2020

49th Annual Ohio Conference

PROCEEDINGS

CLEAN, SAFE WATER

NOVEMBER 2 – 5, 2020

= 1.4 CEU CREDITS

WMAO Water Management Association of Ohio

ODSO · OFMA Managing Flood Risk · OLMS · Ohio Stormwater Association · WPA Ohio Watershed Professionals Association

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49th Annual Water Management Association of Ohio Conference

The 2020 Rivers Symposium was initially scheduled for March 20th in Columbus. Under travel restrictions, WMAO has partnered with the ODNR Division of Natural Areas and Preserves (ODNR-DNAP), Ohio Watershed Professionals Association (OWPA), and Ohio Scenic Rivers Association (OSRA) as the hosts to offer the event virtually during our annual meeting. We appreciate this collaboration on Sessions IV and VI scheduled for November 3, 2020. The Rivers Symposium agenda is shown on page 3.

A Special Thank You to Our Sponsors!

49th Annual Water Management Association of Ohio Conference

Agenda at a Glance

Monday, November 2, 2020		**Tuesday, November 3, 2020**	
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Danella Pettenski, *Administrator* *City of Columbus, Division of Water*		*Pouring Salt into the Waters: Recent Increases in Chloride in Lake Erie Tributaries* (**Douglas Kane**, Heidelberg University)	Opening Remarks - *Welcome*: **Mary Mertz**, Director, Ohio Department of Natural Resources
		Spectral Decomposition of remote sensing images as a tool for water quality management (**Joseph Ortiz**, Kent State University)	Keynote Address: *Recent Trends in Ohio's Native Fish: Expansions and Contractions* (**Brian Zimmerman**, The Ohio State University)
Cleveland Metroparks Fisheries Program: An Intersection of Conservation, Education and Recreation (**Mike Durkalec**, Cleveland Metroparks)		*Researching HAB Mitigation through Optimization of Algaecide Type and Application* (**Elizabeth Crafton**, Hazen and Sawyer and **Jessica Glowczewski,** City of Akron)	*Geologic History and Geomorphology of the Little Miami River* (**Mike Angle**, Ohio DNR Division of Geologic Survey)
Clean H2O in the O-H-I-O: Encouraging clean water through innovations in sustainability (**Heather Sheets**, Ohio Clean Marinas)		*Field Testing of AB Algaecide Optimization Research at Lake Rockwell Reservoir* (**Jessica Glowczewski** and **Charles Lacy,** City of Akron)	*The Heidelberg Tributary Loading Program: Keeping a Finger on the Pulse of Ohio's Watersheds* (**Laura Johnson**, Heidelberg University)
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Ohio Floodplain Management (OFMA)	***Water Resources***	***Ohio Lake Management Society (OLMS)***	***ODNR-DNAP, OWPA, OSRA Rivers Symposium***
Proactive Data Collection for Flood Warning (**Chuck Kozora**, OTT Hydromet)	*An Evaluation of the Long-term Integrity of the Ohio Ground Water Observation Well Network* (**Curtis Coe,** Ohio DNR Division of Geological Survey)	*Comparing SWAT predicted flows at field-scale with edge-of-field data in western Lake Erie basin, US* (**Asmita Murumkar**, The Ohio State University)	*A Partnership to Protect Ohio's Giant Salamander, the Eastern Hellbender* (**Greg Lipps**, The Ohio State University)
National Flood Insurance Program (NFIP) Update (**Alicia Silverio**, ODNR Division of Water Resources)	*Three-Dimensional Hydrodynamic Modeling to Analyze the Salinity Interaction between Coastal Marshland* (**Sharesh Sharma**, Youngstown State University)	*Sport Fish Assessment in Ohio: the Inland Management System* (**Curtis Wagner**, Ohio DNR Division of Wildlife)	*Status of Ohio Freshwater Mussels in the Little Miami River and Statewide* (**Michael Hoggarth**, Otterbein University)
Temporary Fill and their impact to the BFE (**Chad Boyer**, ms consultants, inc.)	*Education and Financial Assistance Programs for Homeowners with Private Drinking Water Wells* (**Cindy Brookes**, Great Lakes Community Action Partnership)	*The US EPA's National Lakes Assessment: A Collaborative Survey of the Nation's Lakes and Reservoirs* (**Lareina Guenzel**, U.S. EPA)	*Scioto Brush Creek: Watershed Education, Awareness and Involvement in a Rural Community* (**Martin McAllister**, The Nature Conservancy)
The Ohio State University Levee Project (**Miles Hebert**, EMH&T)	*Design-Build delivery and its benefits to stream restoration projects* (**John Herchl**, Environmental Remediation Contractor)	*Can Buoys Predict the Future? Early Alerts of Harmful Algal Blooms* (**Darren Bade**, Kent State University)	**Meet the River Partnerships** *Join us for small group discussions related to Ohio rivers*

Wednesday, November 4, 2020		Thursday, November 5, 2020	
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9:00 - 11:00	**9:00 - 11:00**	**9:00 - 11:00**	**9:00 - 11:00**
Asset Management	***Ohio Watershed Professionals Association (OWPA)***	***Agriculture***	***Ohio Dam Safety Organization (ODSO)***
Concept of Remaining Useful Life: Benefits & Dangers (**Murat Ulasir**, OHM Advisors)	*Statewide Volunteer Monitoring Programs: Keys for Success* (**Marcy Knoll Wilmes**, Michigan Dept. of Environment, Great Lakes, and Energy)	*Farmer Advocates for Conservation* (**Stephanie Singer**, and **Erin Payne**, The Nature Conservancy)	*Utilizing Scanning and UAV Technologies to Document As-Builts & Monitor Potential Spillway Movement* (**Boris Slogar** and **David Lautenschleger**, Muskingum Watershed Conservancy District)
Application of Artificial Intelligence in Operations & Planning (**Murat Ulasir**, OHM Advisors)	*Choose Your Adventure: A Model for Watershed Stewardship Program* (**Lisa Meranti**, Cleveland Metroparks)	*The Farmer or the Farm: What Explains Farmers? Nutrient Loss? Associated Risk Perceptions?* (**Elizabeth Schwab**, The Ohio State University)	*Case Study: The Importance of Good Flashboard Design for Dam Safety, a Dam Owner's Perspective* (**Stephen Kinsley**, City of Columbus)
Data the Newest Asset (**Mark McCabe**, Wallace Pancher Group)	*Volunteer Monitoring in Licking County, Ohio: A Soil and Water Conservation District Program* (**Denise Natoli Brooks**, Licking SWCD)	*What are the nutrient levels in Lake Erie tributaries and where are they coming from: Expanded Nutrient Monitoring Report* (**Sandra Kosek-Sills**, Ohio Lake Erie Commission & **Paul Gledhill,** Ohio EPA)	*Saving Lake Jinelle - Ohio's First Dam Overtopping Protection Project with ACBs* (**Erik Schuller**, Gannett Fleming Engineers and Architects)
Drinking Water Metrics for a Complete Asset Management Program (**Sean Stephenson**, Ohio EPA)	*Collecting Monitoring Data to Inform Stormwater Management Policy* (**Matt Wooden**, Northern Kentucky Sanitation District No. 1)	*H2Ohio Implementation on Working Agricultural Lands in the WLEB* (**Clark Hutson**, ODA Division of Soil and Water Conservation)	*The failures of Edenville and Sanford dams in May 2020* (**Daniel Pradel**, The Ohio State University)
11:30-12:30		**11:30-1:00**	
Poster Session		**AWARDS CEREMONY and WMAO ANNUAL MEETING**	
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1:00 - 3:00	**1:00 - 3:00**	**1:00 - 3:00**	**1:30 - 2:30**
Drinking Water	***Ohio Stormwater Association (OSWA)***	***Water Education***	
Source Water Protection Planning in the Age of PFAS (**Doug Hunter**, Cox-Colvin & Associates, Inc.)	*Can We Retrofit Storm Sewers to Reduce the Frequency of Stream Disturbances?* (**Adam Lehmann**, Hamilton SWCD)	*2020 Project WET Ohio Water Education Program Updates* (**Dennis Clement**, Ohio EPA Office of Environmental Education)	
Optimization of Microcystin-LR Removal by Permanganate Pre-oxidation (**Maycee Hurd**, The Ohio State University)	*Habitat Provision by Bioretention Retrofits in an Urban Area* (**David Wituszynski**, The Ohio State University)	*Ohio County Soil and Water Conservation Districts Area and OFSWCD State Envirothon* (**Janelle Mead**, OFSWCD; **Emily Heppner**, ODA; and **Wendee Zandanski**, Jefferson SWCD)	
Characterization of ambient germicidal UVB (**Eric Mbonimpa**, Air force Institute of Technology)	*Underground Storage and Pretreatment: Design Methods in Ohio* (**Michael Cook**, Advanced Drainage Systems, Inc.)	*Future City* (**Kevin White**, IBI Group and **Matt Marquis**, Hull & Associates, LLC)	
Integrating Source Water Protection into Ohio's Environmental Programs (**Craig Smith**, Ohio EPA Division of Drinking and Ground Waters)	*Managing Stormwater - Regionally and Collaboratively* (**Frank Greenland**, Northeast Ohio Regional Sewer District)	*Distance Learning and discover-water.org During Covid-19: A Closer Look At Project WET Materials for Virtual Learning* (**Dennis Clement**, Ohio EPA Office of EE)	

49th Annual Water Management Association of Ohio Conference

Conference Registration (up to 1.4 CEUs):

Attendees can select unlimited access to the agenda or by individual session:

Unlimited Access – WMAO Members	$100
Unlimited Access – Nonmembers	$125
Unlimited Access – Emeritus Members	$ 50
Plenary and Sessions I through XIII	$25 each
Student Members – All Sessions*	No Fee

*Student members can register for free. Annual membership for students in WMAO is $10. Join as a member here and then go to the conference registration portal to make selections.

Conference Sponsorships:

We invite water resource companies to showcase their services to conference attendees through a sponsorship. Company logos will be prominently displayed on marketing materials, the website, and during session introductions.

Full Conference Sponsorship	$300
Awards Ceremony Sponsorship	$150
Session Sponsorship	$ 75

One Unlimited Access or entry to an individual session is included in the cost of either a Full Conference Sponsorship or a Session Sponsorship, respectively. The Awards Ceremony is open to all without a fee.

Conference Day:

Conference registrants will receive an email with a link to the virtual meeting rooms in Zoom (zoom.us) a day or two prior to the scheduled session. An evaluation survey will be sent following the conference to provide the Planning Committee feedback and to confirm attendance for certification hours.

Register Here

Monday November 2, 2020

9:00 – 11:00 am

Plenary Session

Keynote Address

Danella Pettenski, Administrator, City of Columbus Division of Water

Biography: Danella Pettenski is the Administrator for the City of Columbus Division of Water. She is a licensed professional engineer in the State of Ohio and holds a Bachelor of Science degree in Civil Engineering from Ohio University. She worked 18 years for an engineering consulting firm designing and managing various water and sewer utility projects for both small and large clients. In 2007, Danella moved over to the public sector and became employed by the City of Columbus Division of Water to oversee their Distribution Engineering group. In 2020, she was promoted to Administrator for the Division of Water and is responsible for overseeing water supply, treatment and distribution operations which provide drinking water to over 1.2 million central Ohio customers.

Danella is an active member of the American Water Works Association (AWWA) where she served on the Ohio Section Governing Board and became Chair of the Ohio Section in 2009. Most recently she is serving as the Director for Ohio at the Association level of AWWA.

Recreation

Cleveland Metroparks Fisheries Program: An Intersection of Conservation, Education and Recreation (Mike Durkalec, Cleveland Metroparks)

Biography: Presenter Mike Durkalec has served as Aquatic Biologist at Cleveland Metroparks since May 2005. The position involves oversight of the fisheries program as well as a good portion of water quality monitoring and aquatic research.

Abstract: This presentation will be an overview of the Cleveland Metroparks fisheries program. Main program facets include 1) active fisheries and habitat management (using both traditional and novel approaches), 2) angler education and information resources, and 3) fostering environmental stewardship. An urban core as well as suburban fringe regions are served by this expansive program. The fisheries program is cost recovery conscious, and this will be discussed as well.

Clean H2O in the O-H-I-O: Encouraging clean water through innovations in sustainability (Heather Sheets, Ohio Clean Marinas)

Biography: Heather Sheets is the Ohio Clean Marinas Program Coordinator with the Ohio Department of Natural Resource's Division of Parks and Watercraft.

Abstract: Clean H2O in the O-H-I-O: Encouraging clean water through innovations in sustainability and expanding training for marina owners and boaters. Having clean, safe water is essential for recreational boating, and there are many environmental challenges facing marina owners today. Several new environmental practices are now required to ensure Clean Marina programs not only maintain a status but continue progress on environmental excellence and setting an example for voluntary stewardship of the waterways in the Great Lakes region. Attendees will learn about the innovative ways the Ohio Clean Marina's certification and education programs across the state are working to help marinas and boaters implement environmental best practices including those on green infrastructure, marine debris, stormwater management and coastal resiliency.

1:00 – 3:00 pm

Session I

Ohio Floodplain Management (*OFMA*)

Proactive Data Collection for Flood Warning (Chuck Kozora, OTT Hydromet)

Abstract: As water managers and engineers, it is important to understand our watersheds, urban landscapes, and their response to extreme events like heavy precipitation and rising surface water levels. Of the numerous tools at our disposal, there are many benefits to a flood warning system, including knowing in time where flooding issues could occur, enabling reactive action, and protecting lives while minimizing damage. In this presentation, I will discuss urban flooding and the value of data collection for flood warning and protection. Together, we will examine what an ideal flood warning system might look like in your community and how data can help convince your community about the importance of being prepared for a flooding emergency. We will also explore readily available data from U.S. Federal Agencies such as the U.S. Geological Survey and National Weather Services and the increasing need for greater data density to augment spatial and temporal data sets feeding critical predictive models. With this presentation, attendees will: 1) Receive an overview of flooding in the U.S. and factors that contribute to flooding, 2) Understand the role of data collection in organizations like the USGS and NWS, 3) Learn the importance of flood warning systems and their components, and 4) Explore how data can help convince your community about the importance of being prepared for a flooding emergency.

National Flood Insurance Program (NFIP) Update (Alicia Silverio, ODNR Division of Water Resources)

Biography: Alicia Silverio is the NFIP Coordinator for Ohio within ODNR's Floodplain Management Program, she assists with the implementation and administration of the National Flood Insurance Program throughout the State of Ohio by providing technical guidance to assist communities maintain NFIP compliance, evaluating local floodplain management programs, and recommending improvement measures.

Abstract: This presentation will provide updated information about the NFIP and current initiatives. The session will also address any news from ODNR's Floodplain Management Program.

Temporary Fill and their Impact to the BFE (Chad Boyer, ms consultants, inc.)

Biography:

Abstract:

The Ohio State University Levee Project (Miles Hebert, EMH&T)

Biography:

Abstract:

1:00 – 3:00 pm

Session II

Water Resources

An Evaluation of the Long-term Integrity of the Ohio Ground Water Observation Well Network (Curtis Coe, Ohio DNR Geological Survey)

Biography: Curtis joined the ODNR Division of Geological Survey as a Hydrogeologist in 2010. He is currently conducting Ground Water Supply Conflict Investigations for High Yielding Irrigation wells. He is involved with Ground Water Potentiometric Surface Mapp

Abstract: An Evaluation of the Long-term Integrity of the Ohio Ground Water Observation Well Network. Approximately 42% of Ohioans depend on groundwater as their source of drinking water.

Thus, knowing where and how much groundwater is stored in the subsurface provides an invaluable source of data for planning the future development of individual aquifers. Currently, Ohio maintains and manages a network of 141 observation wells. The objective of Ohio's groundwater management program is to determine the quantity of groundwater resource reserves stored in Ohio's major aquifers systems. Subsequently, it is important to evaluate the long-term integrity of the observation well network to ensure accurate groundwater levels are measured from individual wells through time. To complete this evaluation process, the Groundwater Resources Program of the Ohio Department of Natural Resources, Division of Geological Survey designed a slug testing program to evaluate the integrity of each well in the observation well network. The testing determined if individual wells were in contact with the aquifer and provide accurate groundwater level data. For the wells that were open to the aquifer, the hydraulic properties of the aquifer were determined. Based on the testing completed so far, each well was placed in one of three categories: (1) wells in contact with the aquifer; (2) wells in need of rehabilitation; and (3) wells that should be replaced over time. The methodology, results, and conclusion obtained from the slug testing are presented for review.

Three-Dimensional Hydrodynamic Modeling to Analyze the Salinity Interaction between Coastal Marshland (Sharesh Sharma, Youngstown State University)

Biography: Dr. Sharma is an Associate Professor at Youngstown State University. Dr. Sharma has a diverse experience of watershed and water quality modeling.

Abstract: In this study, a three-dimensional, Environmental Fluid Dynamics Code (EFDC) model was developed to simulate the hydrodynamics and salinity distribution for the western section of the Mentor Marsh wetland located in the shoreline of Lake Erie. The model forcing functions consist of creek inflows, water surface elevations along the open boundaries, and atmospheric conditions. The model was first calibrated with the observed time-series data of water levels, temperatures, and salinity. The model adequately simulated stage, temperature, and salinity when evaluated through various statistical measures. This was revealed through the close agreement of the observed and simulated data when corresponding variables were compared. Salinity distributions were investigated under different inflow conditions and lake level rise scenario. The analysis suggested that the salinity moved upstream towards the Mentor Marsh under high flow and lake level rise scenario, whereas, the salinity moved towards Mentor Marina under low flow conditions. The analysis also suggested that there was no significant salinity contribution from the Marsh Creek or Lake Erie to the salinity of Mentor Marsh. In addition, a graphical analysis of the salinity was performed at four different locations within the western basin of the Mentor Marsh. The analysis also indicated that road salt application during the winter and spring seasons was the prime cause to increase the salinity in the western basin of the Mentor Mar

Education and Financial Assistance Programs for Homeowners with Private Drinking Water Wells (Cindy Brookes, Great Lakes Community Action Partnership)

Biography: Cindy Brookes was raised in rural Northwest Ohio and graduated from The Ohio State University with a Bachelor of Science in Agriculture Education and Agronomy. Following graduation, she worked as an Extension Educator on the Indian Lake Watershed project from 1990-1993. Moved back to the Northwest Ohio area and was employed as in family businesses of asbestos abatement, construction, food service, farming and bridal from 1993-2004. After leaving the family businesses, was employed as a Greenhouse associate/floral designer from 2004 until 2006. In November 2006, accepted the position as Sandusky River Watershed Coalition as Watershed Coordinator the largest functioning watershed organization in Ohio administered by WSOS Community Action Commission, Inc. (WSOS) until the Fall of 2017. Over the years Cindy has worked in a part-time capacity for the Rural Community Assistance Program (RCAP) until 2017 when she became a full-time Senior Rural Development Specialist. Her focus with RCAP is the education of Private Well Owners on Public Health and Source Water Protection. Her work also in the private sector, includes administration of Home Sewage Treatment System grants for four Ohio Local Health Departments, while providing traditional technical service to communities with or in the process of obtaining water and/or sewer utilities.

Abstract: Great Lakes Community Action Partnership (GLCAP) through the Rural Community Assistance Program (RCAP) will be sharing information about the group and one-on-one educational programs designed to assist homeowners to better understand maintaining and ensuring water quality of their private drinking water wells. Well Professionals and other stakeholder trainings are also being offered to ensure homeowners can be provided the best possible services and education. Additionally, GLCAP will share information about their low interest loan program for homeowner water well replacement, rehabilitation and/or treatment needs.

Design-Build Delivery and its benefits to stream restoration projects (John Herchl, Environmental Remediation Contractor)

Biography: John Herchl, LEED AP, CPESC, is Director of Client Development at Environmental Remediation Contractor. At ERC, John is responsible for expanding the company's market position in the Great Lakes and Ohio River Valley while growing key services of ecological restoration, environmental remediation, and emergency services. Following a degree in Construction Engineering in 2001, John cut his teeth in environmental restoration and water quality in the Pacific Northwest. After family brought him back to the heartland 2008, John managed the design and construction of stormwater and restoration projects throughout Ohio. Most notably, John was program manager for the Metropolitan Sewer District of Greater Cincinnati's Green Infrastructure Early Success Projects and led the development of a Green Infrastructure Design and Implementation Guidelines manual for City of Columbus. Previously, John was the Great Lakes and Ohio River Bioregion Team Leader for Biohabitats where he led implementation of numerous stormwater, ecological restoration, and design/build

projects for public, private, and NGO clients. John is a 6-year member on the Board of Directors of the Water Management Association of Ohio. Residing with his family in Westerville, Ohio, John enjoys skiing, biking, fishing, and recreating on many of Ohio's scenic rivers.

Abstract: Design/Build (D/B), although commonplace in the world of construction, is becoming increasingly popular as a method of executing ecological restoration projects throughout the US. When compared to traditional Design/Bid/Build (D/B/B), the D/B delivery method increases communication between owner, designer, and contractor. Additionally, D/B can balance project team risk, accelerate project schedule, and reduce project cost increases.

The presentation will begin with a brief number of D/B project examples (highlighting owner and scope) to illustrate regional traction in the D/B delivery model. The presentation will then discuss at length four primary benefits of D/B for restoration projects including risk, communication, schedule, and cost. Examples will include:

Risk – shift in design responsibility; performance versus prescriptive specifications; and stream dynamics affecting site conditions.

Communication – contractual bond between designer and contractor that is collaborative versus adversarial; early and often communication related to constructability, sequencing, and access; and contractor input on design related to access, means and methods, and material availability.

Schedule – reduction in procurement time of only one contract; compressed design of 60% versus 90%; accelerated permit schedule; and overlapping design and construction activity.

Cost – limited owner resources to manage only one contract; ability to combine RFQ and RFP into one solicitation; budget prioritized rather than a function of design; contactor develops cost estimate rather than engineer; and projects adopt "adaptive management" approach to limit change orders and resolve disputes internally.

Project Effectiveness – contractor input on project feasibility; designer input during construction ensures design intent; site conditions are adapted to as construction commences; and value engineering is integrated into the implementation process.

The presentation will conclude by corelating each of the previously mentioned examples to real-life project examples of where these benefits have been realized. Upon completion of the presentation, the audience will have a better awareness of D/B and its regional application for ecological restoration projects while understanding how this delivery model provides value to the owner and ecological success of the project.

Tuesday November 3, 2020

9:00 – 11:00 am

Session III

Ohio Lake Management Society (*OLMS*)

Pouring Salt into the Waters: Recent Increases in Chloride in Lake Erie Tributaries (Douglas Kane, Heidelberg University)

Biography: Doug Kane is an Assistant Professor of Biology (Ecology) and Research Scientist at the National Center for Water Quality Research at Heidelberg University. His research interests lie in the ecology of large lakes and their tributaries.

Abstract: One of the most recent threats to clean, safe water is the increased concentration of chloride ions seen in many rivers throughout the Midwest and Northeast. Previous studies have shown that these increasing amounts of chloride are derived from road salt application and correlated with the amount of urbanization in a watershed. To test whether this is the case for northern Ohio rivers, we determined chloride trends for the Maumee, Sandusky, and Cuyahoga Rivers using 35+ years of data from the Heidelberg Tributary Loading Program. Mean daily concentrations (mg/L) of chloride increased significantly and substantially over time only in the Cuyahoga River (most urbanized watershed) and although significant increases occurred in all seasons, the greatest increases were in winter. These results point both to the importance of continuous, long-term monitoring and the presence of diffuse, nonpoint source pollution impacting aquatic ecosystems. Finally, our data lend support to the Freshwater Salinization Syndrome, but only in rivers with a substantial residential and urban land uses coverage in the watershed.

Spectral decomposition of remote sensing images as a tool for water quality management (Joseph Ortiz, Kent State University)

Biography: Joseph Ortiz is a Professor in the Department of Geology at Kent State University. He is an oceanographer who studies climate change and environmental remote sensing of water quality at field sites in Ohio and around the globe.

Abstract: Remote sensing provides advantages for water quality management in Ohio and globally. Sensor trends have shifted progressively toward more bands and smaller pixels, with governmental sensors boasting spectral resolution as fine as 2-3 nm and commercial sensors with spatial resolution of tens of cm. For water quality work, what is needed are methods to capitalize on high spectral resolution to create products beyond Chl a pigment estimates of bloom extent. Work at Kent State over the past

decade has focused on the developing methods to differentiate algae and cyanobacteria from space, map out their degradation products, or track sediment plumes of different mineral composition. The KSU spectral decomposition method employs varimax-rotated, principal component analysis to remove noise and redundant information from remote sensing images and thus separate and enhance the independent information captured within them. The method has been used to map out various constituents of the complex, perennial Microcystis blooms that occur in Lake Erie, to track changes in the brown tide caused by Aureoumbra lagunensis in the Indian River Lagoon, as well as cyanobacterial blooms in Lake Okeechobee and to partition benthic habitat from water column signals in Biscayne Bay, Florida and the waters around the US Virgin Islands. This presentation provides a synthesis of results to stimulate discussion of the utility of the approach to water management.

Researching HAB Mitigation through Optimization of Algaecide Type and Application (Elizabeth Crafton, Hazen and Sawyer and Jessica Glowczewski, City of Akron)

Abstract: With the increasing occurrences of potential HABs on Ohio inland lakes and reservoirs, the use and application of algaecide emerged as a potential in-lake treatment process. Due to the variety of copper based algaecides, and with emerging algaecides utilizing peroxide as the catalyst (Na2CO3-1.5H2O2), lake managers are tasked with making an often costly decision in which product to purchase, how to apply the product, and how much product to apply. Copper-based algaecides are non-selective in the destruction of microorganism and can lead to copper resistant cyanobacteria when used regularly. Additionally, the use of copper based algaecide creates sampling events for the water treatment utility, another unanticipated cost of in-lake treatment. With funding from Ohio SeaGrant, The City of Akron Water Bureau and University of Akron evaluated two commonly used copper based algaecides (Earthtec and Cutrine Ultra), as well as one peroxide algaecide (PAK27) at quarter dose, half dose, and full dose based on brand label directions on populations of cyanobacteria harvested from drinking water reservoirs. This presentation will discuss the research and results of this experiment.

Field Testing of AB Algaecide Optimization Research at Lake Rockwell Reservoir (Jessica Glowczewski and Charles Lacy, City of Akron)

Biography: Ms. Glowczewski has over 12 years of experience in watershed management and operations with a focus on the Upper Cuyahoga River Watershed ad drinking water reservoirs for the City of Akron Water Bureau.

Abstract: With the increasing occurrences of potential HABs on Ohio inland lakes and reservoirs, the use and application of algaecide emerged as a potential in-lake treatment process. Due to the variety of copper based algaecides, and with emerging algaecides utilizing peroxide as the catalyst (Na2CO3-1.5H2O2), lake managers are tasked with making an often costly decision in which product to purchase, how to apply the product, and how much product to apply. Copper-based algaecides are non-selective in the destruction of microorganism and can lead to copper resistant cyanobacteria when used

regularly. Additionally, the use of copper-based algaecide creates sampling events for the water treatment utility, another unanticipated cost of in-lake treatment. This presentation will discuss how the City of Akron's reservoir management program developed and picks up where the presentation Researching HAB Mitigation through Optimization of Algaecide Type and Application left off. It will evaluate two and a half years of field testing and results from the SeaGrant funded research findings, applied to Lake Rockwell, the source water reservoir for the City of Akron. It will also discuss application of this research to other in-land lakes in the hopes to assist other lake managers control HABs, both with or without upstream nutrient management.

9:00 – 11:00 am

Session IV

Rivers Symposium

Keynote Address: ***Recent Trends in Ohio's Native Fish: Expansions and Contractions*** (Brian Zimmerman, The Ohio State University)

Geologic History and Geomorphology of the Little Miami River (Mike Angle, Ohio DNR Division of Geologic Survey)

Biography: Mike obtained his BS and MS in Geology at the University of Akron and then worked on a PhD at Miami University in Oxford, Ohio. His area of specialization has been primarily in mapping glacial geology and hydrogeology. He has worked at ODNR the last 35+ years roughly splitting his time between the Ohio Geological Survey and the Division of Soil & Water Resources, Groundwater Resource Section. He was promoted to Supervisor for the Geologic Mapping Group at the Ohio Geological Survey in 2007 and became the Asst. Chief/Asst. State Geologist of that Division in late 2012. In February of 2019, he was appointed as the 14th State Geologist and Division Chief. Mike has worked with the Scenic Rivers program on numerous sites to help minimize impacts of drilling and installation of pipelines and other utilities.

The Heidelberg Tributary Loading Program: Keeping a Finger on the Pulse of Ohio's Watersheds (Laura Johnson, Heidelberg University)

Biography: Laura is director of the National Center for Water Quality Research at Heidelberg University where she works on watershed sediment and nutrient export. Prior to joining the NCWQR in 2013, Laura received her Ph.D. from the University of Notre Dame in 2008 and was a postdoc at Indiana University in

Bloomington. Aside from working with the long-term Heidelberg dataset, her recent research also focuses on examining the influence of agricultural nutrient management on nutrient export, identifying sources of nutrients within watersheds, and contributing to the seasonal harmful algal bloom forecast for western Lake Erie.

1:00 – 3:00 pm

Session V

Ohio Lake Management Society (*OLMS*)

Comparing SWAT predicted flows at field-scale with edge-of-field data in western Lake Erie basin, US (Asmita Murumkar, The Ohio State University)

Biography: Asmita is a postdoc in the Food, Agricultural, and Biological Engineering Dept. at the OSU. She works on water-quality modeling of Western Lake Erie basin with an aim to guide nutrient management in the basin.

Abstract: Maumee watershed is the largest watershed in western Lake Erie region, where agricultural landscapes are one of the leading sources of nutrient loadings that contribute to Lake Erie's harmful algal blooms. The watershed models are widely used to guide management and practice implementation in the watershed with an objective to improve water quality at the outlet. However, the ability of such models to simulate hydrologic processes at field scales is unknown. This study evaluated surface and subsurface (tile) flow predictions of a field-scale SWAT (Soil Water Assessment Tool) model by comparing them with observed data from seven edge-of-field monitoring sites within the watershed. We compared two SWAT model scenarios: (1) a baseline version of the model that was calibrated for flow and nutrient losses at the watershed outlet and (2) a re-parameterized version that represented site-specific weather, drainage characteristics, and crop management. In general, the model predictions of surface and subsurface flow improved after incorporating site-specific parameters. The study also identified likely factors causing systematic biases in hydrologic processes. These results will be useful for future model improvements.

Sport Fish Assessment in Ohio: the Inland Management System (Curtis Wagner, Ohio DNR Division of Wildlife)

Biography: Curt earned his BS from the Pennsylvania State University and MS from the University of Illinois. Prior to his current position, Curt served as a Fisheries Biologist in Wildlife District Three (2008-2017).

Abstract: The U.S. Fish & Wildlife Service estimates that over $750 million dollars is spent annually by Ohio anglers fishing inland waters, comprised mainly of reservoirs, the Ohio River, and other rivers and streams. The Ohio Division of Wildlife manages these monetarily- and ecologically-important waters through the Inland Management System (IMS), a planned, iterative approach to standardized assessments of sport fish populations and their anglers in (1) about 170 reservoirs with a surface area greater than 10 ha, (2) 450 miles of the Ohio River, and (3) countless lengths of streams. IMS seeks to best invest available staff time building long-term datasets to expand angling opportunities, examine fish population trends, determine angler effort, evaluate existing and future management practices, and respond to angler inquires. Balance is sought between intensive and complex system-specific management and general, one-size-fits-all approaches. Sampling methods include all types of standard fish population assessment gears (i.e., electrofishing, trap netting, gill netting), less commonly used gears (e.g., hydroacoustics), on-the-water creels and web-based surveys, and productivity measurements. Here, we provide an overview of IMS as it relates to fisheries management in inland reservoir. These overviews include the collection, storage, use, and distribution of data and sampling timelines, targeted sport fish species, and gears used for evaluations.

The US EPA's National Lakes Assessment: A Collaborative Survey of the Nation's Lakes and Reservoirs (Lareina Guenzel, U.S. EPA)

Biography: Lareina Guenzel is an aquatic ecologist with 15 years of experience working on projects related to Clean Water Act. I started my EPA career in Region 8 working on water quality standards and monitoring and joined the Office of Water in 2017.

Abstract: The National Lakes Assessment (NLA) is conducted in collaboration with states, tribes, other federal agencies and partners every five years as a component of the US EPA National Aquatic Resource Surveys (NARS). The surveys sample and estimate the condition of the Nation's different water body types on a rotating basis. Standardized protocols and select core indicators are used to develop statistically valid assessments of the biological and recreational condition of US waters at the national and regional scale and are designed to assess change in condition over time. The NARS program also provides opportunities to explore research indicators that advance our understanding of the waterbody type. This presentation will provide an overview of NLA fundamentals including the survey design, target population, and the core indicators; highlights from NLA 2007, 2012, and 2017; how to explore and access NLA data; and planning for the upcoming 2022 survey. As a nationwide collaborative survey, the NLA offers a unique opportunity to frame discussions and plan strategies for the protection and restoration of lakes across the United States. Results of the NLA also provide a broad range of information that can help us better understand the condition of lakes in the United States, some of the stressors affecting them, and how stressors relate to local conditions.

Can Buoys Predict the Future? Early Alerts of Harmful Algal Blooms (Darren Bade, Kent State University)

Biography: Dr. Darren Bade is an Associate Professor at Kent State University. He studies lake ecosystem ecology, especially biogeochemical processes related to nutrient cycling of phosphorus, nitrogen and carbon.

Abstract: Emerging ecological theory suggests that prior to a shift in an ecosystems state (e.g. non-bloom vs. bloom) there may be statistical indicators of the impending shift in key ecosystem parameters. The goal of this study was to determine if these statistical indicators exist in Lake Erie and whether an early warning signal for harmful algal blooms could be generated. Specifically, we analyzed the variance of phycocyanin data collected at high frequency from three buoys in Lake Erie. To generate an early warning signal, we used the Quickest Detection (QD) technique, which calculates the likelihood of a system existing in a new or alternate state based on the variance observed. When that likelihood crosses a user-defined threshold, a warning could be generated. One buoy near Cleveland and another near Gibraltar Island, where algal blooms are not common, were used to determine the baseline variance expected in non-bloom conditions. The procedures effectiveness was tested on data from a buoy near the Toledo water intake. Large blooms occurred near the Toledo buoy in 2015 and 2017 and blooms were much smaller in 2016 and 2018. The QD method was able to produce warnings for the 2017 bloom and did not produce warnings in 2016 and 2018. Anomalous conditions at the Gibraltar buoy and lack of data from Cleveland in 2015 could explain the absence of a warning signal for Toledo in that year.

1:00 – 3:00 pm

Session VI

Rivers Symposium

A Partnership to Protect Ohio's Giant Salamander, the Eastern Hellbender (Greg Lipps, The Ohio State University)

Biography: Greg Lipps is the Amphibian & Reptile Conservation Coordinator for the Ohio Biodiversity Conservation Partnership at Ohio State University. He is a lifelong Ohioan, born in Cincinnati, now residing in the Oak Openings Region of northwest Ohio. Greg worked in The Toledo Zoo's Department of Herpetology, before leaving to complete his Master's in Biology at Bowling Green State University in 2005. Since then, he has been conducting surveys of amphibians and reptiles throughout the state and collaborating on conservation strategies for a wide range of species and ecosystems. For the past decade, Greg has spent much of his time investigating the status and distribution of Eastern

Hellbenders, determining threats to the viability of populations, and leading a partnership to restore Hellbenders in Ohio. Greg is an editor and contributing author to the book Amphibians of Ohio and the forthcoming Reptiles of Ohio. He is the current Co-Chair of the Ohio Chapter of Partners in Amphibian & Reptile Conservation and in 2017 was awarded PARC's Award for Excellence in Herpetofaunal Conservation.

Status of Ohio Freshwater Mussels in the Little Miami River and Statewide (Michael Hoggarth, Otterbein University)

Biography: Mike Hoggarth is Professor of Biology at Otterbein University and one of the co-authors of the Freshwater Mussels of Ohio. He became interested in mussel ecology in Alabama, where he got his master's degree and then moved to Ohio to work with Dave Stansbery at OSU on the PhD. He did environmental assessment for the Ohio Department of Transportation prior to going to Otterbein and worked extensively with Dan Rice on the mussels and fish of Ohio Scenic Rivers. He performed the first systematic survey of the mussels of the Little Miami River system in 1990/91, repeated that survey 15 years later, and then again, this past summer. His presentation today will describe some of the changes that have occurred in the mussels of the Little Miami River and throughout the state.

Scioto Brush Creek: Watershed Education, Awareness and Involvement in a Rural Community (Martin McAllister, The Nature Conservancy)

Biography: Martin is the Appalachian Forests Project Manager with The Nature Conservancy in Ohio and a founder of the Friends of Scioto Brush Creek, Inc. He obtained his undergraduate degree in Natural Resources from Shawnee State Community College in 1983 and has worked in the field of conservation for over 36 years. For much of his career he was employed by the Ohio Department of Natural Resources as a naturalist, land manager and administrator, serving at various times in the Divisions of Natural Areas and Preserves, Parks and Recreation and the former Division of Civilian Conservation. Martin retired from ODNR in 2014 as the Southwest District Manager for Ohio State Parks and State Nature Preserves. In his current role with The Nature Conservancy Martin directs the management of the 20,000-acre Edge of Appalachia Nature Preserve in Adams County and leads TNC's Appalachian Forests Project which strives to improve forest health and management on both public and private lands. Martin has lived his entire life in the Scioto Brush Creek watershed and is married to the current president of the Friends of Scioto Brush Creek, Jody Newton-McAllister.

Wednesday November 4, 2020

9:00 – 11:00 am

Session VII

Asset Management

Concept of Remaining Useful Life: Benefits & Dangers (Murat Ulasir, OHM Advisors)

Biography: Murat is an infrastructure asset management practice leader at OHM Advisors, with nearly 20 years of experience providing infrastructure asset management planning and capital improvement assistance to a variety of clients and agencies.

Abstract: Our industry has become familiar with the infrastructure report cards published by the American Society of Civil Engineers (ASCE). According to these report cards, our wastewater infrastructure grade has hardly improved in the last ten years and persistently hovers around a grade D. Investment needs associated with replacing our aging sanitary sewer infrastructure are an important contributor to this grade. Several utilities in many states around the country use a remaining useful life's approach as an indicator of the physical condition state of an infrastructure asset. The remaining useful life is identified as the age of a system in comparison to its presumed useful life. However, there is growing evidence that, generally speaking, the age of an infrastructure is not necessarily a good indicator of its physical condition state. This paper presents the results of an analysis, including nearly 30 million feet of municipal sanitary collection sewer inspection data throughout the country (inspections performed between the years of 2016 and 2018). This paper, using this information combined with advanced data analytics, will highlight some of the potential fallacies associated with the remaining useful life concept and provide some insights for what other approaches can be used in assessing condition states of linear sewer assets.

Application of Artificial Intelligence in Operations & Planning (Murat Ulasir, OHM Adivsor)

Abstract: Our industry has become too familiar with numerous reports from a variety of reputable agencies that collectively conclude with an important message: our assets are aging and the funding gap between what is needed and what is available is growing. Condition assessing alone of miles of linear assets can be a costly proposition. The fact of the matter is that a large percentage of our municipalities in the country are not the big, metropolitan cities, which might be able to afford such expenses. At the same time, a technological revolution is unfolding outside the municipal world, often referred to as the 4th industrial revolution. This presentation aims to find an answer to the following question: can advanced technologies help small and medium sized communities address their infrastructure challenges in a cost effective and timely manner? The concepts of artificial intelligence-based image recognition as well as machine learning type pattern recognition will be introduced. Several examples

will demonstrate the use of these technologies in condition evaluating sanitary sewer assets and identification of trends hidden in the data municipalities collect as part of normal operations, which can help utilities be more proactive about maintaining their infrastructure asset needs

Data the Newest Asset (Mark McCabe, Wallace Pancher Group)

Biography: Mr. McCabe is a graduate of The Ohio State University and has worked in the stormwater and water quality community for more than 30 yrs. Mr. McCabe is the incoming president of OSWA and is a member of the FHWAs Trans. Research Board - stormwater ctm.

Abstract: Technology has allowed us to view and interact with data on new and more comprehensive level. There have been historic drivers as to why and what type of data we needed to collect. What has been missing is how and what do we use the data for? This session will explore the evolving sector of data management, data as a decision-making tool and data as an asset. Several agencies have had federal mandates to collect and organize public infrastructure asset data, this session will take a snapshot look at one agencies approach and how certain elements of this approach may be transferrable.

Drinking Water Metrics for a Complete Asset Management Program (Sean Stephenson, Ohio EPA)

Biography: Sean currently works within Ohio EPA's Division of Drinking and Ground Waters and is currently the capability assurance coordinator for the Division and helps oversee Ohio EPA's Asset Management Program. He has been with Ohio EPA since 2014 and graduated from Ohio University with a bachelor's degree in biological sciences.

Abstract: Ohio EPA now requires all public water systems in the state to have a written and implemented asset management program. As part of the new asset management rules there is a requirement for public water systems to report a set of metrics on an annual basis. Metrics are a set of indicators that can be used evaluate the effectiveness of an asset management program. We will be discussing the metrics reporting requires, the expectations that go into calculating the metrics, and how the metrics can be used to help water systems set goals for continual improvement.

9:00 – 11:00 am

Session VIII

Ohio Watershed Professionals Association (***OWPA***)

Statewide Volunteer Monitoring Programs: Keys for Success (Marcy Knoll Wilmes, Michigan Dept. of Environment, Great Lakes, and Energy)

Biography: Marcy Knoll Wilmes is an Aquatic Biologist in the Water Resources Division of the Michigan Department of Environment, Great Lakes, and Energy (EGLE) in Lansing, MI. As an Aquatic Biologist, she works as the coordinator for Michigan's statewide volunteer water quality monitoring program called MiCorps, monitors the water quality of Lake Michigan watersheds, and writes reports based on sampling results. She received her B.S. in Conservation of Natural Resources at Central Michigan University and her M.S. in Aquatic Ecology from Central Michigan University. Marcy joined EGLE in November 2008 as an Environmental Quality Analyst in Gaylord, MI. Under this title, Marcy reviewed permit applications for impacts to wetlands, inland lakes, and Great Lakes and permitted projects that assured best management practices for the conservation of Michigan's natural resources. Marcy enjoys cross-country skiing, hiking, kayaking, and spending time with her family.

Abstract: Volunteer engagement is vital to surface water quality monitoring in the State of Michigan. The Michigan Clean Water Corps (MiCorps) engages volunteers across the state in stream and lake water quality monitoring. MiCorps provides education and training on stream macroinvertebrate sampling to watershed groups and conservation districts through the Volunteer Stream Monitoring Program. In addition, the Cooperative Lakes Monitoring Program (CLMP) provides training, technical assistance, and monitoring for lake water quality parameters. Descriptions of program sampling parameters, key components to a volunteer monitoring program, and volunteer success stories will be outlined.

Choose Your Adventure: A Model for Watershed Stewardship Program (Lisa Meranti, Cleveland Metroparks)

Biography: Lisa Meranti has been the Watershed Volunteer Program Coordinator since June 2016 but involved in watershed stewardship since childhood. A love of water at an early age influenced her to get a B.S. in Environmental Biology and Chemistry from Lebanon Valley College in PA and then M.A. in Environmental Studies from Cleveland State University. Lisa has focused on working in the field of citizen science and volunteer management for the last decade and served on the board of Forum for Volunteer Administrators.

Abstract: Watershed stewardship provides multiple avenues for adventure, learning, and life-long enrichment. Therefore, a citizen science program which allows volunteers to choose their own adventure in watershed stewardship can lead to high engagement as it has in Northeast Ohio. The Cleveland Metroparks Watershed Volunteer Program, in partnership with West Creek Conservancy and Northeast Ohio Regional Sewer District, was created in September 2012 to involve citizen scientists in watershed education, monitoring, and restoration. Over 2,180 individuals have contributed more than 21,700 hours throughout the region since the program start. Join to hear how the program is designed to engage diverse volunteers, while providing choice, incentives and opportunities to expand service regionally.

Volunteer Monitoring in Licking County, Ohio: A Soil and Water Conservation District Program (Denise Natoli Brooks, Licking SWCD)

Biography: Denise Natoli Brooks has been monitoring water quality for two decades and in multiple states. Through authentic learning opportunities she has trained thousands of people to monitor water quality using simple techniques. Denise earned a B.S. in Recreation Resource Management with a focus on forestry from Utah State University and a M.A. In Zoology with a focus on community-based conservation from Miami University of Ohio. Currently she coordinates stormwater compliance and education programs for multiple entities in Licking County. As a community-based conservation advocate, she believes citizens can and should participate in efforts to wisely use our natural resources.

Abstract: Learn how to develop and facilitate a robust credible data program in your community like Stream Team, a citizen science-based water quality monitoring program hosted by Licking County Soil & Water Conservation District. Licking Soil & Water took the lead in an effort to monitor water quality after a comprehensive study was completed by the Ohio EPA in 2012. All community members are invited to attend training, adopt a location to monitor and report results to Licking Soil & Water. Thus far, CQHEI, biological, chemical and physical monitoring results show water quality remains largely the same over time.

Collecting Monitoring Data to Inform Stormwater Management Policy (Matt Wooden, Northern Kentucky Sanitation District No. 1)

Biography: Matt Wooten has spent over 20 years studying aquatic communities as a means of monitoring water quality. He holds both Bachelor's and Master's degrees in biological science from Marshall University in Huntington, WV. Matt started his professional career with the West Virginia District of the US Geological Survey as a hydrologic technician, and then moved to ORSANCO as a biologist, where he was primarily focused on the development of biological criteria on the Ohio River. Currently, Matt is employed with the Northern Kentucky Sanitation District No. 1 (SD1) as an Environmental Program Manager, where he spent the last 14 years focused on understanding the interactions of stream ecology and urban hydrology in order to more effectively manage the physical and ecological impacts of storm water runoff. He has authored/co-authored nine peer reviewed manuscripts, multiple technical reports, and has served as a contributing reviewer for USEPA guidance documents. Additionally, Matt has presented his research at numerous conferences, symposia and workshops, was named the Young Scientist of the Year by the Cincinnati Society of the Scientist and Engineers in 2007 and is a 2019 graduate of the WEF Leadership Institute.

Abstract: Sanitation District No. 1 of Northern Kentucky has developed a comprehensive monitoring program to inform and update stormwater management policy. Learn about the path the district took to establishing the program, the components of the program and ways that it has informed stormwater management policy.

11:30 – 12:30 pm

Poster Session

Artificial Floating Island System as a Sustainable Solution for Addressing Nutrient Pollution in OH (Zhaozhe Chen, The Ohio State University)

Biography: Currently enrolled in the master program of Earth Science in the Ohio State University. Obtained MS degree in chemical biology at Stevens Institute of Technology, NJ. Obtained bachelor degree in biomedical engineering at Southeast University in China

Abstract: Artificial Floating Islands (AFIs), a phytoremediation technology, has been proven as an efficient, environmental-friendly, and cost-effective strategy to address the issue of nutrient pollution. However, most previous studies of AFIs were done in controlled conditions at mesocosm experiments. In addition, limited information exists on the use of AFIs as a nutrient remediation/prevention strategy in Ohio. This study aims to fill these gaps. We are currently undertaking a combination of mesocosm and natural experiment to assess the nutrient-removal efficiency of AFI systems in the Milliron Research Wetlands (at the Ohio State University Mansfield campus), and establish a performance baseline for two native aquatic plant species, Carex comosa and Eleocharis palustris. 18 AFIs were deployed in a section of the Milliron Research Wetlands. Physical and chemical parameters are being monitored bi-weekly. Since nutrient removal from the wetland is affected by numerous natural processes, a mesocosm experiment was set up to assist the quantification of nutrient removal due specifically to the presence of AFIs. Physical and chemical measurements (as well as sample collections) are performed weekly. Preliminary results show that the AFI systems quickly developed large root systems and extensive bacterial biofilms. The effects of the associations between plant biomass, biofilm development, and changing chemical and physical conditions will be investigated as the experiment progresses.

Identifying the Dominant Drivers of Hydrological Change in the Contiguous United States (Zhiying Li, The Ohio State University)

Biography: Ph.D. candidate in physical geography from Department of Geography at The Ohio State University.

Abstract: Understanding the dominant drivers of hydrological change is essential for water resources management. The dominant controls of streamflow can change over time and space; however, few studies have analyzed such changes. This study examines how the dominant drivers of streamflow vary between watersheds with different climate regimes (e.g., wet gets wetter, dry gets drier) and land cover characteristics. This study uses a time-varying Budyko framework to quantify the relative importance of precipitation, potential evapotranspiration, and other factors (e.g., agricultural drainage, groundwater withdrawal, and urbanization) in 1079 watersheds in the contiguous United States from 1950 to 2009. Results show that at the mean annual timescale, streamflow is most sensitive to precipitation in eastern

half of the country, while other factors are the major driver of streamflow in arid regions. Temporally, precipitation leads to increases in streamflow in most watersheds from 1961 to 1993, while other factors lead to decreases in streamflow in most watersheds from 1972 to 2004. Spatially, watersheds that are getting wetter are primarily due to increases in precipitation. However, watersheds that are getting drier in wet climates are due to precipitation, while those getting drier in dry climate are due to other factors such as groundwater withdrawal. This study clearly demonstrates that non-climatic factors have a substantial influence on streamflow in many regions of the United States.

Statistical data characterization of in situ nitrate-level time series in the Mississippi watershed

Nicholas V. Scott[1][a], Jack McCarthy[b], Ted Kratschmer[c], Miles Corcoran[c], Dietrick Lawrence[a], and John Ploschnitznig[a]

[a]Riverside Research, Open Innovation Center, 2640 Hibiscus Way, Beavercreek, OH, USA 45431-1798; [b]University of Dayton, Department of Computer Science, 300 College Park Ave., Dayton, OH, USA 45469-0001, [c]National Great Rivers Research & Education Center, Lewis and Clark Community College, One Confluence Way, East Alton, IL, USA 62024-2401

Biography: Dr. Nicholas Scott is an environmental physicist and geo-intelligence scientist specializing in hyperspectral imagery analysis and environmental water quality modeling using remotely sensed data.

Abstract: Data characterization of an eight-site nitrate-level time-series array using a suite of dimensional reduction and statistical modeling algorithms was performed as the preliminary stage of a full Bayesian state-estimation approach for understanding the Illinois section of the Mississippi watershed. Preliminary analysis shows high mean nitrate levels in the northern, western, and southern parts of the Illinois watershed with significant correlations of nitrate levels appearing not only in the southern region, but also across a north-south transect. Dimensional reduction of the eight-site array based on empirical orthogonal function analysis and nonnegative matrix factorization demonstrates that specific time series, lower in number than the eight-site dimension, are responsible for both global and local variability. Dimensional reduction based on Gaussian mixture modeling applied to sets of dual-site time series in the north and south shows multi-modal clusters characterized by distinct mean and covariance structure. Competitive-leaky-learning-based inter-site data group modeling depicts nonlinearly generated data clusters possessing labels also based on mean and covariance structure. All facets of the machine-learning results offer a means for quantitatively describing the Illinois watershed's nitrate-level dynamics over a fall-winter seasonal time scale.

Bayesian State Prediction of In-situ Nitrate Level Time Series for the Mississippi Watershed

Nicholas V. Scott[1][a], Jack McCarthy[b], Ted Kratschmer[c], Miles Corcoran[c], and Sarah Jensen[d]

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Abstract: Nitrate levels throughout the Mississippi watershed experience fluctuations over seasonal time scales due to natural processes as well as human behavior. Seasonal prediction of nitrate levels is important for understanding watershed system dynamics which impacts the allocation of resources by decision makers tasked with monitoring and assessing environmental health. Algorithms are needed to provide predictive capability across the watershed. In particular, there is a strong need for inferring nitrate levels in one or more spatial regions based on nitrate level statistical evidence in other areas. Hidden Markov model parameter estimation is applied to a nitrate level time series array spanning the 2017-2018 fall-winter season for the purpose of exploring the feasibility of constructing cross-watershed system models. Parameterized Bayesian models demonstrate statistical predictive estimation power for nitrate level state evolution. In addition, generative topographic mapping is used to estimate a characteristic nitrate level scale which segments measured nitrate levels across the watershed. This data-derived scale threshold provides a way for investigating covariance-based nitrate level classification. This allows for the creation of distinct seasonal models for sub and super nitrate levels which is the preliminary stage for the development of a full Bayesian network model of the watershed.

The Potential of Beaver Ponds to Mitigate Acid Mine Drainage (AMD) (Holly Stanley, The Ohio State University)

Biography: Holly Stanley is an honors student at The Ohio State University School of Environment and Natural Resources. She will graduate this December with a B.S. in Environmental Science and a specialization in aquatic sciences and ecosystem restoration.

Abstract: Acid mine drainage occurs when water runs over sulfur-rich rocks exposed during mining activity, causing low pH levels and high metal contamination including sulfur, aluminum, and iron in nearby waterways. The detrimental impacts of mining on aquatic ecosystems can last long after the activity ceases, and current treatment methods are costly and vary in effectiveness. AMD is an issue worldwide, and Ohio alone has over 1,300 miles of impacted streams. In Southeastern Ohio at The Wilds, a series of beaver ponds has been established in a watershed heavily impacted by AMD due to previous coal mining. Wetlands have been shown to have mitigating effects on acid rain impacted landscapes, as well as improve ecosystem biodiversity. We investigated whether, as a type of wetland, beaver ponds could also improve water quality in an AMD stream. Upstream of the ponds, the pH is as low as 3-4 and the iron concentration is around 54 mg/L with visible iron precipitates. After traveling around 800 meters downstream from the first site through the string of beaver ponds, the pH reaches 7.5 and iron levels decrease to 0.31 mg/L, with no signs of precipitates. It appears that beaver ponds are capable of increasing water quality in AMD streams, which indicates that beavers may be a practical tool for ecosystem restoration of AMD impacted landscapes. While beaver ponds have been shown to improve water quality, further research is needed to determine if there is a restoration of ecosystem services.

Statistical Analysis of Water Demand Before and During COVID-19 Lockdown (Lauren Feltman, University of Cincinnati)

Biography: Graduate student at the University of Cincinnati, Department of Chemical and Environmental Engineering. Currently completing a M.S. in Environmental Engineering. Completed B.S. in Marine Science at University of South Carolina.

Abstract: The recent COVID-19 pandemic has altered individuals' way of life everywhere. Public health agencies ordered citizens to stay in their homes, avoid unnecessary travel, and practice social distancing. Periods of lockdowns were imposed worldwide. We conjecture that the lockdown has resulted in an increase in residential water use and a decrease in water use at non-essential workplaces. This study aims to test the hypothesis that the COVID-19 lockdown resulted in a significant change in water use. Water demand data from buildings in four different cities will be used. Two cities in Ohio (Cincinnati and Cleveland), and two cities in Australia (Sydney, NSW and Canberra, ACT) will be investigated. The raw data will be provided in intervals of 1-minute or longer. Weekly mean flow rates (l/s) will be calculated from the water use data. These values will be used to test the hypothesis using a one-sided student t test at each building. Period 1 is pre-lockdown lasting from 12-21-2019 to 03-13-2020; Period 2 is lockdown lasting from 03-14-2020 to 05-08-2020. The null hypothesis for all buildings will be H0: Î¼1 = Î¼2, i.e., there is no difference between pre-lockdown and lockdown water use. The alternative hypotheses will vary based on building use. For the case where water use is thought to increase during the lockdown, the alternate hypothesis is HA: Î¼1 < Î¼2. Conversely, where water use is thought to decrease during the lockdown period, the alternate hypothesis is, HA: Î¼1 > Î¼2.

1:00 – 3:00 pm

Session IX

Drinking Water

Source Water Protection Planning in the Age of PFAS (Doug Hunter, Cox-Colvin & Associates, Inc.)

Biography: Doug Hunter is a professional geologist with over 30 years of experience in the exploration and development of groundwater resources. Doug holds a BS in geology from James Madison University and an MS in hydrology from the University of Arizona

Abstract: PFAS contamination is driving a nationwide environmental crisis that has left us playing catch up as we struggle to characterize the potential threat this seemingly ever-expanding class of chemicals pose to our drinking water sources. To compound this issue, many of the source water protection plans

in Ohio were developed prior to our knowledge of this emerging class of contaminants and thus do not include in the current Potential Pollution Source Inventories. In this article, we will discuss the different types of source areas associated with PFAS contamination and how these contaminants potentially migrate from the source areas to drinking water supplies. The goal is to outline potential strategies for identifying and evaluating potential PFAS source areas and the need for updating existing Source Water Protection Plans to address these potential threats.

Optimization of Microcystin-LR Removal by Permanganate Pre-oxidation (Maycee Hurd, The Ohio State University)

Biography: Fourth year Environmental Engineering student at The Ohio State University. Summer 2020 undergraduate research fellow at Ohio State's Department of Civil, Environmental, and Geodetic Engineering.

Abstract: Harmful algal blooms (HABs) have increased in severity and longevity in Ohio's lakes and are harmful due to their release of cyanotoxins. The cyanotoxin of interest for this project is microcystin-LR (MC-LR), which is a known liver toxin. Many drinking water sources of many Ohio residents can reach levels over a hundred times greater than the Ohio EPA recommendation of 1.6 ppb. A common treatment method for MC-LR removal is pre-oxidation using potassium permanganate. During previous work within our group, the dissolved organic matter (DOM) in the water was shown to inhibit the efficiency of permanganate for MC-LR removal. However, continued reaction of MC-LR with permanganate would proceed at a faster rate when a second permanganate addition was made after the initial reaction had ended. We have been currently exploring this observation to optimize pre-oxidation treatment by, instead of one dose of permanganate, using the same amount dosed in smaller portions over time. In general, the difference in MC-LR degradation rate constants between each dose was greater in Suwannee River (Georgia) DOM and the overall removal of MC-LR was improved using sequential dosing in Grand Lake St. Mary's (Celina, Ohio) DOM. This method may potentially be used to prevent lysis of cyanobacterial cells, which can release additional MC-LR. Large doses of oxidant are known to lyse cells, and sequential dosing may represent a more gentle treatment that helps to prevent cell lysis.

Characterization of ambient germicidal UVB (Eric Mbonimpa, Air Force Institute of Technology)

Biography: Dr. Eric Mbonimpa is an assistant professor in Systems Engineering and Management department at Air Force Institute of Technology. He conducts research related to water and environmental sustainability.

Abstract: Solar radiation received on surface of the earth could include germicidal wavelengths (297-315 nanometers), known as UVB. During the outbreak of Covid-19 there has been a debate on whether solar radiation can inactivate the virus outdoors. To assess the capacity of solar UV to inactivate viruses, we

collected UVB data from sensors managed by Colorado State University's natural resource lab in various US locations and performed statistical analyses to determine spatial and temporal variations in UVB. This UVB info was used in germicidal dose-response models from previous studies to characterize spatial and temporal variations in viruses-inactivation potential. The results could help explain the fate of Coronaviruses on surfaces and water or saliva droplets exposed to ambient solar radiation.

1:00 – 3:00 pm

Session X

Ohio Stormwater Association (*OSWA*)

Can We Retrofit Storm Sewers to Reduce the Frequency of Stream Disturbances? (Adam Lehmann, Hamilton SWCD)

Biography: Adam Lehmann manages a Stream Conservation Program for Hamilton County Soil and Water District. Adam also leads a multi-organizational restoration and research effort focused on mitigating the impacts of urban hydrologic alteration on in-stream biol

Abstract: Mitigating the impacts of flashy urban flows on in-stream erosion and biology (i.e. reducing the frequency of bedload mobilizing stream flows), in many situations, requires regional stormwater management practices in addition to on-site practices. However, availability and opportunity cost associated with acquiring appropriate land for constructing regional facilities is a major obstacle. A potential option to achieve regional storage capacity where it is most needed, without the opportunity cost of displacing more economically productive land uses, is to utilize the capacity that already exists within local storm sewer systems. Retrofitting storm sewer systems to detain stormwater from the most frequent runoff events contributing to in-stream disturbances, while maintaining conveyance capacity for larger events, could represent a significant opportunity for contributing to the urban hydrologic mitigation toolbox. In this talk we explore insights, lessons-learned, and modeling results from a multi-agency effort to turn this concept into a reality. We also share a tool that was created to help water resource managers screen potential retrofit sites. Thanks to the Ohio Environmental Education Fund, this tool is available to all free of charge.

Habitat Provision by Bioretention Retrofits in an Urban Area (David Wituszynski, The Ohio State University)

Biography: David Wituszynski recently received his PhD working under Jay Martin at the Ohio State University, where he studied the ecological and hydrological impacts of a large-scale bioretention retrofit. He remains in the Columbus area.

Abstract: Bioretention is a popular stormwater management technique which is being installed in large quantities in urban areas. One reason for this popularity is its potential to deliver multiple benefits beyond stormwater retention. While the hydrological and water-quality benefits of bioretention are increasingly well-substantiated, little work has quantified the ecological benefits provided by these systems. This is an important gap in knowledge, as these systems might be engineered to provide habitat for vulnerable species in urban areas, increasing both their conservation value and their contribution to human well-being. To work toward addressing this gap, we surveyed birds and carabid beetles in bioretention basins installed as part of a large-scale bioretention retrofit in a residential neighborhood of Columbus, OH. We found that both bird and beetle communities were different in bioretention basins from those in nearby lawn sites. The difference in bird communities was driven by changes in community composition during the migration period. The difference in carabid communities was correlated with differences in feeding guild and body size. These differences strongly suggest that bioretention has the capability to increase the diversity of species within a landscape. We suggest strategies for increasing the diversity of both of these groups in bioretention systems.

Underground Storage and Pretreatment: Design Methods in Ohio (Michael Cook, Advanced Drainage Systems, Inc.)

Biography: Mr. Cook is a Regional Engineer for Advanced Drainage Systems, covering Northern and Central Ohio since 2014. He specializes in stormwater and wastewater treatment, sewer collection systems, underground detention, and post-construction BMPs. His project design experience as a design engineer includes stormwater management, CSO Long Term Control Plans, and collections systems. He holds a Bachelor of Science in Civil Engineering from the University of Akron. Mr. Cook worked for Burgess and Niple (2001-2006) and AECOM (2006-2014) prior to joining Advanced Drainage Systems in 2014.

Abstract: This presentation will describe and cover the design calculations and methods (per the Ohio Stormwater General Permit) for extended detention and infiltration of water quality volume (WQv) utilizing underground storage and pretreatment. Since the 2018 Ohio Stormwater General Permit was released, there has been some confusion as to proper design, calculations, and methods in meeting the new pretreatment requirements. Pretreatment is now required upstream of underground storage for extended detention and infiltration. This presentation will show a number of methods for pretreatment and the design choices, calculations, and decisions associated with each method. The presentation will also cover costs associated with this new pretreatment requirement, so the designer/owner can make cost-effective decisions.

Managing Stormwater - Regionally and Collaboratively (Frank Greenland, Northeast Ohio Regional Sewer District)

Biography: Mr. Greenland has worked for the District since 1988. Formerly a planning engineer, project engineer, planning manager, deputy director of engineering and construction, and director of capital programs, he now serves as the Director of Watershed Programs. He has been involved in a variety of wet-weather projects, including the District's $3 billion Combined Sewer Overflow (CSO) Control Program (Project Clean Lake) and the development and implementation of the District's Regional Stormwater Management Program. A registered Professional Engineer, he earned his degree in Environmental Engineering Technology from the University of Dayton and Masters in Civil Engineering from Cleveland State University.

Abstract: A regional approach is critical to the success of any stormwater program, as political boundaries are invisible to stormwater problems. Successes occur from collaboration, communication, and holistic problem area solutions. Property acquisition, cost sharing, and impacts of the local sanitary and storm systems are critical to these successes. As part of the overall program, design and construction of projects are being implemented by varied contractual methods with creativity and flexibility in funding for implementation. Residents who have experiences a long history of flooding are being relieved of this burden. Transportation, building, and utility assets long at risk from the impacts of stormwater runoff are being protected. Stream banks are being stabilized, reducing risk and improving water quality be reducing sediment load from entering the waterways. All of this is being done through a regional and collaborative approach.

Thursday November 5, 2020

9:00 – 11:00 am

Session XI

Agriculture

Farmer Advocates for Conservation (Stephanie Singer and Erin Payne, The Nature Conservancy)

Biography: Stephanie and Erin are with the Nature Conservancy on the Agriculture Team in the Western Lake Erie Basin.

Abstract: Farmer Advocates for Conservation aligns the work of four major non-profits with the WLEB Partnership and government programs to train 60 farmers in the Maumee River Watershed to become technical experts and community leaders for sustainable agriculture. Each Farmer Advocate is trained to use peer to peer methods to reach late/middle adopters with the result of at least 12,000 more farmers directly educated leading to adoption of best management practices to improve water quality. The Farmer Advocates will be compensated for their time to attend training and provide outreach. This Farmer Led Outreach will be evaluated by a social science research program to both quantify participation and measure success by changes in attitudes and practices.

The Farmer or the Farm: What Explains Farmers? Nutrient Loss? Associated Risk Perceptions? (Elizabeth Schwab, The Ohio State University)

Biography: Elizabeth is a PhD student in the Department of Food, Agricultural and Biological Engineering at The Ohio State University. Her work focuses on understanding factors that influence farmers' decisions and associated impacts on soil and water quality.

Abstract: Consequences of agricultural nutrient loss include the formation of algal blooms which cause water quality impairments affecting economies, public health, and recreation. Thus, understanding the

factors that shape farmers' risk perceptions and decision-making can help protect water resources. This work presents two different approaches to investigating farmers' risk perceptions associated with nutrient loss. Farmer survey data collected in the Maumee River watershed provides information about farmer perceptions, beliefs, and specific farm field management. An initial conceptual model integrates information about farmer identity, risk perceptions, perceived sufficiency of nutrient management practices, and farm field management. We investigate potential mechanisms through which risk perceptions may be formed and identify which factors best explain risk perceptions. A second study utilizes specific farm field management information as Soil and Water Assessment Tool model inputs to generate water quality outputs for individual farm fields, which are then matched with on-farm nutrient loss risk perceptions to generate "relative accuracy" scores. These scores represent comparative over- or under-prediction of nutrient loss risk for each farmer. Farm and farmer characteristics that were associated with "relative accuracy" are identified, helping us better understand factors influencing relative overprediction or underprediction of risk. We find that characteristics of the individual are stronger drivers of risk perception than is objective vulnerability of land to nutrient loss, and farmers' conservation-oriented identities are particularly important in influencing risk perceptions. This work highlights the need to consider characteristics of both the farmer and the farm in working to increase farmers' adoption of nutrient management practices.

What are the nutrient levels in Lake Erie tributaries and where are they coming from: Expanded Nutrient Monitoring Report (Sandra Kosek-Sills, Ohio Lake Erie Commission & Paul Gledhill, Ohio EPA)

Biography: Sandra Kosek-Sills is an Environmental Specialist at the Ohio Lake Erie Commission. She is lead senior staff for the State of Ohio's Domestic Action Plan. She holds a PhD and MLA in landscape architecture.

Abstract: Ohio EPA, ODNR, USGS, and Heidelberg University have established many sampling stations in the Lake Erie watershed. To aid in reporting out these data to stakeholders and the general public, the Ohio Lake Erie Commission has published a Western Lake Erie Tributary Water Monitoring Summary each year starting with 2014. The Summary focuses on total phosphorus, dissolved reactive phosphorus, and nitrogen in the form of nitrate (NO2) + nitrite (NO3). The amount of water in the rivers is measured by USGS at their streamflow gaging stations, allowing the calculation of loadings. The recently published Expanded Like Erie Tributary Nutrient Load Monitoring report accompanies the annual Water Monitoring Summary. It provides complete monitoring information used in the Summary in a tabular format. It includes monitoring data from all additional Lake Erie tributary sites that are monitored in Ohio but not published in the Summary. This report includes spring season (March 1-July 31) and annual water year nutrient loads and concentrations for the most recent year calculated for all Lake Erie tributary sites with continuous nutrient monitoring. We will discuss the monitoring program that underpins the report and review the report and its contents.

H2Ohio Implementation on Working Agricultural Lands in the WLEB (Clark Hutson, ODA Division of Soil and Water Conservation)

Biography: Clark Hutson is the H2Ohio Western Lake Erie Basin Program Coordinator, for the Ohio Department of Agriculture. Clark's role is to oversee implementation ODA's efforts to encourage widespread adoption of BMPs on Agricultural Lands within the Western Lake Erie Basin.

Abstract: Clark will provide a brief outline of the Ohio Department of Agriculture's efforts to Implement the H2Ohio Best Management Practices on Agricultural Working Lands in the Western Basin of Lake Erie. Clark will review the process used to develop the practice guidelines, including seeking input from a wide range of stakeholders. He will discuss the Department and Local Soil & Water Conservation Districts Outreach efforts and summarize the results of the landowners/operators response with an initial signup that greatly surpassed expectations.

9:00 – 11:00 am

Session XII

Ohio Dam Safety Organization (*ODSO*)

Utilizing Scanning and UAV Technologies to Document As-Builts & Monitor Potential Spillway Movement (Boris Slogar and David Lautenschleger, Muskingum Watershed Conservancy District)

Biography: Boris E. Slogar, P.E., MPM is a WMAO water buffalo, was appointed chief engineer of MWCD in 2007 and has over 30 years of experience in water resources engineering.

Biography: David G. Lautenschleger is the Deputy Chief of Surveying/GIS for MWCD. He has Bachelor of Science degrees in both Surveying & Mapping and in Geography & Cartography from The University of Akron, a master's degree in GIS from Penn State University, and is a professionally licensed surveyor in the State of Ohio.

Abstract: MWCD's Chippewa Subdistrict in Medina and Wayne Counties consists of 8 flood control dams constructed by SCS from 1969 to 1980 under PL 566. Hubbard Valley Dam (ODNR Class I) is 55.5' tall, 2.600' long and has a drainage area of 3,763 acres. MWCD contracted GPD Group to scan the principal spillway structure inside and out to create a 3D model to record existing conditions and create a benchmark for future scanning comparisons. MWCD utilized their in-house UAV to fly the earthen portion of the structure to create a topographic model of the dam. This discussion will focus upon how scanning and UAV technology is being used to manage and monitor the health of the dam.

Case Study: The Importance of Good Flashboard Design for Dam Safety, a Dam Owner's Perspective (Stephen Kinsley, City of Columbus)

Biography: Stephen is an engineer working for the City of Columbus as the Dam Safety Coordinator since January of 2019. He has also been on the ODSO board since January of 2020.

Abstract: Consequences of agricultural nutrient loss include the formation of algal blooms which cause water quality impairments affecting economies, public health, and recreation. Thus, understanding the factors that shape farmers' risk perceptions and decision-making can help protect water resources. This work presents two different approaches to investigating farmers' risk perceptions associated with nutrient loss. Farmer survey data collected in the Maumee River watershed provides information about farmer perceptions, beliefs, and specific farm field management. An initial conceptual model integrates information about farmer identity, risk perceptions, perceived sufficiency of nutrient management practices, and farm field management. We investigate potential mechanisms through which risk perceptions may be formed and identify which factors best explain risk perceptions. A second study utilizes specific farm field management information as Soil and Water Assessment Tool model inputs to generate water quality outputs for individual farm fields, which are then matched with on-farm nutrient loss risk perceptions to generate "relative accuracy" scores. These scores represent comparative over- or under-prediction of nutrient loss risk for each farmer. Farm and farmer characteristics that were associated with "relative accuracy" are identified, helping us better understand factors influencing relative overprediction or underprediction of risk. We find that characteristics of the individual are stronger drivers of risk perception than is objective vulnerability of land to nutrient loss, and farmers' conservation-oriented identities are particularly important in influencing risk perceptions. This work highlights the need to consider characteristics of both the farmer and the farm in working to increase farmers' adoption of nutrient management practices.

Saving Lake Jinelle - Ohio's First Dam Overtopping Protection Project with ACBs (Erik Schuller, Gannett Fleming Engineers and Architects)

Biography: Erik Schuller is a Staff Geotechnical Engineer with Gannett Fleming in Columbus, OH. During his 8 years of experience he has worked on numerous water resource projects included dam inspections, assessments, design, and construction administration.

Abstract: Lake Jinelle, located in Richfield, OH, was designed and built by inventor Jim Kirby in 1919. The lake design included a patented stormwater bypass system at the two feeder streams to reduce silt build-up, making it the world's only known patented lake. The dam and accompanying mill, which Mr. Kirby used to power his workshop, are on the National Historic Register. The Class 2 dam is currently owned and operated by the Richfield Joint Recreation District as part of a heritage preserve. In 2014, a periodic inspection of the dam by ODNR Dam Safety identified that the storage and spillway capacity of the dam were not adequate to safely pass the design flood discharges and required improvements. If the dam could not be brought into compliance with Ohio dam safety laws, the dam would have to be

removed, and with it, the rich history of the site. Site topography and historic preservation requirements eliminated nearly all spillway and storage improvement options. Gannett Fleming proposed the use of articulated concrete blocks (ACB) to provide overtopping protection of the dam's earthen embankment and auxiliary spillway during design flood events. While ACBs have historically been utilized for certain aspects of dam rehabilitations, this project represents the first time that ACBs have been approved specifically for overtopping protection of a dam in Ohio. This presentation will discuss the history, design, and construction of the project.

The failures of Edenville and Sanford dams in May 2020 (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.

Abstract: After several days of heavy precipitation, two earth dams failed (Edenville and Sanford) and two other were damaged (Secord and Smallwood) north of the town of Midland, MI, resulting in widespread destruction and the evacuation on May 19th, 2020, of about 11,000 people among the COVID-19 pandemic. In response to the destruction, a team led by the author was organized by the ASCE with the main objective of capturing perishable data that could be used subsequently by practitioners. The team performed geophysical testing, drone reconnaissance, soil sampling and detailed observations at the dam sites. The Edenville Dam site was of particular interest, because the failure was captured on video by a local resident and failure occurred without the dam being overtopped. Downstream, the Edenville dam failure resulted in the subsequent overtopping of Sanford dam and widespread destruction in and around the town of Midland, MI. In its last frames, the Edenville dam video shows a completely liquefied earth fill just before the breaching of the dam. Laboratory testing performed by the EDS team revealed that the silty sand which was used to construct the dam in 1923-1924, had low densities, low strength and was contractive in nature. Since Ohio, and neighboring states have many earth dams of similar vintage that were constructed before earth compaction quality control measures were proposed in the 1930's, understanding the failure of Edenville Dam has significant importance.

1:00 – 3:00 pm

Session XIII

Water Education

2020 Project WET Ohio Water Education Program Updates (Dennis Clement, Ohio EPA Office of Environmental Education)

Biography: Dennis graduated from Hocking College in March 1994 with Associates of Applied Sciences in Wildlife Management and Interpretive Services. His background includes two years substitute teaching for Tri-Rivers Career Center, 6 years as education coordinator with the Morrow SWCD, and 18 years with the Ohio EPA, Office of Environmental Education (OEE) as an Environmental Public Information Officer 1. In January 2015, he was appointed Project WET State Coordinator for Ohio. In his spare time, he is a carded equine judge for the American Buckskin Registry Association, International Buckskin Horse Association, Pinto Horse Association and The Ponies of America. He is also certified 4-H Equine Judge in Ohio and Michigan.

Abstract: This has been an interesting year to say the least. From educator workshops happening in late 2019 to teachers and students learning virtually in March 2020. This session will provide updates on the 2019/early 2020 Project WET – Ohio activities. What will Project WET look like in the future and what was the total number of educators and students educated in using Project WET in 2019. What are the plans for the remainder of 2020 and beyond with the pandemic and getting back to some normalcy in mind.

Ohio County Soil and Water Conservation Districts Area and OFSWC State Envirothon (Janelle Mead, OFSWCD; Emily Heppner, ODA, and Wendee Zandanski, Jefferson SWCD)

Biography: Janelle is the Chief Executive Officer, of the Ohio Federation of Soil and Water Conservation Districts. The OFSWCD is a non-profit organization providing support and assistance to Ohio's 88 county Soil and Water Conservation Districts. County SWCDs provide a variety of conservation related assistance and programs to landowners and users of Ohio's working lands -- working hard to keep soils productive and waters clean throughout the state of Ohio. Growing up on her family's row-crop farm in Fayette County, Mead has always been interested in agriculture Most recently, Mead served as the deputy director of the Ohio Department of Agriculture. Her responsibilities included overseeing the department's animal health, communications, legislative, and marketing efforts, and shaping department policy. Mead has also worked for the Ohio Farm Bureau Federation, The Ohio State Alumni Association and Mycogen Seeds. She is a graduate of The Ohio State University where she earned a degree in agricultural communications. She and her family live in Fayette County.

Emily Heppner currently oversees the day to day operations at Ohio Department of Agriculture Division of Soil and Water Conservation, where she began service in 2015. After earning a Bachelor of Science degree in environmental science from the University of Toledo in spring 2009, she gained early experience employed with Ohio River Valley Water Sanitation Commission (ORSANCO), Midwest Biodiversity Institute, Ohio Department of Natural Resources, Sanitation District of Northern Kentucky, and Brown Soil and Water Conservation District as White Oak Creek Watershed Coordinator.

Wendee Dodds has been the Natural Resources Specialist for the Jefferson Soil & Water Conservation District since 2001. She has a bachelor's degree in natural resources conservation from Kent State University, inspired by her high school Envirothon experience. Wendee currently serves as chair of the Ohio Envirothon Committee and vice-chair of the NCF-Envirothon Operating Committee.

Abstract: North America's largest high school environmental competition, the Envirothon challenges teams of 5 high school students in soils, wildlife, aquatic ecology, forestry, and current environmental issues. Ohio has one of the strongest Envirothon programs in North America because of our strong network of support, partners, sponsors, and dedicated soil and water conservation districts. Ohio is set to be the host of the NCF-Envirothon in the summer of 2022! Members of the Ohio Envirothon Committee will update you on the Area and State Competitions, how an outdoor environment competition was held virtually this year, and the plans for hosting the national competition.

Future City (Kevin White, IBI Group and Matt Marquis, Hull & Associates, LLC)

Biography: Kevin Is a design engineer for IBI Group, focusing on water, wastewater, and stormwater infrastructure. Born and raised in Columbus, he received both his bachelor's and master's degrees from The Ohio State University and is an avid buckeye fan. He has served as the Ohio Chair for Future Cities for the past 4 years.

Matt Marquis is a Civil Engineer with 10 years of experience specializing in water resource projects including stream restoration and floodplain management, and heavy civil projects including dams and levees, upground reservoirs, and landfills. Matt graduated with a Bachelor's of Science in Construction Engineering from the University of Toledo and followed with a master of science in Civil Engineering from Norwich University. Matt currently serves as a Board member of the Ohio Dam Safety Organization and a Board Member of the Ohio Future City Competition Steering Committee.

Abstract: The Future City engineering competition allows teams of middle school students to work with an engineer to design a city of the future, build a scale model, write an essay and prepare an oral presentation about how their city meets specific challenges including energy efficiency and environmental sustainability. The theme for the 2020 competition was "Clean Water: Tap Into Tomorrow."

Distance Learning and www.discoverwater.org During Covid-19: A Closer Look at Project WET Materials for Virtual Learning (Dennis Clement, Ohio EPA Office of Environmental Education)

Abstract: Water touches every aspect of our lives—the cells in our bodies, the food we eat, the recreational activities that we enjoy, the weather that affects our daily lives and much more! DiscoverWater.org is a self-directed educational resource about different water topics—ranging from global to personal perspective—which together reflect many of the complex and important roles of

water in our lives. DiscoverWater.org is designed for use by children ages 7-12 and for educators and parents of this age group, both in and out of a classroom setting (taken from Project WET Webpage, 2020). Participants will be led through three (listed below) of the eight interactive modules that are free activities located at Project WET's www.Discoverwater.org.

- The Water Cycle
- Investigate Fresh Water
- Explore Watersheds

Participants will also be briefly introduced to the online self-paced educator course to obtain the 2.0 Project WET Educator Guide. We will also tie everything together talking very briefly about the Ohio Environmental Education Fund (only Ohio educators) and how educators can apply for mini grant funding (up to $5,000) to purchase any of the materials from the Project Wet Store to teach about water in their own informal and formal settings whether it be virtually or in-person.