evaluation of hydrogeologic information, models, statistics and analytical reports for sites undergoing subsurface investigations and corrective action activities; Interpretation and application of regulatory authority under Ohio's RCRA and CERCLA programs, as well as its solid waste regulations; Determination of well field capture zones, hydrogeologic settings, and the potential rate, extent and concentration of ground water contamination; Evaluation and selection of appropriate remedial measures necessary to remove or prevent contaminant migration; Provision of technical assistance to Ohio EPA staff, industry & government officials on ground water issues. Since 2010, his primary responsibility has been the promotion of Source Water Protection initiatives in 23 southeastern Ohio Counties.
Prior to joining Ohio EPA in 1996, Mr. Saines worked as an adjunct instructor for 3 years in Pennsylvania and Ohio, as an environmental consultant in Pennsylvania for 6 years, and as a water resources project leader for 3 years in Burkina Faso, West Africa.

Abstract: As of 2017, 30% of community public water suppliers in southeastern Ohio have endorsed Source Water Protection Plans. This talk outlines the general approaches many communities are taking in Ohio's Appalachian region to maintain clean source water resources and/or prevent future contamination. The most common environmental challenges addressed in Source Water Protection Plans include: legacy industrial solvent contamination; increased nutrient loading, sometimes resulting in harmful algal blooms; increased oil and gas development; salt contamination. Source water protection opportunities in Southeastern Ohio communities include: establishing partnerships between potential polluters and public water suppliers to promote routine communication; moving potential pollutants (or their activities) outside source water protection areas; monitoring source water quality; enacting local zoning ordinances; creating third party partnerships to improve outreach efforts and data collection; installing pollution detection/removal technologies.
Ohio EPA's Source Water Protection Program started in the 1990s, following several US Congressional amendments to the Safe Drinking Water Act, which helped establish and fund state programs and initiatives. After several years of program development and technical assessment of the state's public water suppliers, Ohio EPA designated protection areas, created contaminant source inventories and performed susceptibility analyses for all public water supply systems in the state. In the last decade, Ohio EPA's Source Water Protection Program has narrowed its focus to helping water suppliers develop unique, site specific Protection Plans which address the most likely causes of contamination or environmental vulnerabilities at their local public water supply source. All Ohio EPA endorsed Protection Plans meet the minimum requirements of the Source Water Protection Program. These requirements include: 1) Identification of potential sources of contamination and the deployment of relevant protective strategies; 2) Updated Emergency Response & Contingency Planning; 3) Education and Outreach Initiatives, and; 4) Source Water Monitoring.

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Title: Community Backyards: Using Incentives, Partnerships and Online Education to Engage the Public
Author(s): Jennifer Fish and Sara Ernst, Franklin Soil and Water Conservation District
Biography: Jennifer Fish is the Director of Franklin Soil and Water Conservation District. She has a Master of Science in Natural Resources and Environmental Policy and a Bachelor of Science in Biology. As Director of Franklin Soil and Water for the past 18 years, she has led the development of the organization into becoming one of the largest districts in the state. She directs and supports a staff of 14 natural resource professionals with the mission of promoting responsible land use decisions for the conservation of soil and water resources. She also serves on the board of the Ohio Stormwater Association and is a Certified Professional in Municipal Stormwater Management.

Sara Ernst is the Conservation Implementation Specialist at Franklin Soil and Water Conservation District, where she leads backyard conservation programs with a focus on rain gardens and other storm water management practices. Sara has worked as a field botanist in Florida and Pennsylvania, performed environmental education in various parts of Ohio and Central America, and led several Greater Cincinnati schools and communities in the installation of rain gardens. Sara earned her BA in botany from Miami University, studied environmental education at Antioch University, and received her Master of Community Planning from the University of Cincinnati. In addition, Sara has served as a volunteer with Americorps and Peace Corps.

Abstract:
The Community Backyards Program is an online program that engages the public in a way that is easy to access and provides incentives for them to follow-through on conservation practices as well as learn about basic stormwater concepts. We provide $50.00 rebates for compost bins, native plants, and rain barrels for residents who participate in an online course and quiz, or a workshop focused on stormwater education. The program is flexible so that multiple communities can take ownership of the program and businesses can participate as partners in providing on-site rebates. This approach is great for helping communities reach out to resident for stormwater management education as well as demonstrate direct involvement of the public in practices that benefit stormwater reduction, stream protection and water quality improvements.Program information can be found at www.communitybackyards.com

Concurrent 2 (8:30) – Stormwater

Title: The "Gray Area" of Green –Where Design Meets PublicPolicy
Author: Kari Mackenbach, ms consultants, inc
Biography: Biography not submitted.
Abstract: The common public works activity of street reconstruction presents an often untapped opportunity to address the stormwater concerns of multiple stakeholders. The shaping of an integrated stormwater design approach around local public policy will be explored through a case study of the Dellrose Street permeable paver project in Pittsburgh, Pennsylvania.
Stormwater management programs are traditionally tied to maintaining public safety, mitigating private land development, or addressing CSO consent orders. Not surprisingly, other opportunities to integrate green infrastructure into urban reconstruction seldom come to fruition, falling victim to a “gray area” in stormwater policy. An integrated stormwater design approach, structured around the concept of stormwater impact offsetting, was developed for the Dellroy Street reconstruction project as a means to maximize the regional stormwater benefit. The Dellrose Street project broke new ground as the first full-width street reconstruction project using permeable pavers in the City of Pittsburgh. This innovative street design allowed for the exclusion of traditional storm sewer infrastructure, reducing both capital and long-term maintenance costs. Established in the public right-of-way and located within the tributary area of a combined sewer system, this commonly-performed public works activity presented an often untapped opportunity to address the stormwater concerns of multiple stakeholders.

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Title: Evaluation of long term performance of retrofit rain gardens: hydrology and hydrocarbons
Author: Abigail Tamkin, The Ohio State University
Biography: Abby is a PhD candidate in Ecological Engineering at Ohio State, under the direction of Jay Martin. She's currently finishing up her dissertation on hydrocarbons in stormwater and bioretention.

Abstract: Hydrocarbons are a prevalent pollutant in stormwater, coming from sources such as automotive fluids, combustion products, and asphalt. Quantifying hydrocarbons effectively is a priority for monitoring urban and suburban water quality, as many hydrocarbons are carcinogenic or mutagenic. Current methods of hydrocarbon measurement are known to have low detection of high molecular weight and weathered compounds; both of which are prevalent in stormwater. We have developed a new isotopic method to quantify total anthropogenic hydrocarbons in a given sample. This method was compared to a common current method: US EPA Method 8015 - Total Petroleum Hydrocarbons (TPH; methylene chloride extraction, GC-FID extraction).
Two experiments were developed to test these methods: a synthetic stormwater mix (SS; six collections), and a hydrodynamic separator (HDS; five collections) underneath a municipal parking lot. In both cases, the focus was on hydrocarbons associated with the particulate matter. Hydrocarbons concentrations were measured on both a mass (mg HC/g dry particulates) and volume basis (mg HC/L water filtered). On a volume basis, the isotope method seemed to outperform the TPH method, recovering 2.8 times more than the TPH method in the synthetic stormwater experiment and 5.3 times more from the HDS samples, but the comparison is not so straightforward on a mass basis: The performance varied from collection to collection, but on average, the TPH method recovered 1.2 times more than the isotope method from the synthetic stormwater and 1.6 times more from the HDS samples.
We are still trying to untangle these disparities, but we believe that these method differences stem from some combination of particulate measurement differences between the methods, along with different biases in detection of hydrocarbons of varying molecular weights.

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Title: Are You Sinking or Swimming - Partners are a Lifesaver
Author: John Kusnier and Jenny Gulick, Davey Resource Group
Biography: The importance of trees extends beyond aesthetic appeal, air quality, and energy saving benefits. They provide important stormwater management services that are often overlooked and undervalued. This presentation highlights projects and partnerships that address multiple issues related to water quality and quantity. Case studies are provided that are examples of working with partners to: provide the basis for informed decision making; restore ecosystems; promotes sustainability.
Abstract: **Jennifer Gulick, M.A.,** is a senior consulting urban forester for Davey Resource Group's Natural Resource Consulting team. She specializes in urban forestry, park management, and land development programs. Ms. Gulick has broad experience in developing urban forestry management plans and maintenance standards; writing master plans for parks; performing tree risk and tree damage and value assessments; communicating with advisory boards, city council, and citizens; managing personnel; writing specifications; and administering contracts. Prior to joining Davey Resource Group in 1999, Ms. Gulick worked in municipal government, specifically a long tenure with the City of Cincinnati, Urban Forest Management Division and ultimately the acting superintendent of park operations. She is an International Society of Arboriculture (ISA) Certified Arborist and Municipal Specialist (OH-0069). Ms. Gulick also has an ISA Tree Risk Assessment Qualification (TRAQ). Ms. Gulick has a master's degree in public administration from the University of Cincinnati and a bachelor's degree in forest resource management from West Virginia University.

John Kusnier is a project developer and NEPA team leader with Davey Resource Group's Natural Resource Consulting team. He has more than 30 years of experience providing environmental and ecological consulting services to clients in the private and public sector. Mr. Kusnier has coordinated and/or authored many ecological surveys, waterway permit applications, wetland mitigation design projects, Categorical Exclusions, and Environmental Assessments for clients in Ohio, Michigan, and Indiana. He also has directed several large-scale, GIS-based watershed studies, including the Wetland and Riparian Inventory and Restoration Plan Development Project for Swan Creek and Ottawa River watersheds, the Ottawa River Habitat Restoration Inventory, and the Duck and Otter Creeks Habitat Inventory and Restoration Project, in northwest Ohio. Currently John serves as the chairperson for the Maumee AOC Advisory Council and is a co-chair of the Toledo Metropolitan Council of Government's Watershed Subcommittee. He also serves on the the board of the Maumee Valley Heritage Corridor. He received his bachelor's degree in biology from the University of Toledo.

Concurrent 3 (8:30) – Ohio Watersheds Professionals Association (OWPA)

Title: Coupling Ecosystem Restoration to Water Quality Improvements in the Wolf Creek Watershed
Author: Ryan Jackwood, The University of Toledo
Biography: Ryan Jackwood is a Ph.D. student at the University of Toledo in the Environmental Sciences Department. Ryan's research background includes horticulture and crop disease, viral genetics, microbiology, and he is focusing on bioremediation and restoration.
Abstract: The Wolf Creek watershed, as a representative tributary within the western Lake Erie Basin, was subjected to land improvements and studied to assess sediment loading, E. coli, and nutrient removal using an engineered ecological system. Within the watershed, a riparian habitat and wetlands were restored to reduce bacteria and nutrients entering Lake Erie through a two-stage process. An upstream sedimentation basin (Phase I) removes bed sediment and sand-sized particles and downstream treatment wetlands (Phase II) trap nutrients and bacteria in a soil-rock substrate. In three years since construction, monitoring data indicate significant reductions in suspended sediment, E. coli, total phosphorus, and dissolved phosphorus. This supports the hypothesis that riparian habitat improvements and wetland restoration can be used throughout the Great Lakes watersheds as viable, cost-effective options for reducing nonpoint source contamination relative to traditional treatment technologies. Additional resources could assist with identifying and developing similar projects within watersheds of the Lake Erie Basin.

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Title: What we know about engaging farmers in watershed-scale water quality initiatives
Author: Joe Bonnell, The Ohio State University
Biography: Joe Bonnell is Program Director for Watershed Management in the School of Environment and Natural Resources at OSU. He has been working to help build capacity of watershed project leaders since 1996.
Abstract: Agricultural land is a major contributor to nutrient loads in the Great Lakes and Mississippi River basins. This presentation will share findings from a review of the literature and interviews with watershed project leaders on keys to engaging farmers as partners and leaders in watershed management to reduce nutrient loads in the Mississippi River basin. Lessons apply to all watersheds in Ohio where agriculture is a major contributor of nutrient runoff.

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Title: Ohio EPA Partnering for NPS Implementation Strategies
Author: Rick Wilson, Ohio EPA
Biography: Rick Wilson has more than 23 years of experience within the Division of Surface Water at Ohio EPA. Since 2008, Rick has been the technical lead and agricultural expert in DSW's §319 Nonpoint Source Grants Program and has served as the technical contact for multiple §319, SWIF and GLRI funded projects—especially those associated with reducing agricultural nonpoint source pollution; AND the programmatic and technical lead for Nonpoint Source Implementation Strategies. In addition, Rick serves as the Division of Surface Water's liaison with agricultural stakeholders and related organizations throughout Ohio — and is filling in as the technical lead for the Ohio EPA's Concentrated Animal Feeding Operation (CAFO) program.
Abstract: U.S. EPA issued new guidance for the Clean Water Act Section 319 Nonpoint Source Program in 2013. This set Ohio on a path toward updated and improved watershed-based planning to help state and local partners better focus resources on solvable nonpoint problems. After a two-year process of Ohio Nonpoint Source Implementation Strategy (NPS-IS) guidance development, local partners have taken up the challenge and produced dozens of U.S. EPA approved "9-element" plans. Furthermore, Ohio EPA has been invited by U.S. EPA to aggregate these strategies to acquire additional Federal funding for nonpoint implementation that would not have otherwise been available to Ohio. This presentation will detail elements of this success story, and communicate specifics regarding the process and benefits of NPS-IS development by local partners.

Concurrent 1 (10:15) – Education

Title: Out of the Classroom and into the Field: Developing a Groundwater Study for a Reclaimed Strip Mine through a Partnership between Academia and the Business Community
Author: Elizabeth Kline, Zane State College
Biography: Dr. Kline is an Assistant Professor of Environmental Science, Safety, and Health as well as Division Chair for Engineering, Math, and Natural Sciences at Zane State College. She also owns and operates a consulting firm providing due diligence services.

Abstract: When academia and the business community collaborate in non-traditional ways, both benefit with engaged students learning real world skills and the community gaining a groundwater baseline study. Every year, Zane State College and the Wilds partner to provide a semester long, project-based learning experience focused on the groundwater quality of a reclaimed strip mine. Instead of employing the traditional lecture-lab model to learn hydrogeology, students learn concepts and skills in the field. Functioning as consultants for the Wilds, the students develop a plan to determine groundwater quality. The project begins with a conference with the client (the Wilds) to develop an understanding of the site history, the client's operations and concerns. Based on their analysis of the client's concerns, the students develop a sampling plan and proposal complete with a cost analysis. Once the client approves the project, the students sample the wells at the site and analyze samples in the field and in the laboratory, which includes learning chain of custody protocols. The students compile and interpret the data, create recommendations, and present the final product to the Wilds. Final steps included a reflection on the learning process and a final exam based on a real scenario from an Ohio Brownfield site. It is the belief of the author that this non-traditional, practical method increases student learning, participation, and confidence, and introduces business skills that all students need to survive in industry. In addition, the partnership provides a much-needed educational service to the community, free of charge. The presentation includes a discussion of the rewards and the challenges of this partnership as well as lessons learned over the past six years.

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Title: Time Savings with ESRI Collector for Stormwater Management

Author: Chad Boyer, MS Consultants, Inc.

Biography: Mr. Boyer serves as Project Engineer for ms consultants in Columbus, OH. At ms, Mr. Boyer designs water resources related projects, specializing in floodplain hydrologic and hydraulic analyses and storm water management projects.

Abstract: Data collection and asset management in residential areas can be challenging, especially in highly urbanized and densely populated neighborhoods. Advancements in mobile technology and the rise of cloud storage have provided new methods to make data collection more efficient and require less post processing of data once back in the office. Engineers and designers are no longer limited to traditional survey equipment, filling out paper copies of forms in the field and other collection methods.

During this presentation will offer a look at residential data collection using the ArcGIS Collector application, in conjunction with GPS enabled tablets. The presentation will analyze strengths and weaknesses, as well as lessons learned from experiences in the field. Various aspects of the collection process will be discussed: application development, user interface, data exchange between cloud and terrestrial servers, data post-processing, QA/QC. The wide breath of the data that was collected will also be explored.

This presentation will demonstrate the potential for cost and time savings by using a GPS enabled tablet to collect asset management features for residential areas. The use of other the Collector Application allowed a six person team to recently complete a 2000 home survey in two months. The presenters will convey the benefits and some pitfalls of the use of the application and collection methods.

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Title: Kinetics of a UV LED/H2O2 AOP Reactor and Potential for Application in a Net Zero Water Program

Author: John Stubbs, Air Force Institute of Technology

Biography: John E. Stubbs is a US Air Force Bioenvironmental Engineer currently pursuing his doctoral degree in Systems Engineering with a focus in environmental systems at the Air Force Institute of Technology.

Abstract: This work examined the viability and applicability of ultraviolet (UV) light emitting diodes (LED) and hydrogen peroxide (H2O2) in an advanced oxidation process (AOP) in support of a USAF net zero water initiative. A bench-scale reactor utilizing UV LEDs as an energy source in a UV/H2O2 AOP was used for the degradation of 11 organic chemical compounds. There was a linear relationship between the input drive current, optical output power, and the apparent first order degradation rate constant, consistent with first principles from quantum mechanics. When the drive current was systematically varied, the apparent first order degradation rate constants depended on the identity of the chemical pollutant and the drive current, and were between 0.003 min-1 - 1.078 min-1. When the molar peroxide ratio was systematically varied, the kinetic profiles revealed either peroxide-limited or radical-scavenged phenomena, consistent with existing literature. Accounting for molar absorptivity helped to explain the shape of the removal profiles associated with some of the chemicals. The study further utilized the observed degradation kinetics of the compounds to compare fit with molecular descriptors from published quantitative structure property relationship (QSPR) models developed with traditional mercury lamp AOP data. A new QSPR model was also built using zero point energy and molar absorptivity as significant predictors. Finally, a

systems architecture view was used to describe a net zero water program at a hypothetical USAF installation and proposed areas within the program where UV LED/H2O2 AOPs might be paired with other technologies in order to treat water. Facility-level treatment for recycling of wastewater was found to be the most feasible near-term application. This research is the first UV LED-based AOP study to identify linear power-kinetics relationships, determine optimum molar peroxide ratios, and reveal the complex role of molar absorptivity in shaping the speed and extent of treatment.

Concurrent 2 (10:15) – Drinking Water

Title: Visualizing the effects of changes in reservoir gate operation
Author: Branden Von Ins, USGS
Biography: Branden is a hydrologist with the USGS who began his career in 2010. He graduated from Ohio University with a bachelor's degree in civil engineering.
Abstract: It can be difficult to predict the real-world hydraulic and water-quality effects of changing a reservoir gate operation. One approach to better understanding these effects is to collect hydraulic and water-quality data before and after a gate operation is changed and then create spatiotemporal visualizations of the differences. The U.S. Geological Survey, in cooperation with the City of Columbus, did a study in 2015 to measure hydraulic and water-quality conditions in Hoover reservoir before and after changing the gate, and consequently the depth, from where water was released from the reservoir. One goal of the study was to provide information that could possibly be used to help control late season algal blooms in the reservoir. While water was being released out of the reservoir from the middle of the water column, an acoustic Doppler current profiler (ADCP) was used to measure velocity and an autonomous underwater vehicle (AUV) was used to measure water-quality (temperature, conductivity, pH, dissolved oxygen, turbidity, chlorophyll, and phycocyanin). The City then changed the gate operation so that water was released from near the bottom of the reservoir and a second set of velocity and water-quality data were collected. Both before and after data were plotted and mapped in a fashion designed to facilitate visualization of changes in the reservoir. One change observed was an increase in mixing across the thermocline (a layer in a thermally stratified body of water where the temperature changes more rapidly than the layer above or below it) that has the potential to increase the transport of nutrients between the hypolimnion (the layer below thermocline) and the epilimnion (the layer above the thermocline where algae typically grow). Releasing water through the lower gate showed the potential to reduce nutrients in the hypolimnion (where the concentrations of nutrients have typically been higher during summer months) by direct discharge through the gate and by mixing with water from the epilimnion. This enhanced mixing likely increased concentrations of nutrients in the epilimnion, which could lead to periods of increased algal growth.

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Title: Advanced Technologies help predict life of reservoirs
Author: Chris Weaver, City of Columbus - Division of Water and Charles H. Murphey, DLZ
Biography: As a Professional Engineer (PE) employed with the City of Columbus, Division of Water, C.R. provides project management for Capital Improvement Projects (CIP) for the Supply Group, which includes water treatment plants, reservoirs, and well fields. Currently, C.R. is working on preliminary design for UV Disinfection at the two surface water treatment plants for the City of Columbus and several reservoir improvement projects and studies.

Prior to working with the City of Columbus, C.R. worked in the private sector for seven years. C.R.'s private sector work provided him with an opportunity to demonstrate skills he obtained in the masters of science (M.S.) program at the Ohio State University.

C.R. lives in Westerville and is married to his delightful wife, Denise Weaver. Their daughter, Penelope, recently turned four years old and still keeps her father up some nights. C.R. enjoys most outdoor activities, primarily volleyball and swimming and spending time with his family.

Mr. Murphy has been with DLZ since 1984 and serves as the Ohio Survey and Right-of-Way Division Manager. He has 47 years of experience in surveying with 24 years in right-of-way plan development and acquisition. During this time, he has performed larger boundary surveys (up to 2,500 acres), recreational development surveys (up to 300

acres), and governmental retracement surveys (up to six square miles). Mr. Murphy also has extensive experience with numerous construction projects where he was the Project Surveyor in charge of all survey operations. He is a member of Professional Land Surveyors of Ohio and National Society of Professional Surveyors and has been a Professional Surveyor in Ohio since 1984.

Abstract: The City of Columbus has three on-stream reservoirs it utilizes to provide the City its water, namely Griggs, O'Shaughnessy and Hoover. Previous capacity studies performed in the 1990's provided area capacity curves and sedimentation rate evaluation based on those years' survey technologies and affordable hydrographic data collection.
Today's advanced technologies allow for massive amounts of hydrographic data to be collected with real time X, Y, and Z coordinates. With that, integrating available or acquired LiDAR mapping allows for the capacity volumes to be determined to an elevation above the normal reservoir pool more accurately than in the past.
The hydrographic surveys for the three Columbus reservoirs included bathymetric survey, determining sediment thickness, preparing topographic maps at two-foot contour intervals. Existing LiDAR mapping was used for the Griggs Reservoir survey due to that reservoir having very little fluctuation in its pool surface. Some conventional survey was required near the shoreline to blend the hydrographic survey data and LiDAR mapping.
LiDAR acquisition was performed at both O'Shaughnessy and Hoover Reservoirs strategically capturing the reservoir surface levels at low water; therefore, allowing the hydrographic survey to collect data above the LiDAR mapping which provided a seamless transition between the two data sets. DLZ computed the reservoir volumes utilizing TIN Subtraction, Grid and Average End Area methods. A report was prepared for each reservoir consisting of area capacity curves for the useful and full storage volumes, rate of sedimentation and estimated useful life, recommendations for actions to prolong useful life of the reservoirs and an electronic version for capacity determination from elevation input.
These studies reveal trends in water storage volumes and sedimentation patterns for the reservoirs and this information is vital in strategic decision making and prolonging the useful life of the reservoirs.

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Title: Improving Drinking Water Quality Using Granular Activated Carbon at the Westerville Water Plant
Author: Richard Lorenz, City of Westerville
Biography: Dick Lorenz holds an Ohio class 4 water operator certificate and has been the Water Utility Manager for the City of Westerville for the past 24 years. Prior to joining Westerville, he worked for the Columbus Division of Water as the Biological and Environmental Research Supervisor in their Water Quality Assurance Lab. He has a biology degree from Miami University and Masters of Science degree from Ohio State. He is a Broad Certified Environmental Scientist, has authored a variety of scientific publications, co-teaches a Harmful Algal Workshop at Stone Lab and is active in local, state, national and international professional organizations, including past president of the Ohio Dam Safety Organization and WMAO Board member. He also has the distinction of being a Water Buffalo.
Abstract: The City of Westerville Water Division recently completed a drinking water treatment facility upgrade that addressed two new U. S. EPA drinking water quality regulations. The planning phase investigated a number of options to reduce disinfection by-products and improve the microbiological safety. The technology chosen was secondary filtration using granular activated carbon pressure filters. Granular activated carbon has enabled Westerville to safely meet tighter Disinfection By-product Stage 2 rules and comply with the Long Term 2 Surface Water Treatment Rule that required Westerville to provide further treatment to address the protozoan Cryptosporidium, based on source water conditions. These and other water quality improvements achieved after the first year of operation will be presented.

Concurrent 3 (10:15) – Stream Restoration

Title: Designs that Drive the Success of Stream Mitigation Banks
Author: Joshua White, Civil and Environmental Consultants, Inc. (CEC)
Biography: Joshua White is a geomorphologist based in Columbus, Ohio for Civil & Environmental Consultants, Inc. (CEC). He received a M.S. in Geomorphology from West Virginia University and a B.S. in Geology from Northern Kentucky University. Josh worked in ecological restoration for a decade in North Carolina before moving back closer to home. Josh fell in love with rocks and streams at an early age on his parent's farm in Kentucky.

Josh's first experience with stream design; as a child; was stacking stones in the creeks. His education continued as he rode his horse around his home state – noticing differences within the landscapes and wondering about the types of processes that had sculpted them. Josh later found out that he could make a career out of restoring streams. He is a professionally licensed geologist, professionally licensed engineer, certified floodplain manager, and certified professional of erosion and sediment control and for the past fourteen years has worked in all aspects of ecological restoration.

Abstract: The fundamentals of stream restoration design can be complicated, and the execution of the plan a challenge. Despite these impediments, cost effective and constructible stream restoration designs can be accomplished through rapidly evolving technologies. Data acquisition with aerial and terrestrial LiDAR can produce economical but highly detailed information on existing conditions suitable for accurate designs. The AutoCAD Civil 3D design platform creates three-dimensional natural channel designs that dynamically and inherently link the pattern, profile, and dimension of a stream, allowing a designer to make iterative changes with instantaneous and accurate three-dimensional updates. GPS guided construction equipment optimizes the execution of the design by taking the AutoCAD drawings into the cabin of the excavator minimizing error and reducing construction cost. Other technologies such as Small Unmanned Aerial Mapping Systems (sUAS) or drones have provided opportunities to improve designs and document as-built conditions. In conclusion, a well-planned design using these technologies can expedite the permitting process, provide cost-effective restoration, and improve ecosystem functions.

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Title: Depaving Paradise: Community based partnerships to improve water resources

Author: Jane Goodman, Cuyahoga River Restoration

Biography: Jane Goodman has been with Cuyahoga River Restoration, formerly known as the RAP, for eleven years, first as Director of Outreach and Education and for the last six years as its Executive Director. During that time her programs have twice been named Outstanding Projects by the Ohio Environmental Education Fund. She studied film and journalism at Northwestern University, and after a first career in television, advertising, and radio production she moved back to Cleveland and began two second careers, one environmental and the other governmental. She served as media director for northeast Ohio's Earth Day '90, then continued at Environmental Health Watch, Cleanland Ohio, and in 2006 joined Cuyahoga River Restoration. That same year she was elected to City Council in South Euclid, a Cleveland suburb, where she now serves as Council President. She is also a member of the National League of Cities Energy, Environment, and Natural Resources Federal Advocacy Committee.

Abstract: Depaving parking lots is a green infrastructure strategy that can engage the public, and property owners, in projects that create distributed stormwater storage and filtration sites throughout communities and raise awareness of the benefits of replacing grey with green. The session we propose for WMAO would present a case study of Cuyahoga River Restoration's DepaveNEO program, team leader training, and pilot project, highlighting the partnerships that are essential to bringing these watershed restoration projects to fruition. DepaveNEO projects engage partners at many levels, which is what makes it effective, attractive to participants, and sustainable. With Ohio Environmental Education Fund support, CRR has trained dozens of project leaders from across Northeast Ohio who are now equipped to plan and implement volunteer-based projects that remove sections of parking lot and replace them with bioretention features. The training that included a series of weekly evening workshops culminated in a pilot project where forty trainees from a wide variety of organizations and municipalities removed paving and planted rain gardens at Mayfield Heights' community center.

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Title: Partnering to protect Ohio's giant salamander, the Eastern Hellbender

Author: Gregory Lipps, The Ohio State University

Biography: Gregory plans, executes, and monitors a variety of projects throughout Ohio related to the conservation and recovery of amphibians and reptiles. Position is supported by the Ohio Division of Wildlife through Ohio State University's Ohio Biodiversity Conservation Partnership. Current projects include: implementing the Ohio Conservation Plan for the Eastern Hellbender; coordinating the Ohio Hellbender Partnership; surveying, monitoring, and identifying conservation opportunities for the Eastern Massasauga; and, developing conservation plans for Ohio species of conservation concern.

Abstract: The Eastern Hellbender is one of the world's largest amphibians, and also one of the most ancient. Found in streams and rivers in the Ohio River watershed of the state, this completely aquatic salamander lives under large rocks and feeds on crayfish and other aquatic organisms. Surveys conducted from 2006-2010 found an 82% decline in the relative abundance of Hellbenders since the mid-1980s, with most populations showing no signs of recent

successful recruitment. Individuals representing a diverse group of agencies and organizations have come together to form the Ohio Hellbender Partnership, and are working to reverse this decline through a combination of head-starting, habitat protection, and restoration. Threats to Hellbender habitat are diverse and challenging, ranging from sedimentation of streams to issues related to Ohio's shale gas boom. Success in mitigating these threats requires addressing the root of the problem – people and the decisions they make – not simply the ecology of the salamander and its habitat.

Concurrent 1 (1:30) – Fisheries and Fish Ecology

Title: Growth Potential and Mortality of Largemouth Bass in Lake Erie's Western Basin
Author: Alex Benecke, Ohio Division of Wildlife
Biography: I am the OSU Fisheries research associate at the ODOW's Sandusky Fisheries Research Station.
Abstract: Over the past decade, a strong increase in angler effort targeting Largemouth Bass in Lake Erie's western basin has become apparent. This increasing popularity among Lake Erie anglers has led managers to seek additional information about this species' population dynamics and consider regulatory changes. Currently, little information about Lake Erie's Largemouth Bass population is available to inform such management decisions. To bridge this knowledge gap, we collected Largemouth Bass and estimated annual mortality and growth potential. One hundred and thirty-two fish were collected via nighttime electrofishing at 12 nearshore sites between Toledo and Huron, Ohio. Otoliths were used to estimate age and back-calculate growth histories of individual fish. We estimated total annual mortality using the Chapman-Robson method and fit a von Bertalanffy growth model to individual back-calculated length-at-age data using a nonlinear mixed-effects model. Largemouth Bass captured during this study were between 1 and 8 years old with a median age of two years. The mean asymptotic length for both sexes was estimated at 425mm (95%CI, 410-440mm). We estimated a total annual mortality rate of 0.45 (95%CI, 0.32-0.56). This relatively low annual mortality may be attributed to a high angler release rate or favorable environmental conditions.

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Title: Understanding the effects of altered visual environments in Lake Erie fishes.
Author: Chelsey Nieman, The Ohio State University
Biography: Chelsey Nieman is a doctoral student in the School of Environment and Natural Resources at The Ohio State University under Dr. Suzanne Gray. She is interested in the effects of human induced rapid environmental changes on fish physiology, with a particular emphasis on sensory systems and vision. Her research is currently focused on the effects of turbidity in the form of algal blooms and sediments on vision in Walleye and Emerald Shiner. She holds a master's degree in Marine Biodiversity and Conservation from Scripps Institution of Oceanography.
Abstract: Changes to the underwater visual environment due to increased turbidity are expected to result in disrupted visual ecology and are hypothesized to lead to community-level shifts in the Lake Erie ecosystem; however, the proximate mechanisms underlying such shifts remain to be investigated. Our objective was to determine the effects of elevated turbidity on visual ecology of native Lake Erie fishes. Turbidity influences visual abilities differently within and across trophic levels (e.g. planktivores *vs.* piscivores) and across different types of turbidity (e.g. algal *vs.* sedimentary). We therefore analyzed the effects of increased algal and sedimentary turbidity on visual acuity in two Lake Erie fishes, a forage fish, Emerald Shiner (*Notropis atherinoides*), and a top predator, Walleye (*Sander vitreus*). Emerald Shiner (n=40) and Walleye (n=14) were found to have decreased reaction distance across all types of turbidity relative to clear treatments, meaning they had to be closer to their prey to detect it. Preliminary analysis of foraging experiments with Emerald Shiner (n=10/treatment) indicate decreased consumption of prey items (e.g. *Daphnia magna*) at high levels of turbidity (NTU=40), with the greatest level of prey consumption occurring at moderate sedimentary turbidity (NTU=20), while all levels of algal turbidity resulted in decreased consumption of prey. Our study provides evidence of altered foraging in turbid environments based on loss of visual cues in the water column, with algal turbidity causing disruptions at a lower level of turbidity. This study will increase understanding of how fish populations respond to increased anthropogenic turbidity in the Lake Erie ecosystem.

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Title: Big Darby Creek Water Quality Survey – A Story of Successful Action
Author: Andrew Phillips, Ohio EPA
Biography: Andrew Phillips is an Environmental Specialist 2 with the Ohio Environmental Protection Agency in the Division of Surface Water in the Ecological Assessment Section. Specifically, Andrew is part of the Fish Evaluation Group. The Ecological Assessment Section (EAS) conducts biological monitoring in streams and rivers throughout Ohio to assess overall integrity and condition of these water resources. Andrew is a relative newcomer to the agency, having started full time in 2013. Previously, Andrew was an intern with the agency in the Fish Evaluation Group. He graduated with honors from the Ohio State University School of Environment and Natural Resources in 2013 with a bachelor's degree in Forestry, Fisheries, and Wildlife with a specialization in Fisheries Science. Andrew also received an associate's degree in Environmental Science from Ohio State's Agricultural Technical Institute.
Abstract: On March 31, 2006, USEPA approved the Big Darby Creek TMDL establishing load allocations to address causes and sources of pollution identified during the 2001-02 watershed survey. In 2014 an integrated biological, physical and chemical survey of the watershed was conducted in order to measure progress towards achieving the goals of the TMDL. Discussion of the survey results, with an emphasis on improvements to the fish community, will reveal how action by a wide range of partners in this watershed have produced improved results.

Concurrent 2 (1:30) – Waste Water

Title: Environmental Dashboard: Using real-time public display of resource use to foster connections & empower stewardship
Author: Ben Hobbs, Oberlin College
Biography: Ben Hobbs is the facility manager and community outreach coordinator for the Adam Joseph Lewis Center at Oberlin College. He is responsible for the day-to-day operations of this early example of ecological design and architecture, whose features include a 160 kW solar array, an onsite Living Machine (waste water treatment facility), and a meticulously designed sustainable landscape. Prior to joining Oberlin College, Ben was the Director of Operations at Bold Alternatives, a solar EPC firm, and a high school science teacher, soccer, and lacrosse coach at University School in Hunting Valley, Ohio.
Abstract: Early humans experienced intimate and continuous feedback from the natural world that informed and constrained decision-making and helped individuals see themselves as part of larger wholes. Today the natural systems are largely out of sight and therefore out of mind. Psychological and physical separation defines our experience with the natural world on which we depend. At the same time human influence over the environment has expanded from local to regional to global. This talk will tell the story of how technology is being used to create a form of "eco-feedback." "Environmental Dashboard" provides three scales of feedback: 1) "Building Dashboard" delivers socially, environmentally and economically comparative information on resource consumption in buildings; 2) "Citywide Dashboard" is a conceptual model animated with real-time data to provide feedback on water and electricity flows and environmental conditions in whole cities and organizations; 3) "Community Voices" combines images and words drawn from the full diversity of colleges and the larger communities they inhabit to celebrate thought and action.

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Title: Microbial Ecology of Sand Bioreactors for Aerobic Treatment of High Salt Content Wastewater
Author: Kristen Conroy, The Ohio State University
Biography: Kristen is a lecturer and PhD student in the Department of Food, Agriculture and Biological Engineering at the Ohio State University. She received her BS in Ecological Science from Elon University and a Masters in Biological Engineering from OSU.
Abstract: Several industries in Ohio produce high salt content wastewater, such as pickling, tanneries, and meat curing industries. Globally, the wastewater from the seafood industry and sea water sewage also contain high salt content and require treatment. Sand bioreactors offer a low-tech solution to aerobic wastewater treatment. This technology consists of three layers of media as 15 cm of gravel, 15 cm coarse sand and 46 cm of fine sand. In a lab scale study, 14 cm diameter sand bioreactor columns were dosed with turkey processing wastewater with 0, 6, 13 and 35 g/L added NaCl. Marine sediment was used to inoculate the sand bioreactors treating 35 g/L added salt wastewater because this salt content is equivalent to that of seawater. High organic matter removal (COD/TOC) was observed at all salt levels. After a 4-7 week acclimation period, sand bioreactors effectively removed ammonia for

several weeks to several months at the varying salt levels. One way to better understand the operation of these treatment systems is to study the microbial ecology. To do this, sand samples were taken during the first four months of operation and were DNA sequenced (16S rRNA genes). Different microbial phyla and genera were dominant in different sand bioreactors in relation to the salt content of the wastewater being treated. Several halotolerant, marine genera were dominant in the 35 g/L filters. Zoogloea, a microbe associated with traditional activated sludge wastewater treatment, was dominant in the control sand bioreactors. Richness and total observed taxonomic units (OTUs) decreased as salt levels increased, however treatment efficiency was high for all sand bioreactors during a portion of the sampling period.

Title: Innovative Planning and Design at the Miamisburg WRF for Compliance and Wet Weather Improvements
Author: Steven Reese, Hazen and Sawyer
Biography: Steven Reese is an Associate Engineer with Hazen and Sawyer in their Cincinnati, Ohio office where he has been for over 12 years. He is a registered professional engineer in Ohio. Steven earned a Bachelors degree in Civil Engineering and a Masters degree in Environmental Engineering both from the University of Cincinnati. His areas of focus are wastewater treatment plant planning and design, biosolids management, and preliminary treatment. He is an active member of WEF, serving on the Ohio Water Environment Association biosolids committee and locally as President of the Southwest Section Executive Committee.
Abstract: The City of Miamisburg owns and operates the wastewater collection system, pumping stations, and Water Reclamation Facility (WRF). The WRF was originally constructed in 1965 with several upgrades until the most recent in 2001 which increased the treatment capacity to 4 MGD.

The City's system has been challenged by high flows during wet weather events and at times, basement backups and sanitary sewer overflows. The City recognized these issues and teamed with Hazen and Sawyer to develop a General Plan, System Evaluation and Capacity Assurance Plan and No Feasible Alternatives Analysis Reports. These evaluations identified the lower cost target level of control and balance of additional treatment capacity at the WRF with collection system equalization volume. The City then proceeded with design of these challenging WRF improvements including capacity of sustained wet weather flows of 15 MGD for a 4 MGD permitted facility.

In 2014, the City and Hazen and Sawyer began preliminary design engineering of the WRF improvements. The design work incorporated evaluations and recommendations from the General Plan, SECAP and NFA reports as well as condition assessments to confirm proposed improvements will provide reliable treatment in the future. Recommended improvements from the initial evaluation totaled $24M at the WRF in excess of available funds. Wet weather capacity, hydraulics and solids handling were given highest priority in further evaluation of the design to maintain the overall capital cost within the affordable budget.

This presentation will cover the innovative planning for WRF improvements, currently in construction, to improve daily compliance as well as plant performance for wet weather conditions. It will also cover design challenges encountered and unique design implemented to address limited treatment capacity for high wet weather flows.

Concurrent 3 (1:30) – Nutrient Management

Title: Contribution of Soil Erosion to Ohio Agricultural Surface Runoff Phosphorus
Author: Shane Whitacre, The Ohio State University
Biography: Shane Whitacre earned is Bachelors Degree in Environmental Science as well as his Masters degree in Soil Science from The Ohio State University. He Contributes to research focused on risk assesment of contaminants as well as nutrient runoff.
Abstract: While reduced tillage in Ohio agriculture has resulted in substantial reductions in erosion, there is still room for improvement. Total Ohio surface phosphorus runoff is the sum of runoff dissolved P and runoff particulate bound P. Particulate bound surface runoff P is directly related to soil erosion. Examined is how much soil sediment is in the runoff and how rich in P the sediment is. Soil Erosion is an important parameter considered in the Ohio P Risk Index. The Ohio P Risk Index is intended to provide a field-scale estimate runoff P risk, based

on field characteristics and farmer management. Presented is how these factors are measured, their possible range in Ohio agriculture and how they are quantified in the Ohio P Risk Index.

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Title: Revised Ohio Phosphorus Risk Index
Author: Elizabeth Dayton, The Ohio State University
Biography: Dr. Dayton is a Soil Scientist at The Ohio State University.
Abstract: The revised Ohio Phosphorus Risk Index is intended to provide a field scale estimate of surface and tile phosphorus runoff risk based on field characteristics, soil phosphorus levels and farmer management practices. It is an integral part of nutrient management plans. Presented will be an overview of findings and tool functions and how information can be used quantitatively to achieve target reductions in P runoff regionally or state-wide. Increasingly the Ohio phosphorus risk index is being used to judge farmer performance so we have to get it right.

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Title: Nutrient Mass Balance for Selected Ohio Watersheds
Author: Dale White and Josh Griffin, Ohio EPA
Biography: Both Josh Griffin and Dale White work in the Division of Surface Water at the Ohio Environmental Protection Agency. Josh has Bachelor and Master of Science degrees from Ohio State University in bioenvironmental engineering. Dale has a PhD in physical geography from Penn State University and a MS in environmental engineering from Ohio State University. He is also a PE and GISP.
Abstract: A nutrient mass balance was completed for seven watersheds in Ohio covering 63 percent of the state's land area. The watersheds studied were in both the Lake Erie and Ohio River drainages. The objective of the study was to determine nutrient (phosphorus and nitrogen) loads and relative proportions of point and nonpoint sources. The study highlights differences between the watersheds both as total loads and relative contributions from different sources in the watersheds. The study identifies opportunities for data collection and new approaches that can refine future analysis on a biennial basis.