

# Wednesday, October 25th

## 8:00 AM WinSLAMM Workshop

**Stormwater Pollution Modeling for LID, TMDL and Retrofitting Analysis – An Overview of WinSLAMM with Dr. Robert Pitt, PhD, PE, BCEE, D.WRE and Eric S. Rortvedt, P.E. Water Resources Engineer, Wisconsin Department of Natural Resources**

This workshop will demonstrate how the latest WinSLAMM software incorporates long-term local rain data along with soils, land use, source area, and other local watershed factors to quantify pollutant sources in complex urban watersheds.

Learn how to use WinSLAMM to:

- calculate pollutant loads and runoff volumes, the cost of stormwater control practices, and runoff volume impacts from porous pavement
- estimate the effectiveness of filter strips, rain barrels and cisterns, hydrodynamic treatment devices, stormwater media filters, and grass swale drainage systems.

8:00-8:30 Introduction and modeling overview

8:30-9:30 WinSLAMM Theory, Practice, and Calibration

9:30-9:45 Break

9:45-10:15 Parameter Files and Particle Size Distributions

10:15-11:15 Modeling a “No Management” Condition - Hands on Workshop

11:15-12:00 Using WinSLAMM to Evaluate LID Practices (Cedar Hills Example) Hands on Workshop

12:00-12:30 Lunch

1:00-1:45 Using WinSLAMM to Evaluate LID Practices Hands on Workshop Continued

1:45-2:00 Wisconsin State Stormwater Regulations and Program: Presentation and discussion by Eric Rortvedt, Statewide Program Coordinator, DNR

## 9:00 AM CFM Exam

Register with ASFPM at: <http://www.floods.org/index.asp?menuid=405>

## 2:00 PM Engineering Ethics Workshop

**Water Engineering Ethics Presentation from the UWM School of Continuing Education**

Earn 2 PDH credits in Ethics for PE license renewal requirements.

Course Outline:

Identify ethical priorities for water engineers

Review general principles of code of ethics for engineers

Identify common ethical dilemmas that occur in water engineering

## 4:00 PM Evening Reception and Game Night

# Thursday, October 26th

## 9:00 AM Opening Plenary

**Legislative Update from ASFPM and**

**Chad Berginnis, CFM, Executive Director ASFPM and Dave Fowler, Stantec**

## 10:30 AM Session A

### **Understanding Wetlands as Solutions to Flood Risks and Other Water Problems**

**Kyle Magyera, Wisconsin Wetlands Association, Local Government Outreach Specialist**

Protecting and restoring wetlands can be a cost-effective and innovative solution for communities dealing with flood risks, water quality impairments, and vulnerable infrastructure; however, planners, policy makers, and land use decision makers do not always have the information, tools, and resources they need to understand how upstream wetland losses contribute to downstream water problems. To help communities in northern Wisconsin overcome these barriers, the Wisconsin Wetlands Association is conducting a geospatial analysis and field investigation of the wetland and watershed characteristics that may have influenced the location and severity of the infrastructure damages that occurred after the July 2016 storm event in Bayfield, Ashland, and Iron Counties. The speaker will present preliminary findings, including examples of how to identify simple, cost-effective wetland conservation strategies, and engage participants in a discussion about the goals, methods, and potential applications of this WI Coastal Management Program funded project. Finally, participants will be asked to share their perspectives on the barriers and opportunities to putting wetlands to work to reduce flood risks and other water problems.

### **Underwood Creek - Past, Present, and Future**

**Susan Coyle, PE, CFM, MMSD**

I plan on talking about the history of Underwood Creek (natural stream to concrete channel) and the past current efforts to remove the concrete and restore the stream. In the future, green infrastructure projects will be used in the upper reaches to control and clean stormwater to further enhance the stream.

## 10:30 AM Session B

### **Flood Frequency Analysis using Stochastic Storm Transposition and Rainfall Remote Sensing**

**Daniel Wright and Guo Yu**

The value of existing observational records can be limited when the environment is changing due to climate warming or other human impacts. Meanwhile, long-standing flood hazard estimation practices such as intensity-duration-frequency (IDF) curves and design storm methods rely on stationary rainfall and flood observational records and use simplified assumptions to describe the interactions between rainfall structure and flood response. I present RainyDay, a stochastic storm transposition (SST) framework for generating large numbers of realistic rainfall “scenarios.” SST “lengthens” the rainfall record by temporal resampling and geospatial transposition of observed storms to extract space-time information from regional rainfall data. Relatively short (10-15 year) records of ground-based weather radar are sufficient to estimate rainfall and flood events with much longer recurrence intervals including the 100-year and 500-year events. I describe the SST methodology as implemented in RainyDay, and compare rainfall IDF results from RainyDay to conventional estimates from NOAA Atlas 14. Then, I demonstrate some of the flood frequency analysis properties that are possible when RainyDay is integrated with a distributed hydrologic model, including robust estimation of flood hazards in a changing

watershed. A web-based version of Rainyday is also available at:  
<http://her.cee.wisc.edu/projects/rainyday/>.

### **A Comprehensive Scorecard Assessment of Wisconsin Municipal Flood Vulnerability** **Haley Briel, Program and Policy Analyst, Wisconsin Department of Health Services**

Over the past several years, flooding in Wisconsin has become more frequent, severe, and costly both in terms of finances and human health. Flooding in Wisconsin is responsible for millions of dollars of infrastructure and residential damage and is associated with many adverse health outcomes—chiefly waterborne diseases such as cryptosporidiosis, giardiasis, and shigellosis. To prevent the negative health outcomes of flooding events, municipal stormwater management needs to be more easily prioritized. To aid communities in determining their existing vulnerabilities and also provide recommendations for improvement, the Wisconsin Department of Health Services (DHS) has developed a four-part comprehensive scorecard to be used by local planners and floodplain managers. By completing each portion of the scorecard, municipalities will identify infrastructural, institutional, social, and environmental vulnerabilities that could hinder their ability to prepare for and respond to flood events. Upon completion of the scorecard, DHS will work directly with a pilot community to evaluate the utility of this tool. Ultimately, the tool is intended to merge the fields of public health, urban planning, and civil engineering to allow Wisconsin municipalities to adapt to and become more resilient in the face of anticipated increases in frequency and intensity of precipitation events.

## 10:30 AM Session C

### **Intermediate UAS Technology**

#### **Ben Yahr, Resolution Studio**

Small unmanned aerial systems (sUAS- drones) continue to grow more prevalent in the media and offer amazing opportunities for design professionals. This presentation will review potential deliverables for engineers and clients, and explain some basic workflows for creating orthophotos and digital elevation models. The presentation will also review current FAA regulations and outline the process and study areas for the Part 107 Aeronautical Knowledge test to receive a Remote Pilot Certification.

### **Sterling Green Infrastructure Riverfront Revitalization**

#### **Jens Jensen, Principal Ecologist, Jensen Ecology**

As part of a large design team, Cardno and Jensen Ecology assisted the city of Sterling, IL in their efforts to build a park on a brownfield along the Rock River in Sterling, IL. The site is a former steel mill that is under remediation. Site work includes green infrastructure, bioswales, permeable paving, and wetland and prairie creation. Jensen Ecology is involved with design, construction specification development, bid administration and construction oversight. When completed, the new greenspace will cover approximately 11 acres of riverfront.

## 11:30 AM Lunch Plenary

### **Disaster Response in the Developing World**

#### **Rod Beadle, Executive Director, ENGINEERS IN ACTION**

Disasters such as earthquakes, typhoons, flooding, drought, diseases, and war can have huge impacts on people directly affected by these powerful events. Their effects are often amplified in vulnerable, impoverished regions where the response is hampered by a lack of capacity and resources to adequately

respond. In nearly all disasters, disrupted access to water, food, and shelter can lead to secondary disasters including starvation and the spread of diseases. Water, sanitation, and hygiene (WASH) engineers serve a critical role in the immediate aftermath of disasters by helping to re-establish supplies of clean water and sanitation facilities.

Rod Beadle will share some of his experiences working as a WASH engineer during recent disaster response operations and explain the unique and critical role that engineers can serve to respond.

## 1:00 PM Session A

### **Abrupt Changes to Bluffs Adjacent to Coastal Structures in Lake Michigan**

**Nick Jordan and Chin Wu**

Shore-parallel shoreline protection structures such as revetments are a common solution to coastal bluff erosion problems on Great Lakes shorelines. However, severe beach and bluff toe erosion often results at the flanks of shore-parallel structures soon after construction. Though this erosion is a long-recognized problem, it has yet to be resolved. This talk highlights research that reveals the coastal processes responsible for abrupt changes to beaches and bluffs at the flanks of structures in Ozaukee County, Wisconsin. Immediately downcoast of newly constructed revetments bluff toe recession rates increase to approximately ten times the long-term rate and beaches narrow to less than 1 m wide. The nearshore and bluff toe steepen dramatically and sediment volume losses exceed 280 m<sup>3</sup>/m across the coastal bluff profile. Increased cumulative wave impact height, CWIH, caused by steepening of the nearshore and loss of beach-building processes, can accelerate undercutting of the bluff, changing failure mechanisms from rotational slope failures to translational failures, solifluction, and block failure. Overall the results of this integrated subaqueous hydrodynamics and subaerial bluff slope study provide valuable information to scientists and stakeholders facing urgent decisions regarding erosion management, shoreline protection, and coastal ecosystem health.

### **Lake Michigan Ravine Streams: Remarkable Habitat in Forgotten Places**

**Dale Buser, PE, PH**

Much of the west shore of Lake Michigan is flanked by steep bluffs drained by short, naturally incised, streams. Land use changes and industrialization degraded most “ravine” streams. Nevertheless, ravine streams are well recognized for unique plant communities and act as natural corridors and refuge areas in intensely developed landscapes. What has not been widely appreciated is that many ravine streams offer regionally unique and important aquatic habitat attributes: attributes such as cold water, steep gradient, coarse-grained substrate, copious groundwater discharge, reliable baseflow, and historical access to Lake Michigan.

Mineral Springs Creek in Ozaukee County, Wisconsin is a typical ravine stream. Bed morphology, watershed conditions, and water quality were heavily influenced by humans. Nevertheless, despite having an urbanized watershed, the creek maintains a reasonably stable, high-gradient granular bed, relatively cold and reliable baseflow, and hosts disproportionately large runs of salmonids.

This presentation briefly examines what makes ravine stream unique and uses Mineral Springs Creek as a case in point. The genesis, evolution, and value of this stream and similar streams ongoing is examined, and challenges and opportunities are discussed. Finally, a series of County-led initiatives and projects that aim to protect and enhance the stream’s unique habitat function are described.

## 1:00 PM Session B

### **Enhanced Storm Water Management Techniques in Sensitive Urban Environments**

**Neil J Pfaff, PE, PH, CST, Vierbicher**

As a component of Multi-Family Unit Production, the Iowa Economic Development Authority (IEDA) offered additional funding above and beyond the standard project award for projects that propose sustainable storm water management practices. The site our client selected for two-30 unit apartment complexes was a redevelopment site located just 200 feet east of McCloud Run Urban Trout Stream within the City of Cedar Rapids, Iowa. This stream is the only urban trout stream that runs through the middle of Cedar Rapids, just outside of downtown. Vierbicher looked at this project as an opportunity to design the two apartment complexes as an environmental benefit to the McCloud Run Trout Stream. The project will infiltrate a larger volume of storm water than the amount that precipitates onto the site and will reduce more sediment than is physically produced on the site. The project is planned to be completed in the spring of 2017. An outfall monitoring of the site for volume and pollutants has not been officially adopted, but is in progress. The total costs for the enhanced storm water management techniques are approximately 1.8 million.

### **Salt? No Thank You. Our permeable pavement is heated**

**Doug Buch and Matt Bednarski**

The ability to efficiently heat PaveDrain blocks adds an additional benefit to this Wisconsin made and manufactured permeable system. Municipalities across the northern U.S. are burdened with the cost of snow removal and sodium chloride (road salt) as a winter deicer. We believe that heated PaveDrain can begin to reduce the discharge of chlorides into waterways by reducing the need to apply road salt during the winter months. Heating of the PaveDrain blocks can be accomplished in two ways; 1. Via PEX tubing filled with a 40% water to propylene glycol mixture. 2. Electrical wiring encased in a protective sheath that heats up when a current is run through it. Heated Helipads have already been installed in the Midwest and multiple private and public projects are in the works around the Midwest. We will cover the concept and several case histories with documented energy uses and budgetary costs and a concept for municipalities to replenish subsoil moisture and not cause ice to accumulate and cause slippage and liability somewhere else - resulting in a significantly lower road salt application rate.

## 1:00 PM Session C

### **2017 Community Rating System (CRS) Manual Update**

**Lou Ann Patellaro, ISO/CRS Specialist**

The Community Rating System (CRS) is a Federal Emergency Management Agency (FEMA) program, administered by the Insurance Services Office (ISO), Inc. that recognizes communities for their floodplain management activities that go above and beyond the minimum NFIP standards. The CRS assigns credit points for each floodplain management activity a community performs and then correlates those points to classes and flood insurance premium discounts for homeowners in that community.

This session will discuss updates and changes to the 2017 CRS Coordinators manual. Discussion regarding the 300 series outreach and how to manage successful outreach projects economically.

## 2:30 PM Session A

### **Great Lakes Coastal Flood Hazard Mapping**

**Alan Lullof, P.E., CFM, Association of State Floodplain Managers**

Coastal flooding in the Great Lakes is a result of the combined action of elevated water level and storm waves. The Great Lakes are unique in that they are subject to long term changes in water level. The long term lake levels change gradually over time, on scales of years to decades, primarily in response to fluctuations in precipitation and evaporation. Strong winds associated with storms induce wind setup and seiche on times scales of hours to days. In addition strong winds generate highly energetic wave conditions that contribute to coastal flooding.

The Federal Emergency Management Agency (FEMA) has initiated a coastal analysis and mapping study to produce updated Digital Flood Insurance Rate Maps (DFIRMs) for coastal counties along the Great Lakes shorelines of the United States. Coastal flooding in the Great Lakes is a result of the combined action of elevated water level and storm waves. Areas subject to waves in excess of three feet will be designated as velocity zones or "V Zones".

This presentation will provide information on the methodology being used to develop the Base Flood Elevations along the coast and revisions needed to community floodplain ordinances to incorporate the building standards associated with those areas designated as V-Zones. In addition, information will be provided on the schedule for developing revised coastal flood hazard data and mapping for communities on the Great Lakes and the process for submitting LOMRs once the maps have been adopted.

### **Floodplain Mapping Using 2D Models**

**Michael Schwar, PE, PhD, Stony Point Hydrology**

Floodplain modeling does not always mean using a 1-D HEC-RAS model anymore. Water resource professionals have long recognized that application of a one-dimensional HEC-RAS modeling approach may not be the most accurate way to evaluate flood conditions in many situations. Fairly recently, modeling advances such as the release of HEC-RAS 2-D and the accessibility of other two-dimensional model platforms have provided tools for analysis of flood events that may have been problematic to model using previous hydraulic models. FEMA has recognized these advancements and has incorporated several of these models into its stable of approaches acceptable for floodplain mapping, and state regulators are likely to follow suit. In this session we will discuss the basics of floodplain modeling and what you might want to consider when analyzing your specific floodplain issues.

After this presentation, you should be able to understand:

- What are the differences between 2-D modeling and the previous standard HEC-RAS approach?
- When might be beneficial to use a 2-D modeling approach for floodplain assessment?
- What are some examples of 2-D models that might be acceptable to develop floodplain maps?
- How might regulators react to me proposing a 2-D modeling approach instead of a standard HEC-RAS approach?

## 2:30 PM Session B

### **Status of Lidar Elevation Projects in Wisconsin**

**Jim Giglierano**

Many program areas in Wisconsin rely on lidar derived elevation products, including coastal and floodplain management, disaster planning and response, managing natural resources and site

development. With the advent of federal elevation funding and increased Wisconsin Land Information Program funding, much of the remaining area of the state is being acquired and made available to the user community. This talk will provide an overview of the status of lidar in the state and future plans.

### **Using ArcGIS Online and the Collector App in Adaptive Management**

**Megan Bender, P.E., CFM**

ArcGIS Online and the collector application are powerful tools in collecting data. These tools can be put to use for collecting information and data management for watershed based phosphorus reduction practices used in adaptive management watershed wide projects. The tool can help with conservation planning watershed wide, as well as workflow management for conservationists in the field, including use as an inspection aid for determining correct implementation of best management practices. The Silver Creek Adaptive Management Pilot project CH2M managed for NEW Water (Green Bay Sewerage District) is an example of how this tool can be used successfully.

## **2:30 PM Session C**

### **Panel Discussion:**

#### **Thinking Outside the Pond: How to Make Green Infrastructure Work in Wisconsin**

**Julia Noordyk, Water Quality and Coastal Communities Specialist, UW Sea Grant Institute**

What is the number one barrier for engineering and implementing green infrastructure in your community? Wisconsin's northern climates or clay soils? The community's love affair with pipes and ponds? Or how about the fear of an epic engineering failure? Join our panel of experts in a discussion that will explore the challenges and successes, lessons learned and myth busting for implementing green infrastructure in Wisconsin.

## **3:45 PM Closing Plenary**

### **Regional Flooding in 2017**

**Paul Osamn, IL DNR and Michelle Staff, WI DNR**

On July 11-12, 2017, parts of southeastern Wisconsin saw 3-7 inches of rain, causing rapid rises along rivers and widespread flash flooding, impacting homes, businesses, and infrastructure. The Fox River in Burlington crested at 16.5 feet, a full three feet higher than the previous record in 2008. For communities that participate in the National Flood Insurance Program (NFIP), it is essential that the local floodplain manager conducts substantial damage inspections and make damage determinations. Michelle will briefly explain the requirements for substantial damage process for the local official.

Once among the top five states in the nation for repetitive loss, Illinois now leads the nation in overall flood loss reduction. Much of this success is due to a strong post flood damage assessment process. To help with this process, the Illinois Association for Floodplain and Stormwater Management (IAFSM) has formed the Rapid Flood Assessment Team (RAFT). The RAFT team is a collection of skilled state and local officials who provide mutual aid to other flooded communities. The RAFT members have now responded to 3 flood events and completed nearly 500 damage assessments. They have become a key player in the state's post-flood compliance process.

After nearly 30 years of working with local officials in Illinois, the NFIP State Coordinator has noticed five key components which are very evident among the good floodplain managers. Few of these components have anything to do with floodplain management. Some are so simple, they might surprise you.

# Friday, October 27th

## 8:30 AM Field Tour

Alliant Energy will lead a tour of Kilbourn Dam and a local ecosystem restoration site. Kilbourn was the first major power-generating dam built on the Wisconsin River and it was the biggest dam west of Niagara Falls when completed in 1909. Today, the nearly 350-foot-long concrete structure remains a treasured landmark and still churns out electricity for southcentral Wisconsin. After the dam began operating, the power generated was used to run a rail line between Milwaukee and Watertown. The dam also raises water levels on the river, making some of the scenic spots amid the high sandstone cliffs accessible to tourists. The dam allows boat access into backwaters such as Coldwater Canyon and Witches Gulch.

Nearby, we'll visit an ecosystem restoration site. Manley Creek on the Merrimac Preserve is a spring-fed creek that flows from Devil's Lake State Park. Past restoration of Manley Creek included re-contouring of stream banks and installation of structures on a ½ mile stretch of Manley Creek to create brook trout habitat. Restoration work continues along the stream banks to control brush and the spread of invasive species. Most of the agricultural land has been converted from row crop production to native prairie at the Merrimac Preserve.

If time and weather conditions allow, we'll end the tour with a trip across the Wisconsin River on the Merrimac Car Ferry, before heading back to the Dells.