Conference Proceedings

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Tuesday, November 18, 2014
Keynote Address
Alder & Oaks Rooms 8:30 am – 9:45 am

Title: *Water Conflicts* - Author: Dr. G. Dennis Cooke, Professor Emeritus, Kent State University

Biography: Dr. G. Dennis Cooke was awarded the Ph.D. degree in Zoology from the University of Iowa in 1965. He then studied as an NIH and NASA post-doctoral fellow with Eugene P. Odum at the Institute of Ecology, University of Georgia, on the ecology of bio-regenerative life support systems for long-term space flight. He was appointed Assistant Professor in Biological Sciences at Kent State University in 1967. His research was on lake restoration and management. He, colleagues, and students developed the alum application method for controlling phosphorus release from sediments of eutrophic lakes. They also investigated several other in-lake treatment methods, including harvesting, herbicides, artificial circulation, and sediment covers. He and a colleague published significant papers on the appearance of disinfection by-product precursors in reservoirs, and the use of management and rehabilitation techniques for their control. He trained three Ph.D. students and many M.S. students, and was awarded the Technical Merit Award from the North American Lake Management Society (NALMS) and the Distinguished Teaching Award from Kent State University. He served as the Founding President of NALMS and the President of the Ohio Lake Management Society. He published more than 60 refereed articles, 5 books, and wrote many reports. He is well- known for his first authorship of Restoration and Management of Lakes and Reservoirs (2005. 3rd Edition. Taylor and Francis). His research was generously supported by the USEPA, the NSF, the AWWA, and the U.S. Army Corps of Engineers. He retired in 2003 and was appointed Emeritus Professor. He then served as one of two limnologists for the State of Oklahoma in an investigation and court trial regarding the impacts of disposal of poultry wastes to the Illinois River and Tenkiller Reservoir (OK). Dr. Cooke served in the United States Navy and was honorably discharged.

Abstract: *Freshwater is essential and there is a limited amount. Conflicts over water intensify as demand increases, supply declines, and water is used as a weapon or objective, or is part of an economic struggle. Climate change is an intensifying factor. The Middle East/North Africa Region, the driest place on Earth, has water at the root of several intense and current military conflicts. The presentation covers some of these and may shed some light on causes of these conflicts. In the USA, as portions of the Nation become drier from climate change and increased demand, major conflicts are evident, especially in the Southwest and Southeast. Eastern USA has more abundant water but pollution is an issue. Our present water conflicts and problems will become more intense in the future for the USA, and immigration, science denial, and an aversion to paying for needed changes may make solutions more difficult.*

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Tuesday, November 18, 2014
Concurrent 1 – Mineral Resources Management
German Village Room 10:00 am – 11:30 am

Title: *Use of Flue Gas Desulfurization By-products for Coal Mine Land Reclamation* - Author: Dr. Butalia Tarunjit, The Ohio State University

Biography: Dr. Tarunjit S. Butalia, an internationally known researcher and scholar, serves as the Director of the Coal Combustion Products Program at The Ohio State University. Dr. Butalia is a Research Scientist in the Department of Civil, Environmental, and Geodetic Engineering at The Ohio State University. His technical specialty is the characterization of natural and synthetic materials and their use in technically sound, environmentally benign, and commercially competitive applications including infrastructure rehabilitation. Dr. Butalia obtained his Ph.D. degree in Engineering from The Ohio State University, Columbus, Ohio, USA in 1997. He is a registered Professional Engineer. He has provided leadership to several CCP research and demonstration projects totaling over $25 million in the last 15 years and has authored, presented and/or published more than 150 technical papers and book articles. He serves on the Advisory Board of the International Pittsburgh Coal Conference and is a member of the Editorial Board of the Journal of Coal Combustion and Gasification Products.

Abstract: *Unreclaimed mine lands present serious threats to human health, public safety, and the environment. Using coal combustion by-products (CCBs), e.g., flue gas desulfurization (FGD) by-products, as backfill material can be an effective and economical approach to re-contour the original landscape of unreclaimed mine lands, eliminate highwalls, and abate acid mine drainage (AMD). In this study, the engineering and environmental responses of using FGD materials to reclaim mine lands are investigated. The effectiveness of using stabilized FGD material for coal mine reclamation and AMD neutralization is investigated in a bench-scale mine highwall reclamation testing module. The bench-scale testing module simulates the conditions similar to AMD penetrating stabilized FGD material during and after mine highwall reclamation under a number of potential placement designs of stabilized FGD material against a mine highwall for AMD treatment. The flow of AMD within the mass of the fill as well as the change of AMD water quality along the path of flow are investigated. The bench-scale investigations will produce parameters needed in the design for a full-scale demonstration project, in which an AMD-producing unreclaimed coal mine highwall complex located at Cheshire, OH will be reclaimed. In addition to the bench-scale study, two full-scale reclamation projects of varying constructability and fill material combinations are carried out at two unreclaimed mine lands near American Electric Power (AEP)'s Conesville and Cardinal power plants. About 1 and 0.5 million tons of FGD by-products are currently being placed at the Conesville and Cardinal demonstration sites, respectively. The changes of the water qualities of the upper-most aquifer systems underlying the reclamation sites are studied to assess the environmental responses. The overall goal of these studies is to assess the potential of using high-volume CCBs in a manner that is economically viable and beneficial to the environment, the public's health and safety, and the generating industry.*

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Title: *Steel Slag Leach Bed Longevity Analysis*- Authors: Sarah Landers, Raccoon Creek Partnership; Sarah Maj, Amy Mackey, & Natalie Kruse, Ohio University

Biography: Sarah Landers has served as the Raccoon Creek Water Quality Specialist since 2011. This position is a joint venture between the Ohio Department of Natural Resources Division of Mineral Resources Management, Ohio Valley Resource Conservation and Development Council, The Voinovich School of Leadership and Public Affairs at Ohio University, Vinton County Soil and Water Conservation District, and Raccoon Creek Partnership. Sarah received her Master's in City and Regional Planning from the Ohio State University in 2008. She manages chemical and biological water quality data collection, data reporting, and monitors and maintains acid mine drainage treatment and reclamation projects in the Raccoon Creek Watershed.

Abstract: *The Raccoon Creek watershed, located in southeastern Ohio, utilizes a mixture of source control, passive, and active treatment projects to remediate acid mine drainage (AMD) polluted waters within the 684 square mile watershed. Fifteen steel slag leach beds (SSLBs) are utilized as a passive treatment strategy throughout the watershed. The oldest steel slag leach beds were installed in 2004 and the most recent in 2011. Each bed is designed differently to account for individual site variation, however each consists of a liner, PVC piping, and steel slag bed material. Newer project designs allow for discharge rates to be manually adjusted by valves which control the quantity of water entering the bed. With the ability to regulate the amount of water flowing through the bed comes the opportunity to fine tune the level of treatment to meet project goals without over treating and prematurely exhausting the alkalinity in the beds. The objective of this work was to estimate the useful lifespan of the slag and evaluate treatment targets by determining target alkalinity loads for SSLB discharges based on the acid loads of the AMD receiving tributaries targeted for treatment. Current and past alkalinity loads from each SSLB were used to estimate the alkalinity generating potential of each bed related to the flow rate through the bed. The acid load of the receiving tributary being treated was calculated based on multiple years of long term monitoring data. This information was applied to the treatment goal of each bed to determine a target operational flow rate. The capability to better estimate the useful lifespan of a SSLB will enable agencies to better estimate long term project maintenance costs and enable those individuals maintaining systems to choose appropriate flow rates to meet treatment goals without prematurely exhausting the alkalinity of the bed.*

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Title: *Using Abandoned Underground Mine Pools at Heat Pumps* - Author: Dr. Dina Lopez, Ohio University

Biography: Dina L. Lopez is professor of Geochemistry and Hydrogeology and Chair of the Department of Geological Sciences, Ohio University. She graduated with a BS in Chemistry and Physics from the University of El Salvador, a M.Sc. in Physics from Virginia Tech, and a Ph.D. in

Geology from Louisiana State University. Her fields of interest are Geochemistry and Hydrogeology.

Abstract: *Our study is focused on characterizing the potential heat exchange capacity for flooded mine in Ohio. To calculate the potential exchange capacity, possible maximum and minimum mine water residence times, effective mine volumes, groundwater recharge rates, maximum and minimum possible linear groundwater velocity, groundwater flow direction, and average ambient mine temperatures were calculated. Looking at 147 different mines located less than 1 mile from cities, this study has estimated that an average of 10^10 kJ of heat per mine is extractable. A change in mine water temperature of 1 degree Celsius was used for this calculation. From the groundwater velocities, the average potential flux of heat to the mines was 10^9 kJ/year.*

The Corning Mine Complex (CMC), located in Perry County Ohio, was studied for thermal and hydrological evaluation to understand heat flow within the mine complex and to determine the effect of atmospheric and hydrologic changes. Temperature and hydraulic head sensors were installed into monitoring wells drilled into the CMC. Time series analysis was performed on the data to detect the temporal relationship between the thermal and hydrological parameters. The results of this study show that the waters within this mine is locally thermally stable (± .2 K), but vary within the mine complex. A linear relationship between water temperatures and overburden thickness was observed within the CMC. The temperature data yielded a regulation time of 6.1 months suggesting that the heat exchange between the thermal reservoir of the atmosphere and the thermal reservoir of the mine complex is defined by seasonal fluctuations in ambient air temperature. The heat available to exchange for the CMC was calculated as 3.24 x 1010 kJ/K. Overall, these results suggest that the mine is thermally stable and that water flow is slow enough to allow thermal equilibrium between the rocks and the water.

Tuesday, November 18, 2014
Concurrent 2 – Ohio Dam Safety Organization (ODSO)
Oak Room 10:00 am – 11:30 am

Title: *Integrating the City of Columbus Upground Reservoirs into the Scioto River Water Resource System: Part 1- Record-Setting John R. Doutt Reservoir Adds Source* - Authors: Jeff Brooks, City of Columbus & Ken Ricker, ms consultants

Biography: Mr. Brooks joined the City of Columbus, Ohio, Department of Public Utilities in 1989. Since 1991 he has coordinated new construction maintenance and compliance for the Division of Water's three existing high hazard dams and associated water supply reservoirs, one of which powers a 5 MW hydroelectric generator. / Kenneth Ricker, PE - Mr. Ricker has over 31 years of experience- 24 years at ms consultants- assisting clients in a the planning, design, financing and construction of a variety of projects, including public water supply, treatment, and distribution, wastewater collection & treatment, solid and hazardous waste management.

Abstract: *The Scioto River begins about 80 miles north of Columbus in Hardin County and serves as a main water source for Central Ohio. The watershed drainage area reaches 1000 square miles just north of Columbus, provides public recreational opportunities and a habitat for aquatic life.*

This presentation describes how the recently completed John R. Doutt Upground Reservoir has become an integral component of the Scioto River Water Resource System. This off-stream reservoir will provide additional source supply, and along with the existing on-stream reservoirs, to help meet future water demands of customers being served by the Columbus' Dublin Road Water Plant during a 50-year drought, as well as to provide additional source supply for the Del-Co Water Company.

The physical size and innovative design of this 9.2-billion-gallon, 850-acre off-stream raw water supply impoundment is record setting, as the earth embankments have a 5-mile perimeter, making it the longest Class I Dam in Ohio. The reservoir's composite lined bottom, installed due to Karst limestone geology underlying the site, is one of the world's largest and consists of 37 million square feet of geomembrane and 2 million cubic yards of compacted clay liner (CCL).

The presentation will:

- *Summarize the source supply/storage components and associated facilities; and describe how the Scioto River is being used for conveyance thus deferring millions of dollars for pipeline construction.*
- *Identify existing/planned public water systems for Columbus and Del-Co Water that will utilize this source supply.*
- *Focus on guidelines developed to identify when stream flows are conducive for flow diversion to reservoir, permissible diversion rates based on regulatory constraints, and downstream flows to be maintained.*
- *Conclude with strategies developed for the timing, rate and duration of the release of stored water from the upground reservoirs back to the Scioto River to maximize the overall safe yield, and when refill should be initiated.*

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Title: *Fly Ash Dam Raising Using Nonconventional Components* - Author: Dr. Mohammad Ajlouni, American Electric Power

Biography: Mohammad Ajlouni is a Senior Engineer at the geotechnical Engineering Section at American Electric Power who has worked there for the last 9 years. His work duties include permitting, design, and construction of landfills and dams, as well as, modeling geotechnical activities. Before AEP, he worked for 4 years at URS –Gaithersburg/MD Tunneling Group on Design and Construction of Tunnels. Mohammad has a bachelor's of civil engineering and Master's in civil Engineering from Jordan University of Science and Technology. Mohammad has PhD in geotechnical engineering from the University of Illinois at Urbana Champaign.

Abstract: *Cardinal Fly Ash Reservoir No. 2 (FAR2) dam is a coal ash dam located in eastern Ohio. The dam was originally constructed as a conventional zoned earth dam in 1985 and featured an inclined clay core and full height chimney drain. In 1997, the dam was raised to a height of 225 feet through the use of an upstream soil cement block in conjunction with a downstream earth fill. In 2011, design work was started to assess the stability and schedule concerns and cost effectiveness of various methods to raise the dam again. Initially a conventional downstream raising approach was assessed which would have required a half million cubic yards of engineered fill. A structural parapet wall was also examined which would have required a costly foundation system. In both cases, it was doubtful that work could be completed over the course of a single construction season. To satisfy unique site requirements and meet a timely need for increased storage capacity, a back to back Mechanically Stabilized Earth (MSE) wall system was designed and constructed to increase the height of the ash storage dam.*

The double-sided MSE wall system that was ultimately developed overcame both site constraints and achieved the timely need for additional capacity. This innovative design resulted from the unusual geometry of the existing dam crest coupled with the need to complete construction over the course of single season. To control seepage, a cement-bentonite slurry wall was constructed which penetrated into the existing clay core. A non-structural vinyl sheet pile wall was then inserted full depth through the slurry wall and extended to the top of the raised dam to act as a cutoff wall within the MSE wall portion. The raised dam also includes a modified emergency spillway composed of mass concrete, and a precast service spillway extension.

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Title: *Emergency Warning Systems* - Author: Jon Kochis, Fairfield County Emergency Management Agency

Biography: Jon Kochis has been the Fairfield County EMA Director since 2007. Jon has a Bachelors in Emergency Management and Associates in Environmental Health and Safety from the University of Akron. The Buckeye Lake Dam Safety program has been a cornerstone project for the Buckeye Lake Region and has included new warning technology implementation and the recipient of competitive grant awards.

Abstract: *Fairfield and Licking County Emergency Management Agencies have put together a warning system for the Buckeye Lake area. This system encompasses many forms of emergency public information to warn residents of potential hazards in the Buckeye Lake Area.*

Tuesday, November 18, 2014
Concurrent 3 – Ohio Lake Management Society (OLMS) – Water Quality
Alder Room 10:00 am – 11:30 am

Title: *Color variation in fishes across turbidity extremes in East Africa* - Author: Dr. Suzanne Gray, The Ohio State University

Biography: Dr. Suzanne Gray joined OSU's School of Environment and Natural Resources in 2013 as an Assistant Professor of Aquatic Physiological Ecology. Her research focuses on understanding how freshwater fishes respond to human-induced environmental change. Work in the Gray Lab currently explores these responses in a wide range of fishes, from cyprinids in the North American Great Lakes to cichlids in East Africa.

Abstract: *Sedimentary turbidity is a globally pervasive environmental stressor that is linked to declines in fish biodiversity. Turbidity alters the color and clarity of the water, which can directly alter the visual capabilities of fishes and have population-level impacts if foraging, mating and anti-predator activities are hindered. Here, we investigate the responses of fishes found across a range of turbidity levels in East Africa. We assessed ontongentic color shifts in the introduced Nile Perch (Lates nilotiocus) predator in a highly turbid lake, male color shifts in a mouthbrooding African cichlid (Pseudocrenilabrus multicolor) that ranges from clear swamps to turbid lakes, and color pattern changes in introduced guppy (Poecilia reticulata) populations in a series of crater lakes experiencing improved water quality due to lake restoration efforts. We used field surveys to capture natural phenotypic variation associated with development in complex, dynamic environments by measuring fish color patterns and the underwater light environment where the fish are found. We found that turbidity can induce color pattern and behavioral changes in addition to morphological change in sensory structures such as eyes and optic lobes of the brain. Such adaptations may allow individuals to cope with altered environmental conditions.*

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Title: *Mind the Gap: The Federal Funding Gap Between Fundamental Research and Fundamental Solutions for Harmful Algal Blooms* - Author: Dr. Stephanie Smith, Beagle Bioproducts

Biography: Dr. Smith is the Co-founder and Chief Scientific and Operating Officer of Beagle Bioproducts, Inc., a company that offers a variety of products and services related to harmful algal blooms. She is a recognized expert on HAB toxins and cyanobacteria, and has used that expertise and her position as a small business owner to understand both the technical and political issues related to HABs.

Abstract: *Harmful Algal Blooms (HABs) are more frequent and more intense than they have ever been since the USEPA began tracking them in the 1970s. The negative impacts of HABs range from devaluation of lakefront properties to the deaths of pets and threats to human health. It*

has been a challenge to put a precise figure on the actual economic impacts of HABs, especially in freshwaters. While Ohio's residents and businesses are painfully aware of the impacts a HAB can have, in many parts of the country people have never even heard of HABs. So how, then, does the federal government "value" this issue?

One way to assess this is to follow the history of the Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA), which was first passed by Congress in 1998. At Beagle Bioproducts we have constructed a timeline of renewals, amendments, and appropriations related to this legislation. What our investigation demonstrates is that the legislation has supported critical fundamental research that has elucidated some of the root causes of HABs. However, there has been an overwhelming bias in at least two regards: support has largely been for coastal areas and red tides, and there has been almost no involvement of the private sector in HABHRCA-related projects. The result, in our opinion, is that practical solutions to this problem will be slow to emerge, even while our understanding of the problem strengthens. Beagle will present suggestions and recommendations for increasing the potential benefits of this legislation, and for how residents and businesses that are most impacted by HABs can make their voices heard.

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Title: *Excess nitrogen stimulates cyanobacteria growth and toxin production* - Author: Dr. Justin Chaffin, Ohio Sea Grant

Biography: Dr. Justin Chaffin has been the research coordinator at The Ohio State University's Stone Laboratory since 2012. He received his PhD from the University of Toledo working mainly from their Lake Erie Center.

Abstract: *Blooms of cyanobacteria often occur in waters that have high phosphorus (P) and low nitrogen (N) concentrations, and the growth rate of the cyanobacteria is often constrained by N. For these reasons, many scientists have suggested that regulation of both P and N is required to prevent blooms. However, because N occurs in many bioavailable forms, regulation of a particular form may be beneficial rather than regulation of all N forms. To address how N-stressed cyanobacteria growth and toxin production responds to various N inputs, N enrichment experiments (nitrate, ammonium, urea) were performed during N-limited cyanobacterial blooms in Maumee and Sandusky Bays of Lake Erie and in Grand Lake St. Marys (GLSM). Bioavailable N (nitrate, urea, and ammonium) concentrations were also determined. Microcystis aeruginosa dominated the Maumee Bay bloom, where the highest growth rates were in response to ammonium additions, and lowest growth rates were in response to nitrate. Urea resulted in intermediate growth rates. All forms of N resulted in similar microcystin concentrations that were greater than control and phosphate-only enrichment. Planktothrix agardhii dominated the Sandusky Bay and GLSM blooms, where nitrate, ammonium, and urea addition resulted in similar growth rates and microcystin concentrations. Incubations using stable isotope 15N showed the cyanobacteria had a preference for ammonium, but the other N forms were also assimilated in the presence of ammonium. These results show that cyanobacterial blooms will assimilate multiple forms of N to support growth and microcystin production. These results*

suggest that N loadings above current levels will exacerbate cyanobacterial bloom, but do not answer the question regarding the need to lower N loading. However, all forms of bioavailable N need to be constrained if lake managers do decide that N abatement is needed.

Tuesday, November 18, 2014
Concurrent 1 – Education and Outreach
German Village Room 1:15 pm – 2:45 pm

Title: *Utilizing "Project WET" and "Healthy Water, Healthy People" in the Development of Ohio's Water Conservation Education Program* - Authors: Leonard Black, Ohio Dept. of Natural Resources & Dennis Clement, Ohio EPA

Biographies: Leonard Black has worked in the Water Planning Program at ODNR for 33 years, served as the State Coordinator for Project WET for 15 years (until 2012), and currently serves as the Ohio Project Wet Workshop Coordinator under contract with the Water Resources Foundation of Ohio.

Dennis Clement has worked in the Office of Environmental Education at the Ohio EPA for 13 years and has served as the State Coordinator for the Healthy Water Healthy People program for the past 10 years.

Abstract: *The Great Lakes-St. Lawrence River Basin Water Resources Compact requires the development of a program for water conservation. Ohio's program provides information and education concerning the importance and value of water conservation and promotes voluntary water conservation practices. An important component of Ohio's program will be outreach, both into the community and the classroom. The presentation will provide a description of the recently-revised Project WET Curriculum & Activity Guide 2.0 and other Project WET materials and how they will be incorporated into Ohio's Water Conservation Education Program. Since Ohio's program also emphasizes the importance of water quality as an element of water conservation, the presentation will also describe how the Healthy Water, Healthy People Program will be incorporated into Ohio's program. An update on the activities of the Ohio Water Education Program (sponsored by WMAO/WRFO, ODNR, Ohio EPA, and OSU-WRC) will also be provided.*

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Title: *The Science – Management Nexus in a Complex Institutional Setting: Promoting Agricultural Best Management Practices in the Western Lake Erie Basin* - Author: Pranay Ranjan, The Ohio State University

Biography: Pranay is a doctoral candidate in the environmental social sciences specialization area, in the School of Environment & Natural Resources at The Ohio State University. His research interests include understanding the role of collective action in drainage management

institutions. Prior to beginning his studies at Ohio State, Pranay has worked for two years on understanding water security in peri-urban South-Asia.

Abstract: *Turning science-based recommendations into actions on the ground is a key challenge for environmental policy. This is especially true when the target actors are private landowners, whose decisions are likely to be based on a variety of factors other than science. This challenge plays out in the context of non-point source water pollution, which is attributable to the independent actions of many land owners in a given water basin.*

For water basins in agricultural regions, prior research has identified the importance of adoption of scientifically-identified agricultural best management practices (BMPs). This study focuses on one particular scientifically-identified agricultural BMP, two-stage drainage ditches. This practice has been shown to reduce nutrient runoff, yet its adoption by farmers is uncertain. The study examines adoption in the context of the Western Lake Erie Basin, one of the most productive and intensively farmed regions of the world. Due to land management impacts on Lake Erie water quality, numerous programs and collective action arrangements have been developed to affect land owner decisions about BMPs such as two-stage ditches.

The study examines the role of collective action and network structure in affecting land owner decisions to adopt two-stage ditches. The data for this study come from two research methods: (1) semi-structured interviews of government officials responsible for administering drainage programs in the 27 counties in Basin; and (2) a mailed survey of 250 landowners/farmers in 3 counties in the Basin. The study combines theory and methods from diverse fields of social network analysis and collective action to understand the process of adoption of agricultural BMPs. Results are more broadly informative about the interactions of science and management and the interplay among private and governmental actors and institutions for solving complex environmental problems.

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Title: *New funding opportunities for water education* - Authors: Carolyn Watkins & Dennis Clement, Ohio Environmental Protection Agency

Biographies: As Chief of Ohio EPA's Office of Environmental Education, Carolyn Watkins oversees a grant program that provides $1 million annually to fund environmental education projects targeting pre-school to university students and teachers, the general public and the regulated community. She also administers Ohio EPA’s environmental science and engineering scholarship program. Her office provides statewide coordination for Project WET (Water Education for Teachers) and its high school curriculum Healthy Water, Healthy People.

Dennis Clement has worked in the Office of Environmental Education at the Ohio EPA for 13 years and has served as the State Coordinator for the Healthy Water Healthy People program for the past 10 years.

Abstract: *The Ohio Environmental Education Fund recently realigned application criteria to more closely reflect Ohio EPA's regulatory priorities. In 2015, OEEF seeks to fund projects that demonstrate and encourage the use of innovative storm water management practices, best management practices to reduce nutrient loadings to streams, and habitat restoration. Target audiences include the regulated community, schools and universities, and the general public including broad-based public awareness campaigns. Recently funded topics include the benefits of wetlands, dam removals and stream meander restoration; green infrastructure; homeowner maintenance of septic systems; vulnerability of underground water supplies in karst terrain; and sharing data from citizen monitoring of lakes and streams. Examples will illustrate how to make education programs more effective (and grant applications more successful!).*

Tuesday, November 18, 2014
Concurrent 2 – Water Quality
Oak Room 1:15 pm – 2:45 pm

Title: *Headwater Stream Assessment* - Author: Elayna Stierhoff, City of Columbus

Biography: Elayna Stierhoff is a Water Protection Coordinator with the City of Columbus, Department of Public Utilities, Division of Water, Watershed Management Section.

Abstract: *Elayna Stierhoff will present details of a current project assessing water quality in the headwater streams for the watershed feeding Hoover Reservoir. Elayna will provide details of performing an Index of Biological Integrity (IBI) using fish and QHEI to document water quality. Elayna will provide information about the credentials needed to do this work at the regulatory level and details of the required equipment and permits. In-stream pictures will depict the work and process. Talk will cover the use of GIS to define basins and select sampling sites, as well as the benefits of getting to know the watershed and positive relationship building with the landowners. Benefits can result in the acquisition of conservation easements and the implementation of Best Management Practices.*

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Title: *Improving In-Situ Sequestration of Contaminants in Sediment Using Ultrasound* - Authors: Zongsu Wei, Dr. Linda Weavers, & Dr. John Lenhart, The Ohio State University

Biography: Zongsu Wei is currently a PhD candidate in Environmental Engineering at the Department of Civil, Environmental, and Geodetic Engineering, The Ohio State University. He received his B.S. in Environmental Engineering from University of Science and Technology Beijing, China, in 2008 and his M.S. in Civil Engineering from the University of Toledo, OH, in 2010. His research interests include water and wastewater treatments, sustainable technology for environmental remediation, and contaminant fate and transport modeling.

Abstract: *Sediment contamination by toxic organic compounds and heavy metals is a significant concern in the Great Lakes region. The contaminated sediment acting as a natural pollution*

source poses a long term risk to the aquatic ecosystem. Some persistent contaminants (e.g., polycyclic aromatic hydrocarbon) accumulate in biota and are passed up the food chain. The bio-accumulative toxics in fish could endanger fish-eating wildlife and humans. Traditional technologies of capping sediment in place and dredging sediment to a waste landfill are energy-intensive, expensive, and destructive to the environment. The in-situ amendment using sorbents (e.g., activated carbon) is a new direction in the sediment managements. The application of ultrasound has potential to increase contaminant mass transfer from the sediment solids to sorbents, thus improving amendment effectiveness. The sonication in short period features high energy efficiency, low operational cost, no chemical addition, and reduced risk of secondary contamination.

The goal of this study is to evaluate the effects of ultrasound waves on sediment solids, pore flow hydrodynamics, and contaminant release and re-sorption on activated carbon. We measured sound penetration, Darcy velocity, and tracer tests, followed by model contaminant (i.e., pyrene) desorption through a bench-scale column packed with model sediments. Hydrophone measurements showed that the intensity of ultrasound dropped quickly due to absorption and scattering by the sediment. However, both pore size and pore water temperature was increased after a short period of sonication resulting in an increased porosity and reduced fluid viscosity. This enhanced Darcy velocity by 42.6% and accelerated bromide tracer breakthrough of packed column. The presence of ultrasound has also increased the availability of pyrene by almost one magnitude in the pore water. The results demonstrate the potential of sonication to improve in-situ sequestration of contaminants in the sediment.

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Title: *Urban Lake Assessment: Water Quality and Lake Condition in Cuyahoga County, Ohio* -
Author: Dr. Julie Wolin, Cleveland State University

Biography: Dr. Wolin is a freshwater ecologist and Associate Professor in the Department of Biological, Geological and Environmental Science at Cleveland State University. Her primary research focus is to understand the effects of human activities in urban and urbanizing environments on freshwater ecosystems.

Abstract: *To better understand the functional role of water bodies in urban and suburban regions, we conducted a county-wide assessment of lakes, reservoirs, and retention ponds in Cuyahoga County, OH in 2013. Physical characteristics, surrounding land use, waterfowl presence, shoreline vegetation, water chemistry, microcystin, and surface sediments for diatom analysis were sampled at forty sites following protocols developed for the 2012 US National Lake Assessment (NLA) and the Ohio EPA Inland Lake Water Quality Monitoring Program. Surveys were conducted to determine lake management practices i.e. fertilizer use, dredging, and method of algal control. Grass was the dominant shoreline vegetation. Our results indicate 40-50% of the sample sites had poor shoreline habitat, comparable to 41% of man-made lakes found in the 2007 NLA. Visual algal assessment indicated moderate to extensive algae in 34% and detectable algae in 57% of the lakes. Microcystis was visible at 50% of the sites, while*

microcystin concentrations above WHO drinking water guidelines (1ug/l) were only found in three lakes. Surface sediment diatom community analysis indicate dominant factors contributing to lake condition are nutrient gradients and depth.

Tuesday, November 18, 2014
Concurrent 3 – Ohio Lake Management Society (OLMS) - Stewardship
Alder Room 1:15 pm – 2:45 pm

Title: *Regional differences in attitudes towards water quality* - Author: Dr. Robert Carlson, Ohio Lake Management Society

Biography: Bob Carlson is an emeritus professor in the Department of Biological Sciences at Kent State University, where he taught since 1975. He directs an all-volunteer international water quality monitoring event in July called the Secchi Dip-In. The goal of the project is to demonstrate that volunteers can collect environmentally-important, and scientifically relevant, information over large geographic scales.

Abstract: *Water transparency, as measured with a Secchi disk, has become an inexpensive and popular measure of one aspect of water quality. Numerous studies in glaciated parts of North America have found that as water transparency decreases, the property values along the shoreline decrease as well.*

The Secchi Dip-In is an effort to provide Secchi disk transparency readings using volunteers from programs across the United States and Canada. Dip-In volunteers were also asked to provide their perspective of the quality of their waterbody. The Dip-In data was used to substantiate the relationship between transparency and perception of water quality on a continental scale.

The relationship between transparency and the volunteer's perception of water quality found in previous studies was substantiated in the northern, glaciated regions of North America. However, the relationship decreased or disappeared entirely in other parts of the continent. Transparency is an excellent indicator of quality in the upper Midwest and the Northeast, but is not related to perceived water quality in regions where the average transparency is low. Volunteers also perceived the problems in their lakes differently in different regions.

The results alter our view of water quality in that the perception of quality changes regionally. Human activities, such as boating congestion and personal watercraft, are perceived to be major water quality problems in non-glaciated regions. This suggests that resource management should also consider regional perceptions of quality and problems instead of using a generic formula that low transparencies are "bad" and water quality problems are largely related to algae.

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Title: *Communicating Watershed Facts Using GIS* - Author: Jim Swihart, Choctaw Lake Property Owners Association

Biography: Jim retired to Choctaw Lake in 2011 and became active in OLMS's CLAM program as the QDC/Lake Keeper for the lake. He is a member of the Choctaw Lake Board of Trustees and is also Chairman of the Lake Water Quality Committee. He has put his engineering background to use in collecting, analyzing and communicating water quality data to his community and in formulating a water quality improvement plan for Choctaw.

Abstract: *We all know that lakes accumulate things, that they are a reflection of their watershed. While a lake is easy to visualize, a watershed is not. Over the years, a lot of misinformation has been informally passed around regarding our watershed. At Choctaw Lake, we have extensively used GIS tools and data to gain a factual understanding of our watershed, what is in it, and just as important, what is not. Using the GIS data available from public and private sources, we have been able to make our watershed 'visual' and communicate relevant facts to the residents of our lake community. Using GIS visuals is far more effective than just written articles or bullet-point slides, which often result in misunderstanding of key facts. Gaining a solid understanding of our watershed is key to focusing our lake water quality improvement efforts on the right issues in the right location.*

GIS software is available free on-line. Many Ohio county governments have made their GIS data files available to the public via the County Auditor's websites. Parcel boundaries, parcel information, land use data, lake and stream data and more is often available. Additionally, the USGS Ohio Streamstats site allows users to download GIS files exactly defining the watershed for a lake, stream or pond. Combining this GIS information along with other information available from the Ohio EPA GIS site allows one to gain a very good understanding of a given watershed. By using the official sources of information it removes speculation and opinions and allows for a common understanding and focused improvement effort.

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Title: *The Good, the Bad & the Ugly, a Community's Response to a Lake in Crisis* - Author: Donna Grube, Auglaize & Mercer County Convention & Visitors Bureau

Biography: Donna Grube has served as the Executive director for the Auglaize & Mercer Counties Convention & Visitors Bureau for 11 years after working more than 20 years as a reporter and News Director for several west Ohio radio stations. Donna and her husband Mark moved to the lake eight years ago so she can share the story of Grand Lake St. Marys from both a professional and personal point of view.

Abstract: *This presentation is a look at how the local residents reacted to the algae toxin issues at Grand Lake St. Marys and the subsequent publicity generated by the state postings. What were the financial ramifications? How did the agency charged with promoting the area for tourism adapt its message and how are things six summers after the alarm first sounded?*

Tuesday, November 18, 2014
Concurrent 1 – Next Generation of Water Professionals
German Village Room 3:15 pm – 4:15 pm

Title: *Nature vs Nurture: What makes for an effective watershed group leader?* - Authors: Dr. Joe Bonnell, Dr. Anne Baird, Dallas Hettinger, & Pranay Ranjan, The Ohio State University

Biography: Joe Bonnell is Program Director for Watershed Management at The Ohio State University. His work is focused on building capacity in Ohio to develop and implement watershed management plans.

Abstract: *This presentation will share results from a year-long study funded by Ohio EPA into the characteristics of effective watershed group leaders. Twenty watershed professionals identified as effective leaders were interviewed to develop a more complex understanding of the factors that lead some watershed leaders to be more effective than others. Results from the interviews are compared with factors identified through a literature review to create a conceptual model of the multiple factors that support or undermine watershed group leaders. Implications for training, hiring, and supporting watershed leaders will be discussed.*

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Title: *Recruiting the Next Generation of Water Management Professionals* - Author: Carolyn Watkins, Ohio Environmental Protection Agency

Biography: As Chief of Ohio EPA's Office of Environmental Education, Carolyn Watkins oversees a grant program that provides $1 million annually to fund environmental education projects targeting pre-school to university students and teachers, the general public and the regulated community. She also administers Ohio EPA's environmental science and engineering scholarship program. Her office provides statewide coordination for Project WET (Water Education for Teachers) and its high school curriculum Healthy Water, Healthy People.

Abstract: *Ohio students, teachers and even career counselors have little understanding of what we do as water management professionals. Environmental scientists and engineers are needed to showcase our profession. State education standards strongly emphasize introducing students to real-world examples of careers in the STEM fields of science, technology, engineering and mathematics, including career paths through two-year technical degree programs and four-year baccalaureate degrees. Ohio EPA is partnering with the Environmental Education Council of Ohio and OSU's School of Environment and Natural Resources to offer a free online program that matches environmental professionals with schools and colleges looking for classroom presentations, career day programs, field trip destinations, and shadowing and mentoring opportunities for their students. Career ambassadors are needed in every Ohio county. This presentation will showcase some successful case studies and explain how WMAO members can get involved.*

Tuesday, November 18, 2014
Concurrent 2 – Fish Science
Oak Room 3:15 pm – 4:15 pm

Title: *Valuing the Lake Erie Fishery* - Authors: Kevin Kayle & Jeff Tyson, Ohio Department of Natural Resources

Biographies: Kevin Kayle is the Fish Biology Supervisor for the ODNR, Division of Wildlife's Fairport Harbor Fisheries Research Unit. He participates in the Great Lakes Fishery Commission's Lake Erie Committee as a member of the Walleye, Yellow Perch, and Coldwater Task Groups, where he is a former co-chairman. Kevin is also a past president of the Ohio Chapter of the American Fisheries Society and past webmaster at OCAFS and the AFS Fisheries Information and Technology Section.

Abstract: *Lake Erie represents a substantial portion of the surface waters of the state of Ohio and of the Great Lakes region. Recreational and commercial fisheries are an important economic driver for the area. While each fisheries management agency applies their own regulations, all jurisdictions participate in interagency management under the auspices of the Great Lakes Fishery Commission and the Joint Strategic Plan and Fish Community Goals and Objectives. Managing agencies and external partners work toward assigning valuations to their fisheries and to management actions associated with the fisheries or other external impacts to the fisheries. We discuss current assessment and valuation techniques and present estimated values of sport, charter, and commercial fisheries on the open waters of Lake Erie, and methods used to place value on shoreline and tributary fisheries. We discuss how these estimates differ and compare their uses. We discuss constructs put in place like Marine Stewardship Certification and the Lake Erie Percid Management Advisory Group that seek to incorporate a measure of transparent, precautionary management. New human dimensions survey techniques can assess not only the economic value, but the social values placed on these fisheries by those that participate in fishing. Even with the assessment and survey techniques in use today, there are still gaps and inadequacies in completing the economic and social valuation picture. There are also difficulties defining these values and performing adequate evaluations during variable conditions that are due to aquatic nuisance species, harmful algal blooms, and changing lake and climate conditions that all have a direct effect on patterns of human behavior associated with the Lake Erie region. While considerable progress has been made on this topic, more detailed and wide-ranging work needs to be done by all participating agencies and stakeholders.*

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Title: *Impacts of Shoreline Alteration on the Nearshore Fish Community of Western Lake Erie* - Authors: Dr. Christine Mayer, Jason Ross, Jeff Tyson, & Eric Weimer, University of Toledo

Biography: Dr. Mayer is a professor in the Department of Environmental Sciences and Lake Erie Center at the University of Toledo. She's been on the faculty, there, for 11 years. Most of the current work in her lab centers on the impacts of human modification to aquatic habitats.

Abstract: *Across the Great Lakes biodiversity and habitat complexity are greatest within the nearshore zone making this area a driver of ecosystem function. In the Ohio waters of Lake Erie nearly 90% of the shoreline has been altered. The impacts of shoreline alteration on fish communities are poorly understood in the Great Lakes since most fishery assessments focus on offshore zones. Our goal was to quantify the reduction in fish species richness and frequency of occurrence on shores that have been armored or had vegetation removed. Fish diversity was lower on armored shorelines in wetlands, but not when the background shoreline type was soft substrate. Sites with vegetation always had higher fish diversity. Future management and guidelines for shoreline alteration should take into account the benefits of limiting armoring and increasing vegetation in order to further promote ecosystem services along the shorelines.*

Tuesday, November 18, 2014
Concurrent 3 – Ohio Lake Management Society (OLMS) – Buckeye Lake: A Case Study
Alder Room 3:15 pm – 4:45 pm

Title: *Exploring Buckeye Lake's Origins, History as a Canal Lake, and Early Lake Studies* - Author: Michael Gallaway, Ohio Environmental Protection Agency

Biography: Mike Gallaway has worked in the Division of Surface Water at the Ohio EPA since 1984. He is currently the Manager of the Surface Water Program in the Central District Office, where he is responsible for implementing the Clean Water Act in 10 Central Ohio counties. Mike has a Bachelor's degree in Zoology from Miami University, and a Master's degree in Zoology from Ohio University.

Abstract: *Originally called the "Licking Summit Reservoir", Buckeye Lake was an early catalyst for commercial growth in Ohio due to its role in providing water for the Ohio Canal. We look at Buckeye Lake's origins based on the work of Wilbur Stout, look at early surveys of the "Big Swamp", and consider its conversion to a canal reservoir. We also consider early limnological studies of the lake as it continues its evolution from an economic driver to a recreational driver. We compare the early studies with recent data from 2011 and 2012.*

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Title: *Buckeye Lake Nutrient Reduction Project* - Author: Jonathan Ferbrache, Fairfield SWCD

Biography: Jonathan is a Resource Specialist for the Fairfield Soil and Water Conservation District. He's a Fairfield County native and a graduate of The Ohio State University, with a Bachelor's of Science in Landscape Architecture. He coordinates the Fairfield County farmland preservation programs, reviews and responds to agriculture and silviculture pollution complaints, administers aspects of the municipal separate storm sewer system programs (MS4)

in Fairfield County and the City of Pickerington, and conducts plan review and erosion inspections. His specialty work currently includes the Buckeye Lake Nutrient Reduction Project.

Abstract: *The Buckeye Lake Nutrient Reduction Project was funded in part by 319 Grant Funding from the Ohio EPA. The Fairfield Soil and Water Conservation District used the funding to put boots on the ground across the Buckeye Lake watershed and conducted a comprehensive inventory and analysis of the tributaries that feed the lake. All 77 miles were inventoried, soil samples collected and the watershed boundary redefined. Efforts put forth were also supported by three other Ohio Farm Bureau Federation grants over several years. Partnerships with the lake community through the Buckeye Lake for Tomorrow and local SWCD relationships with the agriculture community in Fairfield, Licking and Perry County have provided a frame work for the long term in addressing lake water quality issues and understanding of the challenges faced by the various stakeholders across the watershed.*

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Title: *Buckeye Lake Update - Presentation of 2014 Data* - Author: Jeffrey Bohne, Ohio Environmental Protection Agency

Abstract: *Ohio EPA is continuing to support development of a local nutrient management plan with ongoing data collection. We present the current year's data, and contrast it with data collected in 2011 and 2012. Long term voluntary monitoring data are used to provide perspective on our more recent data. These data are evaluated using the Trophic State Index (TSI) to evaluate any potential trends in lake water quality.*

Wednesday, November 19, 2014
Concurrent 1 – Wetlands
German Village Room 8:30 am – 10:00 am

Title: *Ohio River Basin Wetland Conservation Planning Project* - Author: Jerome Iles, The Ohio State University

Biography: Jerry has been employed with OSU Extension as a watershed specialist for the past 14 years. He also currently serves half time as the OSU Extension Educator for Agriculture and Natural Resources in Hocking County. Prior to working at OSU Jerry worked on acid mine drainage remediation with the Monday Creek Restoration Project and the Raccoon Creek Watershed Project.

Abstract: *The Ohio Division of Forestry manages over 200,000 acres of state forest within the Ohio River Basin (ORB), and therefore has a significant influence on water quality issues. Forested wetlands carry out critical hydrologic, biogeochemical, and ecological water management roles as well as enhancing habitat for a variety of species. Forest wetlands are also excellent carbon sinks and perform natural services such as carbon sequestration, nitrogen and phosphorus remediation, and reduce sedimentation. Since European settlement, Ohio has*

lost 90% of its wetlands. This presentation will highlight a project where Ohio State University Extension partnering with Ohio Department of Natural Resources - Division of Forestry located, collected water quality and vegetation data on all forested wetlands within Zaleski State Forest. The data collected by OSU Extension staff was provided to ODNR- Division of Forestry (DOF) for addition to the Ohio Statewide Forest Resource Assessment. Recommendations were developed by OSUE to manage, protect, and expand these forested wetlands as appropriate. These recommendations have been provided to DOF for inclusion in the Division's State Forest Strategic Plan. Additionally, areas on state forests where forest wetlands can and should be developed have been identified by OSUE for inclusion in long-range plans. OSUE has worked with DOF to develop plans for forested wetland demonstration sites. Another critical role of the project was training for DOF service foresters by Ohio State University Extension to initiate the identification of existing and potential wetlands and incorporate BMPs into Stewardship Plans developed by DOF service foresters. These BMPs were developed to not only protect wetlands and streams but also to enhance associated forest uplands (skid trails, log landings, etc.), critical for the protection and enhancement of water quality "downstream."

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Title: *The Nature Conservancy's Stream and Wetland Mitigation Program: Reducing permitting time and increasing success* - Author: Devin Schenk, The Nature Conservancy

Biography: Devin Schenk is the Mitigation Program Manager for The Nature Conservancy (TNC), where he is responsible for setting up and running TNC's state-wide Stream and Wetland In-Lieu Fee Mitigation Program. Devin has worked in the field of stream and wetland mitigation for over 14 years in California, Kentucky, and Ohio. Devin received his B.S. from the University of Cincinnati, M.En. from Miami University of Ohio, and J.D. from Northern Kentucky University's Salmon P. Chase College of Law.

Abstract: *The Clean Water Act operates on a principle of "no net loss" to our nation's streams and wetlands. This requires that any impacts to jurisdictional waters must be offset by compensatory mitigation. The overall goal of The Nature Conservancy's (TNC) In-Lieu-Fee mitigation program (ILF) is to provide an effective form of compensatory mitigation to those applicants seeking permits from the Army Corps of Engineers (Corps) and the Ohio Environmental Protection Agency (OEPA).*

Federal law has established a hierarchical preference for mitigation, first through mitigation banks, then in-lieu fee credits, and lastly permittee responsible mitigation.

Prior to this, those seeking permits for impacts to aquatic resources outside of mitigation bank service areas were required to perform their own compensatory mitigation, and monitor and maintain it for several years. This program allows for a fee to be paid "in lieu of" permittee performed mitigation.

Through the ILF program public and private developers are able to realize economic advantages over implementing their own mitigation projects, including reduced permitting time and costs, and the transfer of all mitigation obligations to TNC.

As the sponsor, TNC is responsible for the oversight, implementation, and fiscal management of the program. In order to find the best opportunities for restoration projects TNC plans to partner with state agencies, non-profit organizations, and for-profit organizations. Once projects are identified and approved by the regulatory agencies, they will be designed and implemented with the help of project partners.

This presentation will provide details regarding TNC's ILF program and discuss ways in which the water resource community can be involved.

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Title: *Environmental causes of methane fluxes from an urban wetland* - Authors: Timothy Morin, Dr. Gil Bohrer, & Liel Naor-Azrieli, The Ohio State University

Biography: Tim is a PhD student at the Ohio State University where he focuses on terrestrial and atmospheric greenhouse gas fluxes. Today he'll be talking about methane fluxes from a constructed wetland park located in Columbus Ohio. Before graduate school, Tim lived in a marshland village in Guyana, South America where he got his interest in wetlands.

Abstract: *Wetlands are the largest source of methane (CH4) worldwide but offer a wide variety of ecosystem services and are commonly constructed in the United States to mitigate wetland loss, particularly in and near urban areas. CH4 emissions were measured at the Olentangy River Wetland Research Park (ORWRP) over three summers and two winters using an eddy flux covariance system. In this study we have determined what conditions drive methane fluxes from the wetland as well as take the first steps towards creating an optimized methane emission model for wetlands. We have found a strong linkage between photosynthetic activity and methane and through examination of the correlation structure have determined that the linkage is through the addition of labile carbon to the system by plants as well as transmission through plant tissue. We also observed that water fluxes were tightly correlated with methane emissions under different conditions, suggesting that water volatization (and possibly evapotranspiration from plants) is tied to, though not driving, methane fluxes.*

Wednesday, November 19, 2014
Concurrent 2 – Nutrient Loading
Oak Room 8:30 am – 10:00 am

Title: *The implications of environmental policy on nutrient outputs in agricultural watersheds* - Authors: Brent Sohngen, Sei Jin Kim, Abdoul Sam, The Ohio State University; Kevin King, USDA

Biography: Brent Sohngen is an environmental economist in the Department of Agricultural, Environmental, and Development Economics at Ohio State University. He conducts research on the economics of water, land use, and climate policy.

Abstract: This paper assesses the implications of agricultural conservation programs on water quality outcomes in agricultural watersheds. Since the mid-1990s, the US government has more than doubled subsidy payments to farmers to reduce pollution output on farms. In addition, new regulations have been implemented on livestock operations in an attempt to reduce the effect of their manure on water quality. In this paper, we test whether these new conservation programs and livestock regulations have improved water quality. Specifically, we assess whether the programs have reduced nutrient concentrations. To test this, we use data on daily observations of the concentration of phosphorus over a nearly 40 years period in two Midwestern watersheds, Maumee and Sandusky, that are predominately agricultural. We model phosphorus concentration as a function of water flow, temperature, precipitation, phosphorus prices, crop prices, and a series of annual and monthly fixed effects. Water flow, temperature and precipitation control for environmental variables that influence phosphorus outputs, while the economic variables control for phosphorus inputs by farmers. The fixed effects capture the response of nutrient concentrations to policy. We find that the elasticity of phosphorus outputs in watersheds with respect to phosphorus price indicates that increases in phosphorus prices reduce phosphorus concentrations in agricultural watersheds. We show that a 25% increase in phosphorus taxes would reduce soluble phosphorus concentrations by around 8%. We are unable to detect a significant effect of current agricultural policies on water quality.

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Title: *Water quality of Grand Lake St. Marys tributaries and potential for in-lake nutrient processing* - Author: Laura Johnson, Heidelberg University

Biography: Laura Johnson is a research scientist at the National Center for Water Quality Research where she works on watershed export and riverine dynamics of nutrients and sediment. Prior to joining the NCWQR, Laura was a postdoctoral research associate in Dr. Todd Royer's Laboratory at Indiana University in Bloomington and received her Ph.D. from the University of Notre Dame in 2008 where she worked with Dr. Jennifer Tank.

Abstract: *Grand Lake St. Marys (GLSM) has been plagued with water quality issues for many years and more recently has experienced extreme harmful algal blooms over the summer*

season. These blooms have led to beach closures and swimming advisories since 2009, when routine testing for toxins began. The National Center for Water Quality Research at Heidelberg University has been measuring the water quality of two major tributaries to GLSM, Chickasaw Creek (started water year [WY] 2009) and Coldwater Creek (started WY 2013) as well as the primary outflow, Beaver Creek (started WY 2014). In WY 2013, annual loads of total phosphorus (TP), dissolved reactive P (DRP), and nitrate were similar between Chickasaw (11.0, 3.5, and 234 metric tons of TP, DRP, and nitrate) and Coldwater creeks (7.2, 2.7, and 118 metric tons of TP, DRP, and nitrate). Yet, compared to other agricultural rivers in Ohio, both Chickasaw and Coldwater Creek had ~20% higher TP, ~50% higher DRP, and ~80% higher nitrate yields (kg/ha). Concentrations of TP, DRP, and nitrate increased with increasing discharge in these two watersheds, indicating a primarily non-point source of nutrients. Thus far in WY 2014, median concentrations of DRP and nitrate have been significantly lower in the outflow, Beaver Creek (0.005 mg/L DRP, 0.72 mg/L nitrate) compared to the inflows (0.17 mg/L DRP, 8.5 mg/L nitrate; Kruskal Wallis P<0.001). Although median TP concentrations were similar across all 3 tributaries (0.17-0.26 mg/L), the median DRP:TP ratio dropped greatly from inflows (0.70) to outflow (0.03) indicating heavy processing of nutrients in GLSM associated with algal growth. Our results imply that substantial reductions in external loads to GLSM are needed to improve lake health.

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Title: *Using Cover Crops and No-Till to Economically Reduce Phosphorus Runoff* - Author: James Hoorman, The Ohio State University

Biography: Jim Hoorman is an Assistant Professor and Extension Educator with Ohio State University (OSU) Extension specializing in Cover Crops, Soil Health, and Water Quality in Putnam County (Ottawa) Ohio. Jim has a Bachelor's degree in Agriculture (1984), a Masters of Arts degree in Business (1987) and a Master of Science degree in Agricultural Economics (1987) from OSU. He is working on a PHD in Environmental Sciences at OSU. His research is on using cover crops to increase soil organic matter, tie up soil nutrients (N-P), and decrease soil erosion.

Abstract: Ohio State University conducted P speciation studies on Hoytville soils to analyze soil P chemical tie up. Phosphorus speciation fractionizes the P into soluble reactive P (SRP), exchangeable organic P (ExP), and inorganic P (calcium P (CaP), iron oxide P (FeP), and aluminum oxide P (AlP)), SRP levels varied by management and was significantly lower (P<.05) on conventional crop rotations (average =0.69a) than permanent vegetated grass or forested areas (average=3.90b) and SRP stratification followed a similar pattern (crop rotations =0.30a vs permanent vegetation=1.37b). Conventional tilled fields (0.69a) had significantly lower SRP (P<.05) than no-till fields (0.93b) and varied by manure type (dairy =0.56a and poultry =1.37b). Significant differences (P<.05) were found in the inorganic plant unavailable P (CaP, FeP, AlP) related to management. FeP is unstable under saturated soil conditions, releasing SRP when Fe3+ (ferric state) is reduced to Fe2+ (ferrous state). The high iron content (20-30%) of Lake Erie soils results in SRP being released when soils become saturated. Improving draining and soil structure could reduce the amount of SRP runoff by keeping the FeP in the ferric state. Researchers are experimenting with cover crops and no-till to economically improve soil

structure and increase drainage. Preliminary results show that SRP was significantly less (P<.05) with a red clover cover crop (0.34a) than fields with no cover (1.42b). Cover crops had significantly (P<.05) more organic ExP (1.23b) or 8.8X more ExP than no covers (0.14a). ExP (organic) and SRP (inorganic) are plant available forms of P but the ExP is a larger more stable molecular form of P. Cover crops cost $20-25 per acre to plant, build soil organic matter, and tie up P in an organic form that could result in less P runoff.

Wednesday, November 19, 2014
Concurrent 3 – Public Water Supply
Alder Room 8:30 am – 10:00 am

Title: *Integrating the City of Columbus Upground Reservoirs into the Scioto River Water Resource System: Part 1 - Removal of Low Head Dam and installation of Pneumatic Weir Gate System* - Authors: Matt Steele, City of Columbus; Anil Tangirala, ms consultants

Biographies: Mr. Steele has worked for the City of Columbus for the past 20 years. He is the Water Supply and Treatment Coordinator responsible for Columbus' three water plants, Water Quality Assurance Lab, and Watershed section. He also oversees Columbus' wellfield, four reservoirs and dams. He has a Bachelor's of Science degree in Microbiology from The Ohio State University and holds a Class III water operator's license. Matt is also the current chair of the OAWWA Technology Committee.

Mr. Tangirala is a Senior Water Resources Engineer at ms consultants' Inc. Mr. Tangirala is a Professional Engineer with more than 12 years of experience in Water Resources Engineering emphasizing on Stormwater Management, Green Infrastructure Planning and Design. Hydrologic, Hydraulic and Water Quality modeling. Mr. Tangirala is currently the Chair of the Ohio Water Environment Association Watershed Management Committee and a regional liaison to Water Environment Federation's Stormwater and Watershed Management committees.

Abstract: *The Prospect Dam, located on the Scioto River at the Marion County/Delaware County line south of the Village of Prospect, was constructed in 1920's era and served to impound river water for use in boilers and condensers at the Scioto Power Station. There was no other known current beneficial use other than limited recreational activities created by the impoundment pool including the use of personal watercraft and fishing including an annual fishing derby held in the impoundment pool.*

The presentation will:

- *Summarize the reasons for the removal of the Low Head Dam and the ecological, recreational and safety benefits obtained from the removal of the dam.*
- *Discuss the Design and Construction of the Pneumatic weir gate system which spans 150 feet in the Scioto River. When raised during periods of elevated stream flow, this weir creates a 6-foot deep temporary impoundment pool and directs river flows to the*

adjacent pump station. When the diversion pump station is not in use, the weir can be completely lowered, allowing the river to flow as normal and permit fish migration.

- *Discuss the proposed stream mitigation plan involving the removal of the lowhead dam and bank stabilization techniques. The low head dam at Prospect created a backwater pool that extended back approximately 7 miles to the Village of Green Camp. Except during periods when the inflatable weir is in operation, the removal of the Prospect Dam allows free flow in the river and free passage into the Scioto River for nine additional miles.*
- *Discuss proactive floodplain management and how the detailed hydraulic analysis of Scioto River for the Low Head Dam Removal is being submitted as a Letter of Map Revision to FEMA to change the Special Flood Hazard Area designation from Zone A to Zone AE.*

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Title: *Integrating the City of Columbus Upground Reservoirs into the Scioto River Water Resource System: Part 2- Multi-Faceted Stakeholder Interactions* - Authors: Troy Branson, City of Columbus; Ken Ricker, ms consultants

Biography: Troy Branson has over 27 years of experience in the engineering field including 16 years with the City of Columbus. Troy has worked on a number of projects as a project engineer within the Division of Sewerage and Drainage at the City's wastewater treatment plants and wastewater facilities. Troy has also worked within the Division of Water and was the project engineer on the recently constructed Upground Reservoir, Raw Water Pump Station, and Raw Water Pipeline. Troy received a BS in Civil Engineering from the Ohio State University.

Mr. Ricker has over 31 years of experience- 24 years at ms consultants- assisting clients in a the planning, design, financing and construction of a variety of projects, including public water supply, treatment, and distribution, wastewater collection & treatment, solid and hazardous waste management. He received a BS in Civil Engineering from the Ohio State University. Prior to joining ms, he had seven years of public service performing engineering reviews of studies and construction documents and providing technical assistance to governmental agencies financing their wastewater projects through the Ohio Environmental Protection Agency, Division of Environmental & Financial Assistance. Mr. Ricker has been a member of the American Water Works Association since 1991.

Abstract: *The City of Columbus, committed to environmental stewardship, performed a comprehensive assessment of potential impacts of their Upground Reservoirs project on cultural resources, terrestrial habitats/endangered species, wetlands, aquatic habitats and groundwater.*

The presentation will the focus on how Columbus not only strived to maintain water resources within the overall project area using mitigation techniques during construction, but also collaborated with regulators and partnered with local communities and stakeholders to

integrate various infrastructure components which will serve as enhancements well into the future.

The following construction mitigation elements and design features will be discussed.

- *Preconstruction well assessments, real time monitoring of construction dewatering, and assistance for potable/agricultural wells impacted by construction.*
- *Collaboration with Soil/Water Districts to intercept/reroute agricultural surface runoff and field tile drainage around the reservoir perimeter using a pair of two-stage ditches designed to perform as water quality vegetative filters and that qualified as a post-construction stormwater BMP.*
- *Partnership on constructing a 47-acre passive recreation park, including conversion of two reservoir soil borrow areas into water features, and ground cover to prairie grass which will act as a vegetative filter with zero net discharge in post development storm water runoff.*
- *Installing a pneumatic weir gate system spanning the Scioto River in lieu of a permanent low head intake impoundment, thus allowing unobstructed river flow and fish migration when not in service.*
- *Restored free flow conditions to a 9-mile stretch of the Scioto River by removing a 1920's era low head dam at the Marion/Delaware County line;*
- *Maintained/enhanced personal watercraft recreation along the Scioto corridor by constructing a canoe portage trail and canoe launch ramp with parking lot as part of the pump station project; and*
- *Improved public safety in two rural townships with the installation of non-potable fire hydrants along the 4-1/2 mile raw water pipeline.*

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Title: *Cost of treating cyanobacteria in drinking water* - Author: Dr. Dean Reynolds, City of Alliance

Biography: Dr. Dean A. Reynolds is an Ohio Certified Water Supply Class IV Operator and the Superintendent of Alliance Department of Water Treatment.

Abstract: *Cyanobacteria blooms significantly increase the cost of treating water for potable use. Costs to water treatment plants can be categorized as direct costs for treatment processes in the plant and for maintaining source water watersheds. Indirect costs of cyanobacteria blooms are caused by the influence of aesthetically unpalatable water and the fear of cyanotoxins on consumer attitude toward water utilities and municipal governments. Several other algal groups are known to cause additional treatment costs when they bloom due to taste and odor and water filter clogging. This presentation will concern only the cyanobacteria. Direct cost increases to water treatment caused by cyanobacteria are as follows 1) cost of additional treatment chemicals to remove taste and odor compounds or remove and/or destroy cyanotoxins, 2) cost of equipment maintenance and cost of additional equipment for treatment, 3) cost to handle*

and remove increased water treatment residuals such as alum sludge, and 4) cost of personnel training and equipment to monitor and test untreated and treated water. Direct costs associated with managing cyanobacteria blooms in the source water watershed include 1) manpower and training to monitor the watershed, 2) sample collection and testing by utility or private laboratories, 3) chemical treatment to reduce bloom development in water source, 4) bloom avoidance procedures using equipment in the source water such as aeration equipment. Indirect costs are not so easy to quantify but can have significant effects on water use and can affect the attitude of the public to the utility.

Wednesday, November 19, 2014
Concurrent 1 – Water Use & Availability
German Village Room 10:30 am – 12:00 pm

Title: *Healthy Water Ohio – A Strategy for Water Resource Management* - Author: Dr. Larry Antosch, Ohio Farm Bureau Federation

Biography: Dr. Larry Antosch has been employed at the Ohio Farm Bureau Federation (OFBF) since July 1999. He is responsible for overseeing, planning, developing and implementing programs and projects addressing policy development and emerging environmental and energy policy issues. In his position, Dr. Antosch provides leadership to the OFBF policy development process and serves as the conduit of unbiased environmental information for the OFBF Board of Trustees, Cabinet and county FB members. He is responsible for reviewing and analyzing environmental data, reports, and proposed rules and legislation to determine its impact on Ohio agriculture and producers. In addition, Larry represents OFBF and county FB members on local, state, national and inter-national task forces, committees and work groups. He currently is providing technical oversight to the Healthy Water Ohio initiative.

Abstract: *The Healthy Water Ohio initiative is a collaborative partnership with stakeholders from agriculture, conservation, business, university and water user groups. This effort will lead to the development of a 20 to 30 year water resource management plan for the stewardship and use of Ohio's surface and ground water resources.*

The ability of Ohio's water resources to support society's current and future water needs is critical to sustaining Ohio's economy and standard of living. The development of a sustainable water resources management plan (Healthy Water Ohio) will serve as the foundation for understanding Ohio's water resource needs and position the state to meet future water needs. The strategy will consider water quantity, water quality and ecosystem needs for the next 20 to 30 years.

Sixteen leaders from Ohio's agriculture, conservation, business, university and water user groups comprise a steering committee that is spearheading the effort that also involves stakeholders from all aspects of Ohio water resources. By June 2015, the group aspires to have a document that will create the future vision for the sustainable use of Ohio's water resources to support current and future water needs while sustaining Ohio's economy and standard of living.

This initiative provides an opportunity for Ohio water users to investigate and evaluate Ohio's water resource challenges, identify innovative solutions and develop a strategy to overcome obstacles faced along the way.

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Title: *Water Withdrawals in Ohio: Recent Trends* - Authors: Mitch Valerio & Mike Hallfrisch, Ohio Department of Natural Resources

Biography: Mitch is an environmental scientist at the Ohio Department of Natural Resources, Division of Soil and Water Resources. He works in the Water Withdrawal Facilities Registration Program and tracks water usage throughout the state.

Abstract: *The Ohio Revised Code (Section 1521.16) requires the owner of a facility with the capacity to withdraw water at a quantity greater than 100,000 gallons per day to register that facility with the Ohio Department of Natural Resources, Division of Soil and Water Resources (DSWR). Registrants are also required to report how much water was withdrawn at their facilities annually. Registered facilities are grouped by DSWR into various categories based on dominant water use type (e.g. hydraulic fracturing, power production, public water supply, etc.). The number of new registrations submitted each year has increased dramatically from 2012 through the second quarter of 2014, primarily due to increasing hydraulic fracturing activity within the state. Prior to 2012, the number of new registrations accepted each year averaged approximately 29. During 2013, the number increased to 150. The total number of registered facilities that were oil or gas related increased from 0 in October 2010 to 66 in July 2012, to 344 in May 2014. As expected, the amount of water withdrawn by facilities associated with hydraulic fracturing has increased steadily in proportion to the number of registered facilities. However, hydraulic fracturing, when compared to the other water use categories, accounted for only 0.02% of total statewide withdrawal amounts in 2012, and is expected to remain low in 2013 after all of that year's data are collected and analyzed. Geographically, newly-registered facilities since 2010 have tended to cluster around hydraulic fracturing activity in eastern Ohio, as well as the Ohio River. In the future, the number of new facility applicants is expected to remain high due to continued oil and gas activity in eastern Ohio.*

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Title: *Water Resources Determining Ohio's Future: Water Efficiency Manual for Industrial, Commercial, and Institutional Facilities* - Author: Serena Alexander, Cleveland State University

Biography: Serena E. Alexander is a PhD candidate at Cleveland State University and a research assistant at The Center for Economic Development. Her research interests include economic development and environmental planning and policy issues with a particular focus on climate action planning, hazard mitigation, and adaptive management and governance.

Abstract: *The project focuses on water intensive industries in the state of Ohio and water efficiency best management practices for industrial, commercial, and institutional facilities. It was prepared for Ohio Lake Erie Commission and Ohio Department of Natural Resources (ODNR). Water intensive industries were first identified by analyzing permitting data on water withdrawal from ODNR. Then, general and industry specific best management practices were selected through a review of the literature and practices at other states. The report can serve as a guideline for industries and facilities willing to undertake water efficiency practices voluntarily. It highlights the general steps these facilities or organizations can take to benefit from the state's water resources efficiently and sustainably. In addition to general guidelines, the report presents industry specific techniques, technologies and best management practices for water efficiency. The final outcome will be offered to entities applying for a water withdrawal permit in the state of Ohio. These entities will be encouraged to voluntary adhere to some of the techniques and best management practices presented in the report. Ultimately, the report concludes with recommendations for the state's next steps.*

Wednesday, November 19, 2014
Concurrent 2 – Nutrient Management
Oak Room 10:30 am – 12:00 pm

Title: *Goose Management* - Authors: Lorraine Krzyzewski & Elayna Stieroff, City of Columbus

Biography: Lorraine Krzyzewski is a watershed protection coordinator for the City of Columbus, Department of Public Utilities, Division of Water, Watershed Management Section.

Elayna Stierhoff is a Water Protection Coordinator with the City of Columbus, Department of Public Utilities, Division of Water, Watershed Management Section.

Abstract: *This presentation will provide a successful, multi-facetted approach to Canada Goose Management in public use areas of the utilities' raw water supply reservoirs. The talk will also present how public education and the application of permitted wildlife control measures can be used together to solve this difficult problem.*

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Title: *The potential for pollutant runoff from surface irrigation of reclaimed wastewater in cold weather* - Authors: Joshua Griffin, Dr. Karen Mancl, & Dr. Olli Tuovinen, The Ohio State University

Biography: Josh Griffin is a Masters student in Food, Agricultural and Biological Engineering studying under Dr. Karen Mancl.

Abstract: *The depth of aerated soils is often a limiting condition in Ohio for soil based on-site wastewater treatment systems. One option for reclaiming wastewater on-site is pretreatment of the wastewater and surface application of the effluent making use of shallow aerated soils.*

Cold weather is seen as a limiting factor to surface irrigation due to excess moisture and soil freezing. The objective of the experiment was to determine the impact of reclaimed wastewater irrigation in winter conditions on the quality of runoff. A controlled experiment was devised where simulated wastewater was applied to field scale plots setup to capture all surface runoff generated. The experimental system was tested over two winters (2012-13 and 2013-14) at the North Appalachian Experimental Watershed in Coshocton, Ohio. The two winters represented mild to severe cold weather conditions relative to the typical Ohio winter. In some circumstances the irrigated plots influenced the hydrology by supplementing the snowpack. During melting events elevated pollutant concentrations were observed. However if melt events were coupled with precipitation events or runoff occurred that was only induced by precipitation, other factors seemed to dominate runoff quality and the impacts of wastewater reclamation were insignificant.

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Title: *Sustainable Water Quality Management and Public Health Protection by Urban Wetlands*
- Authors: Tsung-Ta (David) Hsu & Dr. Jiyoung Lee, The Ohio State University

Biography: David Hsu is a PhD Candidate at the Environmental Science Graduate Program at the Ohio State University. He has a master's degree in microbiology and is interested in studying microbes in the environments. He is currently working with Dr. Jiyoung Lee as a graduate research associate at the College of Public Health at OSU where he investigates pathogen dynamics in urban wetlands and its public health implications.

Abstract: *The Olentangy River in central Ohio has been listed on the Ohio Clean Water Act section 303 (d) because of its deteriorated water quality. Construction of the Olentangy River Wetlands has improved water quality by reducing nutrients and E. coli levels across the wetlands. However, more specific information on its public health impact (i.e. human enteric pathogens) remains unknown. Shiga toxin-producing E. coli and Campylobacter are major foodborne and waterborne pathogens. In addition, Arcobacter is an emerging enteric pathogen. The objectives of this current study are 1) to investigate changing levels of pathogens (Shiga toxin-producing E. coli, Campylobacter, Arcobacter) in the two constructed wetlands in the Olentangy River Wetland Research Park (ORWRP); 2) to compare the efficiency of pathogen reductions between the two types of wetlands (planted vs. originally unplanted) in the ORWRP; and 3) to determine relationships between environmental variables and pathogen reductions. The study period is from July, 2013 to June, 2014. Preliminary results showed that E. coli and Arcobacter were prevalent in the wetlands (98.8% and 97.6%, respectively), whereas Shiga toxin-producing E. coli and Campylobacter had lower occurrence (22.0% and 7.3%, respectively). Both E. coli and Arcobacter reductions across the wetlands were observed in sixty percent of sampling events. However, no significant differences were found in terms of reductions between the two wetland types. Reduction efficiency of E. coli and Arcobacter was associated with turbidity, indicating the pathogen reduction mechanism by the wetlands could be attributed to settling out of sediments. Establishment of the Olentangy River Wetlands in Columbus urban*

area demonstrates its sustainable way of water quality management as well as public health protection by pathogen reductions.

Wednesday, November 19, 2014
Concurrent 3 – Groundwater
Alder Room 10:30 am – 12:00 pm

Title: *Groundwater Resources: An Innovative Succession Plan* - Author: Jess White, City of Dayton

Biography: Jess White is currently a laboratory sampling tech for the City of Dayton Division of Water Supply and Treatment. She will be graduating with a B.S in Environmental Health Sciences at Wright State University in the summer of 2015.

Abstract: *Integrating technology into the current water system profile is crucial in order to be sustainable in the future. The City of Dayton, with the help of OTCO began utilizing GIS to map the monitoring wells, production wells, and sample stations located throughout the water system. Until this point, the knowledge of those assets was kept in an archaic manner, through word of mouth and out of date maps and descriptions. These mapped locations are now accessible from our desktop computers, and will eventually be uploaded to hand held devices that can be used in the field. The idea to map these sites with GIS led to a final plan that develops a pathway to link within SCADA and LIMS. With these programs linked to each location, we will be able to monitor and trend our ground water resources before and after production. Furthermore, we will also be able to read various parameters at specific locations, as well as, detect changes in water quality throughout our groundwater system. The operators will also have the advantage to adjust their treatment procedures according to the chemical makeup of the well water coming into the plant at any given time. These additions will help to ensure the success and security of our groundwater resources.*

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Title: *Hydrologeological Investigation of the Timken Faircrest Steel Plant Construction Dewatering Project Stark County, Canton and Perry Townships, Ohio* - Authors: Curtis Coe & Jim Raab, Ohio Department of Natural Resources

Biography: Curtis joined the ODNR Division of Soil and Water Resources 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 Mapping, GIS Investigations for ground water supply exploration and development. He is providing Technical Support to the public, government, consultants, and Industry.

Abstract: *Timken Corporation (Timken) began upgrading and remodeling of the Timken Faircrest Steel Plant (TFSP) located southwest of Canton, during the summer of 2012. Part of the remodeling involved the installation of a vertical steel pipe caster that would be installed 89 feet*

below the land surface. Timken had done a geotechnical investigation of the subsurface for the vertical caster foundation engineering design. However, Timken did not include a hydrogeological impact assessment to determine how the construction dewatering would affect the ground water levels in local domestic water supply wells in the surrounding area.

During the excavation of the foundation, the contractor encountered ground water. Timken installed six (6) dewatering wells around the excavation. Shortly after the dewatering operation started in August 2012, local residents complained to the Stark County Health Department (SCHD) that they were having problems with their wells. In response to the request by the SCHD for assistance, the Ohio Department of Natural Resources – Division of Soil and Water Resources (ODNR-DSWR), met with Timken to assess the site hydrogeological characteristics near the dewatering operations. The ODNR-DSWR designed and implemented a long-term monitoring program to determine the extent of the cone of depression created by Timken dewatering operations.

The ground water impact assessment was accomplished during August and September of 2012. It was concluded that the cone of depression had migrated beyond Timken's property boundary. The main area affected was to the south and east of the TFSP. The September 2012 monitoring data was used to define the approximate geographic extent of the impacted area. Timken used the inferred impact area to sort through the complaint list compiled by the SCHD. In total, Timken responded to 77 complaints from local homeowners.

Long-term monitoring data confirmed that ground water levels in the area were impacted by the Timken dewatering operation, but as of September 2013 the ground water levels in the area had returned to normal. At this time, it has been concluded that Timken has taken the precautionary steps necessary to protect the public health and safety. There does not appear to be any long-term impacts to the ground water supplies available from either the glacial or bedrock aquifer systems in the area.

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Title: *Chloride and Nitrate Trends in Ohio's Public Water System Wells* - Author: Michael Slattery, Ohio Environmental Protection Agency

Biography: Mike Slattery has a BS in Earth Science (Southern Illinois University) and an MS in Geological Science, with a focus on isotope hydrology (UNLV). His current work includes data management and analysis for the Ambient Ground Water Monitoring Network for the Ohio EPA.

Abstract: *The assessment of trends in ground water quality is an important step in understanding the factors that affect water quality over time. Trends in ground water quality are driven by natural geochemical evolution, climate, land use activities, ground water extraction, groundwater-surface water interaction, and inter-aquifer leakage. Smaller, more shallow aquifers may react quickly to changing conditions (days to years) under high recharge*

conditions, while larger, deeper aquifers with much greater storage may respond many times more slowly (decades to millennia). Here, changes over the last four decades in concentrations of two key water quality parameters, chloride and nitrate, are evaluated in the raw water of public supply wells using data from Ohio EPAs Ambient Ground Water Monitoring Network (AGWMP). This dataset comprises a rich, long-term archive of Public Water System (PWS) source water data with adequate spatial and depth coverage across the main aquifer types encountered in Ohio.

Estimates of trend are evaluated using standard regression measures to estimate the intra-well monotonic trends of chloride and nitrate (tendency of concentration to increase or decrease over time). While numerical estimates of slope and significance help to document variation over time, they do not imply cause and effect relationships to land use activity or contamination source, nor are they predictive in that regard. To help interpret the physical significance of the trend results, the slopes are evaluated by well depth, aquifer type, and land use category to determine if any spatial patterns emerge as significant, although such patterns are often difficult to discern in well networks. Based on the rather deep settings of PWS wells in general, slower water quality changes over time might be expected in these wells compared to networks of shallower wells.

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Title: *Groundwater Availability in the Appalachian Plateaus* - Author: Kurt McCoy, U.S. Geological Survey

Biography: Kurt McCoy has been employed as a hydrologist with the USGS West Virginia, New Mexico, and Virginia Water Science Center offices for the last 12 years.

Abstract: *The U.S. Geological Survey's Groundwater Resources Program is conducting an assessment of groundwater availability throughout the United States to gain a better understanding of the status of the Nation's groundwater resources and how changes in land use, water use, and climate may affect those resources.*

The Appalachian Plateaus groundwater availability study has recently been initiated to quantify current groundwater resources in Permian-, Pennsylvanian-, and Mississippian-age aquifers from Alabama to New York. The study will evaluate how regional groundwater budgets have changed over time, and provide the foundational groundwater-related datasets to support other Federal and State water-resource investigations. The intent of the study is to improve datasets for adaptive management of drinking-water resources, aquatic ecosystems, and continued energy resource development in the region. A better understanding of groundwater availability in the Appalachian Plateaus thus plays a central role in sustained economic development of the region.

Wednesday, November 19, 2014
Concurrent 1 – Climate Change
German Village Room 1:45 pm – 3:15 pm

Title: *Modeling Potential Impacts of Climate Change on Runoff in the Upper Scioto River Basin - Part 1* - Author: Greg Koltun, U. S. Geological Survey

Biography: Greg is a hydrologist with the U.S. Geological Survey (USGS), Ohio Water Science Center, where is the discipline specialist for surface-water hydrology, hydraulics, and sediment transport. Since joining the USGS in 1980, Greg has served as principal investigator or co-investigator on a wide variety of projects dealing with topics in hydrology; hydraulics, computer applications and modeling, and water quality. Greg obtained a B.S. in Microbiology and a M.S. in Civil Engineering from the Ohio State University.

Abstract: *The U.S. Geological Survey, in cooperation with the Ohio Water Development Authority, the Mid-Ohio Regional Planning Commission, and the Cities of Columbus and Delaware, Ohio, did a study to provide information on the hydrologic effects of potential changes in 21st-century climate, water use, and land cover in the upper Scioto River Basin, Ohio. A precipitation-runoff model, calibrated based on historical climate and streamflow data, was used to simulate the effects of climate change (as informed by selected global-climate-change models) on streamflows and reservoir water levels at several locations in the watershed. Level 1 simulations were done accounting only for changes in climate and anticipated operations of three City of Columbus upground reservoirs located in northwest Delaware County, Ohio. Results from the level 1 simulations were analyzed to evaluate climate-driven temporal changes in annual, seasonal, and monthly streamflow and reservoir water-level characteristics as well as in maximum and minimum 7-, 30-, and 180-day average streamflow and reservoir water-levels. Level 2 simulations also were done incorporating build-out (population and development-driven changes in land cover and water use) in addition to the level 1 changes in climate and upground-reservoir operations. Results from the level 2 simulations were analyzed to evaluate and contrast (relative to level 1 results) the effects of these added factors on the N-day average streamflows and reservoir water levels.*

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Title: *Sustaining Scioto: Investing Today Preserving Tomorrow: Modeling Potential Impacts of Climate Change on Runoff in the Upper Scioto River Basin - Part 2*- Author: Greg Koltun, U. S. Geological Survey

Biography: Greg is a hydrologist with the U.S. Geological Survey (USGS), Ohio Water Science Center, where is the discipline specialist for surface-water hydrology, hydraulics, and sediment transport. Since joining the USGS in 1980, Greg has served as principal investigator or co-investigator on a wide variety of projects dealing with topics in hydrology; hydraulics, computer applications and modeling, and water quality. Greg obtained a B.S. in Microbiology and a M.S. in Civil Engineering from the Ohio State University.

Abstract: *The U.S. Geological Survey, in cooperation with the Ohio Water Development Authority, the Mid-Ohio Regional Planning Commission, and the Cities of Columbus and Delaware, Ohio, did a study to provide information on the hydrologic effects of potential changes in 21st-century climate, water use, and land cover in the upper Scioto River Basin, Ohio. A precipitation-runoff model, calibrated based on historical climate and streamflow data, was used to simulate the effects of climate change (as informed by selected global-climate-change models) on streamflows and reservoir water levels at several locations in the watershed. Level 1 simulations were done accounting only for changes in climate and anticipated operations of three City of Columbus upground reservoirs located in northwest Delaware County, Ohio. Results from the level 1 simulations were analyzed to evaluate climate-driven temporal changes in annual, seasonal, and monthly streamflow and reservoir water-level characteristics as well as in maximum and minimum 7-, 30-, and 180-day average streamflow and reservoir water-levels. Level 2 simulations also were done incorporating build-out (population and development-driven changes in land cover and water use) in addition to the level 1 changes in climate and upground-reservoir operations. Results from the level 2 simulations were analyzed to evaluate and contrast (relative to level 1 results) the effects of these added factors on the N-day average streamflows and reservoir water levels.*

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Title: *Adaptive Management Planning for Climate Change: Addressing Potential Impacts on Infrastructure Planning and Design* - Authors: Kristin Knight & Lisa Jeffrey, Brown and Caldwell

Biography: Mrs. Knight is a Principal Engineer with Brown and Caldwell and has 17 years of experience in water resource design and management including water treatment, distribution and stormwater management.

Abstract: *This presentation will provide an overview of the adaptive management planning associated with a multi-year, regional study being conducted in Central Ohio. The study was designed to facilitate planning and development of adaptive management strategies for mitigating risk associated with climate change. The Mid-Ohio Regional Planning Commission (MORPC), together with the U.S. Geological Survey (USGS), the City of Columbus, Del-Co Water Company, Inc., and the Ohio Water Development Authority has initiated this planning study called "Sustaining Scioto".*

This proactive, science-based study is being conducted to ensure that Central Ohio has clean and secure water resources for current residents and businesses, and to sustain needs from future growth. It includes development of adaptive management strategies to manage water quality and quantity during extreme drought or flood. Brown and Caldwell is currently working with the planning commission to develop this adaptive management plan using the results of the model and input from a broadly based Stakeholder Advisory Committee. The considerations and lessons learned from this study are relevant to water resource planners in Virginia and throughout the East Coast.

On a national level, there is significant concern regarding the potential impacts to water resources due to climate change and associated extreme weather events (USEPA, 2012; Wilbanks and Fernandez, 2012; NACWA, 2009; Brekke, et al., 2009). The impact of climate change on water resources has been noted in several national studies as one of the critical issues for public utility planning, especially as related to water supply systems (NACWA, 2009; USEPA, 2012). This problem is exacerbated in Central Ohio where 85% of daily water usage is supplied by surface water (Markstrom, et al., 2012).

This presentation will focus on the development of water management strategies to mitigate quantity impacts and treatment strategies to mitigate water quality impacts of climate change in Central Ohio and the eastern portion of the mid-west. This project's approach and considerations have broad applications throughout the region and the country. The presentation will present a suite of adaptation strategies to address both the water management challenges associated with changing flow patterns and the water treatment challenges associated with changing source water quality due to climate change. The project builds on the associated presentations being submitted by MORPC, most specifically the modeling work being conducted by the USGS. The USGS has developed a hydraulic/hydrologic (H/H) model to assess quantitative impacts, in conjunction with this adaptive management planning.

Wednesday, November 19, 2014
Concurrent 2 – Watershed Management
Oak Room 1:45 pm – 3:15 pm

Title: *What do markers tell us about septic systems in agricultural watersheds?* - Author: Dr. Christopher Spiese, Ohio Northern University

Biography: Christopher Spiese is an environmental chemist at Ohio Northern University. His area of expertise is on sulfur and phosphorus biogeochemistry in aquatic systems.

Abstract: *Markers offer interesting insight into the complexities of nutrient management in watersheds. This paper reports on the use of caffeine as a marker to track the contribution of human wastewater and groundwater to nutrient levels observed within tile drainage effluents in a rural, secondary tributary of Lake Erie in northwest Ohio. The study results revealed a strong, negative correlation between caffeine and total phosphorous (Pearson's product moment correlation = -0.9). However, no additional correlations were observed between caffeine and other nutrients. Caffeine was positively related to total coliform bacterial abundance as well as E. coli abundance. Mean ± standard deviation caffeine concentrations ranged from non-detect at the control site to 1.2 ± 0.4 µg/L in tile drainage effluents from sites having on-site wastewater systems. Mean ± standard deviation concentrations observed for total nitrogen and phosphorous concentrations in tile drains were 3.5 ± 1.8 mg/L and 0.4 ± 0.07 mg/L, respectively. Bacterial abundances ranged from non-detect to 60 cfu/mL. Commonalities in nutrient fingerprints (total and speciated phosphorous and nitrogen) in groundwater and tile drainage*

highlight the complex relationships for nutrient and water quality management in irrigation drainage networks.

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Title: *Ohio Watershed Plan Endorsement 2.0* - Author: Greg Nageotte, Ohio Department of Natural Resource

Biography: Greg Nageotte currently serves as the Watershed Program Manager with Ohio Department of Natural Resources, Division of Soil and Water Resources. He graduated from Oklahoma University with a Bachelor's in Political Science, and Indiana University with Masters of Public Affairs concentrating in Environmental Policy and Natural Resource Management. In addition to managing the Ohio watershed coordinator grant program and watershed action plan state endorsement process, Greg serves on several state and regional coordination and advisory groups. He is also a past WMAO president and current treasurer.

Abstract: *Ohio EPA and Ohio Department of Natural Resources jointly developed guidelines for developing local watershed action plans (WAPs)... including policies and procedures so that the agencies could "endorse" locally developed plans. Over 60 WAPs have been "state endorsed" utilizing these policies. This presentation will include an overview of the outcomes of the Ohio watershed planning initiative and provide an outline for developing new WAP planning policies including the maintenance of "state endorsement."*

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Title: *Discharge Quality Water From Dairy Manure: A Summary Of The McLanahan Nutrient* - Author: Renee Schrift, McLanaham Corporation

Biography: Renee Schrift is McLanahan Corporation's Director of Sales & Customer Service (Agricultural Division) and a graduate of The Pennsylvania State University with a B.S in Dairy & Animal Science. For the past 14 years, Renee has worked with dairy producers across the United States and Internationally to improve their manure management systems through the adoption of technologies such as sand manure separators, fine sand recovery systems, liquid solid separators and associated conveyance systems. Renee is currently leading the sales effort to commercialize a new McLanahan technology to further enhance manure value by segregating/concentrating nutrients and producing discharge quality water.

Abstract: *Since the beginning of time, dairy manure has been land applied consistent with the agronomic requirements of growing crops. Though manure is still applied under this same construct, due to consolidation of the dairy industry over the last 40 years, animal density has increased dramatically creating logistical, storage and environmental challenges. Manure maintains tremendous nutrient value; however, water comprises approximately 90% of the manure stream. Development of new and innovative methods for extracting nutrients for*

beneficial reuse while preserving water quality is of paramount importance to the future of the US dairy industry.

The McLanahan Nutrient Separation system seeks to improve the social and environmental sustainability of the dairy industry, while reducing the cost and liability associated with manure management. In general, nutrients are separated and concentrated, allowing for application where and when they are needed. The separated water can be land irrigated, re-used or even discharged. The system is comprised of a four steps: pretreatment under anaerobic conditions, ultrafiltration, air stripping and reverse osmosis. A summary of the technical merits of the process plus the economic underpinnings of this system will be presented.

Wednesday, November 19, 2014
Concurrent 3 – Floodplain Management (OFMA)
Alder Room 1:45 pm – 3:15 pm

Title: *City of Mansfield Flood Hazard Mitigation Initiative* - Authors: Miles Hebert & Shawn Arden, EMH&T

Biographies: Miles is the Director of Water Resources at EMH&T and oversees projects ranging from stormwater management, floodplain studies and regulatory compliance, ecosystem restoration, NPDES compliance, and green infrastructure for water quality and CSO abatement. Miles works with engineers, planners and environment scientists to develop comprehensive solutions which address local, state and federal regulations for a wide variety of public infrastructure improvement projects. Miles was the Project Manager overseeing the Touby Run watershed and flood mitigation study for the City of Mansfield.

Shawn Arden is a senior member of the Water Resources Engineering team at EMH&T. He is a recognized expert in the water resources field, having served in multiple capacities for the planning and design of public and private infrastructure projects. In addition, Shawn has been a member of the Ohio Floodplain Management Association (OFMA) Managing Board since 2007, and he is currently serving his second term as President of the Association.

Abstract: *Dating back to 1929, studies have been conducted to evaluate mitigation alternatives for recurring flooding along Touby Run within the City of Mansfield. The City has experienced widespread flooding associated with Touby Run on eight occasions since the summer of 2003, each event leading to significant damage to private property as well as impacts to public streets and utilities. Other areas of the City have also experienced recurring flooding related to overwhelmed channels and storm sewer systems. The flooding has resulted in the abandonment of residential and commercial properties and is contributing to a blighted condition within neighborhoods along and near to Touby Run. In response to this history of flooding throughout the community, the City has undertaken an initiative focused on the relocation of residents and businesses in the high flood hazard area, through the acquisition of properties and demolition of structures. Due to the impacts of flooding to portions of the downtown area, the City is also*

investigating the feasibility of structural improvements within the Touby Run watershed to reduce the potential for flooding.

The City's flood hazard mitigation program includes the development of a GIS-based database of floodprone properties, providing information essential for the consideration of future acquisition and demolition. The database provides information consistent with the federal Pre-disaster Mitigation (PDM) grant funding program, allowing the City to prioritize properties for future grant applications and to begin allocating the funding necessary to purchase floodprone properties, with or without grant assistance. In addition, the City is completing a watershed-scale study for Touby Run to consider improvements that would reduce peak flood discharges through regional detention basins, and improve conveyance capacity along the channel by replacing/removing smaller roadway bridges. This study is considering the utilization of existing open space and the purchase of properties to create large scale on-line storage areas to detain flood flows, while also considering the utilization of these facilities as open space amenities that would benefit the entire community.

The watershed investigation has revealed a number of opportunities that would significantly reduce the potential for flooding along Touby Run, including nearly eliminating the potential for flooding through the downtown area. These opportunities have been evaluated from the standpoint of project costs and permitting liabilities, as well as the overall impacts to the surrounding community in terms of land acquisition and open space enhancements. The presentation will focus on the history of flooding within the City and the past and current studies to provide mitigation. The presentation will include a discussion of past efforts to pursue hazard mitigation grant funding and the on-going evaluation of structural flood hazard mitigation measures and their benefit the community. The presentation will include a discussion of the process of developing a matrix of potential solutions and the challenges associated with large-scale improvements in an urbanized area.

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Title: *Understanding the Homeowner's Flood Insurance Affordability Act of 2014* - Author: Alicia Silverio, Ohio Department of Natural Resources

Biography: As a Senior Environmental Specialist with ODNR's Floodplain Management Program, Alicia Silverio 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. Additionally, she coordinates Environmental Reviews, Community Rating System (CRS) activities, and the annual Statewide Floodplain Management Conference for the Floodplain Management Program.

Ms. Silverio is a Certified Floodplain Manager as recognized by the Association of State Floodplain Managers and President of the Ohio Floodplain Management Association. She is a graduate of The Ohio State University where she acquired a Bachelor of Science Degree in

Natural Resources (majoring in Environmental Science with emphasis in Water Quality). Ms. Silverio has been with ODNR's Floodplain Management Program since 1999.

Abstract: *ODNR will discuss recent legislative changes to the National Flood Insurance Program (NFIP) under the Homeowner's Flood Insurance Affordability Act (HFIAA) of 2014. The session will explain the implications of the Act as well as its effects on flood insurance premium rates.*

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