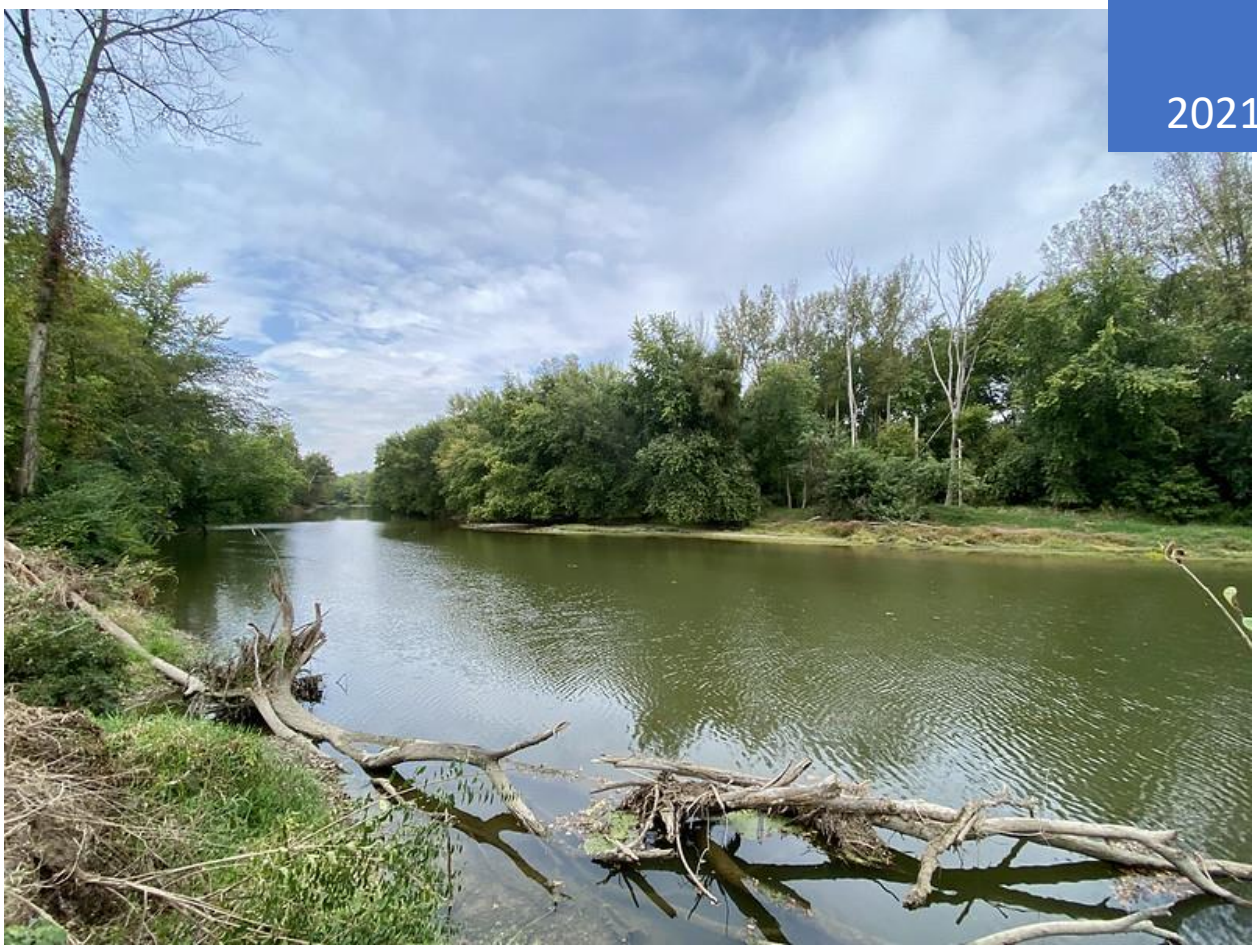
2021



50th Annual Water Management Association of Ohio Conference

PROCEEDINGS

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Wednesday, November 3, 2021

1: 15 – 2:45 pm

Ohio Dam Safety Organization

90 Years of Change: The Lower Guard Wall at the Charleroi Locks and Dam (Timothy Hampshire, DLZ Ohio, Inc.)

Biography: Mr. Hampshire received his Master's Degree in Civil Engineering from the Ohio State University in 1997 and is currently the Director of Water Resources at DLZ. His professional focus is on dam safety especially as it pertains to children around dams.

Abstract: The Monongahela River Locks and Dam No. 4 facility (commonly referred to as Charleroi Locks and Dam) is situated on the right bank of the Monongahela River, approximately 20 miles south of Pittsburgh. Since its original construction by the US Army Corps of Engineers in the 1930s the facility has undergone several major renovations, including the on-going work to increase the size of the dual lock chambers to accommodate modern shipping traffic. These renovations have resulted in numerous different loading conditions that the original timber pile supported concrete structures were not designed to withstand, and which would have likely led to unsatisfactory performance or failure of the structures had they not been modified and reinforced accordingly

This presentation will focus on a specific section of the facility's lower guard wall, which has been subjected to significantly varying loading conditions over the past approximately 90 years and is now scheduled for demolition in late 2021. This includes loads resulting from the guard wall previously functioning as a portion of a cofferdam system (for certain phases of the lock and dam renovation work) and currently acting as a portion of the dam across the Monongahela River. With limited original as-built drawings and other information to go by, complex and creative geotechnical and structural measures, including high-capacity H-pile underpinning and inclined rock anchors installed underwater, were modeled, and designed.

Subaqueous Construction Ohio River Lock and Dam (William Walton & Andy Baxter, GEI Consultants)

Biography: Bill is a licensed civil and structural engineer in 21 states, including Ohio, and has significant experience in the geotechnical and structural design and construction of dams, deep shafts, tunnels, hydroelectric facilities, and embankments.

Abstract: A hydroelectric generating plant (Racine Dam) on the Ohio River near Racine, Ohio. This hydroelectric project was constructed by Appalachian Power Company in cooperation with the Federal Energy Regulatory Commission (FERC) under License Number 2570, dated 27 December 1973, on the Ohio River. In 2016, the structure was suddenly compromised, and AEP took immediate steps to slow a possible progression. GEI was responsible for providing interim risk reduction measures as well as full

design and construction services with expected resource-loaded scheduling, quality control of design, and construction oversight. GEI also participated in public outreach and stakeholder involvement.

The project is now complete and undergoing baseline monitoring. More than 100 GEI employees from over 20 offices have been involved in the project over the four-year design and construction, and there were typically three to four GEI employees on site each day working on the project.

GEI worked with both the U.S. Army Corps of Engineers and the FERC to work toward completing the design through construction of the dam on the Ohio River to under two years. Design elements included over water drilled shafts, underwater concrete placement, a secant cutoff wall, and mass concrete, as well as temporary works. Many challenges were encountered during the design and construction of this project. The presentation will provide a summary of the challenges and a discussion of how they were overcome.

Lockington Dam Right Wall Drain System and Concrete Repair Project (Barry Puskas, Miami Conservancy District)

Biography: Barry Puskas is the Chief of Technical and Engineering Services for Miami Conservancy District (MCD) in Dayton, Ohio. Mr. Puskas provides MCD with technical expertise in H&H modeling, GIS, and design and analysis of dam and levee safety projects.

Abstract: The Miami Conservancy District (MCD) owns and maintains five large earthen dry dams, 55 miles of levee, and 35 miles of improved channels in southwest Ohio. The integrated flood protection system was completed in 1922. Lockington Dam is the furthest upstream dam on Loramie Creek in Shelby County approximately 5 miles north of the City of Piqua. The dam is an earthen embankment with a fine-grained core with a granular shell and a massive concrete outlet works. The concrete walls are up to 84 feet tall and 40 feet thick at the base sitting on bedrock. The walls have numerous horizontal and vertical construction/contraction joints. The concrete structure has had previous repairs and more recently displaying visible surficial deterioration. MCD has implemented several design elements at Lockington Dam Right Wall to repair the concrete and control drainage collecting behind the walls. Construction at the dam was completed in 2021. MCD has collected numerous photographs during construction to document the effort and findings of this dam repair project.

Ohio Lake Management Society

Restoring the Water Quality of Chippewa Lake (Isaac Smith, Medina County Park District)

Biography: Mr. Smith is a parks professional with more than 15 years' experience and holds a BA from Youngstown State University and a MA from The University of Akron.

Abstract: At more than 300 acres, Chippewa Lake is ecologically significant as Ohio's largest inland glacial lake. It has been a recreational amenity for more than 100 years and was purchased by Medina County Park District in 2007. In recent years, the park district has observed harmful algae blooms, and high E. coli following heavy rainfall. This presentation will cover past measures taken to manage these issues, and current efforts to resolved them through ecological restoration and the support of the State of Ohio's H2Ohio program.

Advancing Stormwater Management at Marinas in the Great Lakes (Heather Sheets, Ohio Department of Natural Resources/ Ohio Clean Marinas)

Biography: Heather Sheets is the Ohio Clean Marinas Program Coordinator. Sarah Orlando is the Ohio Clean Marinas Program Manager and Paul Dravillas is the Ohio Clean Marinas Program Administrator.

Abstract: The Ohio Clean Marinas Program is part of a multi-state project, Advancing Stormwater Management at Marinas in the Great Lakes, that developed an online toolkit with a suite of marina-specific resources on stormwater. As part of this toolkit, the project team created a decision support tool (DST) that will help marinas select the most appropriate green infrastructure (GI) practice for their site to manage stormwater, reduce nutrient and sediment loading, and stabilize shorelines of the Great Lakes. The DST will guide marinas through the process of selecting and installing GI through long-term management of the facility. Also, as part of the project, Ohio Clean Marinas developed the Ideal Clean Marina Virtual Reality tool to help marinas visualize how stormwater best management practices can be implemented in a marina setting. Finally, an on-the-ground demonstration project of green infrastructure was installed and monitored at an Ohio Clean Marina. Join us to learn more about this project, the resources available, and ways to partner with the Ohio Clean Marinas Program to help increase the adoption of stormwater BMPs at marinas across Ohio.

New Approaches for the Portage Lakes: Plan, Partnership, and Plants (Maia Peck, Northeast Ohio Four County Regional Planning and Development Organization)

Biography: Maia Peck has been an environmental planner for 30 years and a watershed planner at NEFCO since 2003. She brings technical expertise and the broad perspective of a planner to balancing human uses and water resource protection.

Abstract: The Portage Lakes Management effort is a new, evolving approach to manage multiple uses on the Portage Lakes, a chain of eutrophic urban lakes in a state park, south of Akron and the Ohio River-Lake Erie divide. They are a regional recreational and economic resource, with 300,000 visitors annually; support thriving communities, and are managed for flood control and flow transfer between the drainage basins. Sustaining the health and multiple uses of urban lakes is a challenge. Dense aquatic vegetation from decades of nutrient loading is essential for lake health but a nuisance to residents and boaters, and clogs control structures. Many organizations are involved in individual aspects of the lakes and park but are limited by scope, budget, time, resources, and technical background. A coordinated approach is needed to manage the complex lakes system. Over the past five years, a multi-disciplinary partnership has built a shared understanding of the lakes and lake management, developing a holistic management plan to address lakers concerns while maintaining the lakes' health. A focus is aquatic plants management within the context of the lakes system. Challenges include: establish a lakes management program, with monitoring, resources, coordination, community involvement; evaluate alternatives; and logistical aspects of plant and lakes management. The partners are the strength of the effort, sharing information and resources, up to the challenges, and eager to get to work.

Ohio Floodplain Management Association

Hazard Mitigation Assistance Grant Update (Jacob Hoover, Ohio Emergency Management Agency)

Biography: Mr. Hoover is a graduate of Wrights State University, he is a Certified Floodplain Manager and American Institute Certified Planner. He is currently the supervisor of the Ohio Emergency Management Agency – Mitigation Branch, prior to coming to work for the State he was the Planning and Development Director for Miami County.

Abstract: This presentation will provide an update on the Hazard Mitigation Assistance Grant.

What to do about these dams? A case study for low-head dam removal on the Mahoning River. (Chad Boyer, ms consultants, inc.)

Biography: Mr. Boyer serves as the Water Resources Technical Services Manager for ms consultants in Columbus, OH. At ms, Mr. Boyer manages and designs water resources related projects. Specializing in stormwater management, asset management and floodplain hydraulic and hydrologic analysis for the past 15 years, Mr. Boyer has worked on projects in Ohio, West Virginia, Indiana, North Carolina and Pennsylvania.
Mr. Boyer holds Bachelor of Science Degree in Civil and Environmental Engineering. He is a Certified Floodplain Manager and Professional Engineer.

Abstract: The presentation will cover the development and results for a case study of a 20-mile section of the Mahoning River and the removal of 4 low-head dams in the area.

What's in a LOMR? That Which We Call an MT-2 Would Smell as Sweet (Mark Seidelmann, Stantec Consulting Services, Inc.)

Biography: Born and raised in Columbus, Mark received an Undergraduate and Master's degree in Civil Engineering from The Ohio State University. He has spent the majority of his career working with Federal and State agencies to model, map, manage, and communicate their flood risk. He has extensive experience with hydrologic and hydraulic modeling, floodplain mapping, and Flood Insurance Study creation for thousands of miles of streams across the country. In addition to his hydrologic and hydraulic expertise, Mark has worked with FEMA headquarters and several regions to evaluate and update Risk MAP program guidelines and standards. His duties included authoring several Flood Insurance Studies (FIS), attending and facilitating numerous FEMA outreach meetings and resolving protests and comments from local officials.

Abstract: For a community to participate in the National Flood Insurance Program (NFIP) they agree to adopt certain floodplain management ordinances intended to reduce future flood losses. As part of this they are responsible for approving all proposed floodplain development. The community is also responsible for submitting data reflecting revised flood hazard
information to the FEMA, so that NFIP maps can be revised as appropriate. This will allow risk premium rates and floodplain management requirements to be based on current data. These updates are made

through the submission of an MT-2 or Letter of Map Revision (LOMR) application. To assist the communities and applicants in understanding what is required in an MT-2 application FEMA has developed extensive instructions and guidelines and standards. In this presentation I will give an overview of these materials and discuss some common mistakes that are made within the MT-2 process.

3:15 - 4:45pm

Ohio Dam Safety Organization

Dam Removal in Ohio Process and Case Studies (Jonathan Scheibly, Stantec, Inc.)

Biography: Jonathan Scheibly, PWS, PE, has worked on dam removal and river restoration projects for 18 years in Ohio and across the United States. He is an engineer and ecologist, holding an MS Biology from Morehead State University, and a BS Civil Engineering

Abstract: Dams can have substantial ecological effects on rivers by modifying hydrology, interrupting sediment transport, and isolating populations of sensitive aquatic organisms. Many of these structures are decommissioned relics from previous water supply, navigation, or hydroelectric projects. With no regular maintenance, many dams are deteriorating, increasing risks to downstream resources over time. Ohio has approximately 1,420 dams, 450 of which are classified as high-hazard structures. ASCE's 2021 Infrastructure Report Card estimated the repair cost for the state's deficient dams at approximately $300 million, but the allocation of resources for dam upgrades is far less. Dam removal has become a viable alternative to structure repair, offering substantial savings in construction and operations/maintenance costs, as well as providing ecological lift to formerly impounded rivers.

Stantec has removed 10 dams in Ohio over the last 15 years, with several more in the Great Lakes region. This work has led to the development of a flexible approach to the process of dam removal from problem identification through implementation. Discussion of this process includes common issues to

consider, grant funding pursuit, permitting considerations, and removal approach selection. Discussion of case studies will illustrate practical applications of the process and lessons learned through several major projects in the State.

Kinsman Lake Dam Failure (Keith Banachowski, Ohio Department of Natural Resources)

Biography: Keith Banachowski is a registered professional engineer in the State of Ohio. He is currently a Project Manager with the ODNR, Division of Water Resources, Dam Safety Program.

Abstract: Kinsman Lake Dam was a 23-foot-high dam in Trumbull County, Ohio, which impounded a 9-acre lake. Beginning in 1992, periodic safety inspections identified several deficiencies with the dam including inadequate flood capacity. No significant repairs to the dam were made to the dam. On July 20, 2019, following a severe storm, the dam overtopped and catastrophically failed. The dam failure caused property damage and stranded several local residents for an extended period because the roadway on the dam embankment also served as the only access to their homes.

The presentation discusses the history of the condition of the dam and how the deficiencies contributed to the failure of the dam. An analysis of the storm provides rainfall intensities and estimates the magnitude of the flood event. A site investigation provides details about how the dam performed and the mechanism of failure.

Failure of the Fujinuma Dam During the March 11, 2011 Tohoku Earthquake (Daniel Pradel, The Ohio State University)

Biography: Dr. Daniel Pradel is Professor of Practice in Geotechnical Engineering at The Ohio State University. Previously he was Vice-President of Shannon & Wilson in California, and an Adjunct Associate Professor at UCLA. He holds a Certificate of Postdoctoral Studies from UCLA, a Doctorate from the University of Tokyo, and a Diploma from the Swiss Institute of Technology in Lausanne (EPFL). Dr. Pradel is a registered Geotechnical Engineer in California and Civil Engineer in several states. He has 30 years of practice in industry, and many of his projects were located in areas with high seismic demands. He has worked on projects located in four continents, including large dams, slope stabilizations using drilled shafts, regional transportation projects, and foundation designs. He has also performed numerous reconnaissance visits after major natural hazard events such as Earthquakes, Landslides and Hurricanes. He is a Fellow of the American Society of Civil Engineers, a Diplomate of the Academy of Geo-Professionals, an Associate Editor of the ASCE Journal of Geotechnical Engineering and Geo-Environmental Engineering, chair of the GI Awards committee and a member of several ASCE and DFI technical committees.

Abstract: The magnitude 9.0 (Mw) Tohoku Earthquake resulted in the failures of the two dams that impounded the small Fujinuma Lake, in Fukushima Prefecture, Japan. Several teams visited the site shortly after the failures and postulated mechanisms explaining the failure modes of the dams. This paper presents the detailed observations made at the site by the authors and the numerical dynamic analyses performed afterwards. The principal aim of this research was to determine the most likely failure mechanisms of each of the dams. Evidence of large downstream lateral movements and bulging were observed on both abutments, below the Fujinuma main dam. Furthermore, geomechanical numerical analyses predicted several yards of lateral displacement due to seismic shaking, i.e., a sliding failure with a corresponding large drop in the crest elevation. In our opinion, this drop rendered the

main dam vulnerable to overtopping which ultimately breached the dam. Additional numerical stability analyses also found that the Fujinuma saddle dam had a static factor of safety below unity under rapid drawdown conditions, and was therefore vulnerable to a rapid release of the reservoir water when the main dam was breached.

Ohio Lake Management Society

Hydrilla Control and Eradication Efforts in Ohio (Mark Waman, Cleveland Metroparks)

Biography: Mark Warman works on aquatic invasive plants at Cleveland Metroparks. Funding for the project comes from Ohio DNR and U.S. Fish and Wildlife via the Great Lakes Restoration Initiative.

Abstract: Hydrilla is recognized as one of the world's worst aquatic weeds yet many Ohioans are unaware of the plant, its habit, and the negative effects of an unmanaged infestation. Identification and common look-a-likes, new observations, and control efforts will be discussed. The more eyes on aquatics, the more resilient our region will be to aquatic invasive plant pressure.

Nitrogen Loading Trends for Several Lake Erie Tributaries at Multiple Temporal Scales (Nathan Manning, Heidelberg University)

Biography: Research Scientist NCWQR 2018-Present
Post Doc, U of Michigan, Allan and Scavia Labs, 2014-2018
Ph.D. U of Toledo, Mayer and Bossenbroek labs, 2013
M.Sc. U of Akron, Fraser lab, 2005
B.A. Wittenberg University, 2001

Abstract: Understanding nutrient loading patterns at short (seasonal), medium (annual) and long (multi-decadal) time scales is an important piece of any lake management strategy. This is of particular importance in large, eutrophic systems, like Lake Erie, where there are multiple tributaries, and land use and land cover (LULC) differences between the tributary watersheds. While phosphorus loading is generally the focus in Lake Erie, there is a growing interest in the role of Nitrogen as both a limiting nutrient and as a factor in the development of toxins. In this talk we present both short and long-term loading trends in Total nitrogen (TN), nitrate-nitrite (NO23), total Kjeldahl nitrogen (TKN) and ammonium (NH4) for several major tributaries of Lake Erie. These rivers are part of the Heidelberg Tributary Loading Program (HTLP), a long term, high frequency water quality monitoring program established in 1969 by Dr. Dave Baker at Heidelberg University, in Tiffin, OH. We used the Weighted Regression on Time, Discharge and Season (WRTDS) to analyze loading trends over multiple time scales. Results indicate that while there is significant inter- and intra-annual variation in nitrogen concentrations, the systems studied are generally trending lower, with some large reductions in concentrations seen at high discharge levels. Seasonal patterns have remained consistent, with watershed LULC type a good predictor of overall loading pattern.

Monitoring Harmful Algal Blooms in Ohio (Ruth Briland, Ohio Environmental Protection Agency)

Biography: Ruth Briland is the technical lead of the Emerging Contaminants section at Ohio Environmental Protection Agency. She has a doctoral and master's degrees from The Ohio State University studying aquatic ecology.

Abstract: Harmful algal blooms and the cyanotoxins that they produce pose a threat to drinking water sources and increase costs to the water system for monitoring, treatment, and waste disposal. Source water monitoring tools and plans are key to implement data-driven reservoir management and to determine the efficacy of bloom mitigation technologies. This presentation will provide a general overview of monitoring requirements for surface public water systems in Ohio and summarize trends in cyanobacteria and cyanotoxin occurrence.

Mineral Resource Management

The Panhandle Archaic (John Boilegh, Ohio Department of Natural Resources)

Biography: John Boilegh, Division of Mineral Resources Management staff archaeologist.

Abstract: A late Archaic prehistoric culture inhabited the upper Ohio valley approx. 3800 years ago. These people, the Panhandle Archaic, utilized the rich resources of the Ohio river to a great extent to insure their survival. We will take a brief look at those people and some of the ways that they made a living using the rivers ecology.

Hydrology of Coal Permitting (Laura Bibey, Ohio Department of Natural Resources)

Biography: Currently a Geologist 3/Hydrologist with ODNR-DMRM Coal Regulatory Program. Also provide hydrology assistance with Industrial Minerals and Abandon Mine Lands Programs within the Division.

Abstract: Permitting for a coal permit is an extensive process of water source documentation and sampling. All surface water bodies and groundwater sources must be located and identified. Background sampling is required for all surface water and 25% of groundwater sources. All of which must be reviewed and verified by the Division of Mineral Resources Management. Verification is achieved via field site inspection, data review and analysis, and sample collection and testing if necessary. After water data verification and issuance of the coal permit all data is then transferred to the Divisions water database for archival.

Continued monitoring is required throughout the life of the permit. Sample results are submitted to the Division monthly and quarterly depending on permit requirements. Sample results are automatically uploaded into the Divisions water database for storage and easy comparison to premising data. Should sampling results show impacts to water quality or quantity in the surrounding area of the permit; then required repairs and/or replacement is required and initiated. The Divisions Hydrologist is required to determine whether or not impacts have been sufficiently repaired and/or replaced.

Biological Recovery: AMD and Stream Restoration (Marissa Lautzenheiser, Rural Action)

Biography: Marissa Lautzenheiser is the Director of Northern Programs with Rural Action. After working with both USDA and ODNR, she joined Rural Action in 2012 as a watershed coordinator. She is a life-long resident of the Tuscarawas River Watershed.

Abstract: The Huff Run has been the focus of 20+ years of acid mine drainage monitoring and restoration efforts. Recently, the watershed also was the beneficiary of a stream restoration project. Learn about the biological recovery attributed to both approaches, and discuss plans for continuing to ensure recovery is sustained into the future.

Thursday, November 4, 2021

8: 30 – 10 am

Ecology

Updating Level 2 Macroinvertebrate Sampling Protocols (Christine Szymanski, Ohio Department of Natural Resources)

Biography: Christine Szymanski works for the Ohio Department of Natural Resources: Division of Natural Areas & Preserves. She is the Stream Quality Monitoring Coordinator for the Central Ohio region. She holds a Masters in Environment & Natural Resources.

Abstract: The Scenic Rivers program, with the assistance of Marty Knapp of Midwest Biodiversity Institute, developed a new Level 2 macroinvertebrate sampling method. The change addresses concerns with the previously implemented Macroinvertebrate Aggregated Index for Streams (MAIS) Level 2 method.

In 2017, Scenic Rivers staff began using Level 2 MAIS protocols, however it was not calibrated for the eco-regions or drainage areas of the Scenic Rivers. Therefore, in 2021 Scenic Rivers developed a new Level 2 protocol. The goal was multifaceted: Minimize the labor involved through adjustment of the sampling and identification procedures (thereby cheaper, increase distribution of understandable trend data to impacted communities, empower citizens through training volunteers to assist in sampling, share the new method with watershed groups throughout the state to supplement the staggered Level 3 sampling plan of Ohio EPA.

We modeled this method after the Ohio EPA's Natural Substrate Method completing qualitative sampling with a dip net. We looked through over thirty OEPA Level 3 samples of Scenic River sites to correlate the scores of ICI with how many families were present to create a baseline for future trend

analysis. For scoring, we modeled the index off of the Headwater Macroinvertebrate Field Evaluation Index (HMFEI) which focuses on presence/absence (verses abundance like the MAIS) which reduces the labor intensity of sampling and identification.

Cincinnati-Area Environmental Mitigation and Suitability Model (Margaret Minzer, OKI Regional Council of Governments)

Biography: Margaret is a Senior Environmental Planner at OKI Regional Council of Governments and manages the Greenspace Office. She has a Doctorate in Education Leadership as well as a background in Ecology and Geographic Information Systems.

Abstract: Ohio-Kentucky-Indiana Regional Council of Governments (OKI) is the Metropolitan Planning Organization (MPO) for the Cincinnati Area. OKI identified the need to identify potential mitigation project areas based on locally available data through the environmental consultation process. By providing more detailed mapping capabilities, OKI found an opportunity to support regional mitigation efforts. OKI worked closely with greenspace and area mitigation experts to better understand the end-user's criteria, including which geographic information systems (GIS) layers and analysis features should be included in the model. The new tool (we call the Environmental Mitigation Model) enables end-users to prioritize areas based on their unique requirements. The end-user would select the GIS layers that are relevant to their specific analysis and weigh the importance of each layer and view a map that calculated the priority areas for them. In addition to supporting identifying potential mitigation projects, local

conservation partners and local governments will use the new tool to prioritize where their conservation efforts should be focused. This session will discuss the development of the tool and provide a demonstration

Mapping Soil Salinity and Investigating the Variability of Soil and Water Salinity in the Mentor Marsh (Suresh Sharma, Youngstown State University)

Biography: Suresh Sharma is an associate professor in Civil and Environmental Engineering Program of YSU. his research interest covers both hydrologic analysis and water quality modeling. Dr. Sharma is also interested in flood modeling and climate change.

Abstract: Mentor marsh is a coastal estuary system, which has been experiencing increased levels of salinity from the early 1960s, especially after the placement of salt mine tailings near the marsh. Consequently, increased salinity has been causing dramatic vegetative change throughout the Mentor Marsh and leading to the rapid development of Phragmites australis. In this study, 10 monitoring stations were established within the Mentor Marsh to monitor the water salinity for few years. In the meantime, sporadic water salinity data was recorded at various locations of the marsh for several years. Similarly, 8 monitoring stations were established for recording soil salinity at various temporal scales. In addition, one-time soil salinity was measured across the marsh in more than 500 locations to develop the salinity contour and salinity gradient in the soil.

The analysis indicated that road salt application during the winter and spring seasons was the primary reason to increase the water salinity in the western basin of the Mentor, whereas the eastern basin salinity was primarily due to salt fill sites. Apparently, salinity from brine well field and salt fill sites seem to be more significant than the road salt. Presumably, the increased phragmites growth in the lower segment of the western basin of the Marsh is due to road salt whereas the phragmites growth in the eastern basin of the marsh is due to salt from salt fill sites. This study can be helpful to assist the stakeholders.

Ohio Watershed Professionals Association

Metroparks: Your Local Watershed Partner (Jennifer Griser, Cleveland Metroparks)

Biography: Jennifer Grieser is Director of Natural Resources for Cleveland Metroparks and chair of the Cuyahoga River Area of Concern Advisory Committee. Previously, Jenn worked for the NYC Dept. of Environmental Protection's Stream Management Program.

Abstract: When Ohio Revised Code established the state's Metroparks system over 100 years ago, the original vision was one of wildlife preserve or countryside getaway. Through the decades that followed, Park Districts evolved to provide an array of benefits to humans, wildlife and associated habitat. One area of particular emphasis includes watershed management. Managing more than 24,000 acres of land that fall entirely within the Lake Erie watershed, including well known tributaries, such as Rocky River, Cuyahoga River and Chagrin River, Cleveland Metroparks actively engages in a variety of watershed management activities. This presentation will describe Cleveland Metroparks' approach to watershed management and encourage the audience to get to know your local park district. It's likely they have

similar programs or may be interested in exploring new opportunities to enhance one of Ohio's most precious natural resources - our water.

Harroun Park Stream Restoration: Challenges in an Urban Setting (Deanna Bobak, Civil & Environmental Consultants, Inc.)

Biography: Deanna Bobak is a Project Manager for CEC, Inc. She is a watershed planner and the lead technical author for 40+ approved NPS-IS, working hand in hand with clients to build feasible, fundable projects that address water quality impairments.

Abstract: Tenmile Creek is a highly channelized stream flowing from agricultural headwaters through the City of Sylvania's Harroun Park to later form the Ottawa River. Channelization and urban development have altered the stream's morphology, and frequent, flashy flows have scoured its banks, causing lateral recession and the introduction of excessive sediments and associated nutrients into the aquatic system. An overly wide channel further exacerbates erosional issues in the stream, accelerating bedload deposition and transverse bar formation that directs shear stress along the streambanks. Within Harroun Park, the aquatic communities of Tenmile Creek are impaired due to excessive sedimentation. In 2019, the City of Sylvania received a grant from the Ohio Lake Erie Commission to utilize natural channel design techniques for stream restoration in an effort reduce sediment and nutrient contributions that eventually flow to Lake Erie. An initial concept included the placement of cross vanes and constructed riffles; however, the extent of surficial bedrock discovered during the existing conditions survey threatened the feasibility of structure placement. Bedrock and a highly constrained urban corridor presented unique challenges to the restoration, necessitating a complete redesign, locational changes and field fits to successfully install J-hooks, soil lifts and toewood to meet restoration goals and proposed sediment and nutrient reduction estimates without exceeding limited grant funds.

Tile Drainage Causes Flashy Streamflow Response in Ohio Watersheds (Sam Miller, The Ohio State University)

Biography: Sam Miller is a postdoctoral scholar at Ohio State University researching the effects of tile drainage on streamflow response.

Abstract: The impacts of artificial subsurface (tile) drainage has been researched extensively at the field scale, but knowledge gaps remain on how tile drainage influences streamflow response at the watershed scale. Daily streamflow was used to characterize both high flow and low flow stream responses under varying amounts of tile drainage across Ohio. Heavily-drained watersheds (> 40% of watershed area) consistently reported flashier streamflow behavior compared to watersheds with low percentages of tile drainage (< 15% of watershed area) across all metrics considered. The mean annual baseflow was about twice as high for watersheds with high percentages of tile drainage relative to those with low percentages of tile drainage. Looking at water quality management, stormflow runoff metrics in Ohio's heavily-drained watersheds were significantly positively correlated to western Lake Erie algal bloom severity. Management practices that reduce the streamflow response time following storm events, such as buffer strips, wetland restoration, or drainage water management, are likely to improve the downstream aquatic health conditions by limiting the transport of nutrients following storm events.

Ohio Stormwater Association

Avoid Vegetation Consternation: Proactive Vegetation Control in Regulated Stormwater Infrastructure (Christina Znidarsic, Davey Resources Group)

Biography: Christina Znidarsic is the Team Leader for Davey Resource Group's Design/Build Ecological Consulting Team and has worked in ecological restoration and stormwater management for over ten years.

Abstract: Many regulated stormwater features include vegetation whether by design or by aesthetics, but vegetation maintenance is often deferred or not considered necessary until it's become a problem. Adopting a proactive approach rather than a reactive approach to vegetation control not only streamlines and simplifies maintenance but also can provide cost benefits over time. Our presentation will provide case studies of vegetation control in stormwater features and show how proactive maintenance is an effective cost-saving strategy over reactive maintenance in a stormwater management program.

Effects of Land Use on Thermal Enrichment of Urban Stormwater and Mitigation of Runoff Temperature by Watershed Scale Stormwater Control Measures (Ian Simpson, The Ohio State University)

Biography: Ian is a PhD candidate in the department of Food, Agricultural, and Biological Engineering at OSU. Ian has high aspirations with the research he is conducting (mitigating urban stormwater pollution) and hopes to obtain a research professor position.

Abstract: Asphalt, shingled roofs, and other low albedo urban surfaces result in substantial heat transfer to stormwater runoff. Runoff from urban watersheds can spike or permanently increase stream and lake temperatures, thereby decreasing dissolved oxygen content. Stream biota are sensitive to changes in water temperature. Stormwater control measures are used in temperature-sensitive watersheds to control sources of thermal pollution. This work measured runoff temperature and thermal loads in urban watersheds with and without green infrastructure (GI) retrofits. The 13 watersheds monitored in the Dayton metro area were free of GI retrofits and were representative of a single, dominant land use. Land use and watershed imperviousness were correlated with runoff temperature and increasing imperviousness had a direct relationship with stormwater thermal loads. The season in which a storm occurred had a substantial impact on runoff temperature, but less of an effect on thermal load, highlighting the importance of runoff volume in the thermal load calculation. Half of the 6 monitored residential watersheds in Columbus possessed varying densities of retrofitted GI, allowing for direct comparisons of runoff temperature and thermal loads to untreated stormwater, across the same weather conditions. Results from this dataset suggest retrofitted GI can mitigate runoff temperature and thermal loads, primarily in the summer months, but cannot restore them to surrogate, pre-development conditions.

Importance of Soil Fertility within a DOTs Stormwater Management Program (Mark McCabe Mills, JEO Consulting Group)

Biography: Mark is a 1996 graduate from the Ohio State University and his background includes 30 years of experience in working in a consultant capacity with both public and private sector clients in multiple states. Mark's range of experience covers stormwater program management; stormwater and water quality research associated with linear transportation systems, stormwater run-off quality analysis; manual and specification development, watershed and drainage area studies, regulatory permitting (NPDES, SPCC, Industrial stormwater).

Abstract: As part of project delivery, DOTs need to establish stable slopes and exposed soil areas to address regulatory compliance requirements that include designing, installing and maintaining effective erosion and sediment controls, effective pollution prevention measures associated with sources found at active roadway construction sites (MS4 requirements) and locations where temporary and permanent site stabilization practices are expected, minimization of disturbances associated with steep slopes and limit exposed soil areas during project construction (construction general permit). The goal of this abstract is to provide information related to leveraging soil fertility information to support vegetation selection for both temporary and permanent project areas while addressing compliance with both the MS4 permit and the construction general permit.

The information presented in this presentation will provide guidance on an approach for using soil fertility information for establishing sufficient vegetative cover for exposed soil areas within construction projects. This information is also transferrable to DOT maintenance operations to address areas that need to be re-vegetated, repair small slope re-revegetation needs and to stabilize DOT maintenance projects that expose soil areas. Understanding the current soil fertility is a factor in determining vegetation cover options. Addressing soil fertility may also require DOTs to re-visit their current temporary and permanent vegetation cover options within their construction specifications. In addition, information in this presentation will provide an approach for DOTs to collect and analyze soil samples, establish landscape zones or regions, and develop a soil nutrient table based on DOT vegetation specifications.

The presentation will provide an overview of Nebraska Department of Transportation's (NDOT) landscape plan that provides a framework to direct current and future development of sustainable roadway corridors. The framework of the plan includes six (6) landscape regions that take into account roadway corridor differences in climate, geology, hydrology, geography and native plants species. NDOT is currently assessing how best to use this landscape plan approach to support their Stormwater Management Plan (SWMP) with temporary erosion control, permanent vegetation cover and assessing their current vegetation specifications against climate, geology, hydrology and geography.

10:15 – 11:45 am

Groundwater

Unconventional Oil and Gas Related Water Withdrawals in the Ohio River Basin (Christopher Spiese, Ohio Northern University)

Biography: Dr. Chris Spiese is Associate Professor of Chemistry and Assistant Dean of the College of Arts & Sciences. He has served as scientific advisor to two projects through the American Geophysical Union's Thriving Earth Exchange.

Abstract: Unconventional gas and oil (UOG) exploration and development in southeast Ohio has been a controversial issue for the past decade. The friendly regulatory environment in the state has enabled multiple companies to extract shale gas from the region, creating an energy boom similar to those found in neighboring states. The environmental risks to date have largely focused on air and water quality, with some attention paid to noise pollution. The risk for excessive water withdrawals and negative impacts of low flow, however, have largely not been addressed, as basin-scale studies have indicated that UOG will not significantly alter flow at large scales. This study focuses on the risk of excessive water withdrawals in the Ohio River basin, particularly in headwater streams. The smallest watersheds are not often gauged by USGS and therefore no historical record of flow is present. Using models to estimate historic flow, the impacts of UOG-related water withdrawals have been determined. The potential impacts of these flow reductions on ecosystems are assessed and future trends discussed.

Miami Conservancy District and the Modernization of Water Data Management (Michael Casey, Aquatic Informatics and Mike Ekberg, Miami Conservancy District)

Biography: Michael Casey is the Enterprise Account Executive at Aquatic Informatics, a global software company providing SaaS solutions that address critical water data management, analytics, and compliance challenges for the rapidly growing water industry. He has over 20 years of experience assisting organizations with data acquisition, analysis and reporting for their real-time systems. Currently focused on helping organizations transform their water data into actionable intelligence by providing best in class solutions to a diverse group of stakeholders including resource professionals, regulating bodies and the public.

Mike Ekberg is the Water Monitoring Manager at Miami Conservancy District, where he's been for over 20 years. He holds a BSc and MSc in geology and has previous experience in environmental consulting and groundwater regulation.

Abstract: The Miami Conservancy District (MCD), responsible for monitoring 4,000 square miles in Southwest Ohio, plays a central role in flood management along the Great Miami River. The 45-person team also plays an active role with water stewardship, ensuring water quality for 1.6 million residents.

This session will explore the modernization of water data management systems & processes at MCD. Water data is critical to the team's daily work, but previous methods reliant on spreadsheets to manage data and reactively respond to requests were cumbersome. Initial attempts at initiating technological change were inconsistent, and the team found it difficult to keep up.

The recent transition from homebuilt tools to cloud-based solutions had a significant impact on a wide range of applications, from water quality and groundwater management to flood monitoring and dam safety. Having a single source of truth “all station data, coordinates, and information in one place” translated to an overall improvement in data accuracy & confidence. Additionally, thanks to the comparable ease at which the team can now visualize and share data via the web, the district has been successfully engaging citizens through public outreach and education initiatives on issues related to water quantity/quality.

Through this talk, you can expect to learn about change management and the benefits of modernizing water data management - including efficiency and an overall improvement in data confidence.

PFAS – What’s New (and Old) (Jeffrey Kauffman, Del-Co Water Company, Inc.)

Biography: Jeffrey Kauffman has worked over 20 years in the water/wastewater industry, currently as the Compliance Manager at Del-Co Water. He has a Bachelor's in Natural Resources, a Master of Environmental Management, a Master of Public Health, and is a Class 3 Operator.

Abstract: Communities across the United States are discovering perfluoroalkyl and polyfluoroalkyl substances (PFAS) in drinking water and drinking water sources. While there are currently no federal PFAS drinking water standards, there is widespread drinking water occurrence, isolated PFAS contamination sites, ubiquitous population exposure, and some evidence of adverse health effects. This presentation will examine the background, history, and sources of PFAS substances, monitoring in Ohio, state and federal regulations, drinking water treatment options, risk assessment, scientific uncertainty, and factors (e.g., social, political, economic) influencing regulatory PFAS developments.

Nonpoint Source Pollution

NPS Strategies: Development and Regular Maintenance Brings Funding Opportunities (Rick Wilson, Ohio Environmental Protection Agency)

Biography: Rick Wilson has served with Ohio EPA for roughly 20 years where he initially worked on programs related to livestock permitting then in the Nonpoint Source Management Section where he supports local watershed planning and implementation.

Abstract: Ohio EPA and ODA program leaders will provide a brief overview of evolution of Ohio watershed planning and updates to current Nonpoint Source Implementation Strategy guidance for developing Ohio '9-key-element' watershed plans.

Development of NPS-IS for Agricultural Watersheds in the Great Miami River Basin (Monica Rakovan and Agnes Marchlewksa, Environmental Solutions, AQ)

Biography: Monica Rakovan CPG PhD is the founder and president of Environmental Solutions AQ, a certified woman- and minority-owned environmental consulting firm in Ohio. Our expertise includes watershed management, modeling, and environmental characterization.

Agnes Marchlewksa is a conservation professional with experience in watershed planning and management, easement acquisition, and natural resources protection.

Abstract: Reduction of nonpoint source pollution in the SW Ohio rural agricultural region has been a challenge because of the lack of well-defined solutions and resources. The Great Miami River is one of the top contributors of total and dissolved phosphorus to the Ohio River and ultimately the Gulf of Mexico.

In May 2021, Nine-Element Nonpoint Source Implementation Strategies (NPS-IS) were prepared and approved for two agricultural watersheds in the Great Miami River basin: the Beals Run Indian Creek (BRIC) watershed and Aukerman Creek watershed. The NPS-IS were sponsored by Three Valley Conservation Trust (for BRIC watershed) and Preble Soil and Water Conservation District (for Aukerman Creek Watershed) and funded by the Ohio Gulf Hypoxia Assistance administered by OEPA. The NPS-IS are living strategic planning documents that summarize causes and sources of impairment, establish critical areas, identify quantifiable objectives to address the impairment, and describe projects designed to meet those objectives.

During the development of these NPS-IS, the team learned the significant outreach benefits of using the Agricultural Conservation Planning Framework (ACPF). In addition to the recommendations, the ACPF outputs provided justification for local grants for targeted and long-range conservation planning. The importance of ground truthing should not be undervalued because it provided the needed model verification and opportunities to interact with landowners and stakeholders.

ODA Watershed Managers and H2Ohio Planning (Peter McDonough, Ohio Department of Agriculture)

Biography: Peter McDonough - ODA, Division of Soil and Water Conservation (Lead), Greg Nageotte - ODA, Division of Soil and Water Conservation

Abstract: Ohio Department of Agriculture is standing up a team of 7 regional watershed managers. They will support 6-digit watershed planning to facilitate expansion of ODA H2Ohio programs and over time will support SWCD efforts with local watershed management. Program leadership will introduce the team, share plans for early steps and a long-term vision for the program.

Drinking Water

Minimizing Cyanobacterial Cell Lysis During Permanganate Pre-Oxidation (Maycee Hurd, The Ohio State University)

Biography: Maycee Hurd is a fifth-year undergraduate researcher in the Contaminant Fate & Transport Lab at The Ohio State University

Abstract: Harmful algal blooms (HABs) are composed of cyanobacteria that can produce microcystins in drinking water sources, which are toxic to humans if ingested. Toxins produced by HABs can be removed using conventional treatment methods, including pre-oxidation with permanganate. While permanganate is effective for removing microcystins, it is also capable of damaging the cells within the source water. This is problematic because damaged cells will release organic compounds into the water, including intracellular microcystins. Many treatment plants are hesitant to utilize permanganate pre-oxidation because of this possibility. Previous research suggests that microcystin removal can be improved by using smaller, sequential doses rather than one large, singular dose of permanganate. High doses of permanganate are known to cause mild cell damage, but there is no data on cell damage caused by multiple low doses. Currently, work is being done to track the integrity of cyanobacterial cells after exposure to multiple low concentration doses of permanganate using a propidium iodide assay. Preliminary results suggest that lower doses of permanganate produce lower rates of cell damage. There is a possibility that the low doses of permanganate can provide a treatment method and prevent additional release of toxins by cell damage. If shown to be effective, this sequential dosing technique is a simple, low-cost method to improve waters affected by HABs in vulnerable communities.

What is going on with our Water Main Assets (Murat Ulasir, OHM Advisors)

Biography: Murat is an asset management planning specialist at OHM Advisors with nearly 20 years of experience assisting clients and agencies with asset management as well as capital planning services.

Abstract: There are numerous reports and studies available providing a glimpse of the condition state of our water main infrastructure assets. This information is predominantly driven by what is referred to as “indicator variables” as opposed to the actual measurement or observation of the” true” condition state of our assets. Indicator variables may include water main breaks and manufacturer based, expected useful lives for water main of different material. This presentation will summarize helpful information associated with understanding the potential condition state of our water main infrastructure assets, especially in the context of actual, field collected water main data from nearly 50 municipalities in the State of Michigan. Areas where field data corroborates with available information and where it diverges will be discussed. Information provided can be used to make effective useful life approximations about water main infrastructure assets in the absence of more detailed, field condition data for water main infrastructure assets.

Evaluating the Shifting Role of PCR Technologies in Routine Legionella Monitoring (Michael Loewenstein, Q Labs LLC)

Biography: Michael Loewenstein joined Q Labs in January 2019 and is the current VP, Scientific Consulting. He has a degree in Microbiology from The Ohio State University and has over 10 years' experience in microbiological control in various industries.

Abstract: It has long been understood that Legionella are the causative agent of Legionnaire's Disease, which has a mortality rate of approximately 10% according to the Centers for Disease Control and Prevention (CDC). Maintaining clean water through a rigorous Water Management Plan (WMP), including routine testing for Legionella, is critical to controlling the waterborne pathogen and avoiding public health crises.

Traditional Legionella culture methods may require up to 14 days or longer to obtain valid results. While these cultural methods have been considered the "gold standard" for decades, the long time to result leads to delayed response to Legionella contamination. In addition, because cultural methods rely on cells being viable and culturable, Legionella contamination is almost certainly being underreported.

In this study, three separate Polymerase Chain Reaction (PCR) based rapid microbiological methods were evaluated against the CDC cultural method. While PCR kits for the detection of Legionella have been commercially available for years, there were several problems: they could not distinguish between live and dead cells, were not quantitative, and had significant variability. However, in recent years, diagnostic test kit companies and method developers have responded to address these issues. The quick time to result, and high sensitivity, may allow industry to be more agile responding to Legionella recoveries, and subsequent interventions to maintain public health.

1:30 – 3:00 pm

Education & Outreach

My Backyard Stream- A Citizen Scientist Online Platform (Jen Bowman, Ohio University Voinovich School

Biography: Jen Bowman is the Director of Environmental Programs at Ohio University's Voinovich School of Leadership and Public Affairs. Jen has over 20 years of experience in water quality assessment and watershed data management.

Abstract: My Backyard Stream is a project hosted by Ohio University's Voinovich School. The project focuses on citizen scientists collecting and sharing water quality data throughout the state of Ohio online. My Backyard Stream allows users to visit their local waterways, collect water quality data, and upload to the My Backyard Stream platform. The data submission can be viewed through an ESRI GIS story map format, with a photo, map, and water quality data. This data can be as simple as an observation, which is appropriate for younger ages, or as complex as physical and chemical water

testing. A lesson plan exists for educators to conduct this project at a middle to high school age, with step-by-step explanation on what and how to test. Submissions are uploaded at http://watersheddata.com/Education/BackyardStreamCode.aspx. As more results are added to the website, users across Ohio can track data and relate it to their own results.

*How's My Waterway- Exploring Your Local Waters (***Cynthia N Johnson and *Kiki Schneider, U.S. Environmental Protection Agency)***

Biography: Cynthia N Johnson is the outreach and education lead for How's My Waterway. Cynthia started with EPA in the Wetlands Division in 2010 and has been working in the Water Data Integration Branch the last few years. She has spent most of her time at EPA working across divisions and offices on collaboration efforts for large scale outreach and education projects including the original How's My Waterway in the early 2010s. Prior to EPA, she was one of the founding members and the first Program Coordinator for American University's Center for Environmental Policy while obtaining her Masters of Public Administration. In her free time, Cynthia enjoys exploring nature by kayaking, paddle boarding, hiking and camping.

Kiki Schneider is the project manager for How's My Waterway and works at EPA headquarters in the Office of Water. She has a background in user-centered design and environmental policy and has spent the last few years developing How's My Waterway so that the general public can have easy access to water quality information. She enjoys spending time outdoors, swimming, fishing and exploring with her two young children.

Abstract: This session will focus on EPA's newest water data tool called How's My Waterway. This user-friendly app makes complex water data easily accessible to anyone. We encourage educators, the public and individuals working in the water sector to learn HMW so they can use it as a tool to help teach/assess water quality, restoration and environmental stewardship and make science based decisions.

How's My Waterway provides a comprehensive overview of water quality data and information in the United States on three different scales: community, state and national. HMW pulls in data from several sources with the goal of answering questions about aquatic life, eating fish, swimming, drinking water, restoration and protection. How's My Waterway can be accessed here: mywaterway.epa.gov

The main goals of the session are to: Provide the public with usable, meaningful information that is user friendly and easy to understand. Communicate progress states, tribes, and EPA are making towards restoring or protecting water quality. Engage the public in understanding impacts on water and issues related to water. This session will feature a demo of the tool, and Q and A at the end of those who helped develop the tools.

Trout in the Classroom (Don Dean, The Ohio State University & Spencer Reams, Benjamin Logan High School)

Biography: Don Dean – OSU and Spencer Reams - Benjamin Logan High School Educator

Abstract: Trout in the Classroom is a nation-wide program, sponsored by Trout Unlimited, for schools to rear trout and learn about their requirements for healthy growth and links the students to their

watershed. The program started in Ohio in 2009 with two schools in the Cleveland area and in the last 12 years has grown to more than 30 schools throughout the State. All grade levels from Elementary schools through High Schools, several Career Centers and two Colleges have been involved. Trout eggs, both rainbow and brown trout, are supplied through the courtesy of the Ohio Department of Natural Resources, Division of Wildlife. Teachers carefully monitor the water chemistry to avoid nitrogenous wastes from building up. The trout grow to about 2 inches by the end of the school year. The big event is the release day, when the fingerling trout are released into a local river or lake. There are many educational opportunities from this program, including water quality, the nitrogen cycle, trout growth, behavior, competition and environmental concerns.

Agriculture

Collaboration and tools for Agriculture Water and Nutrient Management Practices at the Edge of the Field (Jessica D'Ambrosio, The Nature Conservancy)

Biography: Jessica joined TNC in 2016. She has a PhD in agricultural engineering from The Ohio State University. She is a Board Supervisor for Franklin SWCD. She lives in Hilliard with her husband, three kids, and two dogs.

Abstract: Agriculture conservation practices focused on managing water and treating nutrients at the edges of farm fields must be part of solution to meet our state and regional water quality and climate mitigation goals. We will highlight what those practices are and why they are important to both landowners and downstream neighbors. Additionally, Agriculture Conservation Planning Framework (ACPF) toolbox has emerged as a promising geospatial and hydroconditioning, field level planning tool to help stakeholders identify suitable areas for placing edge of field practices. The tool, run at the HUC-12 scale, can help identify projects for 9-element watershed plans and, potentially, suitable projects for H2Ohio funding. The Nature Conservancy and our partners have been collaborating to adapt and standardize the tool for use in Ohio and the Western Lake Erie Basin with a set of standard operating procedures and by assembling datasets for users to run the tool, creating tool outputs for priority watersheds, positioning the tri-state region to be part of a national data and information hub, and hosting outreach events to familiarize users with the toolbox. We will share results of those collaborative efforts and plans for future work.

Precipitation Impacts on Nutrient Loss from Western Lake Erie Basin Elevated-Phosphorus Fields (Rachelle Crow, The Ohio State University)

Biography: Rachelle Crow earned a B.S. in Biosystems Engineering from Michigan State University in 2020 and is currently a graduate student in The Ohio State University's Food, Agricultural, and Biological Engineering Department.

Abstract: To reduce the likelihood of harmful algal blooms in Lake Erie, the Great Lakes Water Quality Agreement set a goal to decrease the phosphorus (P) load to the Western Lake Erie Basin (WLEB) by 40% from 2008 loads. This ambitious aim may be met by targeting best management practices (BMPs) to agricultural fields with a potential for disproportionate nutrient runoff. This study considers whether fields with elevated soil test phosphorus (STP) levels (Mehlich-3 P > 100 mg/kg), sometimes called legacy

P fields, contribute disproportionately to the P load in the WLEB. Rainfall events are driving factors of P loss from fields with agronomic STP levels (Mehlich-3 P â‰¤40 mg/kg). However, the impacts of precipitation have not been described for fields with more than twice this amount of STP. Quantifying the effects of current weather on P loss from elevated-P fields can predict the influence climate change will have on nutrient runoff. In this study, water quality and quantity data collected at 10 elevated-P fields in northwest Ohio were compared with similar data collected at 20 fields with agronomic STP. Preliminary data from the elevated-P fields indicate a positive correlation between P concentration and discharge. This suggests high intensity precipitation events increase P runoff from elevated-P fields. This research provides insight to the significance of elevated-P fields on water quality issues and therefore informs decisions on BMP selection, placement, and management.

Transition to a Nutrient Management Conservation Focus (Terry Mescher, Ohio Department of Agriculture)

Biography: Terry Mescher is Agriculture Engineer with the Ohio Department of Agriculture in the Division of Soil & Water Conservation. Terry started with the Division as an Area Engineer in Southwest Ohio in. In 2009 Terry was asked to lead the implementation of the Distressed Watershed Rules in the Grand Lake St Mary's watershed, where the development of Nutrient Management Plans was required to meet program rules. Since 2019 Terry has been the H2Ohio Program Manager for the Department of Agriculture and has been working to deliver the H2Ohio program to agricultural producers in NW Ohio.

Abstract: ODA Division of Soil and Water Conservation program leaders will describe how agricultural conservation priorities, programs, and delivery systems have evolved with nutrient enrichment of waters increasingly dominating the news and public consciousness over the past decade.

Water Treatment

Designing Manufactured Treatment Devices (MTDs) with Maintenance in Mind (Dana Hinaman, Contech Engineered Solutions)

Biography: Dana is the Stormwater Consultant for OH and KY specializing in stormwater solutions. She provides assistance to local engineers and regulators with the selection and design of post-construction BMPs. Dana started her career with Contech in 2016.

Abstract: Manufactured Treatment Devices (MTDs), similar to non-proprietary stormwater BMPs, must be maintained to perform as intended. However, majority of effort and focus is placed upon the initial design and construction of stormwater treatment facilities, with little thought as to how these systems will be maintained long-term. The property owner is typically left responsible for the consequences of decisions made by others during the design and construction phases, nearly all of whom have moved on to new projects after the construction phase of the project is concluded.

As our industry evolves, civil engineers are now placing more importance on the long-term maintenance costs associated with MTDs. To serve the best interest of their clients, not only does the specifying engineer have the responsibility to select and design the stormwater BMP that meets the site's

structural and regulatory requirements, they also have a responsibility to consider long-term cost of ownership as well as initial capital costs. Reviewing access constraints, placement of the MTD, maintenance onsite logistics, materials needed, and disposal logistics are crucial in the selection and design of MTD's

This presentation aims to help engineers better understand how to design MTD's with maintenance in mind, the integration of O&M information into the BMP selection process and the factors that impact MTD maintenance cost.

The History and Mathematics of Cleveland's Egg Sewers (MaryAnne Hejna, CT Consultants)

Biography: MaryAnne is a civil engineer focused on the environmental stewardship of watersheds. Prior to her master's research on nonpoint source pollution, MaryAnne worked on flow monitoring projects, where she became interested in the math of the egg sewers.

Abstract: Like many cities in the northeastern United States, Cleveland built brick egg-shaped sewers in the mid 1800â€™s to carry sanitary flows safely away from homes and businesses. Egg-shaped sewers in different cities have their own unique geometry. Smaller sewers were installed initially, replicating European practices. As Cleveland's population grew, the smaller sewers were replaced with larger ones. The theory behind the egg-shaped sewer was to provide maximum depth of flow and velocity. Stronger velocity flow kept sewers cleaner. Historically, Cleveland sewers were designed as a combined system, transporting flows from city infrastructure to Lake Erie. Sanitary flows were channeled into tributary streams through diluted stormwater, in an attempt to use streams, but prevent pollution of these waterways. Engineers realized over 100 years ago that putting sewage untreated into Lake Erie was ultimately harmful to human health. This realization propagated the design of relief sewers and the construction of the three wastewater treatment plants. Today, understanding the existing sanitary sewer system capacity is important for proposed design work. This presentation explains the mathematics behind the egg-sewers. Discussion will step through construction, beginning with the design of two externally tangent congruent circles, and continue with a step-by-step explanation until the final egg-shape is formed. A depth equation will be shared for modeling flow through any sized egg sewer.

Ohio Coronavirus Wastewater Monitoring Network (Zuzana Bohrerova, The Ohio State University)

Biography: Zuzana Bohrerova serves as the Associate Director of the Ohio Water Resources Center and a Research Specialist at OSU. Her research focuses on microbiology in drinking water and wastewater.

Abstract: Wastewater surveillance is relatively novel approach that utilizes detection and interpretation of various markers in wastewater and provides health and behavior information on communities. Early in the COVID-19 pandemic, SARS-CoV-2 fragments were detected in wastewater in quantifiable amounts worldwide and due to lack of adequate clinical testing, wastewater surveillance was implemented throughout the word as a possible tool to monitor COVID-19 community spread. In this talk I will present the statewide Ohio's wastewater monitoring network for SARS-CoV-2. Monitoring results, the relationship with cases and results applications will be presented. Wastewater monitoring was successfully used in the past year as an additional tool to control the virus spread in over 67 Ohio's communities.

Wednesday Evening Poster Session

Anthropogenic Contamination of Water Environments with Antibiotics and Antibiotic Resistance Genes (Shanvanth Arnipalli, The Ohio State University)

Biography: Shanvanth R. Arnipalli, BS (1); Shashi B. Kumar, Ph.D. (2); and Ouliana Ziouzenkova, Ph.D. (2)
(1) School of Environment and Natural Resources, The Ohio State University
(2) Department of Human Sciences, The Ohio State University

Abstract: Antibiotics have become a confounding factor in human and animal diets and their microbiome. The escalating contamination of the environment with antibiotic-resistant genes that enable bacterial horizontal and vertical evolution increasing antibiotic resistant strain of bacteria has become a global threat. Specifically, the contamination induced by antibiotics and antibiotic resistance genes play a role in the manifestation of these contaminants in the food chain. Antibiotics produced by industry as well as their metabolites are released from plants, hospitals, farms, and households with biological wastes (urine, faeces, sputum, placenta, tissues and organs) or by means of abandoned animals (e.g., cattle in India), stray animals (dogs, pigs, and birds) and open human defecation in slum areas. From the sewage, wastewater treatment plants (WWTPs), and surface run off the antibiotics and/or ARG contaminate water and can be dispersed on fields that directly or indirectly enter humans' and animals' food chain system. This topic of choice is a condensed version of the review paper written by Kumar et al. and was made possible by an analysis of pathways that were previously published. The goal of this study and poster is to advance understanding of the mechanisms of dissemination and development of antibiotic resistance genes in the context of nutrition and related clinical, agricultural, veterinary, and environmental settings.

SARS-CoV-2 in urban stormwater: An environmental reservoir and transmission pathway? (Kay Bernard, The Ohio State University)

Biography: Kay Bernard is a graduate student earning her Ph.D. in Ecological Engineering at The Ohio State University. She is interested in water quality, microbial communities, and green infrastructure. Her background is in ecology and evolutionary biology.

Additional Author(s): Angela Davis, The Ohio State University
Ian Simpson, The Ohio State University
Vanessa Hale, The Ohio State University
Jiyoung Lee, The Ohio State University
Ryan Winston, The Ohio State University

Abstract: Stormwater has been demonstrated to harbor dangerous pathogens and pollutants. At present, no studies have explored the potential threat of SARS-CoV-2 in stormwater. Given the many possible routes for human-originated fecal contamination like sanitary sewer overflows, leaky wastewater pipes, and non-human animal waste, it is plausible that SARS-CoV-2, a virus that can be shed fecally, could serve as an environmental reservoir and transmission pathway in stormwater. To investigate this, we designed a study with the following objectives: determine whether the presence of SARS-CoV-2 could be detected in stormwater via RT; quantify human-specific fecal contamination using

microbial source tracking; and examine whether rainfall characteristics influence virus concentrations. To accomplish this, we monitored 10 stormsewer outfalls in 3 counties with varying population densities and 4 different land uses in Ohio. 25 samples from these sites were collected and at minimum one SARS-CoV-2 target gene was detected in 22 samples. Further analysis showed a significant correlation between the SARS-CoV-2 E gene and antecedent dry period. Grouping the data by cities showed that two cities had significantly different concentrations of the virus in stormwater. Neighborhood-level infection rates did not correlate well with county-level infections rates. Human fecal contamination in stormwater is an established threat to public health that might be heightened by the presence of SARS-CoV-2.

Growth of Two Aquatic Macrophyte Species in Artificial Floating Islands in an Ohio Wetland: Potential for Nutrient Sequestration (Zhaozhe Chen, The Ohio State University)

Biography: *Zhaozhe Chen* is a Ph. D. student in School of Earth Sciences, The Ohio State University, OH, USA.

Additional Author(s): Ozeas Jr. Costa, School of Earth Sciences, The Ohio State University at Mansfield

Abstract: Artificial Floating Islands (AFIs) have been documented as an efficient, environment-friendly, and cost-effective method to tack nutrient pollution. However, most AFI studies were conducted in lab scale and AFI applications in Ohio is limited. To assess the nutrient-removal efficiency of AFIs in natural conditions, we conducted a combination of field and mesocosm experiments with two native aquatic plant species, Carex comosa and Eleocharis palustris, in a constructed wetland in north-central Ohio in 2020. During the study period, C. comosa outperformed E. palustris with respect to biomass accumulation and root system development. C. comosa in the field experiments had a total dry biomass production of 58.5 Â± 22.2 g/plant compared to 6.1 Â± 3.2 g/plant in E. palustris. C. comosa had a relatively balanced growth of above and below-ground tissues, with a ratio of 1.12 for shoots-to-roots dry biomass accumulation, while E. palustris tended to allocate more biomass to the roots, with a shoots-to-roots dry biomass accumulation ratio of 0.02. The maximum estimated N and P storage for C. comosa were 19587 mg/m2 and 1287 mg/m2, respectively, whereas they were 2239 mg/m2 and 161 mg/m2 for E. palustris, respectively. Besides direct uptake of nutrients by plants, the more developed root system of C. comosa suggested that AFIs containing C. comosa potentially had a higher total nutrient removal capacity.

Impact of wastewater salinity on suspended solids in septic tank effluent (Kristen Conroy, The Ohio State University)

Biography: Kristen Conroy is a Lecturer and PhD candidate at the Ohio State University. She studies high salt wastewater treatment, focused on the potential for flushing toilets with seawater.

Additional Author(s): Molly Brun - Ohio State University
Karen Mancl - Ohio State University

Abstract: Understanding the impact of salinity on solids settling in septic tanks can inform decisions made by sanitarians and engineers. The increase in ion concentration and density caused by dissolving salt in water led the authors to hypothesize that treating high salt wastewater would result in increased suspended solids in septic tank effluent. Increased suspended solids in the effluent is a concern because

this could contribute to clogging of downstream treatment systems. Six lab-scale septic tanks were designed using 50-gallon tanks and sludge from a local wastewater treatment plant. Three tanks were maintained at tap water salinity and three at seawater salinity, with NaCl as the salt source. Turbidity, total suspended solids (TSS) and sludge depth were tested 12 times during the 124 day study. No statistically significant difference was found between the solids parameters of septic tanks treating tap water and high salt water. These findings indicate that increased salinity did not result in higher suspended concentrations in the septic tank effluent.

Effect of Drinking Water Treatment Processes on the Integrity of Cyanobacteria Cells (Dane Elliot, The Ohio State University)

Biography: Dane Elliott has her bachelor's degree in chemical engineering from Case Western Reserve University and is currently pursuing her master's degree in civil and environmental engineering at Ohio State University.

Additional Author(s): Allison MacKay, Chair of the Civil, Environmental, and Geodetic Engineering Department at Ohio State University

Abstract: As source waters for Ohio drinking water treatment plants are increasingly subject to algal blooms, treatment utilities must employ methods to remove resulting cyanotoxins. Cyanotoxins exist in two forms: intracellular toxins, those contained within a living cyanobacteria cell, and extracellular toxins, those dissolved in water after cell death. Treatment for each form of cyanotoxin varies and can result in a conflicting outcome. Strategies like pre-oxidation, which are employed to remove extracellular toxins, can adversely affect the living cells, causing them to lyse and release toxins, which results in higher levels of extracellular toxins later in the water treatment process. <CR><LF>While the behavior of extracellular toxins is well-studied, that of cyanobacteria cells and their intracellular toxins is not. Our work aims to discern where cyanobacteria cells are subjected to stressors that cause damage within the drinking water treatment process. A bench-scale simulation of the water treatment process is employed to focus on microcystin-producing cyanobacteria that are prominent in Ohio. Common chemical treatments are studied with and without subsequent mechanical shear. The extent of cell lysis is determined using fluorometric analysis to quantify the release of organic matter contained within the cyanobacteria. This knowledge will help in identifying tolerable amounts of stress to avoid toxin release, which will assist water treatment utilities in managing algal blooms.

Harmful Algal Blooms (HABs) in Caesar Creek Lake and their relationship to Riparian Cover (Morgan Grunden, Wright State University)

Biography: Morgan Grunden is a graduate student at Wright State University pursuing a Master of Science in Chemistry with a focus in analytical chemistry. She received her Bachelor of Science in Chemistry from Wright State University in May 2020.

Additional Author(s): Travis Luncan and Audrey E McGowin

Abstract: The first documented harmful algal bloom (HAB) at Caesar Creek Lake in Warren County, OH, occurred in June 2017. The HAB and associated toxins in the main drinking water source for Wilmington, OH, forced city officials to switch to an alternate reservoir. Much of the watershed surrounding Caesar

Creek Lake consists of land used for agricultural purposes where phosphorus and nitrogen are applied to soil to aid in the production of crops, whether added as inorganic fertilizer or as animal wastes. Phosphorus will precipitate as complexes in sediments and travel to the lake contributing to algae growth by cycling between algae, the water column, and the sediment until it is washed downstream over time. Storm runoff events cause high levels of nitrate and particulate-associated phosphate to enter Caesar Creek Lake from the main tributaries, Caesar Creek and Anderson Fork. Iron is an essential nutrient for cyanobacterial growth, yet the role of iron in the formation of HABs is not clear. Riparian cover contributes to reduced nutrients entering waterways during stormwater runoff events which in turn may potentially reduce the occurrence of HABs. Sediment samples from Caesar Creek and Anderson Fork were collected in November of 2020 and were analyzed for phosphorus and iron using ICP-AES following EPA Methods. Percentages and types of riparian cover at each sample site were evaluated using QGIS and satellite imagery. Statistical analysis was used to evaluate the correlation between sediment phosphorus and riparian cover.

Reducing trash in Toledo's water ways using trash traps (Saee Gunjal, The University of Toledo)

Biography: Saee Gunjal is a final year student of Environmental Engineering at the University of Toledo. She has successfully completed two co-op rotations. She is the only ESL student to win the esteemed Shapiro essay writing competition at her university.

Additional Author(s): University of Toledo: Defne Apul, Ethan Eidt, Saee Gunjal, Elouise Filas
City of Toledo: Edith Kippenhan, Regina Collins, Julianne Badreddine
Hanks Plumbing and Heating: Shane Dustin and Brad Nowakowski

Abstract: An estimated 2,500 tons of plastic enter Lake Erie every year, and the Lower Maumee and Ottawa-Stony Watersheds are major contributors to this problem. With this project, we aim to address this problem by installing trash traps at five locations in Toledo. Four kinds of trash traps are scheduled to be installed: Brute Bins, Seabins, Litter Gitter, and boom and net. These devices block the flow of floating litter and collect them, thus avoiding them from polluting downstream waterways and Lake Erie. The samples collected from the trash traps will be categorized using the Escaped Trash Assessment Protocol (ETAP). Preliminary data shows that styrofoam and plastic contribute the largest fraction of litter in the waterways. This presentation will discuss the sampling design and data collected from the trash traps.

Using SWAT+ to build a management tool for Old Woman Creek to project climate and land use change (Haley Kujawa, The Ohio State University)

Biography: Haley is a PhD candidate at the Ohio State University and a Margaret A. Davidson fellow at the Old Woman Creek National Estuarine Research Reserve.

Additional Author(s): Margaret Kalcic, The Ohio State University, Food, Agricultural and Biological Engineering; Gil Bohrer, The Ohio State University, Civil and Environmental Engineering

Abstract: Protecting watershed-estuary systems as the climate changes is a unique challenge facing coastal managers. Managers of Old Woman Creek (OWC), located in northern Ohio and one of the Great Lakes' few remaining natural estuaries, have asked for a tool to project how climate and land-use

change will alter discharge and nutrient loadings in the estuary and subsequently to Lake Erie. In this study, we use the newly restructured version of the Soil and Water Assessment Tool (SWAT+) to simulate the watershed-estuary system (OWC-SWAT+). We simulate the estuary as a series of connected reservoirs that represent distinct eco-hydrological patches within the wetland. We calibrate the model at the watershed outlet (Berlin Rd. USGS # 04199155) and at the outlet of the estuary into Lake Erie, using an automatic calibration tool (IPEAT+) that incorporates both "hard-data" and "soft-data" approaches. The approach of building and calibrating the OWC-SWAT+ model can be replicated to incorporate heterogeneous estuaries into SWAT+ for informing management in watershed-estuary systems across the U.S.

Benzotriazole Anti-Corrosives in Surface Waters Downstream from an Ohio Airport (Clara Leedy, Wright State University)

Biography: Clara is a graduate student at Wright State University working on research in environmental chemistry. I am thankful to Dr. Audrey McGowin, Travis Luncan, and the Department of Chemistry for this opportunity to share what I have learned.

Additional Author(s): Lee Raska, Jessica Weise, Travis Luncan, Audrey McGowin PhD.

Abstract: Water quality and anti-corrosive contamination in two creeks near a small airpark in Wilmington, Ohio, was monitored over a three-year period. The airpark has experienced increased traffic over the past three years due to its use by an online retailer. During winter months, deicing and anti-icing chemicals are used extensively. Benzotriazoles are a class of emerging contaminants of concern that are added to deicing and anti-icing agents because of their anti-corrosive effects. They are resistant to biodegradation. Liquid chromatography mass spectrometry was used to detect 1H-benzotriazole (BTZ) as well as analogues 4-methyl- and 5-methylbenzotrialzole (collectively tolytriazole, TTZ). Concentrations of benzotriazoles measured in surface water following winter storms were significantly elevated. In addition to water samples, sediment samples were analyzed to determine the potential of sediments to serve as a reservoir of these compounds. Water and sediment data were used together to assess the risk and impact of contaminated runoff on these surrounding surface water ecosystems

Impact of Beaver Ponds on Acid Mine Drainage Stream (Haley McLean, The Ohio State University)

Biography: Haley is a Master's student at The Ohio State University studying Environmental Science.

Additional Author(s): Holly Stanley OSU, Anne Gerhart OSU, Rachel Gabor Ph.D. OSU

Abstract: Acid Mine Drainage (AMD) is a global problem that occurs when surface mining activity exposes sulfide-containing minerals, such as pyrite, to water and oxygen resulting in the formation sulfuric acid. This lowers pH and increases mobility of heavy metals in streams. AMD can harm aquatic life and pollute drinking water. Treatment wetlands are a common remediation tool for improving water quality. However, few studies have investigated the impacts of beaver ponds, a type of natural wetland, on AMD streams. The goal of this study is to examine how beaver ponds influence the biogeochemistry of an AMD stream. To do this we measured how water quality changed through a 1km AMD stream reach containing several beaver ponds. Previous work on this site included taking grab samples to

measure anions, cations, metals, and nutrients. To further analyze stream behavior above and below the ponds, we installed sensors to measure pH, dissolved oxygen, conductivity, and pressure. We found improved water quality downstream of ponds including increased pH, increased dissolved oxygen, decreased dissolved metals, decreased sulfate concentrations, and decreased conductivity. Stream metabolism modeling showed ecosystem respiration greater than gross primary production throughout the reach, but downstream had greater productivity than the upstream. These results indicate that beaver ponds may improve water quality of AMD impacted streams. Collecting data from nearby streams that are similarly impacted by AMD but lack beaver activity can shed light on the extent of these effects.

Determining the Stream Health and Functionality of a Headwater Stream, Summit County, OH (Kamille Miracle, Baldwin Wallace University)

Biography: Kamille Miracle is a recent graduate of the Biology and Geology department at Baldwin Wallace University. She worked with streams throughout her undergraduate career.

Abstract: Headwater streams provide critical ecosystem and hydrologic services, which makes studying their quality and functionality important for the entire watershedâ€™s health. The Rocky River Watershed is a 294 square-mile network of neighborhoods, farms, forests, parks, roads and streams stretches from Medina to Lake Erie, and includes parts of Cuyahoga, Medina, Lorain and Summit Counties, including all or part of 32 municipalities and townships. In this project, we surveyed an unnamed headwater tributary to the East Branch of the Rocky River in Summit County, Ohio, that drains 1.1 mi2. This stream had been in private ownership for generations and recently became accessible as part of a public park, making this the first detailed stream survey conducted on this section. We determined the stream to be functioning with unstable banks, based on geomorphology (entrenchment, width-depth, sinuosity, slope), bank erosion hazard index scores, and large woody debris index scores. Biologic assessments of macroinvertebrates and stream habitats indicated that this is a Class-III Primary Headwater Habitat stream. Water quality measurements were largely within Ohio standards for streams. Despite the high quality of this stream section, upstream pressures include new and expanding housing developments and increased park usership, which could compromise water quality, stream stability, and aquatic habitats.

Evaluating the impact of river sediment on phosphorus uptake (Erica Mobley, Ohio Northern University)

Biography: Erica is a junior biochemistry major, working as a research student at Ohio Northern University with Dr. Christopher Spiese to evaluate phosphorus in the northwest Ohio watersheds.

Abstract: Phosphorus sorption to sediments is an important process that can buffer dissolved P concentrations. Both the amount of P and sediment as well as the mode of binding can influence transport of P in aquatic ecosystems. This study focused on determining sediment stocks in the Maumee River basin and quantifying reactive and total P extracted from sediment by a sequential multi-step process. Quantification of sediment stock will enable more accurate modeling of P retention and ultimately P loading into western Lake Erie.

Precipitation and Analysis of Dissolved Phosphorus by P-31 NMR (Elliette Neal, Ohio Northern University)

Biography: Elliette is a senior chemistry major at Ohio Northern University doing mentored environmental research under Dr. Christopher Spiese.

Abstract: This study compares four methods for pre-concentration and preservation of dissolved phosphorus species for P-31 NMR analysis. P-31 NMR enables differentiation among classes of phosphorus compounds: orthophosphate, phosphate esters, nucleic acids, polyphosphate, and phosphonates. A variety of water samples were obtained from rivers, lakes, groundwater, wastewater treatment plants, wetlands, and tiles. Four methods utilizing different metals were then used to concentrate phosphorus to a level sufficient to permit P-31 NMR analysis. From these analyses, the depletion or enrichment of specific phosphorus species in natural waters can be determined. These data will help elucidate phosphorus speciation in the dissolved phase and enable more robust analysis of phosphorus biogeochemistry.

Investigating Induced Infiltration by Municipal Production Wells using Stable Isotopes ^{2}H and ^{18}O (Idah Ngoma, Miami University)

Biography: Idah Ngoma's academic background includes a masters degree in Biology and a bachelors degree in Agricultural science. She is currently a PhD student and her research interests are groundwater and surface water interaction and environmental pollution prevention.

Additional Author(s): Jensen Fass, undergraduate at Miami University Oxford Oh
Jonathan Levy, Director of the Institute for the Environment and Sustainability Associate Professor, Dept. of Geology & Environ. Earth Science Miami University, Oxford

Abstract: Alluvial aquifers that are hydraulically connected to surface water bodies are used for drinking water production due to ease of extraction and high production capacity. The high aquifer-recharge rates caused by induced infiltration from the surface-water body help reduce drawdown in the production well. However, induced infiltration poses a potential risk of introducing contaminates from surface water into groundwater and potential streamflow depletion especially in arid and semi-arid environments. The study objective was to investigate the use of stable isotopes 18O and 2H to quantify the proportion of pumped water that comes from induced infiltration. We sampled water from groundwater not influenced by induced infiltration, stream, production wells (PW) and groundwater believed to be influenced by induced infiltration and analyzed it for d18O and d2H. Results indicate that on average, surface water was more enriched in both δ 2H and δ 18O with high variability of isotope concentrations. PW3 had mean 18O and 2H concentration similar to groundwater and lowest variance. PW1 and PW2 had intermediate mean values of both δ 2H and δ 18O suggesting that about 50% of the water pumped comes from induced infiltration. Hydraulic gradients at PW1 indicated a strong connection between pumping and groundwater heads beneath the creek. We continue to monitor isotopic composition at PW1 and PW2 to gain more insights and quantify induced infiltration.

Creating a Nonpoint Source Implementation Strategic Plan for the Acton Lake Dam-Four Mile Creek Watershed (Oluwaseun Olamiposi, Miami University)

Biography: Oluwaseun Olubodun is a Masters graduate of the Environmental Science Program of Miami University and this work is their Professional Service Project

Additional Author(s): Emily Salings, Katie Vonderembse, Sarah Walter, Seth Swearingen, Zak Schultz-Institute for the Environment and Sustainability

Abstract: A team of graduate students from Miami University's Institute for the Environment and Sustainability assisted Butler Soil and Water Conservation District (BSWCD) with developing a Nine-Element Nonpoint Source Implementation Strategy (NPS-IS) for the Acton Lake Dam "Four Mile Creek Watershed (ALD-FMC). NPS-IS plans are created to characterize a watershed, identify critical areas, plan remediation projects, and request funding from the Ohio EPA and other funding sources. The research was conducted from August 2019-May 2020 as part of a Professional Service Projects (PSP) class. The PSP team was responsible for drafting the first two chapters, introducing the watershed characteristics, history, and water quality. These chapters used data from EPA databases and reports and the Butler County Stream Team sampling of local surface waters to identify critical areas needing remediation. This information was detailed on a series of 24 GIS-software-generated maps. The team also held a stakeholder engagement meeting to gather information about potential critical areas in the watershed from local community members and agency representatives. The critical areas identified as part of the report will later become the focus of clean-up efforts. BSWCD will handle the future submission and implementation of the NPS-IS.

Evaluating Rare Earth Element Speciation and Fractionalization in Appalachian Abandoned Mine Lands (Brianna O'Neil-Hankle, The Ohio State University) Olamiposi, Miami University)

Biography: Brianna O'Neil-Hankle is pursuing a Master's degree in Civil and Environmental Engineering at The Ohio State University. Her current role is a Graduate Research Assistant working on the geochemistry of acid mine drainage systems.

Additional Author(s): John J. Lenhart (Professor of Environmental Engineering, The Ohio State University), Chin-Min Cheng (Senior Research Associate Engineer, The Ohio State University), Tarunjit Butalia (Research Associate Professor, The Ohio State University)

Abstract: Abandoned mine lands (AMLs) and the associated discharge of acid mine drainage (AMD) impair water resources throughout the world by negatively impacting groundwater and aquatic ecosystems. Acid mine drainage and the associated AML sediments are a valuable source of rare earth elements (REEs) and critical metals. The concentrations of REEs can be orders of magnitude higher in AMD compared to average river water and seawater. REEs tend to remain in solution in acidic conditions and to precipitate or adsorb onto clays and metal oxyhydroxides under alkaline conditions. Cleaning up AMLs globally has been estimated to cost in the tens to hundreds of billions of dollars. Recovering REEs from AMD and the associated AML sediments provides the potential to offset the cost of AML reclamation and mine drainage treatment. The study site, "Flint Run", is seriously affected by AMD with multiple past remediation attempts. This 240-acre site in Ohio is located between the Middleton Run and Flint Run Watersheds and the drainage exhibits high REE concentrations up to 1.7 mg/L. This study details sampling and analysis on AML sediments to determine the behavioral distribution patterns of

REEs in freshwater systems. The aim of this present work is to describe the content, fractionalization and mineralization pattern of the REE in freshwater sediments affected by AMD. This study will help to further the understanding of mechanisms and phases responsible for binding REEs in AML sediments.

Using lake sediment to project future conditions: An example from Summit Lake, Akron, Ohio (Melissa Rego, University of Akron)

Biography: Melissa Rego received a BA in Environmental Science from the University of Akron in 2020. She is currently a MS Geology graduate student studying lake processes and deposits to better assess environmental change.

Additional Author(s): John Peck: Department of Geosciences, University of Akron

Abstract: Summit Lake, located in urban Akron, Ohio, is being revitalized for greater recreational opportunities. With increased access, understanding the lake's present-day and future conditions is important. This study is investigating the seasonal changes to the water column and sediment, and shows the utility of sediment archives for projecting future conditions. In March 2021, the water column is well-mixed and oxygenated, with a total phosphorous (TP) concentration of 58 Î¼g/L. By May the lake becomes thermally stratified with anoxic conditions below 6.5 m. In July, the lake is well-stratified with anoxic conditions below 4.5 m. TP concentrations average 928 Î¼g/L in the hypolimnion. Thus, the sediment provides an important internal phosphorous loading source. The seasonal cycle measured in the water column also influences the type of sediment deposited. Sediment cores reveal rhythmic layers of white, red, and brown mud. This study's cores were correlated to cores collected in 2003 to determine that 15.1 cm of sediment accumulated in 17.9 years. 17 mud rhythmites occur in the upper 15.1 cm suggesting varves which provide a high-resolution chronology. Downcore heavy metal concentrations were measured. If the trend of the last 35 years continues, lead will decline to the probable effects concentration by about the year 2031. However, zinc and copper do not show declining trends possibly because they have reached a steady state with urban background inputs.

Spatial and Temporal Distribution of Potamoplankton in the Sandusky River during the Summer of 2021 (Kelly Spence, Heidelberg University)

Biography: Jessalyn Adkins is a rising senior majoring in environmental science and economics, with a minor in computer science. A current intern at the National Center for Water Quality Research.

Additional Author(s): Kelly Spence, Heidelberg University

Abstract: Cyanobacterial Harmful Algal Blooms (CyanoHABs) are an increasing threat to the waterways of Ohio, and can have debilitating effects on the lives of humans and wildlife. The Sandusky River, a major agricultural tributary to Lake Erie, carries nutrients from human activities to the lake, which can facilitate CyanoHABs. We assessed the biomass of potamoplankton (riverine plankton) in the Sandusky River during the summer of 2021 and looked at the spatial and temporal changes from eight sampling locations. Each sample was analyzed on a Fluoroprobe, which discriminates among different major groups (i.e. green algae, bluegreen algae, diatoms, cryptophytes) of phytoplankton. Using the Fluoroprobe data, water chemistry, and river conditions we determined plankton community composition and biomass and possible drivers of CyanoHABs in this river.

Sample Shelf Life of Fluoroprobe-assessed Biomass and Community Composition of Sandusky River Algae (Kelly Spence, Heidelberg University)

Biography: Jessalyn Adkins is a rising senior majoring in environmental science and economics, with a minor in computer science. A current intern at the National Center for Water Quality Research.

Additional Author(s): Kelly Spence, Heidelberg Heidelberg University

Abstract: Automated samplers are used for collecting high-frequency river chemistry data. With recent Cyanobacterial Harmful Algal Blooms (CyanoHABS) in the NW Ohio rivers and the development of methods to assess live potamoplankton (riverine plankton) samples using a Fluoroprobe, being able to use the same sampling scheme for determining phytoplankton biomass, community composition and river chemistry would be of great utility. For this study, the biomass of different phytoplankton groups over time was analyzed using a Fluoroprobe. Eight samples were collected along the Sandusky River. After collection samples were transported to the lab for initial Fluoroprobe analysis. Samples were then refrigerated to simulate automatic sampling stations and tested every day after collection for 10 days. We tested how total phytoplankton and major group biomass changed over time to determine how long samples could be held at automated sampling stations before analysis on the Fluoroprobe. Preliminary results indicate that total phytoplankton biomass was relatively unchanged for 3-5 days for most samples, but community composition change could occur with some groups increasing in biomass, while others declined. After this 3-5 day period, decreases in total phytoplankton biomass were evident, as were major changes in community composition. Based on our findings we recommend that samples held for several days could give a relatively accurate picture of both phytoplankton and individual group biomass.

Effects of an Experimental Nanobubble Ozone Treatment on an Ohio Lake Impacted by Algal Blooms (Holly Stanley, The Ohio State University)

Biography: Holly Stanley is a first year Master's student at Ohio State University. She is getting her M.S. in Environment and Natural Resources.

Additional Author(s): Autumn Taylor (Ohio State University), Justin Chaffin (Ohio State University), Billy Fagan (Ohio State University), Linda Weavers (Ohio State University), Heather Raymond (Ohio State University), Rachel Gabor (Ohio State University)

Abstract: Harmful algal blooms (HABs) occur in lakes largely due to excess nutrients and are an increasing problem in Ohio. The need for an efficient, cost-effective treatment for HABs is critical to preserve the health of inland lakes. Nanobubble ozone technology (NBOT) is an emerging treatment for HABs designed to remediate cyanobacteria blooms through nanobubbles and ozonation. Lake Sylvan is a small Ohio lake west of Columbus that historically experiences severe algal blooms in summer through early fall. For this trial, we ran NBOT units at Lake Sylvan early July to mid-September 2021 to evaluate the impacts of treatment. We measured nutrients, cyanotoxins, carbon, and algae concentrations June through early October. Phosphorous increased at the beginning of the summer and held steady from July to August. Cyanobacteria increased in early summer, stabilized after initial NBOT treatment, then sharply declined after the dose was increased in early August. Cyanobacteria increased following a 4.5â€ early September rain event and declined by the end of September. Approximately two weeks after the NBOT units were shut off, cyanobacteria more than doubled and surface scums were observed

throughout the lake. Water column microcystins were highest in late July and decreased by more than half by the end of August. This was the first summer in recent years where a recreational advisory was not issued due to microcystins. Further lab, field, and mesocosm NBOT evaluations will be done in 2022.

The Influence of Urbanization and Agriculture on the Geochemistry of the Scioto River, Ohio (Connor Wichterich, The Ohio State University)

Biography: Connor Wichterich is a second year MS Earth Science student at The Ohio State University. His thesis focuses on the influence of agriculture and urbanization on the geochemistry of the Scioto River. Wichterich received a BS in Geology from Texas A&M University in May 2020.

Additional Author(s): W. Berry Lyons- The Ohio State University School of Earth Sciences
Sue Welch- The Ohio State University School of Earth Sciences

Abstract: Nonpoint source pollution from agriculture and urbanization is a major threat to surface water quality worldwide. The Scioto River in central Ohio flows through agricultural fields downstream to suburban areas and into Columbus. This study investigates the influence of both agriculture and urbanization on the chemistry of the river. This presentation focuses on the results of nutrient analyses of weekly samples from three locations; one draining agricultural land; the second in a suburb north of Columbus; the third in downtown Columbus. Sampling of the river at both high and low flow reveals potential changes in the source of nutrients to the river system. Data from March through May 2021 show that nutrient (nitrate-nitrite, phosphate and ammonia) concentrations at all flow volumes were highest at the suburban location from March to mid-April, generally followed by the urban location then the rural-agricultural location. After mid-April, nutrient concentrations were highest at the rural-agricultural location. The shift to higher nutrient concentrations in the agricultural area from an average of 0.17 mmol/L NOx-N before mid-April to 0.36 mmol/L NOx-N after mid-April could result from the start of planting and fertilizing in late spring. Sampling will continue weekly/biweekly through December, providing a large dataset with which to examine seasonal changes in nutrient concentrations in the river and quantify the importance of land use on surface water quality.

Phosphorus Extraction from Sediment for NMR Analysis (Jasmine Wolfgram, Ohio Northern University)

Biography: Jasmine Wolfgram is a Junior Chemistry major at Ohio Northern University and is completing mentored environmental research under Dr. Christopher Spiese.

Abstract: Past research has focused primarily on the quantity of phosphorus in aquatic ecosystems. However, speciation of P can provide details such as bioavailability and source. The chemical type of P dictates sorption behavior in sediment, making characterization important. However, traditional assays do not readily ascertain speciation. This work analyzed P speciation by Nuclear Magnetic Resonance (NMR) after applying various extraction techniques. While orthophosphate was effectively extracted by all methods tested, additional P forms were found with the Olsen and SEDEX methods. The presence of reduced P forms indicates that more in-depth analyses of aquatic systems may aid in better understanding P biogeochemistry.