42nd Annual WMAO Conference

Now Trending: Innovations in Water Resource Management

November 13 & 14, 2013

Quest Conference Center, Columbus, Ohio

ABSTRACT PROCEEDINGS

Table of Contents

Wednesday

Thursday

Wednesday Concurrent 1 – Mineral Resources Management
Capitol Room 10:00 am – 11:30 am

Title: Collaborative biomonitoring at the state and local level to track acid mine drainage remediation achievements in Southeast Ohio, yields success - Authors: Jennifer R. Bowman, Kelly Johnson, Ben McCament, Jeff Calhoun, Amy Mackey, Nate Schlater, and Natalie Kruse

Biography: Jennifer Bowman is a senior project manager with the Energy, Economics, and Environment (CE3) team at Ohio University's Voinovich School of Leadership and Public Affairs in Athens, Ohio. She is a hydro-geochemist focusing on water contamination issues in surface and groundwater. She received her M.S. in Environmental Geochemistry from Ohio University in 2000. She currently coordinates the Appalachian Watershed Research Group at Ohio University, an interdisciplinary group focused on providing high-quality, applications-based watershed research for the benefit of the region while providing innovative learning opportunities for students. She spearheaded the development of a statewide, online and interactive mapping and water quality database system; currently used for tracking successes of acid mine drainage remediation in Appalachian coal watersheds in collaboration with Ohio Department of Natural Resources - Division of Mineral Resources Management.

Abstract: *Southeast Ohio watershed groups work alongside Ohio University Voinovich School's Appalachian Watershed Research Group (AWRG) and Ohio Department of Natural Resources Division of Mineral Resources Management (DMRM) to use aquatic organisms to track acid mine drainage (AMD) remediation successes in abandoned coal mine impaired streams. Over the past decade through a robust partnership of federal, state, and local funding approximately $20 M have been spent on reclamation in AMD impaired streams in Raccoon Creek, Sunday Creek, and Monday Creek. While all partners assist with the biological data collection efforts, each entity contributes an essential piece of the collective sampling effort. Ohio University provides coordination of biological sampling, training for watershed volunteers and taxonomic identification oversight, local watershed groups provide the extensive on-the-ground macroinvertebrate data collection, and DMRM provides the high-level electrofishing data collection and analysis. Macroinvertebrate and fish sampling results are used to track project successes along the mainstem of these three watersheds. Local watershed professionals collaborate with Ohio University's faculty, staff, and students and DMRM biologists to sample, identify, and quantify results using multi-metric indexes. Protocols for two multi-metric indexes are implemented to record biological health of the stream, the family-level Macroinvertebrate Aggregated Index for Streams (MAIS) and the Index of Biotic Integrity (IBI). To track reclamation successes over time, baseline conditions were established during the time period of 1997-2001 using various sources of data (Ohio EPA and USGS). Consistent annu family-level macroinvertebrate data collection started in 2005 at 44 sites across these three wa rsheds. Fish data are collected every 1-5 years and used to complement the family-level MAIS r sults.*

Statistically, MAIS data collected from 2005 -2011 show 17 of the 44 sampling sites have 'improved' (P-value ranging 5.65E-05 to 0.05), 2 sites indicate 'some improvement' (P-value = 0.07), 24 show 'no change' (P-values 0.1 to 1.0), while 1 site 'declined' in quality. The fish and macroinvertebrate data are compiled from the online database ***watersheddata.com*** *managed by Ohio University's Voinovich School Consortium for Energy, Economics, and the Environment (CE3) team to track project successes based on biological targets (MAIS = 12, IBI = 44/40 wadable/boatable). These data suggest approximately 47 stream miles, that didn't previous meet use attainment for Warmwater Habitat (WWH) in 2005, would now meet their intended aquatic use. Regulatory agency review of these watersheds occurred 1997-2001 and is not scheduled for re-evaluation again until 2019. Collaborative efforts between watershed groups, Ohio University's AWRG, and DMRM allow the environmental conditions of the stream to be monitored post reclamation on a more frequent basis to track successes in the short-term and long-term.*

~-~

Title: The Design and Use of Ground Water Flow Models in Industrial Minerals Dewatering Permits at ODNR, Division of Mineral Resources Management

Biographies:

Kelly Barrett is a geologist with the Ohio Department of Natural Resources Division of Mineral Resources Management in Columbus, Ohio. She performs ground water modeling, hydrology permit reviews, and water complaint investigations for the Industrial Minerals Program. Kelly has worked for ODNR for nine years and has Bachelors and Masters in Geology.

&

Wayne Jones is a Hydrogeologist at ODNR, Division of Soil and Water Resources. Mr. Jones works on a variety of ground water projects which include the review and construction of ground water flow models in conjunction with the Division of Mineral Resource Management. Mr. Jones received a bachelor's degree from The Ohio State University in Geology and Mineralogy.

Abstract: *The Ohio Department of Natural Resources (ODNR), Division of Mineral Resource Management (DMRM), is responsible for the management of industrial mineral extraction in Ohio. Aggregate mining, especially limestone and dolomite, may necessitate the pumping of ground water to artificially lower the water table. Dewatering of an industrial minerals permit requires the completion of a ground water model to predict the effect of dewatering on the hydrologic cycle. The ground water model is used to establish a projected cone of depression to designate the area in which the ground water level is lowered 10 feet or more by the pumping of ground water out of a mining area. The establishment of a cone of depression is required by OAC 1501:14-5-01 and ORC Title 15, Chapter 1514.13 when an application to add acreage or lower the mining depth of an existing dewatering permit or a new application that includes dewatering are submitted to DMRM. The modeling can be completed by an environmental consultant or the operator may request that the model is completed by ODNR. The ground water model must be calibrated to pre-mining or current conditions. The results of the model are used to produce a map defining the 10-foot cone of depression. The 10-foot line is a boundary where*

the quarry operator is responsible for deepening, or re-drilling any well that is impacted by dewatering. Models that are completed by the operator or their consultant must be presented to DMRM in a report with figures and maps. DMRM will work with the provider to assure that the final version of the report accurately represents the hydrogeology of the site. The completion of this step is necessary for the operator to obtain an approved application.

~-~

Title: Benefits of Coal Remining in Ohio

Biography: Cheryl Socotch has been with Ohio Department Natural Resources (ODNR), Division of Mineral Resources Management for 29 years. She served primarily as a lead hydrologist in the coal regulatory and Abandoned Mined Lands programs and provided technical assistance to program staff as well as working with citizen watershed groups addressing mine drainage remediation in their watersheds. Cheryl now serves as the Division's Remining Coordinator and manages the Field Hydrology program. Her education includes a Bachelor of Science in Environmental Geography and Geology from Ohio University and she instructs a number of hydrology-related courses for the U.S. Federal Office of Surface Mining (OSM).

Abstract: *Remining is the surface mining of previously-mined and abandoned surface and underground mines to obtain remaining coal reserves. Remining provides an alternative mechanism to create jobs, produce coal from previously disturbed areas, and eliminate safety and environmental hazards after reclamation. Remining efforts in Ohio has documented water quality improvements in our streams.*

Wednesday Concurrent 2 - Water Management Tools
Worthington Room 10:00 am - 11:30 am

Title: Handling Withdrawals from State-Managed Surface

Biography: Ms. Cheryl Green has 35 years of experience in civil and environmental engineering in Ohio. Her water management experience includes planning, design and permitting of surface water, storm water, drinking water and wastewater facilities to meet water quality objectives as well as infrastructure growth needs for communities and industry. Recently she has been involved with water source engineering and storm water management for shale oil and gas producers in the West Marcellus and Utica plays. Her broad background in water management was tapped by the ODNR Division of Soil and Water Resources as Hull & Associates, Inc. assisted in developing recommendations for the Ohio Water Withdrawal Management Model that she will discuss today.

Abstract: *ODNR has been given a specific charge from the Great Lakes – St. Lawrence River Basin Water Resources Compact to develop a means for implementing permitted withdrawals and consumptive uses, while ensuring no significant individual or cumulative adverse impacts in*

state-managed waters. Hull is working with ODNR to develop a water withdrawal management tool that the department can use for evaluating permitted withdrawals. This tool will be scientifically-based in an appropriate model, which will be thoroughly evaluated during the course of this study. As part of developing this tool, existing ecologically-based flow models developed by other states and organizations are being assessed. This study will result in a recommendation to ODNR of specific components or methodologies that will ultimately result in a water withdrawal modeling approach.

~-~

Title: Water Quality 1.1- Merging field studies with mobile technology

Biography: Heather Mayfield is Director of the Foundation for Ohio River Education, a non-profit educational foundation affiliated with the Ohio River Valley Water Sanitation Commission (ORSANCO). Heather oversees the development and implementation of FORE's educational programs and ensures that FORE's programs are adequately promoted and funded. She is also an acting board member of the Kenton County Conservation District in Northern Kentucky. Before coming to FORE, she directed a volunteer water monitoring program for the Sierra Club, and worked as a water quality researcher at the Environmental Protection Agency.

Abstract: *A collaborative team from Northern Kentucky University (NKU) and the Foundation for Ohio River Education (FORE) has released a new mobile application called Water Quality 1.1 for iPad, iPhone, and iPod Touch. The app enables scientists, citizen monitors, teachers and students (elementary through university level) to efficiently log water quality data from rivers, lakes and streams and to better understand key parameters that are used to measure the health of our waterways. Water Quality 1.1 allows users to create a profile for their monitoring site and to easily log results of chemical and bacterial monitoring. It includes colorful charts and illustrations that define commonly-measured water quality parameters and healthy ranges for each. It also includes a digital field guide for identifying aquatic macroinvertebrates and a Pollution Tolerance Index calculator. The use of Water Quality 1.1 will be illustrated with practical examples of how the app has been used in field and educational applications. Water Quality 1.1 is being expanded into a suite of apps that can be used for educational and field programs to assess habitat and fish populations.*

~-~

Title: USGS Water Resources Tools

Biography: Kimberly Shaffer has a degree in Civil Engineering from the Ohio State University and has worked for the U.S. Geological Survey for the past 16 years. As a hydrologist, she has collected and published streamflow, water-quality, and water use data. Kimberly has published

over 9 reports and fact sheets. She is the outreach coordinator, water-use specialist, and water-quality monitor project leader for the Ohio Water Science Center.

Abstract: *How to Get the Hydrologic Information You Need from USGS Water Resources Online Tools The U.S. Geological Survey in Ohio—in cooperation with local, State, and Federal partners—operates about 240 streamgage stations, 50 water-quality stations, and 25 real-time groundwater wells, in addition to collecting other scientific information. The USGS has developed several helpful online tools to help visualize, review, or retrieve water data in a variety of formats. These tools also provide statistical values for a range of times or samples. The purpose of this presentation is to highlight USGS water resources online tools and demonstrate the uses of WaterWatch, WaterqualityWatch, GroundwaterWatch, the National Water Information System, and the Flood Inundation Mapper, which are described below: WaterWatch displays maps, graphs and tables of real-time, recent, and past streamflow conditions, including locations where floods and droughts are occurring. WaterqualityWatch displays maps showing near-real-time temperature, specific conductance, pH, dissolved oxygen, and turbidity. GroundwaterWatch provides groundwater levels and statistical data for the long-term Real-Time Groundwater Level, Active Groundwater Level, and Climate Response Networks. The National Water Information System provides current and historical streamflow, groundwater-level, water-quality, precipitation, and water-use data. The Flood Inundation Mapper displays the likely areal extent of flooding at different river levels.*

Wednesday Concurrent 1 - Dam Safety
Capitol Room 1:00 pm - 2:30 pm

Title: **New Probable Maximum Values for Dam Design in Ohio**

Biography: **Keith Banachowski** is a program manager for Ohio's dam safety program and has over 15 years of experience in dam safety. His responsibilities include managing the periodic safety inspection program, performing detailed engineering analyses and inspections, and overseeing the program's database. He received Bachelor and Master of Science degrees from the Ohio State University and has taught open channel hydraulics at the Ohio State University for four years.

Abstract: *"Probable Maximum Precipitation" or "PMP" means the theoretical greatest depth of precipitation for a given duration that is physically possible over a given size storm area at a particular geographic location. It is an important component in determining the design flood for a dam. The most recent publication for PMP values is Hydrometeorological Report No. 51, which was prepared by the National Weather Service in 1978. In 2011, the Ohio Department of Natural Resources (ODNR) commissioned a consultant to perform a study to update the PMP values for Ohio. ODNR also commissioned a third-party board of consultants to review the study. The study was completed in February 2013. In March 2013, the study and a recommendation from the board of consultants to accept the study were provided to the Chief of the Division of Soil and Water Resources. Acceptance of these new (lower) values by the Chief and appropriate application during design and analysis will have a significant impact on remediation of dams and determination of the design flood for new dams.*

~-~

Title: Conducting EAP "Table Top" Exersise

Biography: Mark Anthony has thirty years' experience in planning and managing strategic communication programs for high-profile public and private sector organizations in Ohio; he has managed public health and safety communications issues ranging from dam emergency preparedness to infectious disease outbreaks, from community emergency management to agricultural biosecurity. Mr. Anthony has helped guide strategic communication planning, risk communication, emergency public information, and crisis communication for a wide range of public agencies that includes the Columbus Mayor's Office, Franklin County Emergency Management and Homeland Security, the Ohio Attorney General's Office, and the state departments of Agriculture, Health and Natural Resources. Mr. Anthony has served as Senior Policy Advisor for the Ohio Department of Natural Resources since July 2012.

Abstract: *Not on File*

~-~

Title: Dam Watch A Real Time, Web Based, Dam Monitoring Software Tool That Allows Dam Owners Early Warning of Hazard to their Dams Via Electronic Medium

Biography: Joseph Scannell is the President, Chairman, and co-founder of USEngineering Solutions. Mr. Scannell is a graduate of the University of Rhode Island with a B.S. in Civil Engineering. Mr. Scannell is a former bridge engineer with the Connecticut Department of Transportation. During his tenure with CONNDOT, Mr. Scannell worked as a Senior Project Engineer with the Federal-Local Bridge Program and a former Technical Chairman for a New England Transportation Consortium (NETC) research project on bridge monitoring. In 2005, Mr. Scannell received a "25 Top Newsmakers" award by the editors of McGraw-Hill Company's Engineering News Record magazine. Mr. Scannell holds a United States Patent for monitoring structural instabilities due to environmental processes.

Abstract: *Not on File*

Wednesday Concurrent 2 - Nutrient Management 1
Worthington Room 1:00 pm - 2:30 pm

Title: Contribute of Rural Septic Systems to Nutrient Loading in a Eutrophic Watershed

Biography: Dr. Christopher Spiese graduated from the State University of New York College of Environmental Science and Forestry (Syracuse, New York) in 2010 with a Ph.D. in

Environmental Chemistry. After a brief appointment as a Visiting Assistant Professor at Hobart & William Smith Colleges in Geneva, New York, he joined the faculty at Ohio Northern University in 2011 as an Assistant Professor of Chemistry. Dr. Spiese is a member of the American Chemical Society (ACS), the Association for the Sciences of Limnology and Oceanography (ASLO), the American Geophysical Union (AGU), and the Blanchard River Watershed Partnership. His research focuses on marine biogeochemistry of reduced sulfur species and the environmental chemistry of phosphorus in agricultural watersheds.

Abstract: *Nutrient loading in Riley Creek and the entire western Lake Erie Basin has led to eutrophication in watersheds and algal blooms in the Lake. Most management practices have focused on agricultural sources of nitrogen and phosphorus, with limited improvements for both nutrients. One potential source of nitrogen and phosphorus into the watershed from non-agricultural sources is rural septic systems. Due to the old age of most septic systems, there is a high probability of discharge of partially treated waste water into receiving streams, increasing loadings of nitrogen and phosphorus. This study quantified the contribution of rural septic systems to nutrient loading in Riley Creek. Nitrogen and phosphorus were measured both in the stream and in pore water. These were compared to human biomarkers such as caffeine and sterols (coprostanol and 5β-stigmastanol) to track anthropogenic inputs. Because many Lake Erie tributaries have elevated concentrations of nutrients, identifying and quantifying all potential sources is of critical importance for management and mitigation.*

~-~

Title: The Prevalence of Phosphorus in Soil Stratification in an Agricultural Watershed: A Potential link to increased Dissolved Phosphorus Loads to Lake Erie

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. Laura received her Ph.D. from the University of Notre Dame in 2008 where she worked with Dr. Jennifer Tank on the effect of human land use on stream nutrient processing. Originally from Virginia, Laura started conducting research on freshwater ecosystems as an undergraduate at Virginia Tech, where she graduated in 2002 with a B.S. in Biology. Laura frequently presents scientific findings at water quality meetings and has published over 15 papers in peer-reviewed journals.

Abstract: *Over the past decade, Lake Erie has been experiencing a recurrence of harmful algal blooms in the western basin, which appear to be associated with increased dissolved reactive phosphorus (DRP) loading from agricultural watersheds. Previous research indicates P stratification, or accumulation of P in the top 1-2 inches of agricultural soil, is linked to elevated DRP runoff; however, the extent of P stratification in agricultural fields in the Lake Erie watershed is not well understood. Further, stratification of P is frequently a result of manure application to no-till agricultural fields and it is currently unclear whether P stratification is also a result of other common agricultural practices. The goal of this study was to examine the*

extent of P stratification and associated land use practices in the Sandusky River watershed, a primarily agricultural watershed that feeds Lake Erie. From 2008-2012, soils were collected from over 1500 fields and P was analyzed using Mehlich-3 extractions. For each 8 inch core, P was measured separately from the 0-2 and the 2-8 inch increments. Our data suggest P stratification is prevalent throughout the Sandusky River watershed. The average soil was 24ppm higher and had 2 times higher P at 0-2 inches compared to 2-8 inches. Most of the fields (49%) were under rotational no-till management, where tilling occurred prior to corn. Broadcast P fertilizer was the most common form of application (52% of fields) and manure application was relatively rare (9% of fields). Therefore, P stratification can be a result of common agricultural practices. In conclusion, our research shows that P stratification has the potential to be a root cause of elevated DRP runoff from agricultural lands in the Lake Erie watershed. Future efforts to reduce DRP export to Lake Erie should include assessment of P stratification in remediation plans.

~-~

Title: Subsurface Control Drainage Structures

Biography: **Mark D. Seger**, P.E. works for ODNR's Division of Soil and Water Resources providing local Soil and Water Conservation Districts (SWCD) reviews of engineering plans and approval of conservation practices in 20 counties of northwest Ohio. He also provides training on the design and construction of conservation practices for technicians of the 88 SWCDs and staff of the Natural Resource Conservation Service (NRCS) in Ohio. Prior ODNR he worked for Sharp and Associates, INC investing, designing, and construction projects to mitigate contaminated sites.

Abstract: *As part of the Ohio Clean Lakes Initiative, The Ohio Department of Natural Resources, Division of Soil and Water Resources, has been working to install control drainage structures on systematic subsurface drainage systems in agricultural fields. The control drainage structures will be managed during the non-growing season to reduce the total volume of drainage water per year by 40 to 50 percent. The control structures are managed by raising the maximum water level in the field to 12 to 18 inches below the surface at the structure. The water level is lowered into a free drainage mode before spring planting and may be managed by the producer to conserve water during the growing season. To be eligible for the Ohio Clean Lakes Initiative, the structures need to be able to control a minimum of 15 acres within 2.5 feet of elevation change from the structures. The initial signup of 220 structures will allow for the control of approximately 6,300 acres. The second signup period has concluded and the Soil and Water Districts are in the process of preparing plans and overseeing the installation of approximately 210 additional structures.*

Wednesday Concurrent 1 - Waste Water
Capitol Room 3:00 pm - 4:30 pm

Title: From Private to Public – Dayton's Journey into the Biosolids Business

Biography: Jason Tincu is the Water Reclamation Division Manager for the City of Dayton and has extensive experience in municipal and environmental management including water and wastewater treatment, landfill post-closure care, organizational development, and comprehensive utility operations. The City of Dayton's Division of Water Reclamation prevents and controls sanitary water pollution to the Great Miami River, working around the clock, 24 hours a day, 365 days a year, year after year since 1929. The WWTP is located in the southwest corner of the City of Dayton at river mile 76.1 on the 170-mile long Great Miami River. Dayton's facility is designed for 72 MGD with a hydraulic capacity of 190 MGD. Jason holds a Bachelor's degree in Management and an Associate's degree in Environmental Management as well as Ohio EPA Class IV-Wastewater and Class II-Water certifications.

Abstract: *Attendees of this session will learn about the transition process related to the in-sourcing of biosolids processing from a previously contracted source to sources within the municipality. For almost 25 years, the City of Dayton relied on a private contractor to dewater, process, and land apply biosolids within the facility footprint. After serious financial evaluations and sparked with traditional Dayton initiative and entrepreneurial spirit, Dayton staff acquired the privately owned assets through contract provisions, performed a series of operational and system evaluations, properly trained staff, and carried the transition of these duties into 2013 and beyond.*

~-~

Title: Beneficial Use of Algae for Sustainable Wastewater Treatment

Biography: Matthew D. Gramza is a Professional Engineer (OH, KY, MN) and Certified Floodplain Manager. Matt has over 15 years of experience with a focus in Water Resources Engineering currently serving Civil & Environmental Consultants, Inc. as a Project Manager. Project experience includes floodplain management, flood mitigation planning, FEMA Map Revisions, hydrologic and hydraulic studies for a wide range of riverine systems, stream restoration analysis and design, dam safety and design engineering, dam breach analysis, steady and unsteady flow hydraulic modeling, sediment transport, bridge design, site development engineering, wastewater collection and treatment design, water storage and distribution systems design, stormwater management, complex drainage systems analysis and design, erosion and sediment control design and regulatory compliance and construction management. He earned his Bachelor of Science in Civil Engineering from the University of Cincinnati. Mr. Gramza is the Past President of the American Society of Civil Engineers – Cincinnati Section and an active member of the Water Management Association of Ohio.

Abstract: *The Ohio EPA was understandably skeptical and cautious when the Cincinnati Nature Center in Milford, Ohio, selected a low-energy, low maintenance, innovative system featuring newly-patented Algaewheel® technology for its onsite wastewater treatment. The Cincinnati Nature Center hosts more than 100,000 visitors a year. Their Rowe Woods site is located roughly 20 miles east of Cincinnati, and encompasses 1,025 acres (including 65 acres of old growth forest) with more than 16 miles of hiking trails. With no available connection to public sewers, the Center must perform wastewater treatment onsite. They had been exhausting valuable time and resources on the maintenance of two separate and failing 40-year-old subsurface wastewater treatment plants whose capacity had long-since been outgrown. Jason Brownknight, Director of Conservation and Stewardship, began a lengthy investigation before arriving at the new environmentally-sustainable solution that would be in line with one of their primary values: stewardship of the land. Conventional wastewater treatment plants typically involve environmentally unfriendly processes using huge amounts of energy and associated carbon emissions, producing large amounts of sludge and discharging relatively poor water quality as indicated by nutrient overloading in downstream waterways. Water scarcity and associated conservation efforts now require a new mindset and new technology to recover wastewater as well as the nutrients it contains, Algaewheel® is that technology. Algae requires less energy to treat wastewater, produces less sludge and can remove more contaminates from wastewater compared to bacteria based biological treatment. Civil & Environmental Consultants, Inc. worked with the engineers at Algaewheel to develop an onsite wastewater treatment system to treat sanitary waste for the Cincinnati Nature Center to final effluent water quality. Completed in 2011, it was the first onsite surface discharging wastewater treatment plant featuring Algaewheel® technology permitted and built in Ohio. The system has since been performing within full permit compliance.*

~-~

Title: Low-cost treatment of Food Processing Wastewater

Biography: Dr. Karen Mancl is a Professor of Food, Agricultural and Biological Engineering at The Ohio State University. Her specialty is rural and food processing wastewater treatment. She develops low-cost, low-maintenance wastewater treatment systems for Ohio's soils and climate and with an MA in East Asian Studies also works in Shandong Province on new wastewater treatment systems for rural China.

Abstract: *Over $10 million dollars has been saved by an Ohio meat processor by treating their wastewater in a new way. A sand bioreactor system was developed based on research conducted at The Ohio State University. This university/industry partnership has saved jobs, money and is protecting the environment with effluents exceeding the quality of conventional treatment systems. Quiet, clean and simple are the best words to describe the appearance of the new sand*

bioreactor system constructed at the meat processing facility. Some people might mistake the treatment system for a park. No odor is a feature neighbors most appreciate. The full-scale wastewater treatment plant began treating wastewater in August of 2012. Plant construction was completed in March of 2013. Start-up and operational data will be presented.

Wednesday Concurrent 2 - Nutrient Management 2
Worthington Room 3:00 pm - 4:30 pm

Title: Water Quality Credit Trading Program in the Great Miami River Watershed

Biography: Sarah Hippensteel Hall serves as the Manager of Watershed Partnerships for the Miami Conservancy District. She coordinates and interacts with community members, federal, state, and local agencies, businesses, and agricultural producers throughout the Great Miami River Watershed – a fifteen county region in Southwest Ohio. Sarah helped lead the creation of the internationally-recognized Great Miami River Watershed Water Quality Credit Trading Program. Sarah earned a Doctorate in Leadership and Change from Antioch University, a Master of Arts from Antioch University Seattle in Environment and Community, and a Bachelor of Science from The Ohio State University in Watershed Resource Policy and Planning. Prior to working for the Miami Conservancy District her experience includes government, private industry, and nonprofit organizations.

&

Renee Reber serves as the Administrator for the Great Miami River Watershed Joint Board of soil and water conservation district supervisors. Renee is working with the Miami Conservancy District to transfer the administration of the Great Miami River Watershed Water Quality Credit Trading Program to the Joint Board. Renee earned a B.S. in Environmental Geography and a M.S. in Environmental Studies at Ohio University. She also has experience working for community-based watershed organizations, the Ohio Environmental Protection Agency, and the Ohio Department of Natural Resources.

Abstract: *The Great Miami River Watershed, located in southwest Ohio, has experienced marked improvements in surface water quality over the last three decades. Despite these improvements, about 40 percent of the watershed's rivers and streams – primarily in the headwaters areas - still fail to meet water quality standards. The failure to fully attain water quality standards will trigger additional regulations focused on wastewater treatment plants (WWTPs). As an alternative to traditional regulatory strategies, the Water Conservation Subdistrict of The Miami Conservancy District, along with many partners, has created and implemented a water quality credit trading program. Water quality credit trading is an innovative, market-driven approach to improving water quality by investing dollars in voluntary agricultural practices that are more cost-effective and provide broader environmental benefits to*

the watershed than could be achieved by technology upgrades at WWTPs. As of March 2013, eleven rounds of project submittals resulted in funding for 397 agricultural projects generating more than 1.14 million credits over the life of the projects. More than 1.6 million dollars will be paid to agricultural producers for these credits. This translates to a 572 ton reduction in nutrient discharges to rivers and streams and other benefits including more sustainable farming operations and an array of ancillary environmental benefits. This session will summarize how the Trading Program works, its current status and its future

~-~

Title: Factors Influencing Planktothrix Bloom Formation in the Lake Erie Watershed

Biography: George Bullerjahn is currently Professor of Biological Sciences at Bowling Green State University. Following undergraduate studies at Dartmouth College, he earned a Ph.D. in Biology from the University of Virginia in 1984. He trained as an NRSA postdoctoral fellow at the University of Missouri, specializing in cyanobacterial photosynthesis and stress responses. Currently he studies dynamics of bloom-forming cyanobacterial communities, nutrient (N, P) stress responses in picocyanobacteria and nitrification in large lakes. His main research sites include Lakes Erie and Superior in North America, and Lake Onega in NW Russia.

Abstract: *Whereas Microcystis spp. are the major toxic cyanobacterial bloom-formers affecting the Lake Erie western basin, other cyanobacterial genera warrant our concern. In particular, Planktothrix spp. blooms are regular events in Sandusky Bay and Grand Lake St. Marys. Additionally, the Maumee River harbors a Planktothrix population of similar composition to that occurring in Sandusky Bay. Toxic Planktothrix produce microcystin (MCY), and blooms are a mixture of toxic and non-toxic genotypes. Our group is currently investigating the effects of nutrients (N and P alone) and the interaction between various species of N and P on toxin (mcy) gene expression and production of MCY by Planktothrix endemic to Sandusky Bay. Given that Microcystis mcy genes are under the control of the N-responsive transcriptional activator NtcA, we are examining whether such mechanisms occur in Planktothrix blooms. If so, current trends showing a decline in N:P stoichiometry may indicate that future Planktothrix blooms will be common and increasingly toxic.*

~-~

Title: Ohio Nutrient Strategy

Biography: Dan Dudley holds a BS in biology from Kent State University and a MS in Animal Ecology from Iowa State University. He was a research field biologist for the Black Creek Non-Point Source Demonstration Project in Allen County Indiana before joining the Ohio EPA in

1979. His job duties with Ohio EPA have covered numerous program areas including writing water quality and biological survey reports, development of water quality based limits for NPDES permits and water quality planning. He is currently the Manager of the Standards and Technical Support Section within the Division of Surface Water and oversees the State's Water Quality Standards program.

Abstract: *Not on file*

Thursday – Poster Session
Columbus Room 4:30 pm – 6:00 pm

Title: E. Coli Removal Efficiency in Cold and Wet Soil

Authors: Guannan Ding, The Ohio State University and Dr. Karen Mancl, The Ohio State University

Abstract: *In our research, we treat 12 acres grassland in the Deer Creek State park as our study site. The residential waste water in this park is delivered to a septic tank near the grassland to separate solid and liquid waste, and then the liquid waste is contained in two lagoons. Then, the waste water in the lagoon serves as the source of irrigation for the grassland. The beneficial side of this waste water is the existence of nitrogen and phosphors will provide the nutrient for the grassland, however, the pathogens within this waste water will be also transferred into soil profile. E.Coli is the mainly type of pathogens in the waste water, the amount of E.Coli colonies will undergo a huge amount of loss while delivering from the lagoon to the sprinklers. Meanwhile, the soil profile itself has the ability to kill the amount of E.Coli by limiting the soil temperature and moisture. The goal of our research is to investigate the influence of soil moisture and temperature in a defined soil depth on the removal efficiencies of pathogens from wastewater. By installing the soil sensors in the depth of 6, 12, 18 and 24 inches, we monitor the changes of soil moisture and temperature through the soil profile. By collecting water samples from groundwater monitoring wells, surface and subsurface run off, lagoon and sprinklers, we measure the changes of the amount of E.Coli colonies before and after irrigation. The meaning of our research is to provide a possibility of reclaimed waste water irrigation in winter and the accurate amount of waste water should be applied so that there will be no harmful and risk for winter irrigation.*

~~~
~~~

Title: **Specific Ion Effects on Adsorption of Microcystin at Clay Surface**

Authors: Yen-Ling Liu, The Ohio State University and Dr. John Lenhard, The Ohio State University

Abstract: *Algae bloom has been a water quality concern in Great Lakes due to the releasing of cyanobacterial toxins, and the concentration of microcystin, one common cyanobacterial toxin, is monitored to frequently exceed the drinking water recommended level from western Lake Erie by National Oceanic and Atmospheric Administration (NOAA). Sorption is found to play an important role on eliminating microcystin from aquatic environment, especially the portion of clay in sediment is capable of adsorbing microcystin in controlling the fate of this toxic. In addition, several major ions in Great Lakes fluctuate, which may result in the adsorption affinity and capacity of microcystin onto clay. Hence, the objective in this study is to evaluate how the specific cations, e.g. sodium and calcium, alter the adsorption of microcystin in fresh water system. The clay surface is saturated with sodium or calcium before batch adsorption experiment, and the adsorption of microcystin is compared between different ion-saturated clay as well as electrolyte concentration. In order to understand the adsorption mechanism, the results are fitted into adsorption isotherms, including Langmuir and Freundlich isotherms. From the isotherms, calcium saturated montmorillonite has higher adsorption capacity and affinity to microcystin than sodium saturated. The trend is attributable to the net negative charge in microcystin at the most pH range of natural water environment.*

~~~

Title: **Effects of Environmental Conditions on Urban Wetland's Methane Fluxes**

Author: Timothy Morin, The Ohio State University

Abstract:
Wetlands provide many important ecosystem services for riparian systems including nutrient removal and flood mitigation. As riverine nutrient loading from agriculture increases, the demand for constructed wetlands has also risen. The climate services associated with wetlands, though, are not well understood.

Wetlands are highly productive ecosystems with a large carbon sequestration potential. While wetlands uptake CO2 on average, they also release methane (CH4), a potent greenhouse gas. To effectively develop wetland management techniques, it is important to properly analyze the carbon budget of wetlands and to understand the driving factors associated with the carbon budget.

Continuous measurements of CO2 and CH4 fluxes were constructed in the Olentangy River Wetland Research Park (ORWRP) using the eddy-covariance technique with open-path infra-red gas analyzers. A footprint
analysis was used to filter data to those readings originating from the wetlands. These fluxes were compared to chamber measurements taken over different patch types in the park. The two
~~~

data sets agree with one another.

Continuous measurements of the meteorological and environmental conditions at the wetlands coinciding with the flux measurements allow the interactions between methane fluxes and the climate and ecological forcing to be studied. A strong correlation was found between methane a nd photosynthetic activity of plants. There is also a strong correlation with soil temperature. It is hypothesized that soil temperature controls the generation of methane while stomatal conductance contributes to the transport of methane through the vascular systems of plants. There is a strong correlation with soil respiration in the wetlands. This is likely reflecting the similar requirement that methanogenic archaea and other anaerobic reducing microbes have. The footprint analysis indicates that highly vegetated areas produce more methane than open water areas. This supports the hypothesis that wetland macrophytes are transporting methane and that this increased transport is critical to the overall methane flux.

~~~

Title: Winter Irrigation of Reclaimed Wastewater Onsite - Will Pollutants Runoff?

Authors: Joshua Griffin, The Ohio State University and Dr. Karen Mancl, The Ohio State University

Abstract: *A replicated, controlled field study was conducted beginning January 21 – May 1, 2013 to explore the use of surface irrigation to reclaim wastewater in cold temperatures. The objective of the experiment was to determine if the potential for pollutants to run off of a site was increased by the surface irrigation of treated wastewater in the winter. Two possible runoff mechanisms were considered. One mechanism considers frozen soil to be impervious, therefore any treated wastewater applied during the winter could runoff rather than infiltrate. The second mechanism considers lack of plant growth in the winter and limited ability to utilize the water, organic matter and plant nutrients in the treated wastewater. Therefore the water and pollutants can accumulate on the soil surface and runoff with precipitation events. Throughout the experiment these mechanisms were not observed. Instead water and treated wastewater did infiltrate the soil throughout the winter. If runoff occurred, pollutants were not at higher concentrations on a wastewater irrigated plot than a water irrigated plot.*

~~~

Title: Interrelationships Between Blended Phosphate Treatment and Scale Formation for a Utility with Lead Pipes

Authors: Stephanie Miller, University of Cincinnati; Lauren Wasserstrom, University of Cincinnati; Michael Schock, U.S. EPA

Abstract: *Lead (Pb) in tap water (released from Pb-based plumbing materials) poses a serious public health concern. Water utilities experiencing Pb problems often use orthophosphate treatment, with the theory of forming insoluble Pb(II)-orthophosphate compounds on the pipe wall to inhibit Pb release into the water. Characterization of corrosion scales on plumbing materials can show the relationship between scale formation and treatment history, and how this may influence Pb release over time. This study characterized the composition of scales formed on the surface of a Pb service line and a galvanized steel pipe in a distribution system that utilizes a chemical that is a blend of ortho- and polyphosphate as a corrosion control strategy. Scales were harvested by layers and analyzed using X-ray diffraction and X-ray fluorescence. Cross sectional areas of pipe samples were prepared for in-situ analysis using scanning electron microscopy and energy dispersive spectroscopy. Results were compared to the literature, and to theoretical predictions for a system treated with orthophosphate. Analysis of the Pb pipe corrosion scales revealed no crystalline Pb-phosphate solids. Instead, an amorphous layer rich in Al, Ca, P, and Pb was observed at the scale-water interface. Thus, the mechanism inhibiting Pb release into the water is not a passivating low-solubility Pb(II)-orthophosphate scale, but rather an amorphous diffusion barrier that was also porous and not well-adhered to the pipe wall. Therefore, scales could easily slough off with a small hydraulic disturbance, sporadically releasing particulate Pb and exposing underlying layers high in Pb. Galvanized pipe scales showed relatively well-crystallized Fe and Zn compounds, with additional surface deposition of Al, P, and Ca. Furthermore, corrosion scales showed accumulation of Pb (likely from the upstream Pb pipe), creating a latent source of particulate Pb release and a potential for long-term Pb exposure, even if the Pb pipe were to be removed.*

~~~

Title: UV-visible/Visible Light Activated Nano-TiO2 Photocatalysts for Water Treatment

Author: Changseok Han, University of Cincinnati

Abstract: *The development of UV-visible/visible light-active nanostructured titanium dioxide (TiO2) photocatalysts have gained much attention in the field of environmental protection such as air purification, soil remediation, and water treatment due to their unique reactivity for pollutant photodegradation and mineralization. However, despite the marked progress in the development of TiO2 photocatalytic materials, their practical application is challenged by their inherent limitation with respect to the range of light absorption. Only UV (4-5 % of solar light) can be used for photocatalytic water treatment using conventional TiO2 materials because of their large bandgap (3.2 eV for anatase and 3.0 for rutile). Much research effort has been made to extend the photoresponse of TiO2 in the visible light region, which covers 45 % of the solar light spectrum.*
~~~

In this study, UV-visible/visible light-activated TiO2 was synthesized by two different sol-gel methods, a self-assembly-based route and an ionic strength-assisted reaction to control the TiO2 nanostructure. This includes porosity, BET surface area, and size of primary particles and aggregates, which are crucial parameters for the efficiency of the photocatalytic process. Moreover, to synthesize UV-visible/visible light-active TiO2, anion doping and noble metal deposition were employed. The synthesized TiO2 was thoroughly analyzed using different characterization techniques such as scanning electron microscopy, transmission electron microscopy (TEM), high resolution TEM, UV-vis diffuse reflectance spectroscopy, X-ray diffraction, porosimetry analysis, micro-Raman and X-ray photoelectron spectroscopy. Their photocatalytic activity under both UV-visible light and visible light illumination was evaluated for the decomposition of contaminants of emerging concern (CEC), including cyanotoxins and pharmaceuticals in water. In this work, results on the characterization of the synthesized TiO2 photocatalysts and their photocatalytic activities for the removal of CEC under both UV-visible and visible light irradiation will be presented.

Thursday Concurrent 1 - Floodplain Management (OFMA)
Columbus Room 8:00 am – 9:30 am

Title: Biggert- Waters Act 2012- National Flood Insurance Reform

Biography: Alicia Silverio is a Senior Environmental Specialist with ODNR's Floodplain Management Program and 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 1999 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). She has been with ODNR's Floodplain Management Program since 1999.

Abstract: *Not on file*

~-~

Title: Risk MAP Non Regulatory Products

Biography: Louie Greenwell GISP, CFM, began his GIS career in 1992 and currently serves as a Client Services manager for T&M Associates. He has a diverse background in GIS implementation that has covered many levels of federal, state, and local government. He experience includes implementation planning, applications and database development, infrastructure and asset management, and floodplain management. He was active in the implementation of FEMA's Map Modernization Program and he continues to lead the Risk Mapping, Assessment, and Planning (Risk MAP) program. He has a BS in Geography from the University of Louisville and has been an active member of the Association of State Floodplain Managers (ASFPM) and the KY Chapter – KY Association of Mitigation Managers (KAMM) for many years.

Abstract: *Not on file*

~-~

Title: High Water Operation System modernizes Regional Flood Protection

Biography: Barry M. Puskas, PE, GISP, is the Manager of Technical Services for The Miami Conservancy District (MCD) in Dayton, Ohio. Mr. Puskas is a graduate of The Ohio State University, registered professional engineer (PE), and geographic information system (GIS) professional. He provides MCD with technical expertise in hydrologic and hydraulic modeling; geographic information systems; flood forecast modeling; flood protection system operations; and engineering design and analysis of dam safety and levee safety projects.

Abstract: *The Miami Conservancy District (MCD) owns and maintains five large earthen dry dams, 55 miles of levee, and 35 miles of improved channels in southwest Ohio. The integrated flood protection system was completed in 1922. This system includes multifaceted levels of operation and monitoring. Having good information is critical to proper operation of the system. In the past the system was monitored by manual readings made by MCD caretakers using staff boards or river level indicators to help make operational decisions. Today, the system has network of USGS gages transmitting river levels to satellites then to MCD processing system. In addition, the NWS Ohio River Forecast Center estimates river levels for future conditions. These data are gathered into MCD's High Water Operation System (HWOS) that displays current and future operation or monitoring needs as outlined by an Emergency Action Plan (EAP) for each of the dams and levee systems. River level data are used by MCD staff to operate up to nearly 200 floodgates on stormwater outlets to the river. The floodgates are used to prevent river water from backing up into the levee protected areas along the river corridor. Monitoring includes piezometer readings to understand groundwater levels in the aquifers or phreatic surface levels at the levees and dams. Additionally, MCD has developed a non-internet access system using call in automated text to voice message of gage level and a text message application to return data from the stream gages.*

Thursday Concurrent 2 - Energy Extraction
Capitol Room 8:00 am – 9:30 am

Title: Biodegradability of Hydraulic Fracturing Fluids under Natural Aquifer Conditions

Biography: **Paula Mouser** received her B.S. in Environmental Engineering from Utah State University and her M.S. and PhD in Civil & Environmental Engineering from University of Vermont. She completed a Post-Doctoral Assistantship in the Dept of Microbiology at UMass Amherst. Paula worked in industry and municipal services for 6 years, receiving her Professional Engineering license during this time. She is currently an Assistant Professor of Environmental Engineering at the Ohio State University.

Abstract: *Unconventional energy resources have stimulated rapid economic growth in the oil and gas sectors across the United States using horizontal drilling and hydraulic fracturing techniques. A critical link between fracturing fluid composition, water quality, environmental risk are studies addressing the potential biodegradability of hydraulic fracturing fluid constituents in the natural environment. We are investigating the degradability of these fluids by soil and groundwater microorganisms using a synthetic fracturing fluid containing 13 of the most commonly used additives disclosed by large oil and gas companies in Ohio and Pennsylvania. Laboratory experiments involving groundwater, sediments, and the synthetic fracture fluid at 0% 25%, 50%, and 100% vol/vol groundwater were used to assess biodegradation extent under aerobic and anaerobic conditions. Indigenous microorganisms were able to degrade 75% (+6%) of the added dissolved organic carbon (DOC) within 7 days under aerobic conditions, while less than 20% of the total DOC was mineralized during this same period under anaerobic conditions. The extent of DOC biodegradation was 80% (+7%) after 25 days under both anaerobic and aerobic conditions, suggesting significant mineralization of fracturing fluid constituents across a range of redox environments. DOC concentrations were 10-15% above background levels after more than five weeks incubation, and could consist of fracturing fluid components or other microbial metabolites. To learn more about the microorganisms involved in biodegradation, we tracked their dynamics using 454-pyrosequence analysis of the 16S rRNA gene. Microbial communities exposed to hydraulic fracturing fluids shifted toward those capable of complex carbon degradation (e.g. cellulosic, aromatic, and aliphatics), including the genera Actinetobacter, Flavobacterium, and Pseudomonas. These results provide evidence that the majority of hydraulic fracturing constituents may be readily degraded by in situ groundwater microorganisms, but a minor portion may persist in the environment. Further research is underway to identify these persistent constituents.*

~-~

Title: Technology Assessment Framework - Wastewater Treatment for Shale Gas Operations in Ohio

Biography: **Annie Lane** has 10 years of experience in chemical engineering process development and project management in technology services, manufacturing, and research and

development. Ms. Lane currently manages Battelle's Water Systems platform, encompassing both commercial and internally-funded projects for the development of water treatment technologies. In this role, she leads efforts to assess, design, and optimize water purification processes for various sources of environmental and industrial water and wastewater. Ms. Lane also provides strategic and technology development support tor Battelle's oil and gas business development team.

Abstract: *This presentation will review the development and application of an assessment framework to evaluate proposed wastewater treatment technologies for Ohio shale gas operations. It will focus on the selection of evaluation criteria by stakeholder engagement and the design and application of the assessment framework to evaluate emerging and established wastewater treatment technologies. Battelle developed this assessment framework to identify viable technologies for treating wastewater generated in shale gas drilling, completion and production operations. This work was completed under a contract with Ohio Environmental Protection Agency (OEPA) and Ohio Department of Natural Resources (ODNR) as called for in Ohio Senate Bill 315 – a bill that provides critical regulatory components for Ohio shale gas operations. State agencies can use this assessment framework to review proposed wastewater treatment technologies with the goal of reducing both the volume of fresh water taken from streams and rivers for hydraulic fracturing and the reliance on injection wells for disposal of wastewater fluids. Battelle worked with stakeholders to reach consensus on criteria to assess the wastewater treatment technologies. This included selection of evaluation categories, key technology attributes and performance metrics. Development of the assessment framework was completed based on selected criteria. Finally, the assessment framework was demonstrated for the stakeholders for two technology approaches.*

~-~

Title: The Need for Water in Ohio's Oil & Gas Boom - An MWCD Perspective

Biography: Boris Slogar was appointed chief engineer of the Muskingum Watershed Conservancy District in 2007. As chief engineer, Boris is responsible for all facilities and works of the 18 county conservancy district including its flood control subdistricts. A veteran of public service, Boris has served as executive director of the Ohio Partnership for Excellence, chief of staff and deputy director of operations for the Ohio Department of Taxation, and as a manager of dam safety and repair programs for the Ohio Department of Natural Resources. He has a Bachelor of Science degree in civil engineering from The Ohio State University, a Master of Project Management degree from Keller Graduate School of Management at DeVry University, and is a licensed professional engineer in the State of Ohio.

Abstract: *The Muskingum Watershed Conservancy District's reservoirs are in high demand as the oil and gas boom grows in eastern Ohio. Founded in flood control, recreation, and conservation, how does MWCD balance these three important mission-critical purposes in light of recent developments? We'll discuss the current state of the oil and gas boom in our part of the state and the need for water that goes with it. You'll learn how much water it takes to frac a well*

and where the oil & gas industry is turning to for water supply. We'll also explain the steps MWCD is taking to protect the Muskingum River Watershed and its reservoirs through programs and partnerships with state and federal agencies

Thursday Concurrent 3 - Lake Management (OLMS) Assessment
Worthington Room 8:00 am – 9:30 am

Title: The Importance of Long-term Lake Data

Biography: **Doug Kane** is an Associate Professor of Biology in the Division of Natural and Applied Sciences and Mathematics at Defiance College. His research interests lie in plankton and benthic invertebrate ecology, as well as effects of invasive species on communities and ecosystems, causes and consequences of cultural eutrophication, and ecosystem integrity of Lake Erie. Doug's recent research has focused on effects of the Maumee and Sandusky River systems on the recent re-eutrophication of Lake Erie and the potential effect of Emerald Ash Borer on Lake Erie island forest tree communities. Doug has also lead service learning initiatives related to water quality monitoring in the Maumee River and Lake Pontchartrain.

Abstract: *Long-term monitoring programs are difficult to sustain but are of great importance in determining water quality trends in lake ecosystems. Herein we describe two long-term (>15 years) datasets related to Lake Erie. The first dataset (Lake Erie Plankton Abundance Study (LEPAS)) consists of zooplankton and phytoplankton data from the mid-1990's to the present. The second dataset (Heidelberg Tributary Loading Program (HTLP)) consists of water quality data from major Lake Erie tributaries from the mid-1970's to the present. As Lake Erie has returned to a more eutrophic state over the last two decades, both of these datasets have been used in documenting this change and in investigating the causes behind this re-eutrophication. Finally, using the above two datasets we demonstrate that increased Soluble Reactive Phosphorus (SRP aka DRP (Dissolved Reactive Phosphorus)) is highly correlated with increased phytoplankton biomass (especially cyanobacterial biomass) in Lake Erie and that all three of these parameters have continued to increase over time. We make the case that although the funding, data management, and personnel challenges are great with long-term monitoring programs, they are essential in determining both the trends and drivers behind trends in lake ecosystems.*

~-~

Title: Water Quality Sensor Technology

Biography: **Paul Nieberding** is the General Manager of Fondriest Environmental with nearly 10 years of experience in the environmental measurement industry. He received his Master's in

Business Administration from Wright State University and has been working for Fondriest Environmental since 2005. Within the company, Paul plays an active role in environmental system design, proposal creation, and customer support.

Abstract: *The oral presentation will introduce and examine some of the more common water quality parameters for which in-situ sensors exist including, but not limited to, temperature, conductivity, salinity, pH, turbidity, dissolved oxygen, and chlorophyll. For each parameter, there will be a discussion on why the parameter is important, how it is reported, how it is measured, typical levels in various environments, and factors influencing the parameter.*

~-~

Title: The Million Sonde March and Other Stories of Sensor Network Science

Biography: Dr. Darren Bade is an assistant professor in the Department of Biological Sciences at Kent State University. Dr. Bade's research has two primary foci: 1) dynamics of major macronutrients in lakes and 2) their relationship to lake ecosystem metabolism. Lake Erie has been the study site for nutrient dynamics and small lakes of Ohio and Wisconsin have been the site for metabolism studies. In Lake Erie, he has been investigating the role the nitrogen cycle plays in major water quality issues in the lake, including the dead zone and re-eutrophication. To study the productivity and respiration (metabolism) of whole-lake ecosystems he employs autonomous sensors and sensor platforms to collect high frequency water quality information.

Abstract: *Automated sensors and their networks have opened new scales of ecological observations and questions. Two examples of large scale, high resolution studies will be presented. The first, coined "The Million Sonde March" placed 35 multiparameter sondes in Sparkling Lake (64 ha) and 27 sondes in Peter Lake (2.4 ha) for a period of 10 days. The aim was to understand the spatial heterogeneity of gross primary productivity (GPP) and respiration (R) within lakes, especially considering difference in littoral or pelagic regions. On a volumetric basis, metabolism was higher in the littoral region of Sparkling Lake but not Peter Lake. On an aerial basis, metabolism was higher in the pelagic region of both lakes. A large amount of the explained variation in estimates of GPP and R was due to location rather than day of deployment, whereas larger proportion of explainable variation in net ecosystem productivity (NEP=GPP-R) was attributed to day rather than location. The second study, conducted through collaborations within the Global Lakes Ecological Observatory Network (GLEON), examined high frequency physical measurements for 40 temperate lakes. The aim of this study was to determine the relative contributions of wind and convection to turbulence in the surface of lakes of varying size. Wind and convection had different seasonal patterns, and convection was an important source of turbulence, especially in small lakes (< 11 ha). Finally, aspects of training students in the use of automated sensor technology will be highlighted.*

~-~

Thursday Concurrent 1 – Watershed Management (OWPA)
Columbus Room 10:00 am – 11:30 am

Title: Making Sense Out Of Soil $saving$- Moving Away from Traditional Incentives

Biography: Cindy Brookes is the Sandusky River Watershed Coalition's Watershed Specialist. She holds a Bachelor of Science degree in Agriculture Education and Agronomy/Soil Science from The Ohio State University. Following graduation she worked as an Extension educator for the Indian Lake Watershed project. She later worked for the family businesses of Construction and Asbestos Abatement before returning to watershed work in the Sandusky River Watershed in 2006.

Abstract: *With increased pressures on the Western Lake Erie Basin to encourage implementation that makes a change, the Sandusky River Watershed Coalition has moved to an innovative approach of incentivizing farmers and landowners to implement soil saving practices which help reduce both soil erosion and nutrient losses. This new approach helps everyone in and out of the watershed to look at incentives as a positive approach rather than just another welfare program. The Great Lakes Basin Soil Erosion and Sediment Control Grant called "Making Sense Out of Soil $having$" ties economics to environmental improves as a fresh new way to both provide incentives and educate the public on the benefits. This grant program has helped people look at the environmental costs that continue to build against the benefits of what an implementation project provides. All that learn will see the benefits to not only the farmer or landowner participating but to themselves as a taxpayer.*

~-~

Title: Technology's Role in Non-Profit Watershed Planning

Biography: Jesse Daubert grew up in the headwaters of the Muskingum River along the Mohican River in Loudonville, Ohio. In the summer of 2009 he served as an AmeriCorps VISTA Summer Associate (internship) for the Friends of Lower Muskingum River (FLMR). In December of 2009 Mr. Daubert received a B.S. in Environmental Science from Marietta College. He then served half of a yearlong term as an Office of Surface Mining (OSM)/AmeriCorps VISTA until 2010 when he took over as Watershed Coordinator (current position) for FLMR through a Watershed Planning grant from ODNR Division of Soil and Water Resources.

Abstract: *For the non-profit watershed organization, Friends of Lower Muskingum River (FLMR), technology has become the foundation of their data collection and watershed planning efforts . Watershed Coordinator, Jesse Daubert would like to present on the role technology has played in his efforts with FLMR during the 42nd Annual WMAO meeting.*

Throughout his presentation Mr. Daubert will discuss how FLMR has obtained some of their monitoring equipment and how they have utilized funding from the Norcross Wildlife Foundation to purchase both hand held multi-parameter meters and the ESRI ArcGIS software at a drastically discounted rate. He will talk about how FLMR integrates mapping softwares such as Arc Map, Google Earth and the Earth Resources Information Network (ERIN) into both his watershed planning efforts and FLMR's "Stream Team" volunteer monitoring program.

Mr. Daubert's presentation will also cover some non-profit options he has found for data management software. In specific, he will discuss the "Stream Team" software application that was created specifically for FLMR's volunteer monitoring efforts by a group of Senior Capstone students in the Computing and Information Systems department at Marietta College. This software application allows volunteers to remotely input data they have collected into a database that can be managed and manipulated by FLMR administrators.

~-~

Title: Watershed report cards to motivate stewardship

Biography: Breann Hohman is the Firelands Coastal Tributaries Watershed Coordinator for the Erie Soil and Water Conservation District. She has a Master's of Science in Biological Science from Wright State University and has been working with the District for 7 years. She Currently manages the implementation of the Old Woman Creek Watershed Action Plan, including stream improvement projects, stewardship motivation, grant writing and non-point source reduction education. She currently serves on the Sandusky River Watershed Coalition and is a Project Team member of the Old Woman Creek NERR Science Collaborative grant project: Ohio Stormwater Solutions – improving science for evaluating low impact development BMPs in partnership with ODNR Division of Surface Water and the Chagrin River Watershed Partners. Bre's focus of science based management decisions has lead the FCT to combine a locally driven volunteer stream monitoring program and social marketing approach that enhances her watershed program.

Abstract: *The Firelands Coastal Tributaries Partners, with the help of the University Of Maryland's Integrated Application Network (IAN), have completed the framework for the first watershed report card of this type in the Great Lakes system. The report card integrates water quality data collected by trained volunteer stream monitors, researchers from the Old Woman Creek National Estuarine Research Reserve, and the Erie County Health Department to inform local residents and public officials of the health and safety of our streams. Environmental report cards help to develop an understanding of watershed conditions because they relay a great deal of scientific information in an easy format that can be used at the local level. The IAN has completed report cards for the Chesapeake Bay area, The Great Barrier Reef, and others which have helped to simplify water quality assessments to a wide audience. Although our watersheds have been studied and monitored by universities, government agencies, and our local volunteer stream monitors, the same question remains: "So what does all this mean; is it good or bad?" The development of these report cards will help to interpret that data into a score that will rate the overall health of the stream. This process utilizes a scientific approach to identifying key*

water quality indicators, setting thresholds, and developing the scoring system. Thresholds are set levels in water quality parameters (i.e.. phosphorus or bacteria) that if exceeded creates an unacceptable condition for aquatic life or human safety. These report cards will use water quality data collected both at the stream and at the Lake's shoreline to tell a story of health about our local tributaries.

Thursday Concurrent 2 - Stormwater (OSWA)
Capitol Room 10:00 am – 11:30 am

Title: Green Infrastructure

Biography: **Kari Mackenbach** is the National Green Infrastructure Practice Leader for URS. Ms. Mackenbach coordinates efforts of the Practice across the US. She is responsible for the overall quality of the practice related to work performed by the Green Infrastructure Group. Ms. Mackenbach and her team work with communities and individual clients on incorporating sustainable practices to their existing decision making matrices. Ms. Mackenbach's background as a Certified Floodplain Manager (CFM) and as an American Rainwater Catchment Systems Association (ARCSA) accredited professional provides her with unique capabilities to work with communities and other professionals on multiple levels as it relates to sustainability and more specifically green infrastructures initiatives. Since 1993, Ms. Mackenbach has evolved by incorporating sustainable criteria into most of her work efforts. Some of the most recent project include the development of green infrastructure programs that help communities quantify and implement green initiatives for long term benefits, development of defensible benefit/cost analyzes for the use of green infrastructure, Stormwater and floodplain program development, sustainable site development criteria, watershed planning and implementation.

Abstract: *Green Infrastructure (GI) is being utilized across the Nation for addressing flooding and stormwater concerns. Properly sited and selected types of Green Infrastructure can have a significant effect on limiting or reducing the damage on our natural infrastructure. (Rivers and streams) Many metropolitan areas within the U.S. are facing costs of millions dollars to address MS4 stormwater and flooding issues. Consequently, there is growing interest in assessing the extent to which green infrastructure can be used to help reduce the amount of run-off generated by urban and suburban landscapes, and whether it can provide a cost effective means to reduce the magnitude of the investments needed for conventional means to address flooding and stormwater issues.*

~-~

Title: Phase II Stormwater IDDE Program - Where Do We Go From Here?

Biography: **Ms. Laura Travers, R.S**., is the Program Manager for Cuyahoga County Board of Health'sStormwater Program in the Environmental Public Health Service Area. She received her B.S. in Geography from the University of Kentucky. Laura has been working as a Registered Sanitarian with the Board of Health since 2005 and is intricately involved with the Stormwater Program. In addition, Ms.

Travers acts as the liaison between the CCBH Stormwater Program and the communities in which the program serves. She is also heavily involved with several local watershed organizations and serves on the Advisory Committee for the Northeast Ohio Stormwater Training Council and the Friends of Big Creek.

Abstract: *According to the U.S. EPA, the top causes of impairment to our water bodies include siltation, nutrients, debris, bacteria, metals, and oxygen-depleting substances. A significant portion of these dry weather flows are from illicit discharges from sanitary sewers, which can result in bacteria entering into the MS4 system. Stormwater runoff transports these and other harmful pollutants through the storm sewer system and discharges them, untreated, into waterways. Discharges from MS4s often include waste and wastewater from non-stormwater sources. These discharges can enter an MS4 system through various means; the result is untreated discharges that contribute to high levels of pollutants, such as bacteria, oil and grease, heavy metals, solvents, nutrients, and viruses. Pollutants from these discharges degrade water quality and threaten aquatic ecosystems and human health. The objective of the IDDE Program is to allow regulators, operators, and citizens to gain awareness of the types of discharges entering into their water bodies. Phase II regulations are intended to reduce adverse impacts to water quality and aquatic habitat by utilizing control methods on unregulated sources of stormwater discharges. These unregulated discharges have the greatest chance of causing continued environmental depletion. When left unmonitored, these discharges could possibly result in fish kills, loss of wildlife habitats and aesthetic value, contamination of drinking water supplies and recreational waterways, thus threatening public health. In Cuyahoga County, all major watersheds and tributaries empty into Lake Erie, where numerous recreational bathing beaches are located. As communities in Cuyahoga County continue to develop and redevelop creating additional impervious surfaces, increased volumes of stormwater and non-point source pollution contribute to reduced water quality throughout the watersheds and Lake Erie. What does the future hold for the Phase II Stormwater Program for regulated communities to be able to reduce the impacts of these illicit discharges on water bodies?*

~-~

Title: Stormwater Mapping on the Cheap: There's an App for That

Biography: **Bill Mellman** has a background in IT and GIS. For the last five years he has worked for the Clermont County Storm Water department fulfilling the mapping requirement of the county's NPDES permit. He works both in the field with a GPS and in the office with GIS. Bill's interests are in Geography, Technology, and Environmentalism

Abstract: *An alternative to the high cost of a high-end, high-precision GPS was sought for mapping storm water structures to fulfill the mapping component of the NPDES permit. An Android based, GPS equipped, mobile smartphone was employed. An app allowing data table and form creation as well as export to an Access based database was purchased and used to develop a mobile data entry form for use in the field. The resultant Access based databases are readily incorporated in Esri's Arc Map. This alternative represented a nearly ten-fold cost reduction while still producing a reasonably accurate map.*

Thursday Concurrent 3 – Lake Management (OLMS) Restoration
Worthington Room 10:00 am -11:30 am

Title: Technology Assessment Framework - Remediation of Hypereutrophic Lakes including Grand Lake St Marys

Biography: **Dr. Harry Stone** is educated as a watershed ecologist with thirty years' experience in water quality issues. Dr. Stone's multidisciplinary expertise contributed ecological and technical insights in the evaluation of approaches for addressing harmful algal blooms in Grand Lake St. Marys. He identified lake-specific concerns that might impact effectiveness of technologies or result in unintended consequences. His recent work involved market opportunity analysis of a range of water-related technologies developed by the EPA.

Abstract: *This presentation will review the development and application of an assessment framework to evaluate proposed treatment technologies to remediate hypereutrophic lakes. It will focus on the selection of evaluation criteria by stakeholder engagement and design and application of the assessment framework to evaluate emerging and establish remediation technologies. Battelle developed this assessment framework to identify promising technologies to remediate Grand Lake St Marys (GLSM), a recreational lake located in northwest Ohio, under a contract with Ohio Department of Natural Resources (ODNR) and the Western Ohio Educational Foundation. Over the past few years, GLSM has experienced severe environmental degradation causing the Ohio Environmental Protection Agency (OEPA) to post warnings and close the lake to all activities because of high levels of microcystin and other toxins. Pollution entering GLSM comes from industrial, municipal, agricultural and residential sources. Studies have shown that excess phosphorus loading of the lake has been the primary reason for toxic algae blooms. Battelle worked with stakeholders to reach consensus on criteria to assess available remediation technologies. This included selection of the assessment criteria and scoring thresholds. Development of the assessment framework was completed based on the selected criteria. Over fifty existing and emerging technologies were evaluated using the assessment framework including chemical, biological and mechanical approaches. This provided an objective and consistent method to identify remediation technologies that met stakeholder criteria and that were ready for immediate deployment or required additional demonstration activities.*

~-~

Title: Assessment of Buckeye Lake Condition Using the Trophic State Index

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: *Ohio EPA recently completed a proactive two year study to fully assess the condition of Buckeye Lake, a hypereutrophic canal reservoir in Central Ohio. The Study was funded by the CWA Section 319 Nonpoint Source Program. The objective of the study is to fully characterize Buckeye Lake, determine if the L-1 sampling location is reflective of conditions in the shallow remainder of the lake, and characterize nutrient processing in the lake. Samples were collected bi-weekly at 3 sites during 2011 and 2012, and a continuous monitoring station was deployed in 2012 to assess potential diurnal impacts on water quality. The Trophic State Index, or TSI, (Carlson, 1977) is used to interpret the data from the assessment, as well as to provide insight to nutrient limiting conditions in the lake. TSI data from other Central Ohio Lakes sampled during the same time period, as part of Ohio EPA's Inland Lakes Program, are used to draw inferences regarding limiting conditions in Buckeye Lake, yet questions remain regarding in-lake nutrient dynamics. Once the quantity and fate of nutrients in the watershed are fully understood, a reasonable management plan can be considered for implementation.*

~-~

Title: **Lake restoration using aeration and alum: A Florida case study**

Biography: **Josette La Hee** is the head of limnological research at Vertex Water Features Inc. in Pompano Beach, Florida and she currently works out of Detroit, Michigan. She conducts research projects that investigate urban aquatic ecology, with a focus on the use of sustainable management techniques as tools for restoring impaired lakes and ponds. Prior to joining Vertex, Josette was a research scientist at Florida International University, where she studied algal ecology in wetland systems in Florida, Mexico, Belize and Jamaica. She has also worked extensively in river, lake and marine habitats, and enjoys teaching biology, botany and ecology.

Abstract: *Bahia del Mar is a 14 acre, 50 foot deep, man-made community lake located in St. Petersburg, Florida. The lake has a history of nutrient and organic matter loading that has resulted in an extreme case of hyper-eutrophication, the symptoms of which included algal blooms, extensive fish kills and persistent pungent odors. In January, 2012 a management strategy was devised to restore the lake to a healthy and stable state. The strategy incorporated the use of aeration for an extended period to improve lake water quality, followed by two alum treatments to reduce the extremely high levels of nutrients in the water column and increase the phosphorus binding capacity of the sediment. One day after aeration installation, stratification in the deepest part of the lake was completely eliminated. Over the next several weeks, oxygen levels increased while turbidity, BOD and nutrient levels decreased markedly. Once conditions in the lake stabilized, two alum treatments were applied, resulting in further drastic reductions in phosphorus levels and increases in water clarity. The results of this study will be presented along with a discussion of the importance of considering multifaceted treatment options for lake restoration and management.*

Thursday Concurrent 1 – Ground Water
Columbus Room 1:00 pm – 2:30 pm

Title: Arsenic Release Mechanisms from Ohio Ground Water Aquifers Under Methanogenic Conditions

Biography: Mengling Stuckman, PhD candidate, in Environmental Science Graduate Program at the Ohio State University. I will have my oral defense on the same day as my presentation day, so I could be called a "doctor" by then.^_^ I have dual master degrees in Environmental Science and Civil Engineering at Ohio State University and B.S. in Environmental Science at Wuhan University, China. My research interest is investigating fate and transport of heavy metals in highly variable geological systems, such as groundwater and landfills. After graduation, I'll start working at National Energy Technology Lab at Pittsburgh, doing research related to environmental impact of hydraulic fracking next January.

Abstract: *Arsenic concentrations in Ohio's drinking water aquifers under methanogenic conditions exceed the regulatory threshold of 10 ppb nearly 50% of the time. To investigate possible release mechanisms, ground water and sediments collected from specific iron-reducing, sulfate-reducing and methanogenic horizons were analyzed for geochemical and microbial community composition and then anaerobically incubated for several weeks. For the deep, methanogenic aquifer solids, As released was 7 times greater than the current drinking water standard. This likely reflects the presence of unstable and amorphous iron-rich ferrous sulfide (FeS) formation. In the shallow, 、 sulfate-reducing aquifer solids, As was sequestered in conjunction with crystalline pyrite (FeS2) formation. 16S rRNA sequencing results from the groundwater aquifers detected coexisting iron reducing and methanogenic microbial communities under conditions fostering As release. No detectable iron reducing organisms were measured under conditions where As sequestration was observed. These findings suggest iron-rich ferrous sulfides may be one potential As release source in methanogenic glacial till aquifers. Additional incubations used dissolved organic matter (DOM) isolated from each aquifer layer to supplement the native DOM conditions. The addition of DOM changed the microbial community composition, with iron-reducing and sulfate-reducing microorganisms being particularly abundant. Thus, DOM availability drives As biogeochemical cycling by stimulating iron and sulfur microbial reduction in highly reduced ground waters. Overall, this study demonstrated that arsenic release from Ohio's methanogenic aquifers was due to microbe-mineral interactions between iron-rich ferrous sulfide minerals and the iron-/sulfate- reducing bacteria stimulated by introduction of DOM to the aquifers.*

~-~

Title: **Are Water Supplies at Risk From Denatonium Contamination: Clay Mineral Sorption of Denatonium Benzoate**

Biography: **Dr. Crosson** earned his PhD in Chemistry from Penn State University in 2005 and is currently an assistant professor of physical chemistry at the University of Dayton in Dayton, OH where he teaches general chemistry and physical chemistry. Prior to coming to Ohio, Dr. Crosson completed a post-doctoral appointment in New York at Brookhaven National Laboratory in the Environmental Sciences Division. At the University of Dayton, the research interests of Dr. Crosson include solid-state nuclear magnetic resonance studies of environmental solids along with fate and transport studies of emerging contaminants in the soil solution.

Abstract: *The sorption of denatonium benzoate to kaolinite and montmorillonite clay minerals is investigated. Denatonium benzoate is a bittering compound added to consumer products to prevent ingestion of poisonous substances such as rubbing alcohol. Recently, anti-freeze producers agreed to voluntarily add the compound to their products. However, questions about potential environmental implications exist. Accordingly, this study represents an attempt at studying the environmental fate of denatonium benzoate in regards to soil components. In batch sorption studies to kaolinite and smectite minerals, the impact of electrolyte ionic strength, pH, initial denatonium concentration, temperature, cation identity and contact time are evaluated. Generally, the results show that clay minerals retard the motion of aqueous denatonium through sorptive interactions. The results also suggest that denatonium sorbs via an ion-exchange process to the interlayer surfaces of permanently charged minerals such as montmorillonite and to external surfaces of variably charged clays such as kaolinite. Evidence for an ion-exchange process is provided by sorption studies as a function of electrolyte ionic strength. Kinetic studies also reveal that sorption equilibrium is rapidly reached in less than 2 minutes for smectite minerals while at least an hour is needed for equilibrium sorption to occur for kaolinite sorbents. An interesting and unexpected observation of increased sorption capacity (estimated using the D-R model) with decreasing pH was observed in 10 mM calcium chloride in contrast to an increase in denatonium sorption to kaolinite in10 mM sodium chloride or 10 mM potassium chloride. The mean free sorption energy for denatonium sorbing to kaolinite was estimated to be 3.665 kJ/mol in from pH 4 to 10 in 10 mM calcium chloride suggesting that sorption may not exclusively occur via cation-exchange. The implications of denatonium sorption to clay minerals is discussed in the context of potential contamination of water supplies.*

~-~

Title: **Development of a Private Well Test Interpretation Tool for Ohioans**

Biography: **Joe Bonnell** is Program Director for Watershed Management and Adjunct Assistant Professor in the School of Environment and Natural Resources at The Ohio State University. He has been conducting water resources education programs at OSU since 1996. Current projects include monitoring farmer attitudes and practices related to nonpoint pollution and developing educational programs on the environmental impacts of oil and gas drilling in the Marcellus and Utica shale formations.
&

Rebecca Fugitt, RS, has B.S. and M.S. degrees in Geological Sciences from Ohio University with specialization in hydrogeology, and is a Registered Sanitarian in the state of Ohio. Rebecca is currently Program Manager of the Residential Water and Sewage Program at the Ohio Department of Health which regulates private water systems and sewage treatment systems. For the last 15 years, Rebecca has been working at ODH on program improvements and implementation including legislation and rule revisions, enforcement and training. Prior to her employment with ODH, she was Administrator of the Water Resources Section, Division of Water, ODNR for 11 years, and spent 3 years at the National Ground Water Association as a Research Hydrogeologist.

Abstract: *OSU received a grant from the Ohio Water Development Authority to develop an online tool for private well owners to enter their well water lab test results and interpret those results. We are working with the Ohio Department of Health and Ohio EPA to develop the tool. We anticipate many private well owners in the Marcellus and Utica shale formation regions will utilize this tool. We will demonstrate the tool and discuss how the tool will aid private well owners to identify and address drinking water quality concerns.*

Thursday Concurrent 2 – Stream Restoration
Capitol Room 1:00 pm – 2:30 pm

Title: Challenges in a Multi-Goal Urban Stream Restoration Projects

Biography: **Mr. J. Meiring Borcherds** is a watershed coordinator and land use professional with 15 years of experience in land and water conservation and preservation programs on three different continents. He has worked on a number of stormwater, stream restoration projects, and educational programs over the years with government and non-government agencies alike. He has co-authored a number of articles and websites with a focus on land use planning for protecting surface water and public health. Recently he has turned his focus to the Cuyahoga River Areas of Concern focusing on the complex issues surrounding this watershed and its land uses. Please feel free to contact him at mborchereds@ccbh.net for any additional information or a networking opportunity.

Abstract: *The Hudson High School Tributary's watershed has experienced significant land use changes in recent history, which has resulted in an altered hydrology. This altered hydrology, along with straightening the stream, has caused changes in the stream's planform geometry and cross sectional shape. The unbalancing of the system has contributed a significant sediment load into Tinkers Creek, increased the risk of down stream flooding and reduced stream habitat. An urban stream restoration project was undertaken by a collaboration of public entities to improve the Hudson High School Tributary and its surrounding environment. This design/build project is unique in that it has a wide range of goals, including: 1) enhance the existing 6 acre high school Land Lab, 2) meet the city's stormwater requirements for the site thus storing 2,000,000 gallons during 25 year rain event, 3) reconnect the stream with it surrounding floodplain, 4) improve water quality, 5) improve habitat, and 6) create an educational component linking the*

restoration to High School curricula. Biohabitats, Inc. was awarded the contract for the design/build project. Working with the high school students, the contractor, and the City Engineer , a design was developed that includes restoration of 2,000 linear feet of stream and reconnecting the stream to a new and historical floodplains through the use of cobble weirs within a riparian area consisting of wet meadow, scrub/shrub wetlands, forested wetlands, riparian forest and emergent wetland habitat. The site also meets the city's stormwater goals of reducing the 25 year flow to the 2 year flow and ultimately providing 6.35 acre feet of additional storage.

~-~

Title: **Short Term Effects of Low Head Dam Removal on River Water Quality**

Biography: **Dr. Zuzana Bohrerova** received a PhD in Soil science and Microbiology from Mendel University in the Czech Republic and Master of Public Health from OSU. She works as an Associate Director of the Ohio Water Resources Center and Research specialist at OSU. She coordinates network of collaborators at OSU that are interested in research on technology development to reduce environmental impacts of shale gas. Her research interests are in the area of microbial regrowth and repair and disinfection.

Abstract: *There are over 76,000 dams above 5 feet high in the United States, many of them aged and not utilized for their original purpose. Therefore dam removal is increasingly used in the US as a potential river restoration tool. While dam removal will likely benefit many components of local ecosystem, limited amount of studies investigating ecological impact of low head dam removal on river was conducted, primary dealing with changes in flow regime, sediment transport, nutrients and macroinvertebrates and fish. The goal of our study was to assess the effects of low head dam removal on fecal contamination indicators immediately post removal. We collected water samples two times before and after the low-head dam removal each along the river from four locations (Olentangy River, Ohio) and analyzed water quality parameters, including fecal bacterial indicator, E. coli, and human-specific genetic marker, HF183. We observed a significant increase in turbidity, E. coli and nitrate levels in the water samples from the river and a significant decrease in phosphates one month after the dam removal. In addition, the human-specific genetic marker indicated that the river is contaminated with human-originated fecal sources during dry weather conditions, probably due to illicit discharges in the vicinity of the sampling locations. The nitrate increase together with warm weather can cause significant deterioration of water quality downstream, since when nitrogen is not removed from the area via de-nitrification it can cause excess algae and biomass growth and oxygen depletion. The increase in E. coli levels after the dam removal should be taken into consideration if water-related recreational locations exist downstream from the low-head dam. From the engineering perspective, low-head dam removal should be planned to occur in late fall or winter, and during a period of dry weather, to better protect water quality and public health.*

~-~

Title: **Stream Restoration by Fluvial Biogeomorphic Succession: applications of a self-forming stream design concept in Ohio**

Biography: **Jon Witter** is an Assistant Research Professor in the Department of Food, Agricultural and Biological Engineering at The Ohio State University. His primary research focus is on novel approaches to channel design and quantifying the benefits, impacts, and costs of implementing various management approaches. He also likes to develop tools and outreach materials that conservation professionals can use to learn about and implement innovative channel designs.
&

Mike Brooker is a doctoral student in the Environmental Science Graduate Program at The Ohio State University. He is an environmental microbiologist that utilizes numerous analytical techniques to explore microbial diversity and functionality in natural systems. Mike's previous work includes a study of factors that influence microbial gas production in constructed wetlands.

Abstract: *A succession-based restoration approach was evaluated on nine reaches in Ohio. The aim of the designs was to construct a channel form that is consistent with an intermediate stage of channel evolution models with the expectation that subsequent successional stages and beneficial processes will follow, and conclude with a stream that is hydrogeomorphically fit to its catchment. This essentially entailed the construction of a roughly planar surface with a stable longitudinal slope and sufficient width to allow a depositional response. Repeated geomorphological surveys were conducted to track change through time.*

Thursday Concurrent 3 - Lake Management (OLMS) Innovations
Worthington Room 1:00 pm – 2:30 pm

Title: **Water Quality and Dams in the Ohio Lake Erie Watershed**

Biography: **John Watkins** is a registered Professional Engineer in the State of Ohio and a Certified Floodplain Manager. He has worked previously with the Ohio Environmental Protection Agency and the Medina County Soil and Water Conservation District. John has worked at the Ohio Department of Natural Resources (Ohio DNR) since 1998 and is currently working for the Ohio DNR Division of Soil and Water Resources in the Dam Safety Program. His position within the Division of Soil and Water Resources focuses on the use of Best Management Practices to address water quality and habitat issues at dams in the Lake Erie Watershed. John resides with his family in Medina, Ohio.

Abstract: *The presentation will discuss the efforts of the Ohio Department of Natural Resources Non-Point Pollution Program to identify Best Management Practices that could be implemented*

to enhance water quality or habitat at certain dams in the Lake Erie watershed. The presentation will discuss the overall Program, describe various types of dams and water quality/habitat issues associated with the dams, provide an overview of Best Management Practices associated with dams, and highlight successful habitat restoration efforts at several dam removal projects in Ohio

~-~

Title: Pond Scum to Products: An Example of Public/Private Collaboration in Response to Harmful Algal Blooms

Biography: Dr. Stephanie A. Smith has over 15 years of hands-on experience in microbiology, biochemistry, and bioprocessing which she applies in her role as the Chief Operating/Science Officer for the company she co-founded, Beagle Bioproducts, Inc. As a scientist-turned-entrepreneur, Dr. Smith is leading the development of a "HAB marketplace," offering products and services that are used by people that detect and monitor harmful algal blooms (HABs). HABs in fact are viewed as a natural resource at Beagle, where Dr. Smith's team has developed technical operations for collection of HAB biomass and its conversion into high-value products.

Abstract: *Through mechanisms such as the Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA), federal funds have been dedicated to the study of HABs and the development of technologies for the monitoring of HABs, such as satellite technologies that detect the pigments made by blue-green algae. The importance of such investments is inarguable, but they do little to help a community cope with a HAB, especially when a bloom reaches the point that businesses and residents are severely negatively impacted. Further, federal funds have largely been devoted to marine and Great Lake regions, while freshwater blooms at inland lakes steadily increase in both frequency and intensity. Presently, responses to freshwater, inland HABs are very reactionary and insufficient to really help people cope with them, and new ideas are needed.*

At Beagle Bioproducts we propose the collection of material from a HAB as a biological feedstock for the generation of high-value products. Such collection of HAB material has the potential to become one piece of a broader, sustainable program for dealing with HABs. In this presentation, we will discuss a model we have developed that includes three key components: 1) identification of HABs that can serve as product feedstock, 2) a field operation platform for collection of the feedstock, and 3) a laboratory operation for the conversion of the feedstock into products. The presentation will focus most heavily on how Beagle has worked with partners in both the private and public sectors to arrive at mutually beneficial arrangements for feedstock collection. While feedstock collection for Beagle's specific products may not operate on the scale required to remediate a bloom, it could operate at a scale that reduces the costs a community incurs when dealing with the biological waste from a bloom, allowing money to be reallocated to programs that benefit the community.

~-~

Title: The Economic Value of Lake Erie Shoreline Angling in Ohio

Biography: Joe Lucente is an Assistant Professor and Extension Educator in Community and Economic Development with The Ohio State University Extension/Ohio Sea Grant College Program. He is responsible for research, education, and technology transfer of information concerning Lake Erie and the Great Lakes. His main responsibilities include developing and conducting an outreach education program on leadership development and capacity building, business retention and expansion, and related issues designed to improve the economic and environmental climate of the Lake Erie watershed.

Abstract: *Little information exists on the value of shoreline angling on the Ohio waters of Lake Erie. In order to quantify economic impacts and benefits of Ohio's Lake Erie shoreline angling, the Ohio Department of Natural Resources Division of Wildlife, added socio-economic questions to a planned creel survey of shoreline anglers in 2006 and 2007. The typical shoreline angler is of modest income, comes from an urban area and likely has only limited opportunities to fish Lake Erie. Lake Erie shoreline anglers make 21.3 annual trips (SD, 29.9) to the shore to fish. While 50% live within 9 miles of their angling destination, the mean one-way travel distance is 32.0 miles (SD, 91.3). Using answers from the survey in combination with other data concerning angler visits, total local spending per angler trip excluding travel costs was estimated to be $8.22 per day (SD, $7.57) equating to average annual spending of $1.13 million. Shoreline anglers mean round trip travel cost is $40.07 (SD, $111.21). Using the travel cost method (TCM), the non-market economic value (consumer surplus) of Lake Erie shoreline angling was calculated. The mean value estimated via a Poisson model was $103.53 per angler trip, while a similarly specified Negative Binomial model produced a mean of $92.75 per angler trip. The total consumer surplus ranged from a low of $9.54 million to $10.65 million in 2007 to a high of $16.01 million to $17.88 million in 2006. These values accrue directly as a result of the amenity offered by Lake Erie to the average Ohio shoreline angler. The results of this study could be used by managers and policy makers in decision making regarding the allocation of resources to enhance public access, improve shoreline water quality, and develop amenities for shoreline anglers.*