Session 1A

Planning and Facilitating Coastal Resilience Across Boundaries

Christopher Devick, P.E.; Michelle Platz, Ph.D.; Zoe Goodrow
Christoper Devick, SmithGroup. chris.devick@smithgroup.com

The Resilient Coastal Project Initiative takes a new approach to identifying and facilitating implementation of shoreline protection and resilience projects. This approach brings together communities, stakeholders, technical experts and potential funding partners to identify the issues, develop potential strategies, define an appropriate scale of fundable project and available grant opportunities to support it. The approach has been implemented along the shorelines of Wisconsin, Indiana, Michigan, Ohio and New York engaging over 20 communities on four of the five Great Lakes, in the last 2 years.

The RCPI works with communities of all sizes to understanding the complex issues they are facing along their shorelines and leverages technical experts in coastal engineering, water resources, habitat restoration, green infrastructure and fisheries to develop projects which address the community's issues through a series of lenses. This allows for resulting projects to not only provide resilient responses to coastal erosion and flood protection, but also provide fish, wildlife and ecological benefits, public access, and recreational value.

Three projects will be highlighted as examples of the process, projects under development and scale of resilience being implemented on Lake Michigan, Lake Erie and Lake Huron.

Topics: Coastal Management, Community Resiliency and Engagement, Innovations in Engineering

Beach Drive Coastal Revetment - Challenges, Hurdles and Achievements

Scott Brandmeier, Director of Public Works, Village of Fox Point.
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In 2019, like many Great Lakes Coastal Communities, Fox Point was facing an increasing lake level, severe erosion, and risk to critical infrastructure. This presentation will identify steps taken to go from a relatively unprotected shoreline to a resilient revetment and the challenges that were encountered along the way.

Topics: Coastal Management, Disaster Preparedness, Response, Recovery, or Mitigation

Session 1B

Small Change, Big Impacts: Giving the River Room to Heal

Bill Roznik, P.E. & Craig Taylor P.E.
Bill Roznik - SmithGroup. bill.roznik@smithgroup.com

The LaCrosse Marsh was historically an anastomosing floodplain of the LaCrosse River. A legacy of encroachments from roads, utility crossings, trails, rail lines, and other infrastructure has left the marsh a relatively isolated and containerized ponding area adjacent to the river. This presentation will discuss a phased design and implementation strategy that utilizes a series of small interventions to reconnect the isolated cells of the LaCrosse Marsh in an effort to restore the marsh function while maintaining and enhancing trail access.

Topics: Floodplain Management, Wetlands

Tackling Regulatory Complexities: A Guide to Successful Waterway Permitting in Wisconsin 1B

Kaley Simonis - Ruekert & Mielke. ksimonis@ruekert-mielke.com

Regulations are tricky, especially when you start moving dirt around in a waterway. The Wisconsin Department of Natural Resources and the St. Paul District United States Army Corps work together to permit wetland and waterway projects in Wisconsin. When working through these permits, there are a lot of different types of regulations you must consider when working within a waterway that may not be covered by the wetland and waterway programs. These can include hazardous waste, endangered species, culturally sensitive resources, and more. Because of the complexity of these project types, it is common to run into permitting snafus due to a multitude of different reasons. This presentation will work through a few different permitting hurdles that you may face when performing in stream work, and how to prepare for them.

Topics: Laws and Regulations

Session 1C

The New State Flood Resilience Grant

Katie Sommers, Wisconsin Emergency Management. katie.sommers@widma.gov

This is the first year of the Pre-Disaster Flood Resilience Grant, which was established through 2023 Act 265. This presentation will go over the requirements in the Act, the application development process, outreach efforts, what makes a good project/application, and the future of the program.

Building Resilient Communities and Infrastructure (BRIC) and Flood Mitigation Assistance (FMA) grant programs.

Heather Thole and Chad Atkinson
Heather Thole, State Hazard Mitigation Officer, Wisconsin Emergency Management. heather.thole@widma.gov

The Building Resilient Communities and Infrastructure (BRIC) grant program and the Flood Mitigation Assistance (FMA) grant program annually make federal funds available for hazard mitigation activities. This presentation will provide an overview of key information for the BRIC and FMA grant programs including objectives, eligible projects, and subapplication process. The presentation will include examples of stormwater management plans and projects submitted under BRIC and FMA in 2023.

Session 2A

Solutions for Pollution

Kelli Duff, P.E., Dave Wolmutt, P.E. & Derek Schlea, P.E.
Kelli Duff, P.E, SmithGroup. kelli.duff@smithgroup.com

Kelli Duff is an experienced professional civil engineer who works across a range of projects to integrate design seamlessly with engineering and technical requirements. Kelli focuses on providing the best solutions for stormwater management to enhance existing ecosystems and provide the best user experience for people focused spaces.

The Phosphorous-Optimal Wetland is a 10-acre manufactured wetland studying the effects of overland filtration for phosphorous reduction within the Lake Erie watershed. Increased algal blooms in Lake Erie are the catalyst for this pilot study and has provided invaluable testing results for replication of these studies across northwest Ohio. This presentation will discuss the site selection process, design of the wetland, water quality and soil testing, and project replication efforts to create large impacts on the watershed with minimal construction effort or equipment.

Topics: Innovations in Engineering, Wetlands

Enhancing Water Quality and Flood Resilience Through Stream Restoration

Abigail Hanson & Nicholas Connor
Abigail Hanson, Project Engineer, Ruekert & Mielke. ahanson@ruekert-mielke.com

Is your community an MS4 regulated community? Do you have flood storage needs? Do you have a requirement to lower phosphorus for your WWTF plant permit? Is your community comprised of agricultural farms with high amounts of runoff? Is your community with in a TMDL watershed? If so, you should consider utilizing stream restoration to address these issues. Stream restoration offers multiple benefits, including water quality credits, erosion control, increased flood storage, and enhanced recreational opportunities. Our experts will share insights on effective construction

techniques, including naturalization, innovative technologies, and available grants to support your restoration projects.

One of the primary advantages of stream restoration is achieving Total Maximum Daily Load (TMDL) compliance. Communities can perform stream restoration projects and gain TSS and TP credits from performing the work. These credits can then be applied towards their TMDL goals and bring the community closer to achieving compliance.

Preventing erosion and increasing flood storage are crucial components of stream restoration. By using stream corridors for additional stormwater capacity, communities can avoid the need for constructing new stormwater ponds or other best management practices. Restoration projects also enhance recreational opportunities, improve water quality, and support aquatic habitats.

How are these comprehensive projects feasible? Funding is often a significant concern, but grants are available to make these projects possible. The Honey Creek project is an example of how grant funding can support restoration initiatives. Join us to learn how stream restoration can transform your community's water quality and flood resilience.

Topics: Floodplain Management, Community Resiliency and Engagement, Local Projects and Initiatives, Outreach and Education, Stormwater Management, Sustainability, Wetlands, TMDLs

Session 2B

Fox (IL) River Watershed Hazard Mitigation Plan

Julia Orlowski, Justin Poinsatte, James Mahony, Laura Herrick, Megan Shedivy, Zijia Li,
Julia Orlowski, Senior Engineer, SEWRPC. jorlowski@sewrpc.org

Julia Orlowski is a senior engineer in the environmental division at Southeastern Wisconsin Regional Planning Commission. She has ten years of experience working at the Commission, with her work focusing on riverine hydraulic modeling and planning level design work to help alleviate flooding problems. She is a Certified Floodplain Manager (CFM), as well as a licensed Professional Engineer (PE).

In September 2023, the Commission published the Fox (Illinois) River Watershed Mitigation Plan. Work began on the plan in 2021, at the request of the Waukesha County Department of Emergency Management. The need for hazard mitigation planning in the Fox River watershed became apparent after the Fox River watershed experienced up to 8 inches of rainfall in July 2017, resulting in flooded buildings, blocked roads, power outages, and sewer backups. The Fox River Watershed Mitigation Plan aimed to quantify the level of risk and recommend mitigation measures to help reduce the severity of this type of future flooding, as well as analyze and mitigate the effects of dam failures and drought within the watershed. A local planning team (LPT) was formed and coordinated to brainstorm ideas and collect feedback about the watershed mitigation plan, and developing the plan encouraged communication between entities within the watershed.

The Fox River plan focused on Kenosha, Racine, Walworth, and Waukesha Counties, which contain 98% of the Wisconsin portion of the Fox River watershed. The plan inventoried major natural

features within the watershed, including stream networks, lakes, floodplains, wetlands, and groundwater, as well as manmade features such as major roads, dams, and monitoring gages for streams, lakes, and rainfall. In addition, the plan quantified the total number of structures and in the Fox River watershed that would be vulnerable to flooding during a 1-percent-annual-probability flood event, as well as the number of major roadways that would potentially be impassable during the same event. The plan made recommendations to remove floodprone structures, protect at-risk roadways, preserve flood storage areas, and increase the number of rain and stream gages in the region, for the purpose of reducing flood hazard risks within the watershed. The available records for dams in the watershed were also reviewed, as well as historical dam failures. The plan provided recommendations for best practices for dam management, which included data management, operational best practices, communication with fellow dam operators, and training of future operators, for the purpose of helping prevent dam failures within the watershed in the future. Finally, the plan inventoried historical droughts in the region, and reviewed available data about subsequent economic losses. The plan recommended protection of high groundwater recharge potential areas, as well as various agricultural practices that can help mitigate the economic losses of drought.

Historically, hazard mitigation plans have addressed a county or city; however, rivers, streams, and watersheds often occupy multiple municipalities, and thus hazard mitigation planning by watershed can provide a more robust analysis of natural water systems. This watershed-based hazard mitigation plan is the first of its kind in the State, and it provides an example for potential future hazard mitigation plans by watershed."

Topics: Floodplain Management, Community Resiliency and Engagement

Opportunities for Mitigation in the Disaster Declaration Process

Chase O'Brien and Katie Sommers

Katie Summers, Wisconsin Emergency Management. katie.sommers@widma.gov

This presentation will provide, with a focus on flooding, a brief overview of the disaster declaration process, opportunities for mitigation under FEMA's 406 Public Assistance (PA) program, and the process for applying for FEMA's Hazard Mitigation Grant Program after a disaster declaration. Presenters will discuss specific regulations that are critical for communities to know and understand throughout the process as well as the roles and opportunities for each level of government, nonprofits, and the private sector.

Session 2C

Working with Old and New Vertical Datums

Rob Merry, Chief Surveyor, SEWRPC. rmerry@sewrpc.org

Elevations can be complicated, but they are an integral component for floodplain modelers. We'll discuss the practical aspects of vertical datums, including the different types of heights, the

current NAVD88 height datum and more importantly the upcoming new datum, as well as how to work within these datums. We'll also mention case studies demonstrating how elevations can be affected for floodplain modelers to possibly be on the lookout for potential elevation discrepancies along with ways to improve the connection between old and new datums as we move forward.

West and Southwest Winnetka Flood Control and Stormwater Management Program

Mark Shubak PE, CFM, Senior Associate, Strand Associates, Inc. mark.shubak@strand.com

Mark Shubak, P.E., CFM is a Senior Associate with Strand Associate, Inc. at their corporate headquarters in Madison, Wisconsin. Mark has over 30 years of experience working in the field of stormwater and floodplain management.

In response to three historic rainfall events (2008, 2011, and 2013) that produced widespread flooding as well as significant property damage and losses for more than 1,000 homes, the Village of Winnetka adopted the Western and Southwestern Winnetka Stormwater Management Program in July 2016. The program addresses inadequate existing stormwater infrastructure with a combination of wet ponds, underground storage, wetland modifications, and conveyance improvements while maintaining the existing stormwater release rates to downstream water bodies and communities. When fully implemented, the program will provide 100-year design-storm level of protection to the western and southwestern portion of the village.

This presentation explains the holistic watershed evaluation that was the basis for the program and the extensive public engagement process that built community consensus for the stormwater management program, describes the multi-agency negotiations and agreements that were foundational, and highlights the unique stormwater management infrastructure being constructed in Winnetka to deliver confidence in the wettest weather.

Topics: Floodplain Management, Community Resiliency and Engagement, Innovations in Engineering, Outreach and Education, Stormwater Management, Sustainability

Session 3A

Detention: More Efficient Management with Advanced Flow Controls

Phillip Taylor, Technical Manager, Hydro International. ptaylor@hydro-int.com

Detention is one of the most expensive and challenging aspects of stormwater design. Water cannot be compressed, and with the upcoming release of Atlas 15, detention volume management will become even more critical. Traditionally, the default option is to design an outlet flow control structure using a low-flow orifice and a combination of weirs to meet allowable release rates. However, this approach tends to maximize the detention volume, extending the duration of elevated flows downstream, and costing the most in materials, installation time, and space usage.

This presentation showcases projects that have used advanced flow controls in the outlet control structure to optimize detention volume. These advanced solutions use less space, are more

adaptable to a changing climate, reduce the duration of elevated flows, and can save the site developer a significant amount of money. It's a smarter approach to stormwater management!

Topics: Innovations in Engineering, Stormwater Management, Sustainability

Stormwater Retrofit Designs are "In"

Cassandra Hoppe and Rob Woodman
Cassandra Hoppe, Green Stormwater Infrastructure Specialist, Ferguson.
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Cassandra Hoppe joined the Ferguson Waterworks Geo&Stormwater team earlier this year as an Engineered Solutions Specialist. She is a trusted advisor that works with and supports civil engineers, landscape architects, developers, municipalities, and contractors by providing a suite of solutions to address key challenges associated with geo and stormwater design. Prior to joining Ferguson, she was an engineering consultant in Milwaukee for AQUALIS (formerly Stormwater Solutions Engineering) - you may remember her from previous WAFSCM conferences where she presented on design projects.

As rainfall events become more frequent and intense, cities and towns across the country are building strategic plans to address the challenges climate change is placing on our aged and often undersized infrastructure. The result – a rapid increase in the implementation of stormwater retrofit projects on both public and private land. In many areas green infrastructure is viewed as a dynamic approach for both water quantity and quality - helping with downstream effects and reach MS4 compliance while leveraging the “triple bottom line co-benefits” (social, economic and environmental). But how do we handle the unforeseen challenges that emerge during construction at these retrofit sites? This presentation will walk through projects within larger cities and local to Milwaukee where Ferguson Waterworks was engaged by project stakeholders to develop solutions to overcome the buried unknowns and to reach the triple bottom line co-benefits.

Topics: Local Projects and Initiatives, Stormwater Management

Session 3B

Federal Flood Risk Management Standard (FFRMS) Implementation

Brian Killen, Sr. Floodplain Management Specialist, FEMA Region 5. brian.killen@fema.dhs.gov

On July 11, after a lengthy rulemaking process, FEMA published a Final Rule and Policy to implement the Federal Flood Risk Management Standard, which addresses increased flood risk. This rule is designed to make communities more resilient and help reduce the damage caused by both current and future flooding. The Final Rule and new FEMA policy will be effective on Sept. 9, 2024.

The Federal Flood Risk Management Standard is a flood resilience standard that aims to build a more resilient future. Based on Executive Order 13690, “It is the policy of the United States to

improve the resilience of communities and federal assets against the impacts of flooding. These impacts are anticipated to increase over time due to the effects of climate change and other threats. Losses caused by flooding affect the environment, our economic prosperity, and public health and safety, each of which affects our national security."

This presentation will cover the basics of FEMA's new FFRMS policy and its implementation, as well as the online tool (Federal Flood Standard Support Tool) developed to support decision makers engaged in federally funded actions."

Topics: Floodplain Management, Laws and Regulations, FFRMS - Federal Resilience Standard

Leveraging AI in Hydrologic and Hydraulic Modeling: Transitioning from Spreadsheets to Code Development

Mohsen Tahmasebi Nasab, Water Resources Engineer, AECOM.
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Dr. Mohsen Tahmasebi Nasab is a water resources engineer at AECOM with an academic background as a former civil engineering professor at the University of St. Thomas and Bucknell University. Mohsen's expertise centers on advancing hydrologic modeling in cold-climate regions, particularly focusing on refining the representation of macro-scale hydrologic processes and depression-dominated landscapes within these models.

Large Language Models (LLMs) are transforming the pre and post-processing of hydrologic and hydraulic modeling datasets from traditional spreadsheets to efficient code-driven solutions. This presentation will demonstrate how LLMs, such as ChatGPT, can improve H&H tasks by generating Python scripts, applications, and tutorials using natural language input from non-programmer users. The capabilities offered by LLMs facilitate the development of code-driven tools, automate repetitive tasks, and integrate new features into existing systems. Additionally, LLMs can produce documentation and tutorials to clarify complex algorithms which makes the code more accessible and maintainable. The presentation will also address challenges associated with transition from spreadsheets to code development using LLMs, including the need for coding skills, and issues related to integration and compatibility. Practical applications of LLMs will be demonstrated through sharing best practices and developed tools, including the NOAA Atlas 14 Processor Toolbox, which automates the downloading and processing of gridded precipitation data for hydrologic modeling, and the SCS Curve Number Generator Toolbox, which simplifies the determination of curve numbers for study areas.

Topics: Innovations in Engineering

Session 3C

Great Lakes Coastal and Nearshore Habitat Projects – 2023

Craig Taylor, P.E.; Christopher Devick P.E.
Craig Taylor, P.E., LimnoTech. ctaylor@limno.com

The Great Lakes Coastal and Nearshore Habitat Program, funded by Coastal Sates Organization, has worked with local communities and stakeholders throughout the Great Lakes to identify high-priority nearshore restoration opportunities. In 2023 four habitat enhancement and restoration projects were undertaken in Wisconsin, Michigan, New York and Pennsylvania. These projects provided a wide range of ecological and wildlife benefits to the drowned river mouth of the Pentwater River, the western branch of the Niagara River, and the Peshtigo River as well as spawning habitat in the nearshore area of Presque Isle peninsula, Erie PA.

Engineering and design of each of these projects focused on restoration, resilience and habitat enhancement, utilizing numerical analysis to test and understand project outcomes, leveraging nature-based approaches and an understanding of the potential for construction impacts to the environment. Significant stakeholder and local community involvement was implemented at each stage of the design and engineering, to develop restoration goals, identify appropriate species and restoration approaches and identify project risks.

Topics: Coastal Management, Ecosystem Services, Wetlands

Using CFD modeling to keep round goby out of Lake Champlain

Jacob Sturzl, Civil Engineer, Anchor QEA. JSturzl@anchorqea.com

Jacob Sturzl is a Professional Engineer at Anchor QEA. Jacob is a graduate of UW-Madison and he specializes in coastal and riverine modeling. Outside of work, Jacob loves the outdoors and Wisconsin sports.

The round goby, an invasive fish species in North America, was discovered in the Hudson River in 2021. Should the goby migrate upstream into Lake Champlain, it will cause irreversible ecological damage. The state of New York and various other stakeholders have prioritized preventing the upstream migration of the round goby. There are 12 lock and dams between the round goby and Lake Champlain, which create an opportunity to halt goby migration. As a preliminary measure, New York implemented a “double draining” procedure, in which the lock operator would fill and empty the lock twice before opening the downstream gates. The goal of this procedure was to expel gobies from the lock’s downstream approach.

Anchor QEA used FLOW-3D to create a calibrated CFD model of Lock C3 to analyze “double draining” and investigate other operational changes to improve the effectiveness of the procedure. Our CFD simulations indicated a significant reduction in the likelihood of gobies passing through the locks with the optimized procedure. The recommended procedure has since been implemented at the Champlain Canal locks, providing a crucial step in safeguarding the Lake

Champlain ecosystem from this invasive species. This presentation showcases successful use of CFD modeling for environmental management.

Topics: Ecosystem Services, Innovations in Engineering