

**Concurrent Sessions Narrative Program**  
**ASFPM Annual National Conference – Orlando, Florida**  
**May 15-19, 2022**

**Tuesday, May 17**

**Session A: 10:30 am-Noon**

**A1: Flood Insurance**

**Floodplain Management and Risk Rating 2.0 – Understanding and Explaining the Changes**

Bruce Bender, CFM, Bender Consulting Services, Inc., babender@cox.net

**Co-presenters:** Joe "Flood" Rossi, ANFI, CFM , joe@joefloodrossi.com

**Abstract:** FEMA created Risk Rating 2.0 (RR2.0) to provide a rating system that more equitably reflects a property's flood risk, simplifies the quoting process, and makes it easier to explain or understand the premium being charged. No longer is NFIP flood insurance rating determined solely by "in versus out" flood zones or base flood elevation. Modern "graduated" rating elements are now used for pricing such distance to water, types of flood exposure, replacement cost and other advanced elements. With the biggest change in NFIP rating methodology in 40+ years, one thing has become clear: messaging these changes is key. The messaging that is given to property owners and communities from FEMA, floodplain managers, and others needs to be crafted carefully. This presentation will not only highlight changes in the rating elements that a floodplain manager needs to know and understand, but also provide messaging around how to deliver those changes; e.g. explaining why one property's premium might go down in price, and the neighbor's goes up. If you are a floodplain manager, local official or someone who supports a community, you will not want to miss this workshop.

**Biography:** Bruce Bender has been providing community engagement/outreach services and flood insurance expertise since 2002. Bruce has supported FEMA's NFIP national marketing programs (e.g., FloodSmart) and national mapping programs (e.g., Map Mod, Risk MAP). At the local level, he assists counties and communities with their community engagement and outreach efforts. Bruce has participated in numerous flood insurance-related research studies and been an expert witness in court cases related to flood and private flood insurance. He is currently a Co-Chair of ASFPM's Flood Insurance Committee. Previously, Bruce worked in the insurance industry for close to 15 years, including managing one of FEMA's largest WYO flood insurance programs and an insurance agency. He has a B.S. in Geology from The College of William and Mary...and a flood insurance policy!

**Reducing Flood Insurance Premiums with Flood-Resistant Design under RR2.0**

John Ingargiola, EI, CFM, CBO, FEMA Headquarters, john.ingargiola@fema.dhs.gov

**Co-presenters:** Laura Ghorbi laura.ghorbi@aecom.com

**Abstract:** With the implementation of Risk Rating 2.0, the NFIP is factoring in more variables than ever before for a more comprehensive picture of risk. While many of the new variables in the pricing methodology are based on geography, part of the methodology still depends on building characteristics.

This presentation will answer questions regarding how owners can make risk-reducing building design decisions that also reduce NFIP flood insurance premiums. Questions such as “Does elevation above the BFE still matter?” (Spoiler alert, yes it does!). “How, and how much, can mitigation impact my premium?” “My building is outside the SFHA, can I do anything reduce my premium?” And many more. This presentation will also add context on these flood-resistant design elements as they relate to building codes and the partial implementation of the Federal Flood Risk Management Standard.

**Biography:** John Ingargiola is a lead physical scientist in the Building Science Branch of the Risk Management Directorate at FEMA’s Federal Insurance & Mitigation Administration in Washington, DC and recently served as Acting Chief, Policy Branch, Grant Programs Directorate. John’s work involves a broad range of mitigation activities including pre- and post-disaster building sciences, building science education, working with model building code and standards-producing organizations, development of technical guidance documents related to hazard mitigation, and coordination with various mitigation partners in the public and private sector. He managed FEMA’s post-disaster Mitigation Assessment Team Building Performance studies conducted for Hurricanes Charley, Ivan, Katrina and Sandy. He helped develop the FEMA Disaster Risk Reduction Minimum Codes and Standards Policy and has been heavily involved with incorporating modern building code adoption into the National Mitigation Investment Strategy, FEMA's Strategic Plan, and FEMA’s grant programs. Before coming to FEMA in 1999, John served as a Building Code Official in Florida. Mr. Ingargiola holds a Bachelor of Engineering Degree in Civil Engineering from the Cooper Union for Advancement of Science and Art.

### **Risk Rating 2.0: Perspectives on Flood Insurance, Floodplain Management, Mitigation and FEMA's 3-Legged Stool**

Bill Nechamen, CFM, Nechamen Consulting, [billnechamen@gmail.com](mailto:billnechamen@gmail.com)

**Co-presenters:** None

**Abstract:** Risk Rating 2.0 is the first time in 40 years that FEMA has made significant changes in the NFIP flood insurance rating process. Instead of a series of rate tables that are available to the public, all flood insurance ratings are done by an algorithm that includes many more variables. The new system no longer uses a binary "in or out" approach to flood risk zones. In fact the flood risk zones on FEMA's Flood Insurance Rate Maps are no longer used to rate policies. Instead such variables as the type of flooding, distance from the flooding source, elevation of the ground above the elevation of the source of flooding and the elevation of the lowest floor above the ground all go into the algorithm. Because elevation above or below the Base Flood Elevation is no longer used to rate policies, such mitigation measures as freeboard, vent openings and protection of mechanical equipment represent only a part of the rating process and are no longer the primary rate driver. This presentation will explore the variables used in the rating process and will consider questions of fairness and accuracy in the the input data and the resulting flood insurance rates.

**Biography:** Bill Nechamen is Principal and owner of Nechamen Consulting, LLC of Schenectady, NY, a company dedicated to providing training and information related to flood risk and the National Flood Insurance Program. Bill was the State Floodplain Management Coordinator for the New York State Department of Environmental Conservation (NYSDEC) from 1996 until 2017. He is the past chair of the Association of State Floodplain Managers (ASFPM) and serves as co-chair of the ASFPM Floodplain Regulations committee. He was a founding member and the first Chair of the New York State Floodplain

and Stormwater Managers Association (NYSFSMA) and currently serves that organization as treasurer and co-chair of the public policy committee

## **A2: Mitigation Planning**

### **What's [in] the Plan? What Floodplain Managers Need to Know about FEMA's Mitigation Planning Policies**

Cathleen Carlisle, MPA, CFM, Federal Emergency Management Agency, Cathleen.Carlisle@fema.dhs.gov

**Co-presenters:** Shubha Shrivastava, shubha.shrivastava@fema.dhs.gov

**Abstract:** Last year, we reached a milestone: 20 years of mitigation since the Disaster Mitigation Act of 2000. In that time, tens of thousands of communities have used mitigation planning as the foundational step to understand and act to reduce their risk. Now, in 2022, the National Mitigation Planning Program is releasing the next generation of the State and Local Mitigation Planning policies. The updated policies reinforce that resilience is a whole-community effort that builds state and local capabilities to plan for long-term risk reduction, climate change and equitable outcomes. Through these policies, FEMA encourages state, local, tribal and territorial partners to plan for and implement diverse mitigation actions, including nature-based solutions, capability-building actions, land use and building activities that increase resilience and can be implemented using a range of resources. Floodplain managers have been and will continue to be an important partner in the mitigation planning process. This session will cover the background on the policies (what they are and how they are used); discuss specific changes, highlighting places where floodplain managers have a role; and share more about how the floodplain management community can get more involved in the mitigation planning process and implementing the plan.

**Biography:** Cathleen Carlisle, MPA, CFM is a hazard mitigation planner with the Federal Insurance and Mitigation Administration at FEMA Headquarters where she leads project teams to produce policy guidance, training and other tools to support FEMA's National Mitigation Planning Program in FEMA's ten regional offices. Cathleen has also served as Lead Mitigation Planner for FEMA Region 2 in New York City leading a team of planners providing technical assistance, and plan review for the States of New York and New Jersey. Prior to joining FEMA, Cathleen planned and coordinated mitigation programs for the City of Portland, Oregon Office of Planning and Development Review where she worked to develop and implement policies with City Planning and Building Officials to mitigate flood and earthquake risk to the city.

### **Planners Unite! The Rise of Planners in Floodplain Management**

Stacy Wright, AICP, PMP, CFM, APA HMDR, stacy.wright@atkinsglobal.com

**Co-presenters:** Christine Caggiano, ccaggiano@mbakerintl.com

**Abstract:** Since the Disaster Mitigation Act of 2000, planning in hazard mitigation has grown exponentially and the field of practice continues to expand. There is still much work to do across the US, as floods, wildfires and climate change continue to impact us each year and planners are front and center battling these issues. Planners are frequently called upon to advise municipalities, counties, regions, states and federal agencies concerning risk reduction and disaster recovery. But the work of

planners cannot happen in a vacuum. Planners work with communities to set the long-term vision for land use and development, and floodplain managers execute that vision through development permitting and other regulations. The American Planning Association (APA)'s Hazard Mitigation and Disaster Recovery Planning Division is a gathering place for members that all have an inherent and significant interest in making communities safer from natural and man-made hazards and in planning recovery from resulting disasters. The Division fosters professional communications on these topics and builds a stronger knowledge base for use by planners through professional development, mentoring and networking. This presentation will: 1. Introduce you to the role of planners in hazard mitigation planning and disaster recovery. 2. Discuss ways floodplain managers and planners can better collaborate to create more resilient communities nationwide. 3. Provide an overview of the resources available through APA's Hazard Mitigation and Disaster Recovery Planning Division. Join leadership from the APA's Hazard Mitigation and Disaster Recovery Division to learn more about how our disciplines can work together for a safer future.

**Biography:** Stacy Wright is the current Chair Elect of the American Planning Association (APA) Hazard Mitigation and Disaster Recovery Division, taking over the Chair role in 2022. She is a seasoned planner with Atkins, N.A., where she shares her expertise and passion related to hazard mitigation, post-disaster support, risk communication and risk/vulnerability assessment with communities and agencies across the United States. She currently serves as Risk Reduction and Hazard Mitigation Lead and subject matter expert for STARR II for all Risk MAP activities related to post-disaster support, natural hazard risk assessment and hazard mitigation support to FEMA. She obtained her Bachelor of Arts in Public Policy Analysis from the University of North Carolina at Chapel Hill in 1996, as well as an Executive Certificate in Community Preparedness and Disaster Management in 2007. She is also well-credentialed as a certified planner (AICP), a certified floodplain manager (CFM) and a project management professional (PMP). She has been involved in the post-disaster response, recovery, and/or redevelopment process for over 120 federally declared disaster events resulting from various hazard impacts.

### **Integrating Hazard Mitigation Planning and Floodplain Management Programs**

Tony Subbio, CEM, CFM, PMP, Tetra Tech, Inc., [tony.subbio@tetrattech.com](mailto:tony.subbio@tetrattech.com)

**Co-presenters:** None

**Abstract:** Hazard mitigation- the long-term reduction in vulnerability to natural and non-natural hazards- is a function that should be integrated throughout a municipality's programs and normal operations. Where flooding is the #1 hazard a community faces, which is common across the country, it is especially important to reduce vulnerability to flooding through strong floodplain management practices. Many of these vulnerability-reducing projects and practices can be implemented relatively easily, with little or no outside funding required. Other enhancements require significant funding assistance. To access that funding, projects will need to be identified in existing community plans, such as a FEMA-approved hazard mitigation plan (HMP). This presentation will describe how hazard mitigation can be integrated into a community's holistic floodplain management program and vice versa. It will help attendees identify mitigation actions that they can take in their communities to reduce their risk from flooding. Finally, it will describe how a floodplain administrator can be involved in a single- or multi-jurisdictional hazard mitigation planning process, which is often led by an emergency manager or planner, to ensure that their identified mitigation actions can be funded by grants and other funding streams.

**Biography:** Tony Subbio is a community resilience consultant with over 17 years of experience helping municipalities, counties, regions, and states enhance their emergency management, hazard mitigation, and/or floodplain management programs. He has led more than 20 countywide hazard mitigation plan updates across Pennsylvania and New York State; provided technical expertise on floodplain management and National Flood Insurance Program (NFIP) compliance to the Commonwealth of Pennsylvania, including serving in the Commonwealth's NFIP coordination role; and has worked with nearly 30 communities in Pennsylvania, New Jersey, New York, and California on entering and/or succeeding in the Community Rating System (CRS) Program. He has presented on emergency preparedness, floodplain management, and hazard mitigation topics at local, state, and national training sessions and conferences, and is a Certified Floodplain Manager and Certified Emergency Manager.

### **A3: Flood Damage Assessment and Probabilistic Analysis**

#### **Resolving the High-Frequency Coastal Flood Risk for Probabilistic Flood Analysis and Mitigation Action**

Jeff Gangai, CFM, Dewberry, [jgangai@dewberry.com](mailto:jgangai@dewberry.com)

Co-presenters: Lauren Schmied, [lauren.schmied@fema.dhs.gov](mailto:lauren.schmied@fema.dhs.gov)

**Abstract:** FEMA is moving toward the generation of probabilistic coastal flood hazard datasets to support development of graduated, structure-level risk assessments. This will provide stakeholders a better understanding of risk and inform mitigation actions. A probabilistic coastal analysis necessitates determination of multiple hazards for a range of frequencies. This presentation will focus on FEMA's efforts to better refine the high-frequency coastal flood hazard and resulting damages. FEMA coastal mapping products have traditionally focused on the 1-percent annual exceedance probability (AEP) flood. Data generated to support these products often covers a larger frequency space and coastal Flood Insurance Studies provide the 10-percent AEP to the 0.2-percent AEP flood hazard data. Chronic flood damages can accumulate over time more frequently than the 10-percent AEP and the sum losses can be as impactful as catastrophic events. Improved methods are needed to define that high-frequency space in a way that supports structure level assessment. The best source for high-frequency water level data is from water level observing stations. A shorter record is suitable for high-frequency analysis, which allows the inclusion of additional water level stations as compared to FIS needs. Challenges remain, as the increased number of stations are not spatially dense enough to represent hazards for all flood exposed areas. This presentation will discuss methodology explorations for high-frequency flood AEP calculations in a case study on the Delaware coast. Analysis was performed on a series of water level stations and spatial translations of the outputs was developed. The derived AEPs were then merged and substituted into existing FEMA coastal FIS data. Finally, the resultant AEP curve was used to identify areas most at risk to coastal flood hazards through building flood damages and average annualized losses. Our presentation will provide an overview of this approach and demonstrate how it improves coastal flood risk assessments.

**Biography:** Mr. Jeff Gangai has been practicing coastal engineering for over 25 years. He holds a Bachelor of Science in Maritime Systems Engineering from Texas A&M University at Galveston and a certificate in Coastal Engineering from Old Dominion University. His area of specialty is coastal hazards including coastal processes and marine structures. Before joining Dewberry, he worked for five years

with the U.S. Army Corps of Engineers at the Galveston, TX District. For over 20 years he has worked at Dewberry on the National Flood Insurance Program for the coastal regions of U.S., evaluating and reviewing coastal flood hazards. He serves as a senior coastal technical specialist and coastal project manager supporting coastal hazard studies.

### **Computing Multi-Frequency Coastal Storm-Induced Erosion Damages**

Betsy Hicks, PE, CFM, AECOM, [betsy.hicks@aecom.com](mailto:betsy.hicks@aecom.com)

**Co-presenters:** Chris Jones, PE, [chris.jones@earthlink.net](mailto:chris.jones@earthlink.net), Jeff Gangai, CFM, Dewberry, [jgangai@dewberry.com](mailto:jgangai@dewberry.com) and Lauren Schmied, PE, FEMA, [lauren.schmied@fema.dhs.gov](mailto:lauren.schmied@fema.dhs.gov)

**Abstract:** FEMA is moving toward generation of probabilistic coastal flood hazard datasets to support development of graduated, structure-level risk assessments. This will provide stakeholders a more comprehensive understanding of their risk and inform mitigation actions. A probabilistic coastal hazard analysis necessitates determination of multiple hazards including water levels, wave heights, wave runup, erosion, and overtopping for a range of frequencies. This presentation will focus on efforts FEMA has undertaken to estimate storm-induced erosion damages from multiple flood frequencies. Historically, FEMA's erosion analysis has been limited to the 1-percent and sometimes 0.2-percent-annual-chance event. Recent efforts by FEMA have explored ways to expand the erosion analysis to multiple frequencies using a case-study area within Rehoboth and Dewey Beach, Delaware. The result is a basic framework that builds from available coastal flood insurance study data to compute erosion damages from annual event probabilities ranging from 10-percent to 0.1-percent. Three components of this framework will be presented in detail: interpolation of transect-based erosion predictions onto the buildings between the transects, conversion of erosion predictions into damage estimates using erosion damage functions, and calculation of averaged annualized erosion losses. The presentation will highlight lessons learned from testing the framework at both small and county-level scales as well as potential next steps for advancing towards FEMA's goal of developing probabilistic coastal flood risk datasets.

**Biography:** Mrs. Hicks is a coastal engineer with over 11 years of experience working on coastal flood hazard studies as part of FEMA's National Flood Insurance Program and climate change studies of varying scale. She is passionate about developing innovative ways to evaluate coastal hazards and finding clear, creative, and visually engaging methods to present coastal risks to diverse clients, state and local officials and to the general public.

### **Flood Damage Assessment in High Velocity Flood Zones**

Michael DePue, PE, CFM, PMP, Atkins, [michael.depue@atkinsglobal.com](mailto:michael.depue@atkinsglobal.com)

**Co-presenters:** None

**Abstract:** This presentation will discuss state of the art in assessing flood damage in areas where high velocities are present. In particular, the presentation will examine historical practices, new data sources, and known gaps for coastal surge, tsunami, riverine flash flood, and dam breach events. The authors will discuss options for flood damage Average Annualized Loss (AAL) computations in these zones, both with integrated depth-velocity-damage curves and with velocity add-on impacts.

**Biography:** Mr. DePue is a Vice President and Principal Technical Professional with Atkins' Federal Business Unit. He is a registered Professional Engineer in 15 states, a Certified Floodplain Manager (CFM), and a Project Management Professional (PMP). His current work focuses on 1-D and 2-D national-scale floodplain mapping, national-scale Average Annualized Loss (AAL) analyses, programmatic

cost estimation, and on-demand analytics to predict flooding extents, severity, and damage pre-and post-disaster. In 2017, Mr. DePue developed a Machine-Learning model of wind and flood damage from Hurricanes Irma and Maria to predict damage to individual structures. This model reduced inspection needs from over 130,000 structures to 30,000. Mr. DePue also led an engineering team that developed 2-D models of 36 dams in Puerto Rico in 72 hours immediately following Hurricane Maria to map the flood risk if those dams were to breach due to high rainfalls. He is an invited keynote and panel speaker on Climate Change and Flooding issues. Mr. DePue served as a subject matter expert for the Federal Emergency Management Agency (FEMA) Interagency Levee Policy Review Committee in 2006 and provided technical support to the California Department of Water Resources Central Valley Flooding Independent Review Panel in 2007. He is an author, co-author, or contributor to 24 papers and 84 presentations and seminars on water resources issues. Mr. DePue's experience includes one- and two-dimensional modeling for riverine and coastal flood and scour studies, as well as the design of stormwater systems for highway and land development projects.

## **A4: State Mapping Initiatives**

### **Quilting: Not Just a Pandemic Hobby**

Rachel Forster, Texas Water Development Board, [rachel.forster@twdb.texas.gov](mailto:rachel.forster@twdb.texas.gov)

**Co-presenters:** None

**Abstract:** In 2019, the Texas legislature created a new state and regional flood planning process, with flood planning regions based on major river basins. The initial regional flood planning groups were formed on October 1, 2020, with the goal of delivering the first regional flood plans by January 2023. New funding was allocated to create statewide Base Level Engineering (BLE) flood risk mapping information. However, BLE will not be completed until 2024. Therefore, the Texas Water Development Board needed to quickly provide the best possible representation of flood risk data statewide for use in upcoming flood planning efforts. Given the size of Texas, floodplain data can be disparate and exists in varying degrees of quality. There were many challenges to overcome to provide a cohesive dataset in a rapid manner, while also maintaining quality. To assist in the development of regional flood plans, the Texas Water Development Board consolidated existing data sources to provide a single composite flood risk dataset for the state of Texas. This presentation will describe the processes used to consolidate various data sources and fill in any gaps, and provide an easily digestible digitized floodplain dataset for Texas, in the form of a "flood quilt".

**Biography:** Rachel Forster is a Geographic Information Specialist at the Texas Water Development Board. After graduating from the University of Texas with a Bachelor of Science in Hydrogeology, Rachel began her career in environmental compliance. She now focuses on geospatial analysis of floodplains for planning and mitigation.

### **Discovery Reimagined**

Dani Halloran, AECOM, [dani.halloran@aecom.com](mailto:dani.halloran@aecom.com)

**Co-presenters:** Griffin Cullen, [griffin.cullen@aecom.com](mailto:griffin.cullen@aecom.com)

**Abstract:** Who doesn't love striking off items on the to do list? Or seeing your checklist with all the boxes ticked? What a rush?! Completion of the Discovery process is the first step in updating Flood Risk Projects, but it is much more than just fulfilling a requirement. AECOM worked with the Colorado Water Conservation Board (CWCB) to reimagine how we approach Discovery in Colorado and to make it more than just ticking a box. In the past, Discovery reports have been extensive, comprehensive, and probably used as paperweights. AECOM and CWCB aimed to create more of a coffee table book, something that is full of information while keeping the reader engaged and ready for more. AECOM and CWCB also wanted to increase information dissemination for all readers, while refocusing on the partnership with FEMA, Cooperating Technical Partners (CTPs), state mapping and mitigation agencies, and Risk MAP providers. AECOM created template materials that provide consistent products and allow all Colorado Discovery purveyors to draw from numerous data sources to provide simplified maps summarizing population and growth, geography and climate, natural hazards, the Coordinated Needs Management Strategy database (CNMS), and existing Hazard Mitigation Plans. Prior to conducting the Discovery meeting with a community, Colorado consultants also perform Base Level Engineering hydrology and hydraulic analyses on streams within the study area to help communities gain a well-rounded view of potential flood risk. The data gathering and analyses comes to fruition in study recommendations developed with the goal of focusing funding and efforts on areas with greatest need. The data, results, and recommendations are compiled into easy-to-read map sheets, rather than pages and pages of text. Ultimately, AECOM tried to reimagine the Discovery process to focus on risk understanding and mitigation during the early stages of the Risk MAP process, with more than just a report.

**Biography:** Dani Halloran is a Hydrology and Hydraulics Project Engineer with AECOM in Denver, Colorado. In her 3 with AECOM, she has focused on floodplain analysis and mapping. She received her BS and MS in Environmental Engineering from Northern Arizona University. In her spare time Dani enjoys seeing live music, skiing, and traveling.

### **Transitioning Midstream: A Case Study of the Migration of data development and stakeholder engagement activities to ArcGIS Online for the Louisiana Watershed Initiative**

Jason Currie, PE, CFM, Freese and Nichols, [jason.currie@freese.com](mailto:jason.currie@freese.com)

**Co-presenters:** Joanna Quiah, [joanna.quiah@freese.com](mailto:joanna.quiah@freese.com)

**Abstract:** The ever-changing climate of technology often demands creative solutions and adaptive approaches. This is particularly relevant to modeling and analysis techniques in the realm of floodplain management, where virtual maps and interactive applications are integral for sharing data between municipal / governmental agencies, private-sector entities, and the general public. ArcGIS Enterprise is a widely recognized and utilized tool for flood risk assessment professionals to perform modeling and analyses on study areas, while ArcGIS Online is rapidly becoming a key player for its functionality as a cloud-based platform for "collaborating, sharing, and connecting with geographic data." Freese and Nichols is one of several firms that was selected to develop flood risk data for the Louisiana Watershed Initiative, which is a massive data development and analysis effort that is being conducted with leadership from the state and with significant input from stakeholders at the local and parish level. This initiative is a key element in the reevaluation of the state's approach to flood mitigation that was necessitated by the increasing frequency of riverine and coastal flooding disasters in the past two decades. The guiding principles of this initiative are to use scientific data and tools, enable transparent



decision-making, maximize the natural function of floodplains, and to establish watershed-based management of risk. In consideration of these principles, the user-friendly and collaborative capabilities of ArcGIS Online should be leveraged for its ability to provide elegant, web-based mapping and data analysis functions while being accessible by the public when needed. This presentation will outline the benefits and challenges associated with transitioning mid-project from ArcGIS Enterprise to ArcGIS Online, specifically, for the Louisiana Watershed Initiative.

**Biography:** Jason Currie is a civil engineer specializing in hydraulic and hydrologic modeling for flood risk identification and mapping applications. Mr. Currie graduated with a Bachelors degree in Civil and Environmental Engineering from the University Of Pittsburgh Swanson School Of Engineering in 2005, and has been a professionally registered engineer in NC since 2010. He has over 16 years of experience and has spent the last 14 years leading and executing large scale hydrologic and hydraulic modeling efforts. He has performed a broad spectrum of project planning and management activities, and is highly proficient in HEC-RAS, HEC-HMS, and a variety of GIS applications.

## **A5: Changing the Story: Real Estate, Risk Rating, and Communications**

### **Having the Flood Talk in the Age of Risk Rating 2.0**

Butch Kinerney, FEMA, [Eugene.Kinerney@fema.dhs.gov](mailto:Eugene.Kinerney@fema.dhs.gov)

**Co-presenters:** Shilpa Mulik

**Abstract:** With the recent implementation of Risk Rating 2.0, the National Flood Insurance Program (NFIP) proposes a 4–5-person panel of experts to discuss how floodplain managers and other local and state officials can talk to their communities about flood risk, flood mitigation and flood insurance in this new age. FEMA’s Butch Kinerney will host, and attendees will learn from panelists about Risk Rating 2.0’s implementation and discuss tips local officials can share on flood risk, flood mitigation steps, and what really goes into your flood insurance premium rate. Three of the proposed panelists are Shilpa Mulik, John Ingargiola, and John Hintermeister. Shilpa Mulik, from FEMA’s Floodplain Management Division, will speak to how local floodplain managers can talk about flood insurance and what effects of Risk Rating 2.0 will have on community discussions. John Ingargiola, from FEMA’s Building Sciences Branch will discuss the criticality of local building code adoption and enforcement and mitigation in the days of Risk Rating 2.0, as well as long-term opportunities and considerations for locals about personal risk. John Hintermeister, FEMA’s Underwriting Branch Chief will discuss the factors that contribute to a Risk Rating 2.0 premium and suggestions on how to make rates more digestible to policyholders. Additional discussion points include a state-by-state breakdown of Risk Rating 2.0, addressing consumer confusion on rates and policy changes, and the benefits of the new rating methodology. Goals 1.

Communicate the changes associated with the Risk Rating 2.0 roll-out, including its benefits and impacts on individual states 2. Empower floodplain managers to communicate with their communities about the benefits of Risk Rating 2.0’s implementation 3. Direct floodplain managers to [Agents.FloodSmart.gov](http://Agents.FloodSmart.gov) for additional information and resources.

**Biography:** Butch Kinerney, FEMA Butch Kinerney is Chief of Marketing and Outreach for the National Flood Insurance Program within the Federal Emergency Management Agency. In that role, he oversees the multimillion-dollar Customer-Centric Communications initiative to educate home and business

property owners about the necessity of protecting themselves against the financial devastation wrought by floods. He also oversees all customer communications for the Federal Insurance Directorate within the Federal Insurance and Mitigation Administration. Since 2012, he's been an integral part of implementing of legislative changes to the NFIP. Butch has served in many capacities since joining FEMA in 2004: as chief of strategic communications for the Federal Insurance and Mitigation Administration where he oversaw efforts to help communities and the public build safer, stronger and smarter to lessen the impact of natural and manmade disasters. He has served as spokesperson for the National Flood Insurance Program, spokesperson for FEMA's Mitigation Division and he received a battlefield appointment to FEMA Press Secretary during the 2005 hurricane season immediately following the departure of FEMA senior staff in the wake of Hurricane Katrina. He's also been a field disaster information officer for a number of hurricanes, tornadoes, floods and other events.

### **Tapping into the Great Real Estate (and Data) Migration**

Leslie Chapman-Henderson, FLASH, [samuel.tatham@ogilvy.com](mailto:samuel.tatham@ogilvy.com)

**Co-presenters:** Patrick Pannett, [patrick.pannett@ogilvy.com](mailto:patrick.pannett@ogilvy.com)

**Abstract:** A consumer survey conducted by the Federal Alliance for Safe Homes (FLASH) determined that 58% of homebuyers would have selected a different home if they had been made aware of natural disaster vulnerability before purchase. Mainstream real estate sites (Redfin, Realtor.com) have started disclosing information on a property's present and future flood risk, revealing a shift in consumer messaging when it comes to home buying and climate threats. This signals a critical opportunity for floodplain managers to leverage mainstream conversation when it comes to flood risk. With climate messaging moving into home buying discussions, resilience and flood risk are no longer just seasonal or geo-specific conversations. In this session, FLASH and Ogilvy will explore the following questions: •

Where is new data showing up and how do floodplain managers and local leaders play a critical role in this shift? • What do recent home buying trends reveal? • How can resilience be a selling point during the home buying process? • How can a nationwide "Resilient Realtor" movement ensure homebuyers are making well-informed decisions that include climate threats? Learn how new data resources can be paired with FEMA's mapping tools and FLASH's Buyer's Guide to Resilient Homes to help equip homebuyers with a 360 view of a home's overall health and risk, improving the safety of your community.

**Biography:** Leslie Chapman-Henderson is the president and chief executive officer of the nonprofit Federal Alliance for Safe Homes (FLASH), the country's leading consumer advocate for strengthening homes and safeguarding families from natural and manmade disasters. FLASH was founded in 1998 and brings together more than 100 diverse partners that share a vision of making America a more disaster-resilient nation. Leslie's experience and expertise span creative, technical, and public policy initiatives from delivery of the award-winning, 4-D "edu-tainment" experience, StormStruck: A Tale of Two Homes® at Epcot® at the Walt Disney World® Resort to the development of Blueprint for Safety®, a landmark education program. In 2016, she developed the award-winning National Hurricane Resilience Initiative - #HurricaneStrong, presented by FEMA, FLASH, NOAA, and The Weather Channel. One of her most recent projects is the creation of No Code. No Confidence. – InspectToProtect.org, a groundbreaking, research-informed public education campaign that drives resilience by increasing transparency regarding building code adoption statuses across the United States.

## **A6: Local Levee Processes and Success Stories**

### **FEMA Has Accredited Your Levee - What Comes Next?**

Vicki Twerdochlib, PE, CFM, HDR, [vicki.twerdochlib@hdrinc.com](mailto:vicki.twerdochlib@hdrinc.com)

**Co-presenters:** None

**Abstract:** As the nation slowly works toward a national levee safety committee, design standards and a program, the following steps taken in response to certification efforts will help levee sponsors reduce their risk. Completing a FEMA certification package for a levee system is no simple task. Scouring your archives for needed information, collection additional soil borings and engineering analysis is a time consuming and potentially expensive process. A certification is not the end of the story, and it won't be the last time you'll have to manage the process. This presentation will review the steps a levee sponsor can take to make the most of the certification effort and reduce the rigor of the next round. The presentation will run through the certification checklist and review those items that typically change between certification periods and those that do not. Items to track will include everything from operations and maintenance, record keeping, and levee, or ancillary structure, improvements. Tracking items that change will reduce the level of effort at the time of the next certification process. Case studies will be used to illustrate methods that have worked well for levee sponsors to manage the information gathering and certification update process. These case studies will be used to identify common coordination issues that many levee sponsors have to deal with (such as private infrastructure that either intersects or directly abuts the levee section) and the solutions we have helped levee sponsors employ to resolve these issues.

**Biography:** Vicki Twerdochlib serves as a project manager and senior water resources engineer in the Dams, Levees, Civil Works business class for HDR in Omaha, Nebraska. Her experience includes the design, planning, evaluation, and construction oversight of levee systems. Vicki's planning experience includes O&M planning, Systemwide Improvement Framework (SWIF) planning, and general levee safety considerations. Vicki is recognized as a professional associate for her work and expertise and her proficiency on various USACE levee and FEMA certification criteria. Further, Vicki is a recognized technical advisor for Section 408 authorization procedures as well as levee certification requirements.

### **Tackling Regional Resiliency with Floodgate in the City of Lumberton Levee System**

Amit Sachan, PE, CFM, Atkins, [amit.sachan@atkinsglobal.com](mailto:amit.sachan@atkinsglobal.com)

**Co-presenters:** Rob Armstrong, PE, [rarmstrong@ci.lumberton.nc.us](mailto:rarmstrong@ci.lumberton.nc.us)

**Abstract:** The "levee-protected" zone of the City of Lumberton was flooded twice in a two-year period during Hurricanes Matthew (2016) and Florence (2018). Finding a more permanent solution for "plugging the hole" in the levee system, instead of the current sandbagging protocol, has long been a desire of the City. In partnership with the State of North Carolina and funded by a private foundation, the City, the Federal Highway Administration, and the CSX railroad came together to address this repetitive flood problem. The City retained Atkins, serving as the Engineer-of Record to design a flood prevention closure at a CSX railroad underpass at Interstate I-95, which is a critical point of vulnerability. Recognizing the importance of partnerships and the roles of partners from the beginning is key to success. For example, the land ownership by the North Carolina Department of Transportation and the

Federal Highway Administration was addressed early on in the design phase. The design is primarily funded by federal and foundation grants and involves multiple state and federal agencies, including FEMA, the NRCS, and the US Army Corps of Engineers due to the existing levee system and citywide structural and non-structural measures to mitigate flooding that were required. In addition to the engineering design of the floodgate system, the presentation will focus on the roles of the various partners and how the design effort is managed to address the partner requirements, address how emergency preparedness is built into the gate operations, and how funding is being secured to construct the project. The presentation will highlight and showcase how private and public partnerships can serve as an example to other communities as to the value of effective partnerships to fund and construct critical flood prevention infrastructure. This presentation will also share lessons learned in design, permitting, coordination, and construction activities.

**Biography:** Amit is Project Director with Atkins in Public and Private Business Unit in Raleigh. With over 20 years career spanning academics and private sectors, Amit has served in engineering and business development roles. His project experience includes riverine modeling, stream restoration, stormwater capital improvement, flood control, erosion control and roadway drainage projects for municipal, state, and federal clients. Originally from India, Amit received an undergrad from IIT Bombay and graduate degrees from Virginia Tech and NC State. Amit has been on the board of directors for American Council of Engineering Companies and he is a current chairman for North Carolina Association of Floodplain Managers. On personal front, Amit enjoys volunteering for STEM education programs such as MATHCOUNTS and FutureCities. Amit stays in Cary with his wife and two kids and they enjoy outdoor activities.

### **Frankenmuth Levee Improvements Project: Flood Resilience Success Story**

Rich Niles, Woodard & Curran, [rniles@woodardcurran.com](mailto:rniles@woodardcurran.com)

**Co-presenters:** Joseph C. Kirby, PE, CFM, [jkirby@woodardcurran.com](mailto:jkirby@woodardcurran.com)

**Abstract:** The Town of Hadley flood protection system was constructed in 1928 and consists of an earthen levee embankment system and protects a portion of the Town against the 100-year flood associated with the Connecticut River. The levee consists of 1.7 miles of constructed levee and 1.5 miles of earthen embankment associated with the former railroad, which is currently a Rail Trail. FEMA is currently updating the 1978 effective FIRM based on updated mapping and the Levee Analysis and Mapping Procedure (LAMP). In anticipation of remapping, the Town began a phased process in 2014 to assess if the system qualifies for certification under 44 CFR 65.10, "Mapping of Areas Protected by Levee Systems". Recent engineering studies identified seepage and stability deficiencies at numerous critical sections and the preliminary base flood elevation (BFE) provided by FEMA indicates that there may be widespread freeboard deficiencies. The Town funded a study to evaluate alternatives and the economic and environmental feasibility of upgrading the existing levee to meet 44 CFR 65.10. If the Town cannot meet these requirements, the levee and protected area will be remapped within the new floodplain. While this will have economic impacts, the cost-benefit was questioned based on the scale of remediation necessary and significant challenges to upgrade the Rail Trail section of the system. The Study, therefore, includes an alternative to abandon the Rail Trail section and extend a new 1.4-mile levee that would provide protection for the majority of the downtown, including critical facilities and infrastructure. This alternative will come at a significant cost, but with significant benefit to properties that are not protected against flooding and are paying insurance premiums. The study includes a

preliminary evaluation of downstream flood impacts, environmental impacts and potential mitigation, and economic impacts, as well as opportunities to fund the capital improvements.

**Biography:** Rich Niles has over 21 years of experience providing consulting for government clients with technical expertise in the areas of flood evaluations and mitigation, dam and levee assessments and remediation design, dam removal and stream restoration, climate impact assessments and building resilience, and stormwater design. He has worked with the NRCS and multiple states to evaluate dams and levees to meet current design standards and support remediation projects. Mr. Niles is experienced in the management of complex projects across multiple disciplines and he is a highly effective communicator with project teams, project owners and stakeholders.

## **A7: Local Case Studies of Navigating Post-Disaster Recovery Programs**

### **Calcasieu Parish and the Case for Unsiloed Consultants**

Gary O'Neal, CFM, CH Fenstermaker & Associates, LLC, gary.onealjr@gmail.com

**Co-presenters:** Brooke Newlin - brooke@fenstermaker.com

**Abstract:** This presentation will focus on response efforts for FEMA-4606-DR, a major disaster that significantly impacted Calcasieu Parish, Louisiana. FEMA-4606-DR was the fourth Presidentially Declared Disaster to affect the Parish in less than a year. At the time of this incident, Calcasieu was still reeling from Hurricanes Laura and Delta along with a Severe Winter Storm which brought torrential rains causing widespread flooding. As the event unfolded in May of 2021, Fenstermaker's in-house Grants Management and Engineering Staff began working in concert with Parish Grant and Public Works officials. This collaboration among both private sector and governmental CFM's served to quickly mobilize Fenstermaker field crews and public employees, launching a data collection effort that would track high-water marks, flood extents, and flood depths throughout the Parish. This rapid disaster response and successful data collection was the result of a shared, clear understanding of proper floodplain management at every level. Calcasieu Parish Public Works, Planning, and Zoning, along with their Grant and Engineering Consultancy group all hold CFM certifications. Each piece of the 'municipal puzzle' demonstrated floodplain management as an intricate practice involving a mixture of non-structural (compliance, high standards and accurate data collection) and structural (projects) concepts to ensure that both compliance and best practices were followed and developed. From having the best available data for Substantial Damage Estimates—ensuring proper post-disaster compliance—to leveraging the understanding that use of this data would inform and supplement post-disaster Hazard Mitigation Grant Applications for critical funding fueling a Resilient Recovery, our consolidated approach (involving CFM's at every level) ensured that DR-4606 was a 'successfully-treated disaster' for Calcasieu Parish.

**Biography:** Gary O'Neal is the Grants Manager at C. H. Fenstermaker & Associates. A CFM and a member of the Association of State Floodplain Managers (ASFPM), he also serves as a Member of the Board of Directors for both the National Hazard Mitigation Association (NHMA) as well as the Louisiana Floodplain Management Association (LFMA). As a Hazard Mitigation Practitioner, Gary has written approximately \$100,000,000.00 in HMA and CDBG-MIT funded Hazard Mitigation Projects for local municipalities since 2017.

## **Holistic Roadmap to Recovery**

Jennifer Aldridge, E.I., CFM, City of Panama City, [jaldridge@pcgov.org](mailto:jaldridge@pcgov.org)

**Co-presenters:** Tanya Shannon, [tanya.shannon@hagertyconsulting.com](mailto:tanya.shannon@hagertyconsulting.com) and Amber Guy, [amber.guy@hagertyconsulting.com](mailto:amber.guy@hagertyconsulting.com)

**Abstract:** After the Category 5 Hurricane Michael devastated the City of Panama City, local leaders were faced with navigating a variety of programs and funding streams to assist in their recovery and work towards their vision of where they can be in 10 to 20 years. A significant priority within their recovery was upgrading the City's water infrastructure throughout the city to address the now regular occurrence of flooding due to the decimation of the tree life by Michael's 161 mph winds. The City has developed a comprehensive strategy, layering federal recovery and mitigation grant funding and other funding sources to address this and other critical needs within the community. Each funding stream and program has their own set of rules and timelines in how they can be utilized and overlapped throughout the recovery; this was overwhelming where costs in the first 90 days exceeded the City's annual budget. This workshop will go over the City's roadmap to recovery identifying critical milestones for decision makers and the major federal and state programs (e.g., Public Assistance including 406 mitigation, 404 Hazard Mitigation Grant Program, CDBG-DR, CDBG-MIT, RESTART, SHIP, etc.) that are all engaged to maximize and expedite the City of Panama City's recovery.

**Biography:** Mrs. Aldridge has worked for the City of Panama City since June 2006 as an Engineer until Hurricane Michael. She was tasked as the Disaster Recovery Project Manager for the City and has been leading the recovery effort for Hurricane Michael. As new events impact Panama City, including Hurricane Sally and COVID-19, her portfolio of responsibilities continues to increase. Mrs. Aldridge also serves as the City's floodplain manager and has been a CFM since 2013. She has been a member of FFMA since 2013 & Region 3 Director for FFMA since 2017. Mrs. Aldridge enjoys spending time with her precious daughters and college sweetheart husband, taking vacations to Disney and the mountains.

## **Dodging Flood Impacts With Multiple Approaches and Funding Programs**

Dan Fricke, PE, CFM, JEO Consulting Group, [dfricke@jeo.com](mailto:dfricke@jeo.com)

**Co-presenters:** Tom Smith, [dodgecoema@gmail.com](mailto:dodgecoema@gmail.com) and Lalit Jha, [ljha@jeo.com](mailto:ljha@jeo.com)

**Abstract:** Desperate to recover from the most devastating flood ever experienced, Dodge County realized a different approach would be necessary to dodge future flooding impacts. The 12 different communities and agencies realized they'd have to work together to not only plan and build flood resilient infrastructure to reduce future flood impacts, but also to secure funding for such a large need. The County and affected communities banded together to pursue multiple funding avenues to address a wide scale of flood risk reduction need. This resulted in HMGP Advanced Assistance funding related to the outlet system that blocks flows from exiting the area effectively as well as BRIC funding on the other side of a city where flows can enter and flood it. CDBG is being utilized to evaluate and repair a critical levee embankment that caused devastating flooding. NRCS WFPO funding is being utilized to address watershed-scale flooding issues affecting multiple communities and transportation corridors. An entire town that was devastated is tapping into resources to re-site the municipality outside of the floodplain. The USACE was tapped to provide rehabilitation of a federal levee. This is in addition to 406 mitigation funding post-disaster for certain areas. This has all happened within 3 years of the disaster due to several considerations, but most importantly due to dedicated local officials determined to recover in a resilient manner. This presentation will discuss the key points of the transition from emergency

response to flood risk resilience planning at varying levels. Funding approaches will be discussed with a highlight of how they complement each other.

**Biography:** Dan Fricke is a Senior Project Manager in Water Resources at JEO Consulting Group, Inc. where he has worked for over 16 years. He holds a Bachelor of Science degree in Civil Engineering and serves as a Board Member of the Nebraska Floodplain and Stormwater Managers Association. Dan's focus is large scale flood risk reduction planning and implementation for communities across the Midwest. He was involved in the emergency response in the days following the record flooding in Dodge County and has continued to serve the city in their resilience actions. Dan champions flood risk reduction using every tool available and is especially fond of non-structural flood risk reduction and flood risk awareness outreach and communication efforts.

## **A8: Moffatt & Nichol Showcase: Ideas to Implementation: Solving the Resilience Jurisdictional Jigsaw Puzzle**

**Moderator:** Lynette Cardoch, PhD, Director, Resilience & Adaptation, Moffatt & Nichol

**Speakers:**

Samantha A. Medlock, Senior Counsel, Select Committee on the Climate Crisis.

Dale Morris, Chief Resiliency Officer, City of Charleston.

Ana Carolina Coelho Maran, P.E., Ph.D., District Resiliency Officer, South Florida Water Management District

**Focus Topic:** Creating resilient communities usually involves multiple jurisdictions. This discussion session today spotlights the roles that these jurisdictions play. With a focus on the federal, regional, and local level, our panelists will share how their organizations impact the resiliency landscape and how these 3 levels can function as nested systems to bring practical solutions to our communities.

## **Session B: 1:45-3:15 pm**

### **B1: Floodplain Management Legislation and Policy**

#### **Impacts of the Infrastructure Act Upon Floodplain Management**

Scott Edelman, PE, AECOM, [scott.edelman@aecom.com](mailto:scott.edelman@aecom.com)

**Co-presenters:** None

**Abstract:** The Infrastructure Investment and Jobs Act (IIJA) is a massive new bill - the likes that have not been seen since the New Deal was performed under President Roosevelt during the Great Depression. IIJA proposes \$550B in new money across 108 separate programs with a 5 to 10 year spend deadline. Of the 108 programs, 67 programs are likely to directly impact our floodplains as well as the planners, scientists, engineers and technicians that will be required to perform the work. Massive projects to protect the coastline, inland waterways and our ecosystem are being proposed. There will be no state or territory that would not benefit from the Act. Items that will be included will be summaries of agency

budgets, timelines, location of work and required congressional reporting of spending. The session will explore this once in a generation opportunity on how we can take advantage of these funds to create a better and safer world for our children and grandchildren.

**Biography:** Mr. Edelman strives to advance the science of sustainability, resilience, and climate change. Mr. Edelman has 40 years of experience devoted to flood insurance studies and floodplain mapping. He has been responsible for overseeing AECOM's floodplain mapping and mitigation work for the Federal Emergency Management Agency (FEMA), as well as many state and local agency Cooperating Technical Partners, including agencies in Georgia, Alabama, North Carolina, South Carolina, Mississippi, Maryland, and California and local/regional CTPs in Florida, Texas, North Carolina, and Virginia. Mr. Edelman is responsible for AECOM's water resource and disaster work globally. He brings the perspective of national-level planning and program management, regional implementation and study management, and state and local agency coordination. He was a key contributor to FEMA projects such as the initial Multi-Year Flood Hazard Identification Plan, developing the initial concepts for the Mapping Information Platform, and contributing to Guidelines and Specifications. He has directed riverine and coastal flood insurance studies in all FEMA regions since 1986. He pioneered the development and application of cost-saving tools such as WISE and GIS-based technologies to streamline the flood insurance study/DFIRM process, reducing schedules up to 75% and costs up to 50%. He is a Past President the ASFPM Foundation and is an ASFPM Foundation Fellow, as well as a past member / presenter of the National Academies of Science committees related to the NFIP

### **Changing the NFIP for a Changing Climate: Update the NFIP's Floodplain Management Standards through Rulemaking**

Joel Scata, esq., NRDC, [jscata@nrdc.org](mailto:jscata@nrdc.org)

**Co-presenters:** None

**Abstract:** Flooding poses a significant threat to life and property and is the most common and costly natural hazard in the United States. Further, the risk of flooding is increasing due to climate change impacts, like sea level rise and changing precipitation patterns, and increased development in the nation's floodplains. Theoretically, the National Flood Insurance Program (NFIP) should deter development in flood-prone areas, ensure that any new development in the floodplains minimizes the potential for flood-damage, and reduces federal expenditures on disaster recovery costs. In practice, the rising debts of the NFIP and growing severity and frequency of flood-related damages, suggest the program is failing to achieve its primary goal. The Federal Emergency Management Agency (FEMA) is required to establish the minimum building, land use, and floodplain management criteria that communities must adopt to participate in the program. Last Fall, FEMA issued a Request for Information (RFI) seeking broad public input on a wide array of potential reforms to the NFIP. FEMA took this action directly in response to a petition filed by NRDC and the Association of State Floodplain Managers (ASFPM). The petition requested the NFIP be updated to reduce harm to the millions of people and properties at increased risk of flooding due to climate change. This presentation will describe what FEMA must do next. Specifically, the presentation will detail the legal options available to FEMA to move from simple information collection to enacting concrete policy through rulemaking. In addition, the presentation will discuss the NFIP floodplain management standards that must be included in any rulemaking to transform the NFIP into the type of future-oriented, climate-informed program the nation needs to cope with the increasingly severe floods and storms. Given the substantial amount of



credible, scientific evidence concerning climate change's role in increasing flood risk, coupled with growing development in flood-hazard areas, the nation needs a federal flood program that adequately accounts for these impacts.

**Biography:** Joel Scata is an attorney with the Natural Resources Defense Council's (NRDC) Water and Climate Team. At NRDC, Scata advocates for and develops federal and state policies and programs that can help adapt the United States to the impacts of climate change. Particularly, he works to: better public access to flood risk information; enact stronger flood protection standards; improve the process to buy out flood-prone homes, and reform the National Flood Insurance Program. Prior to joining NRDC in 2014, Scata served as a Peace Corps Volunteer in Mali, working to conserve land threatened by desertification. He is based in Chicago.

### **Updates on the National Flood Insurance Program (NFIP) Endangered Species Act (ESA) Compliance Planning**

Zane Hadzick, FEMA, Updates on the National Flood Insurance Program (NFIP) Endangered Species Act (ESA) Compliance Planning, [zane.hadzick@fema.dhs.gov](mailto:zane.hadzick@fema.dhs.gov)

**Co-presenters:** Erin Cooper, FEMA, [erin.cooper@fema.dhs.gov](mailto:erin.cooper@fema.dhs.gov) and Michael Nakagaki, FEMA, [michael.nakagaki@fema.dhs.gov](mailto:michael.nakagaki@fema.dhs.gov)

**Abstract:** For the past two years, FEMA Headquarters began working collaboratively with the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) on a national programmatic consultation under Section 7 of the Endangered Species Act (ESA), as amended (16 United States Code [U.S.C.] § 1536). This consultation is in reference to implementation of the National Flood Insurance Program (NFIP) nationwide. To date, the collaborative effort between agencies has included monthly pre-consultation coordination virtual meetings. FEMA is re-evaluating the impact on endangered species of implementation of the NFIP at the national level. In 2021, FEMA launched a nationwide Conservation Action Program after informal consultation under section 7(a)(1) with USFWS and NMFS (collectively, referred to as the Services) to promote conservation of listed species and critical habitat. Section 7(a)(1) of the ESA encourages agencies to use their authorities to conserve threatened and endangered species and minimize any adverse impacts to them. In addition, FEMA Headquarters is currently working with the Services toward conducting a national programmatic consultation on implementation of the NFIP under ESA section 7(a)(2). Section 7(a)(2) of the ESA requires agencies to avoid jeopardy to listed species and habitat. Concurrently with the national NFIP ESA effort, two FEMA regions are undertaking ESA section 7(a)(2) consultations as part of settlement agreements. Region 9 undertook a three-county evaluation of potential impacts to listed species and habitats with development of a Programmatic Biological Assessment. Region 9 leveraged the three-county ESA consultation to conduct a statewide ESA consultation, presently underway. Region 10 is implementing Reasonable and Prudent Alternatives resulting from NMFS Biological Opinion. As a part of this effort, R10 and FEMA Headquarters are preparing a NEPA document to review potential impacts from the RPA implementation. The panel will review the FEMA Headquarters and regional ESA consultation efforts and provide updates on how they will be integrated into the overarching NFIP ESA compliance planning efforts and discuss next steps.

**Biography:** Zane Hadzick serves as the National Endangered Species Act (ESA) Coordinator at FEMA Headquarters. Zane is responsible for overall coordination and support of FEMA's ESA compliance initiatives so that actions are coordinated appropriately, knowledge and visibility is shared between

affected offices, and that related projects are aligned. He also coordinates an interdisciplinary project team of subject matter experts representing the National Flood Insurance Program (NFIP) and program and advisory offices of FIMA to ensure appropriate processes are followed as required by the National Environmental Policy Act (NEPA) and ESA.

Previously, Zane served as the Senior Planning Specialist in the Floodplain Management and Insurance (FMI) Branch of the FEMA's Region 3 office. Zane supervised the FMI team and together they worked to support the Region 3 State Partners and local communities in the implementation of the NFIP. He was responsible for helping communities protect people and property through floodplain management regulations, conducting compliance visits, providing technical assistance, reviewing floodplain regulations, interpreting flood maps and studies, and advocating for the purchase of flood insurance. Zane was also part of the nationally recognized group that developed and implemented the FEMA Region 3 Substantial Damage Administrative Procedures to help communities become more resilient and better prepared for disaster events.

During times of disaster, he served as Liaison Officer (LNO) supporting the Region 3 State Partners. He also deployed as an External Affairs Specialist to support the first-in-nation Mobile Vaccination Units (MVUs) for COVID-19 response efforts to support historically underserved communities.

Previously, Zane was an Environmental Planner for the City of Baltimore, Maryland where he worked as a Floodplain Manager and Community Rating System (CRS) Coordinator.

He holds a Bachelor of Science in Environmental Science and Policy with a focus in Soil, Water, and Land Resources from the University of Maryland and Master's Degree in Natural Resources and the Environment from the University of Michigan.

## **B2: State Mitigation Initiatives**

### **Innovative Flood Resilience Tools for Local Governments**

Kelly Hill, GA Department of Natural Resources, [Kelly.Hill@dnr.ga.gov](mailto:Kelly.Hill@dnr.ga.gov)

**Co-presenters:** None

**Abstract:** This project demonstrates how a coastal community can become more resilient to riverine and coastal flood and wind events by implementing Green Infrastructure (GI) practices such as enhanced infiltration and retention of rainwater, dune enhancement and policies such as shuttering ordinances for mitigating coastal flooding and wind damage. To capture a range of possible current and future conditions, a total of 118 wind and flood scenarios were modeled in two Georgia communities using HAZUS-MH, which is a powerful flood and wind damage and loss modeling software developed by the Federal Emergency Management Agency (FEMA). The results of this analysis show the monetary loss from the flood scenarios based on damages to buildings and structures identified in the flooded area. This modeling considered future hazards stemming from shifts in climate (e.g., precipitation, sea level rise, and temperature), urban development, and land-use changes. Damage assessments were completed for "business as usual" scenarios and for those incorporating green infrastructure practices, allowing the researchers to calculate the potential reduction in damages that would occur if these practices and policies were implemented. This presentation will share the modeling results of current

and future flooding and wind scenarios and the impacts that GI along with land use and policy decisions can have on reducing damages. Associated guidance documents and tools will also be presented.

**Biography:** Kelly Hill works as a Coastal Resources Specialist with the Georgia Department of Natural Resources (DNR), Coastal Resources Division in Brunswick. At DNR Kelly works with the Georgia Coastal Management Program providing technical assistance to local governments and other coastal stakeholders by offering expertise on coastal issues, assisting with her program's Coastal Incentive Grants, and clarifying regulatory requirements. Her specialty area focuses on sustainable and green growth practices as well as promoting the use of Low Impact Development and green infrastructure practices for stormwater management in the coastal region. Prior to joining DNR in 2007, Kelly received her Bachelor's degree in Environmental Science from the University of New Hampshire and her Master's degree in Environmental Management from Duke University.

### **The Resilient Florida Program: An Unprecedented Investment in Florida's Future**

Diane Quigley, AICP, WEDG, Florida Department of Environmental Protection,  
Diane.Quigley@floridadep.gov

**Co-presenters:** Eddy Bouza, Florida Department of Environmental Protection,  
Eddy.Bouza@FloridaDEP.gov

**Abstract:** The Resilient Florida Program was established during the 2021 Legislative Session with the passage of SB1954/HB7019 and the creation of section 380.093, Florida Statutes. The Speaker of the House called this legislation "one of the most robust and bold proposals in the entire United States of America to tackle sea level rise and coastal flooding of any state." This legislation will ensure that communities have the resources they need for resilience planning and project implementation as well as creating a framework for a cohesive, coordinated approach to address the impacts of sea level rise, effects of intensified storms, and localized flooding. In addition to a robust grant program, the legislation requires the compilation of a statewide dataset that will contribute to a statewide flooding and sea level rise vulnerability assessment. This vulnerability assessment will provide the basis for the Statewide Flooding and Sea Level rise Resilience Plan which will guide further investments throughout the state. This presentation will cover the program structure in general, a short legislative history, and highlight some successful grant applications received in the first round of funding to better prepare communities for the subsequent rounds of the five-year program. While specific to Florida communities, the State hopes to lead the way for, and collaborate with, other states who endeavor to take on such a tremendous initiative.

**Biography:** Diane brings 33 years of experience in local, state, and private sector planning. She specializes in strategic planning, policy development, program management and grant administration, as well as environmental, land use and transportation planning. Her experience includes work as a local government planner and a research associate with the University of South Florida and as a private sector engineering and planning consultant. She previously served the state of Florida as an Environmental Program Manager, Intergovernmental Programs Manager, and administrator for the Florida Department of Transportation. During that time, she focused on program management, transportation policy, and the mitigation of environmental and community impacts associated with transportation systems. As the Director of Strategic Initiatives for the Florida Department of Corrections, she managed the Risk Management Program and was instrumental in coordinating the agency's efforts in damage assessment and rebuilding critical infrastructure after Hurricane Michael. She has a Bachelor of Science in Geology

from Nicholls State University and a Master of Urban and Regional Planning from the University of New Orleans.

### **Resilient NY Initiative - Enabling Communities to Address Current and Future Flood Risk**

Shaun Gannon, PE, D.WRE, P.H., CFM, Ramboll, [shaun.gannon@ramboll.com](mailto:shaun.gannon@ramboll.com)

**Co-presenters:** Kadir Goz, [kadir.goz@ramboll.com](mailto:kadir.goz@ramboll.com)

**Abstract:** In November of 2018, New York State (NYS) announced the Resilient NY program in response to devastating flooding in communities across the State in the preceding years. High-priority flood prone watersheds across New York State are being addressed through the program. Flood mitigation studies were commissioned using advanced modeling techniques and field assessments to identify priority projects in flood-prone watersheds, develop state-of-the-art studies to reduce flooding and ice jams, and to improve ecological habitats in the watersheds. The New York State Department of Environmental Conservation is responsible for implementing the program with assistance from the New York State Office of General Services (NYSOGS). The Resilient NY flood studies identify the causes of flooding within each watershed and develop effective and ecologically sustainable flood and ice-jam hazard mitigation projects alternatives. Proposed flood mitigation alternatives were identified and evaluated using hydrologic and hydraulic modeling to quantitatively determine flood mitigation strategies that would result in the greatest flood reductions benefits. The studies incorporate the latest climate change forecasts and assess open-water and ice-jam hazards where future flood risks have been identified. The goals of the Resilient NY Program are to: 1. Perform comprehensive flood and ice-jam studies to identify known and potential flood risks in flood-prone watersheds 2. Incorporate climate change predictions into future flood models 3. Develop and evaluate flood hazard mitigation alternatives for each flood-prone stream area, with a focus on ice-jam hazards. The overarching purpose is to evaluate a suite of flood and ice-jam mitigation projects that local municipalities can undertake to make their community more resilient to future floods. Projects should be affordable, attainable through grant funding programs, able to be implemented either individually or in combination in phases over the course of several years, achieve measurable improvement at the completion of each phase, and fit with the community way of life. This presentation will speak to the programs success in educating the community regarding their current and future risk, promoting mitigation and the use of nature-based solutions.

**Biography:** Shaun Gannon is a Knowledge Expert - Technical Manager at Ramboll America where he leads the Americas Hydrologic and Hydraulic Practice Group within the Water, Infrastructure and Climate division. Shaun is responsible for developing solutions to water resource, stormwater management and flood risk and mitigation projects. He has a passion for the funding issues communities face when addressing flood risk and resiliency project implementation. He is also committed to addressing climate change factors in the repair, replacement, and modernization of infrastructure. Shaun has participated in the NY Floodplain and Stormwater Managers Association since its founding as an ASFP Chapter in 2002. He currently serves on the NY Association board as the Region 6 Director. He holds a Master's in Civil Engineering from Norwich University. He is a registered Professional Engineer in NY, NJ, OH and PA, and a Certified Floodplain Manager. He is also a Diplomat, Water Resource Engineer, a Project Management Professional and a certified Professional Hydrologist. Shaun is an Adjunct Professor in the Civil Engineering Department at the State University of New York Polytechnic Institute where he teaches a senior elective in Hydrology. He has given presentations to the Association of State Floodplain Managers, the Association of Dam Safety Officials, Northeast

Conference, NYS OGS 2017 Design Conference, and the multiple New York State Floodplain and Stormwater Managers Association.

### **B3: Coastal Modeling and Marshes**

#### **Study Design: Accounting for Wave, Sea Level Rise Risk for Marsh Communities**

Erin Benford, GIT, AECOM, erin.benford@aecom.com

**Co-presenters:** Adam Clinch, adam.clinch@aecom.com

**Abstract:** Risks to infrastructure due to storm impacts and sea level rise (SLR) can be complex to quantify, particularly in estuarine marsh systems. However, relatively simple modeling methods can be used to determine vulnerability to SLR, shoreline change, and wave damage; both from the existing wave climate and storm-induced waves. Additionally, publicly available tools and datasets can be leveraged to enhance these analyses. With the use of the USGS DSAS tool, NOAA Sea Level Rise datasets, WHAFIS, SWAN, and a robust research assessment, a study plan was developed to assess the shoreline vulnerability of the marsh shorelines at the Kennedy Space Center, located on Merritt Island, FL. Aerial imagery datasets were employed to produce a shoreline change analysis, while 1D and 2D wave modeling analyses were used to determine current and future wave hazards and potential risk assessments due to SLR inundation. Overland wave propagation analyses were augmented with marsh migration projections and estimates of sediment accretion. The results identified risks due to inundation and wave hazards and were used to make recommendations for shoreline stabilization, storm damage mitigation, and inform decision-making for the future of the site. This presentation intends to outline the decision-making process in designing a project to determine future wave and inundation risk for communities or infrastructure in marshes.

**Biography:** Erin Benford is a Coastal Scientist and Geologist in Training with AECOM. She has been working on and studying the effects of storms and climate change on the Southeastern US coast for 16 years. She is a FEMA coastal guidance and technical mapping subject matter expert. She has a BS in Marine Science with a minor in coastal geology from Coastal Carolina University, an MS in Geology with a focus in coastal geomorphology from UNC Wilmington, and a Graduate Certificate in Coastal Science from University of New Orleans. Her professional interests include GIS analysis of coastal systems, impacts of climate change on the coastal plain, and barrier island system response to storms.

#### **Coastal Storm Surge Study Innovations – Addressing Tide Phases, Transitioning Storms, and Supercharging Quality**

Christopher Bender, Ph.D., P.E., D.CE, Taylor Engineering, cbender@taylorengeering.com

**Co-presenters:** None

**Abstract:** This presentation will share three innovations implemented by the Compass PTS JV during preparation of a coastal surge study, modeling surge from Troy, NY, to Cape May, NJ, for FEMA Region II. The innovations – two technical, one quality – provided greater confidence in the modeling process by both the study team and impacted communities alike. Further details regarding each of these innovations follow. • The first innovation involved a statistics-based approach (termed the Modified Linear Superposition (MLS) method) to analyze and quantify the nonlinear deviations in the tide and surge interactions throughout open coast and sheltered waters. As tides and storm surges along much of the U.S. East Coast are of comparable magnitude, the selection of a small number of random phases

can introduce substantial deviations in estimates of combined tide-surge extremes. The MLS method addresses these deviations in a robust manner, which improves on prior analyses that focused on a limited number of tide phases. • The second innovation involved an approach to address modeling of tropical storms such as Hurricane Sandy (2012) that “transition” to extra-tropical storms in the study area. Traditional study methods have not explicitly separated purely tropical (non-transitioning) and transitioning cyclones. Allowing for the analyses and results to specifically account for the different features and storm surge developed by each type provided an advancement over prior studies. • The third innovation was implementation of a Coastal Advisory Panel (CAP) consisting of key study stakeholders including communities, Federal and State agencies, and other coastal subject matter experts. Numerous CAP webinars were convened to share progress, discuss technical issues, and get feedback regarding approach and findings. CAP members also reviewed and provided comments for all Intermediate Data Submissions (IDSs). This collaborative process is expected to improve the overall project quality and lead to greater study buy-in upon study completion.

**Biography:** Christopher Bender is a Vice President at Taylor Engineering in Jacksonville, FL. Chris's work has focused on coastal processes analysis, beach design, and storm surge and wave modeling. Prior to joining Taylor, Chris obtained his master's and doctoral degrees from the University of Florida. Chris is certified as a Diplomate in Coastal Engineering by the ASCE and is a part-time faculty member at the University of North Florida.

### **Interdisciplinary Forward-Thinking Approaches to Floodplain and Tidal Wetland Restoration**

Scott Blossom, P.E, CFM, LEED AP, Blossom Consulting and Engineering Inc.,  
scott@blossomconsulting.net

**Co-presenters:** None

**Abstract:** As water resources engineering continues to integrate with natural systems design and community development, the critical role of hydrologic and hydraulic modelling in predictive analysis continues to add value in the realm of floodplain management and restoration. When merged with Geographic Information Systems (GIS), historic aerial imagery and climatological data, cutting edge modeling and software platforms facilitate advancements water resources and risk management. Through highlighting a variety of hydrologic and hydraulic (H & H) modelling projects, Scott C. Blossom P.E., CFM, LEED AP will explore the benefits (and limitations) of H & H modelling and its role in managing water resources and restoring floodplains in a variety of settings. Hydrologic and hydraulic analysis for resilient design adds value not only through deliverable but also through process. Through the process of analyzing a system and deciding upon design storms and “scenarios” a design team is forced to gain an understanding of the climatic, topographic, and geographic position of a system and make design decisions based on anticipated outcomes. The fields of stream and wetland restoration have complemented the conventional world of floodplain analysis, dam safety and risk management with a forward-thinking approach involving a more detailed consideration of evolution and natural tendency. The presentation will compare multiple innovative projects, including tidal wetland mitigation designed to adapt to rising tides, stream and floodplain restoration for nutrient crediting in the Shenandoah Valley, watershed modelling to identify road overtopping for 100-year-old military facilities and post hurricane stabilization in steep coastal island settings. The presentation will explore the evolution of ‘urban design storms and scenarios’ that are a standard component of today’s water resource engineering profession, evaluating the similarities and differences between design storms for coastal design, dam safety, floodplain management, restoration and stormwater design.

**Biography:** Scott C. Blossom P.E., CFM, LEED AP specializes in water resource engineering stemming from his long-term commitment to sustainability and resiliency. As a certified floodplain manager (CFM) and LEED Accredited Professional (LEED AP), Scott has focused on high performance stormwater management and floodplain restoration throughout his 20-year career. He has Rosgen training in River Morphology, Assessment and River Restoration and Natural Channel Design and has prepared retrofit & restoration plans as engineer of record for numerous projects throughout the Mid-Atlantic and Caribbean. Mr. Blossom is a graduate of Northern Arizona University with specialized coursework in water resources at the University of Newcastle in New South Wales. He currently leads a highly specialized engineering firm headquartered in Williamsburg Virginia.

## **B4: FEMA Mapping Program Showcase**

### **Exploring the Benefits and Multi-Program Uses of Graduated Flood Hazard and Risk Data**

David Bascom, FEMA Headquarters, david.bascom@fema.dhs.gov

**Co-presenters:** Sean McNabb - sean.mcnabb@fema.dhs.gov, Andy Bonner - andrew.bonner@aecom.com and Mat Mampara - mmampara@dewberry.com

**Abstract:** FEMA's Risk Management Directorate (RMD) leadership has promoted their Future of Flood Risk Data (FFRD) vision, with one of the goals being to shift from a binary to a graduated analysis and depiction of flood hazards and risk. In addition to simply changing the focus beyond just the 1% annual chance event, the FFRD vision includes increased access to flood hazard and risk data that can better support mitigation grants, floodplain management, and disaster preparedness and response needs. As a major element of the FFRD initiative, recent efforts have focused on how the program's explorations into probabilistic flood hazard and risk analyses may help to achieve the goals of FFRD and deliver the cross-program benefits that RMD seeks to accomplish. This presentation will share some of the recent RMD explorations and potential applications of probabilistically-derived graduated hazard and risk data. After establishing a foundational understanding of the opportunities and insights that graduated data offers as compared to traditional NFIP data, several examples will be highlighted that help illustrate the types of benefits that probabilistic analyses and graduated data can provide beyond insurance and mapping. Some of these use cases include supporting community floodplain management policies and development plans, providing rapid access to flood hazard and damage estimates in pre- and post-disaster environments, enabling hazard-informed decision-making at sites of interest for new construction, and more broadly evaluating the benefits and overall impacts of mitigation projects, among others.

**Biography:** Mr. David Bascom serves as the Branch Chief for the Engineering Resources Branch within the Risk Management Directorate at FEMA Headquarters. David is currently guiding the strategic shift within the Flood Hazard Mapping Program to support a risk-informed National Flood Insurance Program (NFIP). This effort involves developing the methodologies, frameworks, and partnerships to support a modern NFIP and to fundamentally improve the Nation's understanding of flood risk through the Future of Flood Risk Data (FFRD) initiative. David oversees a team of coastal, riverine, and levee technical experts, and mapping program experts who provide operational and strategic leadership. David has

been associated with FEMA for over 15 years and holds a B.S. in Civil/Environmental Engineering from Virginia Tech.

### **Collaboration is Road to Coastal Appeal Resolution St. Tammany Parish**

Alan Johnson, P.E., FEMA Region VI, alan.johnson@fema.dhs.gov

**Co-presenters:** Donna O'Dell, St. Tammany Parish (LA); dsodell@stpgov.org, Melissa Kennedy, P.E., Project Manager, HNTB: makennedy@hntb.com and Darryl Hatheway, CFM, Sr Coastal Scientist, AECOM: darryl.hatheway@aecom.com

**Abstract:** St. Tammany Parish (STP), Louisiana, is located along the North Shore of Lake Pontchartrain, and is part of the New Orleans metropolitan area. Lake Pontchartrain and STP's proximity to the Gulf of Mexico, leaves the southern portions of the parish vulnerable to Tropical Cyclone (TC) induced coastal hazards. In particular, the types of coastal hazards threatening STP include storm surge, winds, and waves. This presentation shares details on the evolution of the STP flood map revisions post-Hurricane Katrina (2005) and the community concerns which resulted in a formal appeal by the Parish for the proposed map revision covering over 200 sq miles of coastal flood prone areas. The presentation will also share experiences of Region VI staff, local Parish officials, and coastal consulting teams (on both sides) and discuss how and why the 2008 preliminary flood insurance study and review playbook (not the guidance), were set aside for an agreed upon collaborative approach for independent technical reviews of more current coastal surge information. This allowed FEMA Region VI and STP to open up communications on how to leverage and adopt existing ADCIRC+SWAN coupled hydrodynamic modeling results from the Louisiana Coastal Protection and Restoration Authority (CPRA) reports and modeling documents, and USACE-ERDC technical capabilities in analyzing the latest storm surge analysis results, to provide the technical support documentation to support an appeal. In addition, this presentation will highlight consistency with FEMA coastal study guidance on intermediate data submissions (IDS) and Independent Technical Review (ITR) Quality Control Review (QC) procedures performed by Compass for Intermediate Data Submittals 1, 2, and 3. This guidance and its applied approach will provide perspectives on successes of the collaboration between FEMA Region VI, and Compass RSC coastal support, and STP staff representatives and Study Team representatives from HNTB, CE Hydro and USACE Engineering Research and Development Center (ERDC).

**Biography:** Mr. Johnson has over 35 years of experience in floodplain mapping, management and insurance rating, either with FEMA, or as a FEMA contractor. From 2009-2016, he was lead subject matter expert for the floodplain management reviews of Hurricane Katrina/Rita (LA) or Sandy (NY) Public Assistance recovery reconstruction. Prior FEMA service includes Contracting Officer's Technical Representative overseeing floodplain mapping and modifications west of the Mississippi River in the FEMA HQ Flood Insurance and Mitigation Administration, plus shorter assignments as a Mitigation Grants reviewer in Florida, and Individual Assistance Applicants' evaluator in Alabama. In 2015, he rejoined FEMA, as team member in the Region 6 Mitigation staff. He holds both a B.S. and a M.S. in Civil Engineering from South Dakota St U., and U. of Nebraska, respectively.

### **Exploring Opportunities for Flood Hazard Inventory Expansion**

Laura Algeo, PE, FEMA HQ, laura.algeo@fema.dhs.gov

**Co-presenters:** Rick Sacbibt, patrick.sacbibt@fema.dhs.gov



**Abstract:** This concurrent session will discuss how FEMA is planning for the potential expansion of the flood hazard data inventory. We have an estimated 1.3 million miles of stream inventory that has not been mapped to identify the hazard. FEMA is coordinating with TMAC, Congress, FEMA Regional offices, CTPs and other stakeholders on identifying the technical criteria and policies that should be put in place to expand the evaluation of these flooding sources. FEMA is investigating additional options in providing data to underserved communities and socially vulnerable areas, so communities have access to the data for use in managing their floodplains. These efforts will ensure all communities have access to the data needed to ensure safe development more quickly and more broadly.

**Biography:** Laura Algeo is a Program Specialist with the Federal Emergency Management Agency (FEMA) Headquarters working in the Engineering Management Branch of FEMA's Risk Analysis Division. She currently serves as the national coordinator for the Cooperating Technical Partners program focusing on the development of training, policy, and guidance. Previously, Laura served as a Senior Civil Engineer for the Mitigation Division in the FEMA Region IV office. Her main duties in the Region included serving as the Coordinator for the Cooperating Technical Partners (CTP) Program and conducting training and workshops on technical and mapping issues for States and Local communities throughout Region IV. She has been with FEMA since August 1999 and with FEMA Headquarters since 2015. Ms. Algeo has a Bachelor of Civil Engineering from the Georgia Institute of Technology with an environmental focus and a Bachelor of Science from Berry College in Rome, Georgia. She is registered as a Professional Engineer in the State of Georgia.

## **B5: Risk: Behavior and Perception**

### **Garnering Public Support for Climate Adaptation in the Face of Uncertainty**

Kristin Murphy, ICAgile Certified Professional, Level 4 Social Marketer (CIM), Booz Allen Hamilton, [murphy\\_kristin@bah.com](mailto:murphy_kristin@bah.com)

**Co-presenters:** None

**Abstract:** The impacts of both the changing climate and climate resilience actions affect every interwoven element of our lives. Reducing climate threats in one sector inevitably tugs at the interwoven connections elsewhere and can cause unintended impacts if we're not careful. Add to that the scientific uncertainty that necessitates planning for a multitude of future scenarios and climate resilience becomes, in a word, complex. However, as the impacts of climate change grow increasingly frequent and more severe, state and local governments will be pushed to make tough choices about how to adapt to our new reality. They will need to garner public and political support to stitch together the resources needed to effectively adapt to climate change. To do this, they will need to combat the psychology of uncertainty. This presentation will provide a review of scientific research from the past three years about the ways that scientific uncertainty can undermine risk perception and the motivation to act. It will illuminate risk-taking and protective behavioral patterns in both the public health and emergency management realms (including emerging behavioral insights from the pandemic). The presentation will then consider the best ways to communicate uncertainty and scenario-based planning to increase understanding and the urgency to take climate adaptation actions.

**Biography:** Kristin Murphy is a strategist with Booz Allen Hamilton and has spent over 17 years delivering integrated business solutions for federal programs and private industry within the mission spaces of disaster resilience, environmental protection, and climate change adaptation. Ms. Murphy brings a fresh take on complex government programs and problems – applying her expertise in behavioral science, predictive analytics, agile program management, and social marketing to transform how federal programs serve the social good. Ms. Murphy has been recognized multiple times in the last decade by the strategic communications industry for her rapid innovation workshop designs helping FEMA and the National Flood Insurance Program (NFIP) improve the impact of their programs.

### **COVID-19 to Climate Change: Effective Communication for Behavioral Change**

Sweta Chakraborty, PhD, We Don't Have Time, [sweta@adapttothrive.com](mailto:sweta@adapttothrive.com)

**Co-presenters:** Skye King, [skye.king@ogilvy.com](mailto:skye.king@ogilvy.com)

**Abstract:** "COVID-19 to Climate Change: Effective Communication for Behavioral Change" What Floodplain Managers Can Learn About Behavior Change from the COVID-19 Pandemic The struggle to convince a skeptical public about the importance of COVID-19 vaccination has been extensively covered in the media. In this presentation, two risk communications professionals whose organizations have been on the front lines of community engagement will look beyond the headlines to show how the successes and lessons learned from COVID-19 behavior-change campaigns are fully translatable to communicating risk about natural hazards and community resilience. Ms. Israeli and Dr. Chakraborty will assess local and national campaigns to overcome vaccine hesitancy, uncertainty, and disinformation and boost COVID-19 vaccination rates nationwide, and show how emergency managers, floodplain administrators and others can apply these strategies at the right scale. The assessment will build on Ogilvy's direct expertise supporting the private sector, local governments, and world leaders on strategic engagement during COVID-19; as well as Dr. Chakraborty's work with communities to encourage science-informed, climate-resilient actions. This session and discussion will explore:

- What are the most effective uses of behavioral science and risk communication principles to drive risk reduction?
- How can we apply what we know about decision-making to encourage individual and community-wide behavioral change, and how can risk communicators from organizations of all sizes harness this knowledge to maximize the effectiveness of their work?
- What is the overlap between public health and climate science in changing Americans' perceptions and actions?
- How can different jurisdictions work together to achieve coordinated engagement for the greatest impact?

What are some successful examples of behavior change campaigns at the local community level and what can we learn from them?

**Biography:** Dr. Sweta Chakraborty is a risk and behavioral scientist whose work is motivated by the need for clear, credible, evidence-based communication to urgently and proactively manage the risks that threaten human security and well-being from climate change to COVID-19. She is regularly interviewed on major, international news media outlets including CNN, the NYT, the BBC, Forbes, Fox News Channel, Sky News, CBS, and MSNBC to name a few. She has appeared on networks like Nickelodeon and Discovery+, where she was featured alongside Kamala Harris for an Earth Day 2021 special. Sweta has written extensively in peer-reviewed journals, is a book author from her time as a postdoc at Oxford University, and is currently working on her second book on adaptation to global risks. Sweta is the US President for We Don't Have Time, the world's largest social network and review platform on the climate. She is the Chair of Top Tier Impact's Policy Action Unit. She is also the founder and principle of Adapt to Thrive, a venture that seeks to better inform individuals, businesses, and government entities

on the complex, interconnected challenges, such as food security and disease, already existing and emerging from a warming planet. Sweta has built her career around how to connect science, policy, and communication to change attitudes, empower audiences, and inspire action. Francie Israeli: Francie has more than 20 years of experience in strategic communications and community engagement. Her specialties include public affairs, science and risk communications, and issues advocacy. As a Vice President at Ogilvy, Francie leads risk communications for the Federal Emergency Management Agency's (FEMA) programs that work with communities, elected officials, and other stakeholders to encourage actions that reduce risks from flooding and other natural disasters. Prior to joining Ogilvy, Francie was Deputy Director of Public Affairs for the National Nuclear Security Administration (NNSA) within the U.S. Department of Energy.

### **The Economics of Emotion: Understanding the cost of risk reduction**

Ronda Oberlin Nowak, CFM CEM, Michael Baker International, [ronda.nowak@mbakerintl.com](mailto:ronda.nowak@mbakerintl.com)

**Co-presenters:** None

**Abstract:** Decisions about risk reduction are complex and personal. They often seem to be based more in emotion than in a calculation of risk reduction costs and benefits. This presentation looks at some of the sources of emotion in risk reduction decision making. It examines economic factors like opportunity cost and social identity, and looks at how they change the math of the cost-benefit calculation. Attendees of this session should expect to gain a better understanding of how individuals process risk reduction messages. The session is also intended to spark a discussion about the goals of risk communication; and how those goals may influence the message and, subsequently, the individual decision process of those receiving the message.

**Biography:** Ronda is currently a senior associate with Michael Baker International where she supports local, state and federal government in risk communication and hazard mitigation. Prior to joining Michael Baker she was the Hazard Mitigation Coordinator for the City of Lansing, MI for 21 years. She is a Certified Floodplain Manager (CFM) and a Certified Emergency Manager (CEM). She holds degrees in communication, emergency management and distance education, and is currently working on her Ph.D. in communication with a focus on risk communication. In 2015 Ronda was inducted into the International Women in Homeland Security and Emergency Management (InWEM) Hall of Fame for her work on the [www.do1thing.com](http://www.do1thing.com) emergency preparedness program.

## **B6: Toward Equitable Floodplain Management**

### **Identifying Barriers to Accessing NFIP Resources**

Rhonda Montgomery, CFM, FEMA, [rhonda.montgomery@fema.dhs.gov](mailto:rhonda.montgomery@fema.dhs.gov)

**Co-presenters:** Annette Burris, [annette.burris@fema.dhs.gov](mailto:annette.burris@fema.dhs.gov)

**Abstract:** The Office of the Flood Insurance Advocate is conducting an initiative focused on engaging with and advocating for communities and individuals who have not accessed resources utilizing the various parts of the National Flood Insurance Program (NFIP). OFIA works daily with individuals seeking assistance with the National Flood Insurance Program. Through casework analytics, the OFIA has been able to identify needs-based opportunities in populations that have historically been underserved by the

National Flood Insurance Program. Through analytical review, OFIA could draw inferences about underserved communities when it comes to accessing programs in the NFIP. The OFIA asserts historically underserved groups: 1) Have not received information about various resources available to them under the NFIP; 2) Receive little information from outside their community foundations; 3) Have a justified aversion to governmental assistance; 4) Are not provided the same access to resources or information as other NFIP customers 5) Do not receive and disseminate information the same way as the traditional NFIP customer. Combining its casework analytics with academic research and subject matter expert collaboration, the OFIA strives to identify and engage communities that do not have the same resources to utilize the various parts of the NFIP as FIMA's traditional customer. The project seeks to approach underserved populations with and without flood insurance and listen to those not well-served to determine their needs and the way they want to be engaged. By listening first, we aim to understand the best approach for programmatic advocacy. Through community-specific outreach the OFIA intends to bridge the gap for the historically underserved by identifying the unique challenges for those insured, and those who are not.

**Biography:** Rhonda Montgomery is the Flood Insurance Advocate at the Federal Insurance and Mitigation Administration. Prior to this, Ms. Montgomery served as Deputy Flood Insurance Advocate. Previously, Ms. Montgomery was on detail to the Executive Office of the President's Council on Environmental Quality as the Deputy Associate Director for Flood Preparedness. She also served as the Executive Officer for the Federal Insurance and Mitigation Administration at FEMA, and as a member of the Floodplain Management Branch. Ms. Montgomery has held her Certified Floodplain Manager designation since 2000 and received her MPA from the University of Kansas.

### **Bridging the Equity Gap: Flood resilience for the whole community**

Jessica Ludy, CFM, US Army Corps of Engineers, [jessica.j.ludy@usace.army.mil](mailto:jessica.j.ludy@usace.army.mil)

**Co-presenters:** Damaris Villalobos-Galindo, [dvillalobos-galindo@valleywater.org](mailto:dvillalobos-galindo@valleywater.org)

**Abstract:** There is a large gap between those who are resilient to floods and those who are not—many individuals and communities are, due to a number of external factors, not well prepared for floods, less able to cope, and slower to recover from floods than others. Low income people, people with disabilities, people in the LGBTQIA+ community, Indigenous, Black, and other people of color, and people with more than one of these identities have historically been excluded from planning and decision making around flood resilience, yet research shows they experience the adverse impacts of floods more significantly than others. As flood risk managers working across the public and private sectors, for large and small organizations, we have huge opportunities to bridge this rift, but what does it look like to start? What can each of us do? The San Francisco District U.S. Army Corps of Engineers Flood Risk Management Program began taking steps over the last year to better understand the flood resilience equity gap and to begin addressing it. Drawing guidance and inspiration from both the environmental justice movement and from Executive Orders 12898, 14008, and 13985, program teams began to rethink how we work alongside (not 'for') communities and initiated a number of activities to operationalize this.

This presentation will share highlights from our efforts including the most meaningful findings from the last year's work. For example, we will share historically excluded communities can access USACE

technical assistance programs. We hope to generate discussion, ideas and collaboration, and to inspire more floodplain managers to take actions in their spheres of influence. This presentation does not represent official agency response to administrative priorities.

**Biography:** Jessica Ludy is the Flood Risk Program Manager at the San Francisco District of U.S. Army Corps of Engineers. She has 14 years experience and loves working with communities and tribes to find collaborative solutions to flood risk management problems. Jessica leads the district's environmental justice initiative and is a member of the Social Justice Task Force affiliated with ASFPM. She spent two years in the Netherlands on a Fulbright Fellowship and graduated from UC Berkeley with a masters degree in environmental planning. Jessica is Certified Floodplain Manager and also Co-Chair of the ASFPM Flood Risk Communication Policy Committee.

### **Incorporating Environmental, Social, and Governance (ESG) Principles into Flood Mitigation Projects**

Mike Onufrychuk, PMP, CFM, AECOM, Michael.Onufrychuk@aecom.com

**Co-presenters:** Aaron Weieneth, AICP, aaron.weieneth@aecom.com

**Abstract:** Across the globe Environmental, Social, and Governance (ESG) practices are becoming increasingly important to people and governments. From aging and deficient infrastructure, to the challenges of climate change and population growth, many parts of the world are under-prepared to meet the increasingly unpredictable challenges of today. There is an increased link in prioritizing ESG practices for investments in the private sector and for federal funding in the public sector. Recent executive orders, including the Justice40 initiative and historic funding for climate resiliency, promote the advancement of equity in all communities—especially those that are disproportionately at risk from climate change impacts. These initiatives and programs are encouraging communities and companies to incorporate ESG practices into their planning, projects, and analyses to achieve climate goals and improve the social outcomes of the communities while integrating ESG objectives with performance metrics. These are issues that concern global leaders across civic society, businesses, and academia. If there is one thing the pandemic has taught us, it's the importance of social values such as health, quality of life, and social inclusion. Promoters of infrastructure projects are increasingly looking for ways to assess and promote these difficult-to-measure values. This presentation will discuss the role ESG topics are playing in relation to floodplain management, future planning, and mitigation. The discussion will describe how the federal government is playing a role through bold initiatives and funding programs; identify available ESG-related tools to incorporate into analyses, such as the U.S. Climate Resilience Toolkit and FEMA's National Risk Index; and examples of how difficult-to-measure values such as social outcomes and future benefits can be quantified or qualitatively identified.

**Biography:** Mr. Onufrychuk is a Senior Manager at AECOM with experience applying data and information analysis to provide clients data-driven solutions to make decisions in resiliency, disaster recovery, mitigation, sustainability, water resources, and homeland security. He leads Environmental, Social, and Governance (ESG) strategy for metro areas in the east region at AECOM, incorporating climate and community resilience principles into projects and programs.

## **B7: Local Climate Change Initiatives**

## **Climate Change – Taking a Regional Approach to Resiliency**

Claire Jubb, AICP, CFM, Charlotte County Board of County Commissioners,  
claire.jubb@charlottecountyfl.gov

**Co-presenters:** None

**Abstract:** Using the recent formation of the Southwest Florida Regional Resiliency Compact as a case study, the presentation will illustrate why a regional approach to climate change is beneficial to all local communities. The impacts of climate change do not stop at jurisdictional boundaries nor do they pay attention to the affluence or politics of a particular community. This presentation will discuss the need to build consensus and address climate change and resiliency on a regional level. The impacts of climate change should be addressed within regions that have similar geography and vulnerability to the many different facets of climate change and a focus should be placed on unified and consistent approach to sea level rise projections, planning horizons, outreach, and other programs. Participants will learn how to start the conversation about a regional compact, how to navigate political divides and how to encourage inclusion to ensure all communities have a voice. They will get practical advice on how to avoid common pitfalls and concerns and learn how to leverage partnerships to make the compact more effective. The presentation will discuss different ways of organizing the compact and how to create a balance between participating jurisdictions, NGO's, and academia and also touch on potential funding options. The Southwest Florida Regional Resiliency Compact is in its infancy and experience of all these issues is very recent and relevant and would help others as others start to navigate these same challenges.

**Biography:** Claire Jubb is the Assistant County Administrator for Charlotte County, FL. She earned a degree in public and private sector management from the University of Wales College Cardiff in the UK and has worked for Charlotte County in various roles since 2003. In 2020, Claire was promoted into her current role. As the Assistant County Administrator, Claire is part of a three-member executive leadership team responsible for the leadership and direction of all government operations for Charlotte County, Florida. Claire is a member of the American Institute of Certified Planners (AICP) and a Certified Floodplain Manager and has led floodplain management initiatives and the county's participation in the Community Rating System for many years. Claire is very active with the Florida Floodplain Managers Association (FFMA) and holds the position of Associate Director of Legislation, Treasurer and Policy Champion. In these roles, her goal is to expand the understanding of the importance of policy and legislation in floodplain management. She is an experienced and respected public speaker, having presented to the Association of State Floodplain Managers, National Association of County's (NACo), Public CIO, the Governing Institute, and at many other local, state, and national events. Claire was named Civic Hero for Building Communities, by Accela Inc. in 2019, was a top ten finalist in the Route Fifty Navigator awards for Leadership and was the recipient of the 2019 Florida Floodplain Managers Association Service Award.

## **Localizing Planning for Sea Level Rise: The Little River Adaptation Action Area**

Christian Kamrath, CFM, Miami-Dade County, christian.kamrath@miamidade.gov

**Co-presenters:** Katherine Hagemann, Katherine.hagemann@miamidade.gov

**Abstract:** Sea level rise is already amplifying other flood risks and in some cases those impacts are being felt far from the coast and out of the limelight along inland waterways. These communities are seeing higher groundwater levels compromising septic systems, impacts to housing, and frequent stormwater

flooding. In addition to the chronic flooding, this area also has a number of pressing water quality issues that affect both the health of the residents and have contributed to wider impacts like seagrass die-off and fish kills. Increasing sea levels are exacerbating these water quality impacts and costing residents through repeated damage to cars and homes. This presentation will discuss how Miami-Dade County is implanting its Sea Level Rise Strategy through localized planning for impacted areas, known as “Adaptation Action Areas”. This presentation will discuss how the Adaptation Action Area process based the recommended projects based on community feedback and based on the different flood hazards these neighborhoods are facing. Miami-Dade worked with several partners and municipalities to develop a forward-looking adaptation plan that includes policy changes, programs, and capital projects. During this presentation, the Office of Resilience will offer insights on how to coordinate multiple capital projects, like extending sewers, upgrading water quality treatment on stormwater systems, and seeking funding for private-side adaptation measures like elevating homes. This presentation will provide a candid overview of the challenges of addressing multiple flooding challenges at once, coordinating project schedules, and managing community expectations in an area that is already suffering from the impacts of climate change and rising rents.

**Biography:** Christian Kamrath has served as an Adaptation Program Coordinator for Miami-Dade County’s Office Resilience for the past 3 years where he supports the Adaptation team and its systems-wide work on sea level rise and flooding education, policy, and planning. Through collaboration across County Departments and with external stakeholders such as community-based organizations, colleges and universities, and others, he supported the development of the County’s first Sea Level Rise Strategy, launched in the Spring of 2021, and has led the Little River Adaptation Action Area planning effort. Christian grew up in central Florida and brings with him 10 years of mixed experience from throughout the Southeast ranging from broadcast meteorology and emergency management to long-term disaster recovery and climate adaptation planning. Christian is a Certified Floodplain Manager and holds a B.S. in Geography from the University of Florida and a Master’s in City and Regional Planning from the University of North Carolina at Chapel Hill.

### **Sea-Level Rise: Turning Uncertainty into Action**

Renee Collini, PLACE: SLR, [r.collini@placeslr.org](mailto:r.collini@placeslr.org)

**Co-presenters:** None

**Abstract:** Sea-level rise is already exacerbating hazards in coastal areas, such as stormwater, high-tide, and tropical storm flooding making it important to consider in floodplain management; however, knowing where to start can be challenging. Information around sea-level rise and its impacts are being made available at an unprecedented rate. These data are instrumental to making informed decisions, but with the data being released at such a rapid pace, it can be difficult to keep up. In this presentation, key resources for considering sea-level rise will be reviewed. A suite of resources will be used to demonstrate how to find local projections of sea-level rise and how to narrow the range of available scenarios to a specific planning range to meet individual project and planning needs. The presentation will also include how to take the next step by translating sea-level rise scenarios into actionable information. Case studies of how different communities have applied these approaches will also be presented. This presentation will enable individuals to easily integrate information about future conditions during project planning and design, enhancing their community’s resilience to current and future flooding.

**Biography:** Renee has a dual appointment as a Coastal Climate Resilience Specialist with Mississippi State University and Sea Grant. Focused on sea-level rise, Renee facilitates the flow of information between researchers and decision-makers to improve science application. The lead of the Program for Local Adaptation to Climate Effects: Sea-Level Rise, she integrates a multi-state network of stakeholders, researchers, NGOs, and state and federal agencies to build tools, programs, and projects to address gaps in sea-level rise observing, research, and decision-making in the northern Gulf of Mexico. She has collaborated on projects and efforts that have improved coastal community and environmental resilience and has led development of tools that have been applied throughout the Gulf and across the United States. Collini is a recognized leader in resilience across the Gulf of Mexico and is serving as an author on the Fifth National Climate Assessment Coastal Effects Chapter.

## **B8: True Flood Risk Showcase: New tools & technologies to advance floodplain management and risk communications**

In this session, discover new methods and cost-efficient technologies used to streamline and improve floodplain management and community outreach strategies including:

- Automating instant access to property-level first floor height/lowest floor elevation data
- Identifying flood risk hot spots within communities
- Optimizing property-level and community flood risk strategies based on a cost-benefit analysis over 10 to 30 year planning horizons
- Evaluating potential benefits of community based parametric or indemnity flood insurance
- Implementing an early warning dashboard to monitor and visualize community flood risk over time including real-time incoming weather events
- Communicating risk management strategies to stakeholders and the greater community

## **Session C: 3:45-5:15 pm**

### **C1: Local CRS Administration**

#### **CRS and GIS: The Perfect Marriage?**

Chris Hill, GISP, CFM, Meshek & Associates, LLC, [chill@meshekengr.com](mailto:chill@meshekengr.com)

**Co-presenters:** Laura Hendrix, [lahendrix@kingcounty.gov](mailto:lahendrix@kingcounty.gov)

**Abstract:** GIS is an essential resource to preparing your CRS documentation for submittal to FEMA and ISO. This presentation is intended to highlight how GIS is used to create informative maps to help community officials demonstrate to the CRS reviewer how the credits submitted meet CRS requirements. The overall goal is to review practical mapping methodologies and examples for CRS 400 and 500 series and other CRS series requiring GIS data analysis. Presentation discussion is intended to highlight lessons learned from a CRS Coordinator's expectations combined with a GIS Specialist's toolset to create effective documentation for your CRS submittal. Co-presenting are Chris Hill, serving as the lead GIS Specialist for the City of Tulsa OK's recent CRS Class 1 certification and Laura Hendrix, the CRS



Coordinator for CRS Class 2 King County, WA. This presentation will show how marrying CRS and GIS together can lead to a successful CRS program.

**Biography:** Since joining Meshek & Associates, LLC in October 2000, Mr. Hill has been involved in numerous mapping and GIS projects for many communities. He has expertise in municipal mapping, data visualization, project data organization and GIS project administration. At Meshek, he has served as GIS Specialist, Project Manager, and as Principal. Mr. Hill has a B.S. in Geography from the University of Oklahoma (1999) and has also earned an A.S. in Engineering from Tulsa Community College (1996). He is a certified GIS Professional (GISP) and a Certified Floodplain Manager (CFM). Mr. Hill's current projects are focused on developing GIS Web Applications for communities, CRS Program Mapping, and working with ESRI's ArcGIS Online resources to create engaging and effective mapping solutions.

### **Participation in CRS with Minimal Staff and a Shoestring Budget**

Joanna Colletti, PE, CFM, McHenry County Dept. of Planning & Development,  
jscolletti@mchenrycountyil.gov

**Co-presenters:** None

**Abstract:** In a time when government employees are being tasked with more responsibilities and municipal budgets are stretched to their limits, participation in the FEMA CRS program may seem like a pipe dream. McHenry County, Illinois is no different. With a staff of four, no additional budget, and numerous other tasks, staff made it a priority to participate in the CRS program while minimizing the disruption to all other required department-wide obligations and responsibilities. With a little up-front effort and the re-organization of some internal procedures, the County was able to utilize current permitting activities, existing ordinance regulations, and a few new tracking items and maps to kickstart the number of points they received. The County does not have any fancy software for floodplain properties or permit tracking; Excel spreadsheets are the norm. The initial CRS application was done without the assistance of GIS, but subsequent Cycle visits did utilize GIS. This presentation will describe ways that CRS program participants may leverage current activities to gain points; provide examples of easy element credits; offer direction on specific elements that may benefit communities; and explain the time commitment of one County's participation in the CRS program.

**Biography:** Joanna Colletti, P.E., CFM, is the Water Resources Manager and Chief Stormwater Engineer at McHenry County Department of Planning & Development. She administers and enforces the countywide Stormwater Management Ordinance and serves as the Enforcement Officer for the unincorporated areas and eight communities within McHenry County. As part of her role at McHenry County, Joanna also oversees all non-regulatory activities of the County associated with groundwater and surface water including floodplain mitigation, participation in the FEMA Community Rating System, compliance with IEPA's NPDES MS4 program, countywide groundwater modelling and data collection, water quality improvements, watershed planning, and sensible salting education and outreach. Joanna has over 20 years of private and public experience as a Civil Engineer. She is the recipient of the 2021 IAFSM Floodplain Manager of the Year award. She has been involved in a wide variety of projects including floodplain and stormwater management, engineering site design, hydrologic and hydraulic analyses of riverine and urban drainage systems, regulatory permitting and enforcement, construction monitoring, and wetland delineations. Joanna holds a Bachelor of Science in Civil Engineering from Bradley University. She is a registered Professional Engineer in the State of Illinois and is a Certified Floodplain Manager.

## **Monroe County, FL: Sustainability Planning, the Bridge to CRS Class 3**

Lori Lehr, CFM, Lori Lehr Inc., [lori@lorilehrinc.com](mailto:lori@lorilehrinc.com)

**Co-presenters:** Erin L. Deady, P.A., Deady Law, [erin@deadylaw.com](mailto:erin@deadylaw.com)

**Abstract:** The key to building successful CRS program starts with early planning. Cross departmental coordination and participation is essential to good floodplain management which is the cornerstone of a successful CRS program. Fostering comprehensive floodplain management and reducing and risk avoidance is the result of a healthy community-based CRS program. This presentation will take the participants on a brief overview the Monroe County's six-year effort to obtain a CRS Class 3. The presentation highlights the collaborations, challenges and victories of the journey that started in 2015. Participants will learn how the CRS program goals were promoted resulting in a 35% discount on flood insurance premium rates, reflecting the reduction in flood risk. The presentation will focus on the ways that the Monroe County partnered with sustainability planning to meet the Class 4 prerequisite for coastal watershed management planning looking by at the impacts of sea level rise on the drainage features throughout the County.

**Biography:** Lori Lehr is the owner of Lori Lehr Inc., with more than 23 years of experience in the field of floodplain management and the Community Rating System (CRS). Ms. Lehr is currently assisting communities across Florida and California with participation in the CRS program. She also works with communities to maintain compliance with the National Flood Insurance Program (NFIP). Prior to starting her own consulting firm, Ms. Lehr was a Senior Field Specialist and Lead Instructor with Insurance Service Office/Community Rating System (ISO/CRS). Along with conducting Field Verification Visits, Ms. Lehr participated in training new ISO/CRS Field Specialist and was the lead instructor for the 278 Community Rating System Course with EMI. Ms. Lehr was also served as the Floodplain Manager for the City of St. Petersburg, Florida. During her tenure with the City, she became a Certified Floodplain Manager (CFM) and the City's CRS Coordinator.

Ms. Deady has significant project management experience on numerous complex projects, plans and policies involving resiliency, sustainability, energy, vulnerability and public engagement to support local governments both within and outside of Florida. Ms. Deady also has direct experience working with Monroe County on previous resiliency initiatives for the last 11 years including all of the County's vulnerability assessments and updates, climate-related comprehensive plan amendments (including the development of Adaptation Action Area draft language and maps, the Roads Pilot Project and the current countywide Roads and Stormwater Vulnerability Assessment and Adaptation Plan. Ms. Deady has written numerous successful Federal and State grants for the County including two Resilience Planning grants and is supporting numerous applications for the Resilient Florida program

## **C2: FEMA Hazard Mitigation Assistance: Programs and Improving Your Grant Applications**

### **New FMA Initiative Pilot: Overview and Stakeholder Feedback Session**

Ryan Janda, FEMA, [ryan.janda@fema.dhs.gov](mailto:ryan.janda@fema.dhs.gov)

**Co-presenters:** Brandon Sweezea, [brandon.sweezea@fema.dhs.gov](mailto:brandon.sweezea@fema.dhs.gov)

**Abstract:** In Winter 2021/2022, FEMA announced a new FMA initiative. FY22 is the pilot year of this initiative. Stakeholder engagement and continuous improvement are critical to FEMA's design and implementation of successful grant programs that meet the needs of SLTTs. ASFPM 2022 presents a unique opportunity to reach key SLTT stakeholders nationwide and collect feedback on the FY22 FMA initiative pilot that can help inform future iterations of the program. Following an overview presentation, presenters will use an interactive virtual platform to solicit feedback on key design elements of the FMA initiative. Participants will also be able to provide general feedback, ask questions, and offer new ideas for the future of the program. This presentation will provide participants with:

- A clear understanding of the goals and application process of the FMA pilot initiative
- An opportunity to provide observations, feedback, and ideas related to the FMA pilot initiative to inform future iterations of the program delivery and support continuous improvement

**Biography:** Ryan Janda is a Branch Chief in FEMA's Hazard Mitigation Assistance Division. Currently, Ryan's Branch manages the implementation of FEMA's non disaster mitigation grant programs including the Flood Mitigation Assistance program, the Pre-Disaster Mitigation program and the Building Resilient Infrastructure and Communities program. Ryan Janda brings over 25 years of emergency management experience to his role as HMA's Non Disaster Grants Implementation Branch Chief. Prior to this position, he served as Deputy Branch Chief and Program Lead for the Hazard Mitigation Assistance Division. As Program Lead, Ryan was instrumental in implementing the merge of the flood mitigation grant programs into one combined Flood Mitigation Assistance program, as well as managing the Hazard Mitigation Grant Program and Pre-Disaster Mitigation program which have provided over \$20 Billion to States, Tribes, Territories and communities since 1989. These programs provide much needed funding to make communities more resilient to natural hazards and their effects by implementing long-term risk reduction measures.

### **Best Practices for Application Development - Observations from the FY21 BRIC and FMA Application Cycles**

Eric Kenney, PE, PMP, CFM, CDM Smith, [kenneyed@cdmsmith.com](mailto:kenneyed@cdmsmith.com)

**Co-presenters:** Manny Perotin, [PerotinMA@cdmsmith.com](mailto:PerotinMA@cdmsmith.com) and Kelsey Schill, [SchillKE@cdmsmith.com](mailto:SchillKE@cdmsmith.com)

**Abstract:** This presentation will present technical observations and best practices from the review of the most common and most complex projects submitted this cycle and highlight common themes from projects that passed the technical review portion; as well as those that did not. These observations can be used to gather lessons learned and best practices to improve applications submitted in future years as the BRIC and FMA programs continue to evolve, and funding levels increase. The priorities for the Fiscal Year (FY) 2021 cycle reflects a continued evolution of the Hazard Mitigation Assistance (HMA) programs in supporting larger, more complex mitigation projects which has both the benefit of mitigating risk to larger portions of a community but can often present a challenge in clearly demonstrating conformance with the HMA program requirements, particularly for communities that have historically not participated in the programs.

**Biography:** Eric Kenney is a Senior Project Manager with CDM Smith. For the last decade he has focused on supporting FEMA on a range of tasks, with a special focus on the Hazard Mitigation Assistance (HMA) grants program supporting HMA program improvements around Benefit Cost Analysis (BCA) streamlining and application development efficiencies as well as the technical and benefit cost analysis reviews of HMA grants. For the last six years has led the contractor support for the National Technical

Review (NTR) of non-disaster grants supporting the review of over 2,000 applications across the FMA, PDM and BRIC programs.

### **BRIC - Lessons learned and Recommendations for Process Improvement**

Jamelyn Trucks, CFM, PMP, Atkins, JAMELYN.TRUCKS@ATKINSGLOBAL.COM

**Co-presenters:** Hilary Kendro, Hilary.kendro@atkinsglobal.com and Simon Van Leeuwen, simon.vanleeuwen@atkinsglobal.com

**Abstract:** The BRIC program was initiated in 2020, replacing the Pre-Disaster Mitigation Grant Program. In the initial year of BRIC, we observed concerns with expectations and outcomes on project selections. Atkins has assisted several states and communities with aligning mitigation projects and scenarios with BRIC requirements and has ongoing engagement and process improvements to share based on that experience. Our discussion will follow along the journey of our state and local partners from the initiation of the BRIC program through the current 2021/2022 cycle. We will review the provided technical and process assistance that was key to identifying capacity and capability needs and implementing program improvements. As with any new program, we all have first year “should haves” – and we will walk through how we implemented lessons learned to prepared for the current BRIC cycle with our partners along with a plan for ongoing and future and continuous improvement.

**Biography:** Jamelyn Austin Trucks, CFM, PMP has 25 years of experience in the areas of mitigation, disaster resilience, planning, project development, and business development. Her experience includes management of stakeholder engagement, financial analysis, budget development, contract negotiations, training, database testing, federal grant administration; and policy development and implementation. Ms. Trucks’ understanding of federal, state, and local government policies and procedures in relation to federal disaster grant implementation, as well as her active involvement in Federal Disaster Response assists clients in applying best practices as well as developing improved methodologies. She is also the ASFPM Committee Co-Chair for Stormwater Management.

## **C3: Incorporating Groundwater and Water Quality into Flood Modeling**

### **The Importance of Surface-Subsurface Water Interactions in Low Elevation Coastal Zones**

Francisco Peña, Ph.D., Florida International University, fpena023@fiu.edu

**Co-presenters:** None

**Abstract:** Low elevation coastal zones characterized by permeable strata and unconfined aquifers are particularly prone to surface-subsurface water interactions and groundwater-induced flooding. In recent years, the duration and frequency of these events have increased due to climate change and sea level rise. Groundwater flooding is not well understood and has been understudied compared to other flood hazards as a result of code limitations and burdensome compatibility between physically-based surface hydrology models and groundwater models. Recent technological advancements in hydroinformatics and computational power are allowing flood modelers to simulate the compound effects of pluvial, fluvial, and coastal flood hazards by linking numerical models. Nevertheless, the groundwater component is often neglected in modeling frameworks. This presentation will present a loosely-coupled modeling framework that simulates surface-subsurface water interactions to advance flood vulnerability

assessments in locations vulnerable to groundwater-induced flooding conditions. A hybrid probabilistic-deterministic approach is implemented to simulate the compound flooding potential of the most extreme combination of rainfall and tide levels with predefined water table thresholds for current and future climate change scenarios. Understanding the impact of the water table in flood simulations is of great importance to improve flood hazard mapping, damage estimation and reveal hidden risks that may not be accounted for when the subsurface component is overlooked.

**Biography:** Francisco Peña is a dual Ph.D. alumnus in Earth Systems Science and Civil and Environmental Engineering from Florida International University and University of Florence (Italy) with an extensive professional background in flood modeling and flood risk management throughout the US and internationally. Mr. Peña's areas of expertise include the application of flood risk and GIS knowledge in supporting environmental, financial, urban resilience, citizen science, and disaster risk reduction projects in multicultural and challenging environments.

### **A Coupled Overland-Sewer 2D Hydraulic Model with Pollutant Transport**

Reinaldo Garcia, Hydronia LLC, rey@hydronia.com

**Co-presenters:** None

**Abstract:** Numerical simulation of flows that consider the interaction between overland and drainage networks is essential to prevent and mitigate flood situations in urban environments, especially when considering intense storms, where the limited capacity of the sewer systems can be a trigger for flooding. Additionally, to assess pollutant dispersion through the drainage network, it is important to simulate the water quality in both domains. For that reason, the addition of a pollutant transport component to both surface and hydraulic sewer models would benefit the global analysis of the combined water flow. On the other hand, when considering a realistic large domain with complex topography or streets structure, a fine spatial discretization is mandatory. Hence the number of numerical cells is usually huge making the use of non-parallelized CPU models exceedingly slow and impractical. Therefore, it is necessary to use parallelization techniques for the calculation, the use of Graphics Processing Units (GPU) being one of the most efficient due to the leveraging of thousands of processors within a single device. In this article, we present an efficient GPU-based 2D shallow water flow solver (RiverFlow2D-GPU) is fully coupled with EPA's Storm Water Management Model (SWMM). Both models are able to develop a transient water quality analysis taking into account several pollutants. The coupled model referred to as RiverFlow2D-GPU UD (Urban Drainage) is applied to real-world cases, covering several hydraulic situations in urban hydrology/hydraulics. A UK Environmental Agency test case is used as model validation, showing a good agreement between RiverFlow2D-GPU UD and the rest of the numerical models considered. The efficiency of the model is proven in two more complex domains, leading to 100-fold faster simulations compared with the traditional CPU computation.

**Biography:** Reinaldo Garcia, PhD Is the Director of Model Development at Applications at Hydronia, LLC, located in South Florida, USA. He has more than 40 years of experience in flood modeling and flood mitigation projects. He is the creator of the RiverFlow2D model and is a consultant for the Interamerican Development Bank and the World Bank. Dr. Garcia has worked in flood-related projects in more than 20 countries, including the USA, Central, and South America, Europe, and Asia.

## **Fall and Rise of the Santa Fe River**

Rehal Kharel, EIT, Wood, rehal.kharel@woodplc.com

**Co-presenters:** None

**Abstract:** This presentation will highlight the impacts of groundwater on surface water attenuation as a result of negative spring flow; this will include a brief discussion on the differences between groundwater conveyance during low and high river stages using various statistical techniques, and rain-on-grid modelling. Santa Fe River (SFR) is a tributary to the Suwannee River with a drainage area of 1,381 sq-mi. in north-central Florida. This watershed is characterized by numerous sinks and springs which are the principal groundwater sources to the Floridan aquifer – a thick sequence of limestone beds. A karst escarpment known as Cody Scarp divides the basin into two regions: confined Northern Highlands to the east, and semi-confined/unconfined Gulf Coastal Lowlands to the west. The impact on SFR flows due to the groundwater/surface water interaction is prominent in the western portion of this watershed. A hydrologic and hydraulic (H&H) study of SFR is being performed in support of the FEMA Risk-MAP project in the SFR watershed for the Suwannee River Water Management District (SRWMD). There are six long term gages along the SFR and the discharges were determined using Bulletin-17C. Flood Frequency Analysis resulted in non-uniform flow changes between gages; this is a result of the numerous sinkholes that attenuate the streamflow. In this study, it was observed that this attenuation due to groundwater storage mostly occurs during high river stages, causing negative spring-flows. Determination of flows at ungaged sites was supplemented by results from 2D rain-on-grid models developed as a part of the FEMA Risk MAP project for the basins contributing to the SFR. These models were calibrated to the existing gages by introducing inverse hydrographs as boundary conditions at various sink locations to emulate groundwater storage. The calibrated flows from the 2D models are then utilized for determining flows at ungaged locations along SFR.

**Biography:** I am a Water Resources Engineer currently working at Wood. I graduated from Georgia Tech in 2015 with B.S. in Physics and Civil Engineering. I have been working on water resources projects for the past 6 years and have experience with complex riverine hydrologic and hydraulic (H&H) modeling, floodplain mapping, dam breach modeling, flood studies, small- and large-scale stormwater modeling, and drainage design projects. I have a keen interest in pursuing data driven modeling, statistical analysis, and automation in H&H modeling to understand flood hazards and implications of climate change variability to disasters. I currently reside in Atlanta, GA.

## **C4: BLE Mapping**

### **The Evolution of BLE**

Patrick Dobbs, PE, Stantec, patrick.dobbs@stantec.com

**Co-presenters:** None

**Abstract:** In late 2021, FEMA plans to issue the first update to the BLE Guidance for Flood Risk Analysis and Mapping. This marks a significant advancement in the vision for BLE since the original guidance was published in 2018. This presentation will begin with a brief overview of the history of BLE and precursors like first order approximation (FOA) and large-scale automated engineering (LSAE). Then most of the presentation will be spent discussing the changes implemented by the new guidance. During the

discussion of the changes, examples from projects will be used to show the benefits of the changes to agencies, contractors, and most importantly communities. This presentation will inform the audience about a new FEMA guidance document and show the benefits to BLE project stakeholders with examples from multiple projects across multiple FEMA regions in all 3 FEMA zones.

**Biography:** Patrick is a Water Resources Engineer at Stantec and has spent the last 14 years as a consultant providing flood study and stormwater services to communities.

### **Large Scale 2D BLE Mapping: Best Practices, Case Studies, and Regional Nuances**

Jared Newell, CFM, GISP, CDM Smith, [newelljd@cdmsmith.com](mailto:newelljd@cdmsmith.com)

**Co-presenters:** David Smith [smithd@cdmsmith.com](mailto:smithd@cdmsmith.com) and Dan Molnar, [molnardw@cdmsmith.com](mailto:molnardw@cdmsmith.com)

**Abstract:** Base Level Engineering (BLE), is an efficient, cost-effective, model-based method of assessing flood hazard risk on a watershed level. Enhanced 2D hydraulic modeling and mapping software, cloud computing, and the availability of high-resolution topographic data has improved the quality, accuracy, and geographic scope of BLE mapping. CDM Smith and Compass mapping partners have increasingly used 2D BLE methodologies to model and map flood risk in large watersheds in many FEMA regions. This presentation will explore regional differences in 2D BLE mapping methodologies, best practices, limitations, and innovations using case studies from New England, South Dakota, and the Gulf Coast.

**Biography:** Over the past 5 years, Mr. Newell, Mr. Smith, and Mr. Molnar have collectively worked on dozens of BLE mapping projects in FEMA regions 1, 6, and 8.

### **Mapping the State of Texas**

Manuel Razo, GISP, CFM, Texas Water Development Board, [manuel.razo@twdb.texas.gov](mailto:manuel.razo@twdb.texas.gov)

**Co-presenters:** Cindy Engelhardt, PE, CFM, [cengelhardt@halff.com](mailto:cengelhardt@halff.com) and Erika Nordstrom, PE, CFM, [enordstrom@halff.com](mailto:enordstrom@halff.com)

**Abstract:** The Texas Water Development Board (TWDB) is tasked with statewide flood hazard mapping. A target of the statewide mapping effort is to achieve statewide base level engineering coverage by 2024. In order to achieve this target, the TWDB partnered with multiple consultants and is developing base level engineering guidelines intended to ensure consistent approaches, optimize efficiencies, maintain quality, and expedite schedules. Traditional objectives for base level engineering were generally focused on riverine flood risk associated with flood insurance mapping and floodplain management. The TWDB is interested in the assessment, identification, and mitigation of fluvial and pluvial flooding in support of TWDB's first ever State Flood Plan. This difference in objectives, as well as, the desire for Texas specific data and methodologies warrants the development of state base level engineering guidelines for 2D analysis which leverages and appends available FEMA documents for base level engineering analysis. This presentation discusses information learned through questionnaires and interviews of various FEMA Regions, state agencies, and consultants as well as lessons learned through the first year of base level engineering production and the development of the initial base level engineering guidelines.

**Biography:** Manuel Razo has been with the TWDB for 5 years serving as the Cooperating Technical Partners (CTP) coordinator, Community Assistance Program Team Lead and recently serving as the National Flood Insurance Program State Coordinator. During this time, his efforts have resulted in a significant increase in FEMA funding for the CTP program, and he was instrumental in guiding the agency

through floodplain mapping discussions leading up to and during the 86th Legislative session. He previously worked for the TWDB from 2008 – 2012 performing community outreach and in TNIRIS working on floodplain mapping. He has a Bachelors Degree in Geography from the University of Texas and a Masters in Geospatial Surveying Engineering from Texas A&M Corpus Christi. He has worked in floodplain and stormwater management for 16 years in the public and private sector.

## **C5: Understanding and Reaching Your Target Audience**

### **Best Practices for Outreach Across Four Regions in Texas**

Shonda Mace, Community Development & Revitalization Department, Intergovernmental Relations of the Texas General Land Office, [Shonda.Mace.GLO@recovery.TEXAS.GOV](mailto:Shonda.Mace.GLO@recovery.TEXAS.GOV)

**Co-presenters:** Caitlin Heller, H2O Partners, a member of the Freese and Nichols, Inc. team, Connor Stokes, Hollaway Environmental + Communications, a member of the DE Corp. team, [connor@hollawayenv.com](mailto:connor@hollawayenv.com), Stephen Tolbert, Partner Forces, a member of the AECOM team, and Cindy Engelhardt, a member of Halff Associates, Inc.

**Abstract:** The Texas General Land Office's (GLO) Combined River Basin Flood Studies' mission is to build flood resilience across the 52 Texas counties most impacted by 2015 Floods and Hurricane Harvey, as well as similar flood disasters. Part of GLO's role is to connect communities that are susceptible to floods with experts, flood models, and mitigation grant opportunities to help prioritize and plan flood mitigation projects. Through community engagement and coordination, we can learn flood challenges to help deploy local and national resources to build resilience in Texas. The Studies consist of very diverse stakeholders including underserved communities, rural/urban and a very wide range of political landscapes. Each of the stakeholders' unique identities were considered to ensure that the outreach and engagement efforts were open, inclusive, and equitable for all communities. The vast array of engagement opportunities requires flexibility in format to mitigate these challenges. The following strategies and best practices have been utilized, to date:

- Leveraging Existing Community Relationships – The GLO, and specifically GLO's Intergovernmental Relations team, has deep roots within the communities for our flood studies. All engagements started with analyzing what existing relationships we have with a community.
- Diverse Outreach Styles – The studies has prioritize developing multiple and flexible engagement styles. We have built automated tools such as interactive flood maps, and have conducted in person, virtual, and hybrid meetings.
- Keeping the Community and Mission First – With multiple different studies, agencies, and vendors all involved in helping to build resilience in Texas, outreach fatigue and duplication was a potential risk. We have established cross-vendor teams, built cross-study working groups, and have data sharing agreements in place to reduce the burden on our communities and stakeholders. The Texas General Land Office and the team of professionals are eager to share challenges, opportunities, and lessons learned with floodplain managers.

**Biography:** Ms. Mace serves on the planning team with the Texas General Land Office's Community Development and Revitalization (GLO-CDR) program. During her tenure with GLO-CDR, Ms. Mace has assisted in the development of a regional planning studies program and Housing technology improvement and studies that utilize HUD's CDBG-DR funding to conduct large-scale studies in disaster-impacted areas to assist communities in their planning efforts. Prior to joining the GLO-CDR team, Ms. Mace worked for 10 years as an Architectural Historian, spending much of her time working as a



consultant for TxDOT reviewing environmental documents and projects for compliance with NEPA, Section 106, and 4(f) requirements.

### **Using Social Intelligence and Artificial Intelligence to Better Understand the Audience**

Tony Mendes, CFM, FEMA R8, [tony.mendes@fema.dhs.gov](mailto:tony.mendes@fema.dhs.gov)

**Co-presenters:** Sean McGowan, PE, [sean.mcgowan@fema.dhs.gov](mailto:sean.mcgowan@fema.dhs.gov), Matt Wagner, [matthew.wagner@ogilvy.com](mailto:matthew.wagner@ogilvy.com) and Liz Bohinc, [liz.bohinc@ogilvy.com](mailto:liz.bohinc@ogilvy.com)

**Abstract:** Technology is changing the game of how we can understand the needs and perspectives of the communities we're looking to help and support. Personal and face-to-face interaction will always be the cornerstone for successful community engagement, but PII-compliant social and digital analytics can be a treasure chest of insight knowledge to help inform and plan successful community engagement efforts. FEMA Region 8 deployed the first region-led social intelligence efforts to inform pre-planning for campaigns in Denver and Salt Lake City. Denver was selected as a test market for an innovative arts-and-mitigation campaign that would change discussions about mitigation by staging local art exhibits around the city. Social intelligence was combined with flood risk data to identify the ripest neighborhoods and the best types of art to communicate to the communities. In March 2020, the Salt Lake City metro area was shaken by a 5.7 magnitude earthquake. FEMA Region 8 leveraged social intelligence to better understand how the community reacted after the earthquake, how Utah's readiness to take action compares with other seismically active states, and which channels and influencers can be most successful to affect behavior change. The session will review the process and types of technology used, some of the findings, and how those findings and insights shaped engagement strategies.

**Biography:** Tony has more than thirty years of emergency management experience at the state and federal levels, with over sixty disaster deployments throughout the nation. He is the Risk MAP Community Engagement & Risk Communication (CERC) program manager for FEMA Region 8, helping state, local and tribal governments and citizens understand the wide variety of natural hazards they face, and what we can do to minimize their impacts on our homes, businesses, and communities. He spends free time in Colorado's mountains biking, hiking, skiing.

### **Reaching Elected Officials - A New Visualization Tool for Community Resilience**

David Betenbaugh, CFM, CSS, Inc. (on contract for NOAA's Office for Coastal Management), [david.betenbaugh@noaa.gov](mailto:david.betenbaugh@noaa.gov)

**Co-presenters:** None

**Abstract:** Concise, visual, easy-to-understand, and now interactive and updated... The Coastal County Snapshots from the NOAA Office for Coastal Management's Digital Coast platform has been the "go-to" online tool for governing bodies, local managers, and citizen groups to get county-level statistics, charts and graphics that turn complex data into bite-size stories. The Snapshots tool has been completely redeveloped to include new topics, interactive maps, and updated data. The new Coastal County Snapshots themes include economics, flooding exposures, as well as potential sea level rise impacts. Once in the tool, simply type in your county name and then choose the topic of interest. You will be presented with the option to explore and interact with the variety of data infographics and maps or download the information in a printable two-page layout. This is a powerful tool for coastal floodplain managers to communicate flood risks to their communities. Come join us for a VIP tour of the new tool,

learn how to explore and share the information, and hear about some of the other Snapshot topics we have in the pipeline for future release.

**Biography:** David Betenbaugh is a Senior Geospatial Analyst on contract with National Oceanic and Atmospheric Administration's (NOAA) Office for Coastal Management (OCM) in Charleston, South Carolina. He has worked with Geographic Information System (GIS) software and data for the past 15 years to map and communicate topics in coastal environments. At OCM he works to support several online tools that focus upon coastal hazards, such as the Coastal County Snapshots and the Coastal Flood Exposure Mapper.

## **C6: Designing Natural Functions into Floodplain Restoration Projects**

### **Natural and Beneficial Functions of Man-Made Wetland and Mitigation Sites**

Sarah Kessler, CFM, City of Clearwater, [sarah.kessler@myclearwater.com](mailto:sarah.kessler@myclearwater.com)

**Co-presenters:** None

**Abstract:** Like much of Florida, Clearwater started off as orange groves. As housing demand increased, those groves were replaced with homes. By the 1960s, the groves were gone, and developers started filling in the floodplains. The development impact to floodplains created flooding and water quality issues. To combat pressure on functions of floodplains, the City highlights three projects: adding rain gardens to an existing park, conversion of a golf course to a park, and conversion of a mobile home park to a park. This presentation will demonstrate how mitigation projects can be built in developed areas and have positive impacts, like improved water quality, increased flood protection, and recreation opportunities, in the community.

**Biography:** Sarah Kessler received her bachelor's degree in Biology from Hope College in Holland, Michigan and has worked in the Environmental Division of the Engineering Department at the City of Clearwater for 15 years. She manages the City's stormwater permit and address surface water quality issues, including TMDLs, and is a project manager for water quality improvement projects, including tidal circulation, dredging, and wetland plantings. Sarah is also the CRS Coordinator and is responsible for verification visits, recertifications, flood mitigation projects, and participation in the County's LMS. Since Sarah is the only Biologist employed by the City, she also conducts environmental assessments and surveys for Public Utilities and Park & Recreation Departments. She is the City's Beach Liaison for residents and businesses on Clearwater Beach and is responsible for addressing issues with sand dunes, sea turtles, beach nesting birds, and other environmental issues. Sarah enjoys spending time with her husband, Steve, while traveling, cooking, and generally enjoying the outdoors.

### **Intermodal Rail Logistics Park Preserves Floodway with Ecological Conservation Corridor**

Garland Pennison, PhD, PE, HDR, [garland.pennison@hdrinc.com](mailto:garland.pennison@hdrinc.com)

**Co-presenters:** None

**Abstract:** In 2013, BNSF Railway opened an Intermodal Facility in the City of Edgerton in southwest Johnson County, Kansas. HDR designed the technologically advanced facility that enables efficient intermodal freight shipments within the BNSF rail network to the Kansas City region. Strategically siting the complex industrial development relative to critical rail and highway transportation assets required

realigning approximately 2 miles of an unnamed Big Bull watershed tributary. HDR strategically consulted with regional stakeholders in developing an enhanced ecological conservation floodway corridor located in a perpetual servitude. Natural stream restoration techniques were used to realign the stream in a strategically sited and centrally located ecological corridor. Sustainable materials were primarily used to construct natural stormwater and erosion control features to enhance water quality treatment for onsite drainage runoff before discharge to the relocated channel. Restored wetlands, riffle pools, and ecologically designed drainage basins function to improve water quality, promote detention/infiltration, restore natural habitats, and reduce indirect environmental impacts. Relocation of the stream with detailed design of drainage features effectively reduced downstream peak flows and upstream base flood elevations. The naturally inspired conservation corridor and mapped floodway is a readily identifiable feature at Logistics Park Kansas City (LPKC). The managed conservation corridor demonstrates BNSF's commitment to minimize environmental impacts and contribute to long-term sustainability of communities served. The naturally landscaped floodway provides sustainable prairie habitat for wildlife, waterfowl, and pollinators, while prioritizing floodplain management.

**Biography:** Dr. Pennison is an HDR Professional Associate and senior project engineer with over 42-years' experience in project planning, engineering, and management. He has diverse experience in all types of civil engineering projects, particularly in large civil, water resources, environmental, and flood protection projects. His training and experience also include land use, infrastructure, and coastal systems planning. Dr. Pennison is a registered civil and environmental engineer with a MSCE in Environmental and Water Resources studies from Louisiana Tech University. His PhD from the University of South Alabama is in systems engineering with studies focused on resiliency of natural and engineered coastal systems when exposed to extreme events such as hurricanes. He is a member of ASCE, Louisiana Engineering Society, WEF, ASBPA, IISE, INCOSE, SAME, and ASFP.

### **Creating Environmental and Community Resiliency through Stream Restoration**

Guillermo Simon, PE, CFM, Halff Associates, Inc., [gsimon@halff.com](mailto:gsimon@halff.com)

**Co-presenters:** Kay Ehas, [Kay@groundworkjacksonville.com](mailto:Kay@groundworkjacksonville.com) and Kevin Tweedy, [ktweedy@eprusa.net](mailto:ktweedy@eprusa.net)

**Abstract:** For decades, the City of Jacksonville, Florida has looked for ways to unlock the potential of its waterways to help downtown communities thrive. As the city's commercial interests grew after the late 1800s, urbanization encroached upon natural space and removed valuable tidal wetlands from the St. Johns River, Hogans Creek, and McCoys Creek. The city's growth also resulted in neighborhoods separated based on cultural and racial backgrounds. Today, thanks to sea-level rise and over 150 years of urban development and creek alterations, these tributaries pose significant flood and health risks to their residents. In 2014, city leaders formed Groundwork Jacksonville — a non-profit organization comprised of city, community, and business representatives — to revitalize downtown communities through the creation of the Emerald Trail, a 30-mile system of linear parks and trails that includes the restoration of these urban creeks. In 2021, Halff Associates began the development of a conceptual stream restoration design for Hogans Creek. The design includes geomorphological adjustments to the creek and the restoration of natural ecosystems to achieve a more natural state, as well as the identification of flood mitigation opportunities through hydraulic modeling. Notably, hydraulic modeling evaluated both rainfall-runoff and storm surge with HEC-RAS 6.0. The model incorporates the City's Master Stormwater Management Plan flows and an innovative approach to urban flooding using building footprint delineation. Other project features include research of soil contamination throughout the Hogans Creek corridor, development of a park and trail plan focused on neighborhood connectivity,

recreation, and cultural heritage, as well as outreach and coordination with numerous stakeholders. The Hogans Creek stream restoration project will combine nature-based solutions to flood mitigation and water quality improvements, neighborhood connections, and direct community engagement to reshape downtown Jacksonville towards a more resilient and sustainable economic and environmental future.

**Biography:** Guillermo Simon has more than 20 years of experience in the fields of surface hydrology, hydraulics, and coastal engineering. His background includes a wide variety of projects, ranging from single lots to multi-county and basin-wide projects — from scoping to completion and quality control. Guillermo’s experience includes engineering analyses, modeling, and design. He routinely leads multidisciplinary production teams in the development of projects for a wide range of clients and stakeholders and enjoys mentoring young staff. Guillermo has a keen interest in serving local environmental and resiliency causes through volunteer roles and acts as Compass PTS JV Subject Matter Delivery Lead in Coastal Engineering. With his diverse skillset in coastal and water resource engineering and project management, Guillermo serves as Halff Associates’ Director of Water Resources in Florida.

## **C7: Local Stormwater Initiatives from Coast to Desert**

### **Rivers of Opportunity – Upper Petaluma River Watershed’s Plan for Stormwater Management**

Millicent Cowley-Crawford, Woodard & Curran, [MCrawford@woodardcurran.com](mailto:MCrawford@woodardcurran.com)

**Co-presenters:** Aaron Fulton, [Aaron.Fulton@scwa.ca.gov](mailto:Aaron.Fulton@scwa.ca.gov)

**Abstract:** The Sonoma County Water Agency (Sonoma Water) is presently developing the Upper Petaluma River Watershed Project (Project) in order to provide regional flood mitigation and groundwater recharge benefits within the Upper Petaluma River Watershed. This watershed experiences large, heavy winter storms, driven by atmospheric river events that inundate creeks and streams and flood local communities. Periodic droughts can also stress groundwater and surface water resources. As a result, Sonoma Water, with the support of Woodard & Curran, has undertaken a watershed-wide study of the technical and practical feasibility of potential stormwater management and groundwater recharge opportunities that can also provide broader community benefits, such as water quality improvements, improved ecosystem function, preservation of agricultural land use, enhancement of open space and recreation, public access and education. A key aspect of the project has been engagement of a wide variety of stakeholders throughout project conception and development. This presentation will allow Sonoma Water to share lessons learned in formulating this watershed-wide approach to optimization of project benefits to meet the diverse needs of the region.

**Biography:** Millie is a senior project manager and expert in water resources management and planning at Woodard & Curran with over 20 years of experience in flood control, climate change, and stormwater management and planning in both the public and private sectors.

### **Sluice Gate Benefits/Climate Change Impacts/Tropical Storm Eta Recap**

Kevin Hart, P.E., CFM, South Broward Drainage District, [kevin@sbdd.org](mailto:kevin@sbdd.org)

**Co-presenters:** None

**Abstract:** South Broward Drainage District (SBDD) is an independent, drainage district located in SW Broward County, Florida. With a jurisdictional area of over 72 square miles, SBDD is the largest single-purpose drainage district in the County. Starting in 2013, SBDD has installed sluice gates at six of its primary stormwater pump stations. These gates allow the District to convey water by gravity flow as opposed to pumping. The District has achieved the following benefits from its sluice gates:

1. Lower operation and maintenance costs by allowing permitted discharge to occur via gravity rather than through pumping operations. SBDD estimates a total reduction/savings in pumping of 7,530 hours and a total cost savings to date of \$102,875.
2. Provides an emergency by-pass at all pump stations in the event that the pump station motors/pumps were to fail.
3. Allows for pre-storm and/or post-storm discharge to occur through a gravity connection, thereby, preserving the use and dependency of the pumps/engines.
4. Allows for greater flexibility in the operation of the pump stations.
5. Reduced pumping time and all associated environmental impacts, including carbon emissions. Since the installation of its first sluice gate in 2013, SBDD estimates a total reduction in carbon emissions of 669 tons.
6. Provide additional discharge capacity in emergency situations.
7. The benefits and savings associated with the District's sluice gates will continue year after year, well into the future. SBDD continues to see the impacts of climate change and sea level rise on its operations, especially during periods of king tide events. Sea level rise and climate change are starting to impact SBDD's ability to utilize its sluice gates. In November, 2020, SBDD experienced the impacts from Tropical Storm Eta, whose rainfall total and intensity exceeded that of a 100-year, 3-day design storm.

**Biography:** Kevin M. Hart has served as the District Director of the South Broward Drainage District for the past 11.5 years. As District Director, Kevin is responsible for the day-to-day operations of the District. SBDD has a jurisdictional area of over 72 square miles and is largest single-purpose drainage district in Broward County. SBDD provides water management and flood protection services for its residents and businesses. Prior to his current position with SBDD, Kevin worked as a Consulting Engineer for Craven Thompson & Associates and Miller Legg & Associates. During that time period, Kevin served as the Engineer for the Town of Lauderdale-by-the Sea, City of Aventura, and Central Broward Water Control District; and as the client manager for Port Everglades. He is the current Chair of the Technical Advisory Committee to the Broward County Water Advisory Board and is a long-standing member of ASCE. He is also a member of the Executive Board for the Florida Association of Special Districts. Kevin is a graduate of Virginia Tech (1981) and is a professional engineer in the State of Florida with over 40 years of civil engineering experience in the South Florida area. He is also a Certified Floodplain Manager.

#### **Lower Las Vegas Wash – Seeking Stability in a Dynamic Stream System**

Ferrin Affleck, PE, CFM, PMP, Atkins North America, [Ferrin.Affleck@atkinsglobal.com](mailto:Ferrin.Affleck@atkinsglobal.com)

**Abstract:** The Las Vegas Wash is a 12-mile-long channel which feeds much of the Las Vegas Valley's water into Lake Mead. The Lower Las Vegas Wash is the ultimate drainage segment of this system. It is a dynamic stream system in a particularly complex desert environment. The reach serves as the connection from the expansive Las Vegas Metropolitan area (with its water treatment facilities)

eastward to the Lake Mead reservoir. Lake Mead serves as the drinking water to multiple communities in the region. Join us as we explore the process in seeking stability of this system using a series of grade control structures with multi-disciplinary considerations. Hydrology, hydraulics, geotechnical, structural, roadway, permitting, sediment, environmental, you name it. The Lower Las Vegas Wash stabilization program considers all design factors with the ultimate objectives of stabilizing the reach to protect upstream assets from failure, improving the water quality of Lake Mead, and promoting a prosperous habitat for wildlife and recreation in the future.

**Biography:** Ferrin Affleck's 18-year civil engineering career is split between civil design work and FEMA's Risk MAP program. He is currently the Deputy Regional Director for the STARR II Joint Venture supporting FEMA Zone 3.

## **C8: Dewberry Showcase: Resilience in Motion: How Vision, Innovation, and Fortitude Drive Resilience Actions**

**Wednesday, May 18**

**Session D: 10:30 am-Noon**

### **D1: Compliance and Enforcement**

**The Community Assistance Contact (CAC)/Community Assistance Visit (CAV) is Changing...Learn How it Impacts Your Community's Compliance to the National Flood Insurance Program (NFIP)**

Sarah Owen, FEMA, Sarah.Owen@fema.dhs.gov

**Co-presenters:** None

**Abstract:** Known fact: Compliance audits and technical assistance build community resilience. When structures are built to meet or exceed NFIP minimum floodplain management standards, they incur 65% less flood damage on average. As natural disasters continue to become more intense and severe, compliance audits are critical to ensuring that communities: 1.) manage their development in a way that reduces flood losses; 2.) build community resilience; and 3.) reduce disaster suffering. To that end, FEMA is redesigning the current CAC/CAV process into a new NFIP Compliance Audit Program. The new audit process will result in increased transparency, consistency, and accountability in how a community's floodplain management program is evaluated and the ability to track and understand compliance changes over time. By attending this session, State and local officials will learn how the CAC/CAV process is changing and what to expect in this multi-year effort. Given the significant change in how communities are audited, we encourage attendees to provide their expertise and feedback to the revised process—leveraging lessons learned and best practices for promoting a sound floodplain management program in their community.

**Biography:** Ms. Sarah Owen currently works at FIMA Headquarters as an NFIP specialist and regional liaison who acts as a resource for regional regulatory support and national policy making. She worked as part of a team that created Policy #104-008-03 on Floodplain Management Requirements Agricultural and Accessory Structures. She also leads the Compliance Committee which aims to increase compliance with NFIP regulations on a national scale. Ms. Owen was a Natural Hazards Program Specialist with FEMA Region IX for over 10 years prior to working at FIMA HQ. She has experience with the interpretation and enforcement of NFIP regulations in arid regions, coastal zones, riverine areas, highly urbanized and extremely rural areas, including conducting mapping outreach, providing technical assistance, assisting communities with correcting NFIP violations, and coordinating with States to change laws that conflict with NFIP regulations. Ms. Owen has conducted multiple classes on Elevation Certificates, Substantial Damage/Improvement, NFIP Basics, and Coastal Regulations throughout Region IX. She has conducted Basic and Advanced NFIP classes at the Emergency Management Institute, as well as Train-the-Trainer classes, and was part of the national effort to redesign the national basic floodplain management class (E273). Ms. Owen has disaster experience on flood and hurricane disasters including Hurricanes Katrina and Sandy, and post-earthquake Preliminary Damage Assessments in Region IX. Prior to joining FEMA, Ms. Owen utilized her B.S. in geology working for environmental consulting companies to conduct groundwater, soil and soil vapor risk assessments, remediate sites contaminated by petroleum hydrocarbons, and characterize the effects of forest harvesting activities on streams. Ms. Owen also served in the Peace Corps in Kazakhstan, teaching environmental studies to middle-school children.

### **Making Elevation Certificate Review Easy**

Becca Fricke-Croft, CFM, Atkins, [becca.croft@atkinsglobal.com](mailto:becca.croft@atkinsglobal.com)

**Co-presenters:** Mike DePue, Michael.DePue@atkinsglobal.com

**Abstract:** FEMA's Elevation Certificate is an important administrative tool of the NFIP. Though it's no longer required to obtain an insurance policy through the NFIP under Risk Rating 2.0, most participating communities, and all of those in the CRS, will still use them for floodplain management decisions inside the SFHA. Elevation Certificates can also provide details that may qualify the property owner for insurance discounts (even OUTSIDE the SFHA)! There are often errors associated with the data recorded on Elevation Certificates, and in some instances the elevation data may reflect a potential violation of the community's floodplain ordinance. Community floodplain managers, building officials, and CRS coordinators are charged with reviewing all new ECs to ensure that the information provided is accurate, that the forms are filled out correctly, and that the information provided reflects a building that is, in fact, compliant with local floodplain management regulations. Communities that participate in the Community Rating System submit all new ECs every year during recertification. A new Class 9 prerequisite requires that 90% of all ECs must be accurate and reflect compliant development or the community risks losing eligibility to participate in CRS. EC review is not an easy task, but it's critical that errors on the form and compliance issues be identified and corrected early in the permit review or inspections process. In this presentation, we will review common errors that are found on ECs and how to quickly spot potential violations. We'll offer tips for finding errors and resolving them quickly. We'll also discuss tools that communities can use to make the review process easier, including FIRM and BFE validation, useful reports like heat maps of areas with frequent errors or violations, and other feedback that the community can use to improve EC accuracy in the future.

**Biography:** Becca Fricke-Croft is a Senior Project Manager and the Training and Outreach Lead for STARR II. As a former elected official and local floodplain manager, she has a unique perspective of the communication and training needs of local communities and works with FEMA to develop outreach strategies that meet the goals of Risk MAP at the federal, state, and local level. She sold her home and everything in it early in 2021. She now lives full-time in her motorhome, traveling around the country to visit family, friends, and fellow floodies. She traveled to 48 states in the first year.

### **Flood Venting 101**

Mike Graham, CFM, Smart Vent Products Inc, [soleary@smartvent.com](mailto:soleary@smartvent.com)

**Co-presenters:** None

**Abstract:** This course provides insight into the importance of proper foundation flood vents and compliance with Building Codes and FEMA standards and how they can effectively prevent major damage to buildings due to flooding. The course will review applicable codes pertaining to foundation flood venting, including a complete review of FEMA's Technical Bulletin TB-1 revised in March of 2020. After the course, participants will have a thorough understanding of the difference between non-engineered openings and engineered openings and the important role they play in designing a sustainable structure.

**Biography:** Mike has been active in Floodplain Management for over 15 years. He was one of the first four Certified Floodplain Managers (CFM's) in New Jersey and was a founding member of the New Jersey Association for Floodplain Management (NJAFM). He is the past President, and current Co-Chair of the NJAFM Educational Conference Committee. Mike is a member of the ASCE Flood Resistant Construction Committee and the ASFPM Floodproofing Committee. In 1999, Mike started work on the development of a line of Engineered Flood Vents, called Smart Vent®, that became the first ever mechanically operated line of flood vents designed to relieve hydrostatic pressure from enclosure walls in the floodplain. Working with the International Code Council Evaluation Service (ICC-ES), Mike developed the first ever Performance Acceptance Criteria for automatic foundation flood vents, which is the standard that Engineered Flood Vents still need to meet today. Directed by Mike, Smart Vent Products, Inc, is the industry leader in Flood Venting products and best practice approaches in Floodplain Management. Smart Vent Products is also known for their complimentary Flood Risk Evaluations Service (F.R.E) that assists industry professionals and homeowners with consulting on mitigation retrofits that reduce flood damage risk and lower NFIP Flood Insurance Premiums.

## **D2: Floodproofing and Retrofitting**

### **Flood Mitigation Certification Program Spotlight**

Louie Greenwell, GISP, CFM, ASFPM, [louie@floods.org](mailto:louie@floods.org)

**Co-presenters:** Charles Mahall, FM Approvals, [charles.mahall@fmapprovals.com](mailto:charles.mahall@fmapprovals.com)

**Abstract:** Are you a community official that is planning a local flood protection project? Maybe you are a property owner or lender with a significant investment that you need to protect? With all the flood mitigation products in the marketplace, how can you be sure which ones will perform as advertised? Can you afford to take the risk of a valve, seal or enclosure failing during a flood? The Flood Mitigation



Certification Program is a partnership between ASFPM, the USACE, and FM Approvals that independently and objectively tests and certifies various flood mitigation products against the ANSI/FM 2510 standard of performance. Attendees will learn about the program, types of certified products, the standard, the testing/certification process, and the benefits to manufacturers and the public.

**Biography:** Louie began his career over 30 years ago and currently serves as the Certification, Training, and Technology Director for ASFPM. With a background in GIS, Louie has managed complex technology implementation projects at many levels of federal, state and local government. His passion for professional development and continuing education led him to ASFPM where he served as a volunteer and President for the Certification Board of Regents (CBOR). He now provides leadership for the national CFM® Program, training, and efforts to modernize and integrate ASFPM's technology platforms. He also serves in a coordination role for the Flood Mitigation Certification Program.

### **Evolving Dry Floodproofing**

Manny Perotin, PE, PMP, CFM, CDM Smith, [perotinma@cdmsmith.com](mailto:perotinma@cdmsmith.com)

**Co-presenters:** None

**Abstract:** With new technology/techniques for floodproofing, additional guidance is needed as it relates to the definitions of floodproofing. The ASFPM Non-Structural Floodproofing is evaluating current definitions and requirements for floodproofing to make recommendations to the Association regarding requirements in accepting various floodproofing solutions to mitigate flood losses. This presentation will focus on potential proposals for incorporating different requirements for new, legal non-conforming, or existing construction when dry floodproofing measures are proposed, as well as outlining construction methods and techniques that are currently unclear as to whether or not they meet the definition of dry floodproofing. The presentation will include example measures to facilitate discussion on what the Association should recommend as the minimum requirements along with best practices for measures that reduce future flood damage.

**Biography:** Manny Perotin is a professional engineer with 20 years of experience in civil engineering, risk and vulnerability assessments, hazard mitigation, benefit-cost analysis, floodplain management, planning, disaster recovery, and project management. Under nationwide contracts with the Federal Emergency Management Agency (FEMA), he served on post-disaster damage, mitigation assessment, and hazard mitigation assistance grant technical review teams, in addition to serving as an instructor teaching benefit-cost analysis and building science courses throughout the country. He has assisted state and local government agencies with preparing or updating emergency management plans, conducting training and exercises, tracking operations during an emergency, and aiding in coordinating reimbursement through the Federal Highway Administration Emergency Response (FHWA-ER) and FEMA Public Assistance (PA) programs.

### **A Climate Resilience Approach to Building Retrofits**

Aditya Bhagath, PE, CFM, WEDG, Thornton Tomasetti, [abhagath@thorntontomasetti.com](mailto:abhagath@thorntontomasetti.com)

**Co-presenters:** Jennifer Mahan, [jmahan@thorntontomasetti.com](mailto:jmahan@thorntontomasetti.com)

**Abstract:** With the increase in the tangible impacts of climate change on the built environment, existing building stock in urban areas is at a higher risk of damage over time. While the risks of coastal flooding become better understood every year, the effects of flooding are compounded by other climate hazards like heavy precipitation and extreme heat that are less familiar to designers and decision-makers. A

resilient approach to building retrofits aims to protect structures from current and future-projected climate-related hazards while incorporating future adaptation strategies. Developing a holistic climate resilience strategy that accounts for these risks, not just flooding, is key to revitalizing existing building stock. Such a strategy should be comprehensive, future-focused, and incorporate a site-specific risk and resilience assessment that includes vulnerability analyses and evaluation of cost-effective resilience measures. This process is key to understanding the gaps between the expected performance of the existing building as-is, prior to any retrofits, and the desired performance. The assessment may indicate a range of deficiencies, including building envelope vulnerabilities to climate hazards, damage to historic façade elements or MEP service equipment, inadequate structural capacity for future projected climate hazards, loss of municipal utilities, or business interruption and disruption of building activities during a hazardous event. Once we identify performance gaps and vulnerabilities, we can develop and implement appropriate resilience measures, as well as optimize co-benefits for the building. We will present an overview of the resilience strategy development process and then dive into detailed case studies of building retrofits in urban areas. We will illustrate how - through a creative, interdisciplinary approach - we successfully navigate challenges inherent to existing building projects while maintaining a future-focused approach to enhance the overall long-term resilience of the building.

**Biography:** Aditya Bhagath, P.E., CFM, WEDG, is an associate in Thornton Tomasetti's Resilience team and has experience providing resilience and structural engineering consulting services on a wide variety of healthcare, retail, residential and commercial projects. His expertise includes multi-hazard climate risk and resilience assessments and adaption strategies and performance testing of installed food resilience measures. His project experience also involves structural investigations of existing buildings, including repairs and alterations to buildings, litigation support and forensic and emergency response for damaged buildings. Jennifer Mahan, WEDG, is a project director in Thornton Tomasetti's Resilience team and brings interdisciplinary structural engineering experience with a focus on resilient design and construction. She specializes in mitigative designs for a variety of natural disaster shocks and stresses, and in post-disaster investigation and assessments. Her responsibilities include the synthesis of scientific research, geospatial data, and post-disaster crowd-sourced information, and the analysis of the latest design and building codes.

### **D3: Modeling and Flood Forecasting**

**Floodcast: Providing realtime flood forecast information to DOT's and beyond for emergency response**

Shane Putnam, PhD, Dewberry, [sputnam@dewberry.com](mailto:sputnam@dewberry.com)

**Co-presenters:** Max Kipp, [jkippp@dewberry.com](mailto:jkippp@dewberry.com); Seth Lawler [slawler@dewberry.com](mailto:slawler@dewberry.com); and Mat Mampara [mmampara@dewberry.com](mailto:mmampara@dewberry.com)

**Abstract:** One-dimensional models have been the backbone of hydraulic design and FEMA's flood mapping program for decades. Although 2D models are replacing 1D studies in many locations, the speed, versatility, and accuracy of 1D models in many ways offer more for less than their 2D counterparts. For this talk, we will provide an overview of the FloodCast project: a multi-year research study for the National Academy of Engineering and the National Cooperative Highway Research Program. During this talk we will demonstrate how 1D models can be used to provide timely flood stage

predictions when combined with the National Water Model streamflow forecast for use by State Departments of Transportation (DOT's) managers when storm systems threaten roadways and commuter safety. This presentation will provide an overview of the current status of the project, including a demonstration of multiple dashboards created for partner DOT's which are actively used in the decision making process for dictating where and when to respond to flood hazards. A technical discussion will provide insight on the approaches for leveraging 1D models and modeling techniques. Further, a review of the many state partners involved in this project, and the flood events that have occurred since this system was put in place will be presented to demonstrate the advantages of a realtime forecast system. Throughout the presentation, the success story of how 1D models are used to effectively translate streamflow forecast to stage predictions at roads and bridges for use in emergency management activities will be showcased.

**Biography:** Dr. Shane Putnam is a hydrologist and scientific programmer in the Computational Science and Informatics group at Dewberry. He is a subject matter expert in statistical hydrology, and has led development of software tools currently in use by FEMA for probabilistic flood risk analysis. At Dewberry, Dr. Putnam has worked on numerous flood hazard and resiliency projects including studies for the National Academy of Science, Engineering, and Medicine.

### **Repurposing HEC-RAS Models for Flood Forecasting Purposes in Mecklenburg County, NC**

Warren McKinnie, PE, CFM, Streamline Technologies, Inc., [fmckinnie@icpr4.com](mailto:fmckinnie@icpr4.com)

**Co-presenters:** Peter Singhofen, [psinghofen@icpr4.com](mailto:psinghofen@icpr4.com)

**Abstract:** Flood Insurance Studies (FIS) are predominately based on steady-state HEC-RAS modeling efforts of open channel systems. Modeling within a particular county might include a hundred or more individual HEC-RAS models that were prepared by various consulting engineering firms over the span of many years. Often, expensive field surveys are used to support the models including important bridge and culvert hydraulics. Although the models are used from time-to-time after their initial purpose to check encroachments into the floodplain, they are of limited use by themselves. This presentation explores the repurposing of 113 HEC-RAS models in Mecklenburg County, North Carolina. Scripts were developed to automatically extract the cross section and hydraulic structure data from all 113 models in one pass and combine them into a single hydrodynamic model of the 263-sqmi watershed. Hydrology is incorporated into the model and was developed using Arc Hydro tools. The nationally (FEMA) accepted ICPR4 Pro model was used as the watershed model. The model was calibrated/verified using 71 rain stations and 32 stream gauges for Tropical Storm Eta (November 2020) and Hurricane Florence (September 2018). Once calibrated, the model was deployed as a real-time flood forecasting system that utilizes forcing data (rainfall and ET) from the National Water Model and includes an outward facing dashboard that can be accessed from a smart phone, tablet, or computer. This presentation will demonstrate via a case study how existing HEC-RAS models can be combined into a single watershed model and repurposed for real-time flood forecasting purposes.

**Biography:** Mr. McKinnie is a senior water resources engineer with over 15 years of professional experience in stormwater management and modeling. He received his bachelor's and master's degrees in Agricultural and Biological Engineering from the University of Florida. His experience includes H&H modeling (1D and 2D), 2D groundwater modeling, hydraulic analysis of erosion and sedimentation countermeasures, floodplain analysis, water quality analysis, secondary drainage system analysis, and

hydraulic analysis of water distribution systems. He specializes in the integration of stormwater infrastructure data with GIS applications for asset management as well as H&H model development.

### **Flood Forecast Alerting based on NOAA's National Water Model**

Jennifer McGee, PE, CFM, GISP, Wood PLC, [jenna.mcgee@woodplc.com](mailto:jenna.mcgee@woodplc.com)

**Co-presenters:** None

**Abstract:** In 2018, Wood kicked-off a project with the Maryland Department of the Environment (MDE), Maryland Environmental Service (MES), the US Army Corps of Engineers (USACE) to research the use of NOAA's National Water Model (NWM) for riverine flood forecasting. The National Water Model (NWM) "is a hydrologic model that simulates observed and forecast streamflow over the entire continental United States (CONUS)", based on the National Hydrography Dataset (NHDPlusV2) stream network of ~2.7 million stream reaches. We coupled the NWM data with FEMA Risk MAP HEC-RAS models to build a pilot system for flood forecast alerting and inundation mapping. Using lessons learned from that pilot, our Wood project team was successful in winning internal R&D funding through a CoLab Challenge to build a more robust solution. The new project is a web application that brings the alerting and mapping into a single platform. Clients and other stakeholders will be able to customize their experience, building personalized alerts for their areas of interest and flood severity levels, receiving either email or text message alerts. When alerts are received, they can log into the portal to see more detailed information. NOAA's NWM Reanalysis dataset, which includes data from a multi-decade retrospective simulation, will also be incorporated into the project. This will help provide default flood threshold values for all stream reaches, making the tool ready-to-use even if detailed hydrology data is not available. The web app will also have an integrated mapping view of the flood inundation layers where flood models are available. This is a great all-in-one portal for keeping tabs on flood forecasting and a great addition to other decision-making datasets in your toolbox. This presentation will provide a brief background on the NWM, share key insights we've learned from this project, and talk about future enhancements that are planned.

**Biography:** Ms. McGee is a Water Resources Engineer with Wood in the Chantilly, VA office. She has a background in FEMA's NFIP program and Public Assistance program for disaster recovery. She specializes in data science applications for engineering projects and program management.

## **D4: State CTP Showcase**

### **Colorado 2D Consortium: Strategies and Lessons Learned from Interagency Collaboration**

Rigel Rucker, PE, CFM, AECOM, [rigel.rucker@aecom.com](mailto:rigel.rucker@aecom.com)

**Co-presenters:** None

**Abstract:** 2D methodologies have pushed the NFIP regulatory envelope in a number of different ways, creating challenges when developing regulatory flood risk products that attempt to incorporate creative and innovative solutions. With new technical approaches, a dependency loop is created. New approaches are in need of technical guidance to develop quality products that leverage the benefits of the new approach while also achieving the goals of the NFIP, and remain user friendly and useful. On the other hand, guidance and standards need lessons learned, case studies, and the collective

knowledge of those implementing the new approaches in order to develop guidance and standards that provide a framework for consistency across Risk MAP studies. That feedback process to identify best practices and update guidance can take a long time, creating a need for interim consistency established by Cooperating Technical Partners (CTPs). In Colorado, this need has been met in part by interagency collaboration via several groups including the Colorado 2D Consortium (C2DC). The C2DC has aimed to develop intrastate consistency and knowledge sharing, while also developing a framework by which recommendations to FEMA on guidance and standards updates are consolidated in an attempt to expediate the sharing process. This presentation will discuss some of the strategies and recommendations of the C2DC, while also discussing some of the lessons learned and considerations for other CTPs and geographies where similar knowledge sharing may be taking place. Finally, some additional benefits of interagency collaboration coupled with the benefits of 2D studies will be discussed.

**Biography:** Rigel graduated from New Mexico State University with a Bachelor's degree in Civil Engineering. He currently lives in Castle Rock, CO with his wife and son while working at AECOM, mainly supporting CWCB's Cooperating Technical Partner program. Rigel has worked the majority of his 19 year career on FEMA's Map Modernization and Risk MAP programs. He has worked on all aspects of flood risk analysis to include working for a local floodplain management office, analyzing floodplains, and managing mapping programs. In addition, he has worked on several hydrology and hydraulic analyses and design projects. He currently serves on multiple technical committees and pilot studies informing the future of Risk MAP. Aside from floodplain analysis, he enjoys auto and home modification/repair, grilling, skiing, hiking, gaming, and anything he can do to get his son out of the house.

### **How to Design, Build, and Manage a Robust CTP Contractor Ensemble**

Steve Story, PE, CFM, Montana DNRC, sestory@mt.gov

**Co-presenters:** None

**Abstract:** Building and orchestrating a talented, experienced, and reliable group of professional services contractors is critical to the long term success of any CTP Program. Doing so takes vision, deliberate planning, and a heaping dose of contract and fiscal management experience and prowess. This presentation will showcase the Montana CTP program and follow its 8-year contractor transformation from an "eggs in one basket" approach into a contractor "ensemble", along with the trials and tribulations. The state currently spreads Risk MAP project work to over half a dozen engineering/surveying contractors, building a strong network of knowledgeable experienced Subject Matter Experts (SMEs) across the state. Although competitors, the ensemble contractors work collaboratively, sharing knowledge and creativity in order to achieve the common goal of developing the most credible and accurate flood hazard and risk products for the public. We'll share lessons learned, along with many of the tools and techniques used to keep this well-oiled machine humming along.

**Biography:** Steve Story, P.E., CFM, is the Chief of the Water Operations Bureau for the Montana Department of Natural Resources and Conservation (DNRC). He oversees and leads the state Floodplain, Dam Safety, and Board of Water Well Contractor programs. Steve is a registered professional engineer in Montana and received a Bachelor of Science in Civil Engineering from Colorado State University in 1996 with an emphasis in hydraulics and river mechanics. Steve previously served as Co-chair of ASFP's Mapping and Engineering Standards Committee, conceived and stood up the ASFP CTP Sub-

Committee, and assisted FEMA's Technical Mapping Advisory Council (TMAC) in 2016 as a Subject Matter Expert. Prior to joining DNRC in 2009, Steve spent a decade in the private sector as a hydraulic engineer and project manager on numerous large scale water resources and flood control projects. He also served a year as the Floodplain Administrator for Teton County, Wyoming. Steve began leading Hydrologic and Hydraulic analyses and map production activities for Map Modernization projects in 2005. During his tenure at DNRC, he has led and completed numerous floodplain studies, managed the Cooperating Technical Partner (CTP) agreement with FEMA, and administered all aspects of Map Mod and Risk MAP projects. Steve lives in Helena, Montana and spends much of his time exploring the mountains, rivers, and wilderness with his wife, Chocolate Labrador, mountain bike, fly rod, and camera.

### **Bottom-up approaches to FIMA's Four-Legged Stool**

Vikram Shrivastava, PE, PMP, D.WRE, CFM, Atkins, vikram.shrivastava@atkinsglobal.com

**Co-presenters:** Mike Schlesener, mike.schlesener@atkinsglobal.com; Scott Ralston, Scott.Ralston@dnr.iowa.gov; and Chris Kahle, Chris.Kahle@dnr.iowa.gov

**Abstract:** The path to resilience through flood insurance, mitigation, floodplain management, and flood hazard identification is cumbersome and arduous when undertaken by either the community, the state, or FEMA by oneself. However, the aligned and coordinated efforts of a community, the State CTP, FEMA, and the CTP's contractor can eliminate obstacles and make progress towards resilience. The presentation will focus on three specific situations in rural and urban communities in Iowa where FEMA, the Iowa Department of Natural Resources (DNR), the Cities of Akron, Cherokee, and Clinton, along with Atkins (the CTP contractor) addressed community concerns with the flood hazard identification. This effort of addressing what mattered to the communities was found to advance resilience by raising the potential for mitigation while proceeding with FIRM updates. In addition, these case studies demonstrate community data contribution and coordination that is key to resolving community concerns and refining the flood hazard analyses.

**Biography:** Vikram is a Senior Project Director and Water Resources Engineer with Atkins. He specializes in natural hazard risk identification and analyses, risk assessment and mitigation. Many of his projects involve water resources focused projects - floodplain mapping, levees, flood risk assessment, floodplain management plans, stormwater management and public outreach. Vikram has a Bachelor's in Water Resources Engineering from the University of Guelph and a MS degree in Agricultural and Biosystems Engineering from McGill University.

## **D5: Decision Support Tools**

### **Hold 'em or fold 'em: Decision-making tools and resources for flood mitigation**

Jenna Moran, ASFPM, jenna@floods.org

**Co-presenters:** Eleanor Rappolee, ASFPM, eleanor@floods.org

**Abstract:** What if a property owner, after suffering through a flood, could browse flood mitigation options on their handheld device to help better inform rebuilding? Or, what if a potential homebuyer finds out at the last minute that their home is in the floodplain and wants to know what types of mitigation can be done, their approximate cost, and if they will have a positive impact on the buyer's

flood insurance premium? The Flood Mitigation Library was built to do just that, to provide property owners and policyholders under the National Flood Insurance Program (NFIP) a way to browse a library of mitigation options that can reduce flooding (and flood insurance) at the structure and property level. The mobile-friendly library not only leads users through a guided search to get results tailored for their property but also provides additional resources on financial assistance options, strategies for renters, who to ask for advice before moving forward with any of the recommended strategies, and more. As the library is further developed, community level mitigation options will be added for a local government audience. This presentation will demo the Flood Mitigation Library website, focusing on how local and state government staff can share this tool and its associated resources with the initial primary user audience of property owners and NFIP policyholders. It will highlight the resources created to assist in education and outreach around the tool and how the development team envisions expanding the resource to a local government staff audience in the future, with searchable and filterable community level mitigation options. It will also highlight how mitigation literature, which was previously fragmented and housed across multiple agency platforms, has been compiled in one place and is searchable via the ASFPM Library.

**Biography:** Jenna joined the Flood Science Center as a Senior Project Manager in October 2020, overseeing the management of several of ASFPM's key projects. Now, as Flood Science Center Portfolio Manager, she oversees the administration and management of the Flood Science Center's portfolio of federal grants. Before coming to ASFPM, Jenna was the Associate Program Director for Resilience at the National Association of Counties, where she handled grants and initiatives relating to resilience and community and economic development. Jenna holds a Master of Public Administration from The George Washington University and a Bachelor of Arts from the University of Notre Dame. Before transitioning into the world of resilience, she worked in arts and culture as a stage manager and a design program specialist at the National Endowment for the Arts.

### **NOAA's Experimental Potential Coastal Flood Impact Mapping for Effective Decision Making**

Doug Marcy, NOAA, [doug.marcy@noaa.gov](mailto:doug.marcy@noaa.gov)

**Co-presenters:** None

**Abstract:** NOAA's Office of Coastal Management (OCM) and NWS Eastern Region (ER) started a collaborative, exploratory project to use the NOAA Digital Coast information combining that information/methodology with the coastal gauge Flood Category Thresholds established by NWS offices and partners to produce "Potential Coastal Flood Impact" layers. During the extratropical storm season, NWS stakeholders and partners need coastal flood scenario maps for effective decision making. By implementing these "Potential Coastal Flood Impact" layers in the Eastern Region Coastal Flood Web pages, NWS partners and stakeholders will be able to visualize the locations that may be potentially impacted during coastal flood events - with the information coming from an authoritative source. This couples observations and forecasts with potential impacts aiding in visualization and planning for coastal flooding. The layers may be used with the coastal flood warnings text products and be included in briefings enhancing communication. This experimental product is a standardized attempt by the NWS ER and NOAA Partner OCM to spatially convey the impact areas based on coastal flood thresholds/categories and the Weather Forecast Office water level forecasts in a seamless and consistent fashion.

**Biography:** Douglas (Doug) C. Marcy is a Coastal Hazards Specialist at the NOAA Office for Coastal Management in Charleston, SC. He has been with the NOAA 19 years working on flooding and sea level rise geospatial mapping projects, storm surge assessments, and coastal hazards assessment projects contributing to more disaster resilient communities. Doug worked as a Hydraulic Engineer with the U.S. Army Corps of Engineers, Charleston District from 1999 to 2002, where he focused on flood control projects, H&H modeling, flood inundation mapping, shoreline change analysis, and coastal engineering. From 1997 to 1999 Doug worked at the South Carolina Office of Ocean and Coastal Resource Management. Doug has a M.S. in marine geology (1997) from the University of North Carolina at Wilmington and a B.S. in geology (1994) from the College of Charleston. Doug's current interests include using geospatial technology combined with meteorological, hydrological, and coastal modeling (including sea level change) to enhance inundation forecasting, mapping, and risk assessment

### **Research-Based Pilot Projects to Increase Flood Resilience**

Ron Langhelm, Science & Technology Directorate, U.S. Department of Homeland Security,  
Ronald.Langhelm@hq.dhs.gov

**Co-presenters:** Vangjel" Gilly" Pali, VANGJEL.PALI@ASSOCIATES.HQ.DHS.GOV; Claire Jeuken,  
CLAIRE.JEUKEN@DELTARES-USA.US; and Robert Hauck, HAUCKR@CHARLESTON-SC.GOV

**Abstract:** The growing impacts of flooding across the United States are constantly posing significant socio-economic and environmental consequences to communities, businesses, and economies across the nation. This phenomenon is further exacerbated by constant urbanization, growing economies, and climate change. The Department of Homeland Security (DHS) Science and Technology Directorate (S&T), in collaboration with the Department of Energy (DOE) and the National Science Foundation (NSF), has implemented the Civic Innovation Challenge. This is a multi-agency, federal government research and action competition that aims to fund ready-to-implement, research-based pilot projects with the potential for scalable sustainability. And the transferable impact on community-identified priorities. DHS S&T, with support from AECOM, has partnered with Deltares, USA, and the city of Charleston, SC, into the development, test, and application of The Community Flood Resilience Support System (CFRSS) and is designed to support communities in their adaptation planning. The CFRSS computes flood hazards, damages, and risks related to combinations of events, adaption strategies, and future conditions like sea-level rise or population growth. Two innovative models enable fast but accurate calculations of floods and damages under multiple scenarios. The Deltares SFINCS compound flood model is an innovative, fast physics-based model. SFINCS is coupled to the Deltares rapid flood impact assessment tool Deft-FIAT, which calculates flood damages to structures and roads. The CFRSS user interface allows users to define events, future projections, and adaptation strategies and automatically adjust model input to represent those scenarios. In addition, an integrated viewer supports community exploration of potential strategies under changing future conditions. This presentation will discuss the partnership and go into detail on the CFRSS development and pilot deployment. The CFRSS is a support system that any community can evaluate their flood risk and assess adaptation strategies under changing conditions. Its utility in long-term equitable adaption planning under sea-level rise will benefit local communities across the US.

**Biography:** Ronald Langhelm is an S&T Program Manager in the S&T Office of Mission Capability Support (MCS) with over 20 years of experience in the Emergency Management/Homeland Security environment. In this role, he is leading projects to support community & infrastructure resilience, climate adaptation, disaster recovery, and flood response & recovery. Specific efforts addressed in his



diverse portfolio include: First Responder Incident Management Information Sharing Capabilities, the Information Sharing Self-Assessment-Tool (ISAT), and First Aid for Severe Trauma (FAST) High School training (age-appropriate Stop the Bleed curriculum).

## **D6: USACE Levee Session**

### **National Levee Safety Program: The Future of Reducing Disaster Suffering and Improving Community Resiliency**

Tammy Conforti, P.E., US Army Corps of Engineers, tammy.conforti@usace.army.mil

**Co-presenters:** Suzanne Vermeer, suzanne.vermeer@fema.dhs.gov

**Abstract:** Levee systems play a critical role in managing flood risk for the Nation. Approximately 25,000 miles of levees reduce risk to over 17 million people that live and work behind them. They also reduce risk to \$2.3 trillion in property value and much of our Nation's critical infrastructure. Managing those levees, however, poses challenges especially as levees continue to age, natural hazards become more frequent and intense, awareness of flood risk remains low, and approaches to levee management vary. The National Levee Safety Program, a joint effort led by the U.S. Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA), is intended to support a more consistent approach to levee management in the U.S. that will help reduce disaster suffering and support more resilient communities. Input from those who play a role in or benefit from levees will inform the development of the program, which will include creating a consistent set of voluntary best practices for levees; encouraging formal levee safety programs at the state level that can support integrated approaches to flooding; aligning federal programs, starting with USACE and FEMA, that support communities' resilience to flooding; and improving information in the National Levee Database. This presentation will provide information on development of the National Levee Safety Program's components, a summary of stakeholder feedback gathered in early 2022, and a preview for what's next for the program.

**Biography:** Special Assistant for Levee Safety at US Army Corps of Engineers Headquarters.

### **National Levee Safety Guidelines: A Resource for Achieving Nationwide Consistency**

Jamie L. McVicker, PE, US Army Corps of Engineers Levee Safety Center, jamie.mcvicker@usace.army.mil

**Co-presenters:** Mike Sharp, PhD, michael.k.sharp@usace.army.mil

**Abstract:** National Levee Safety Guidelines, comprised of voluntary best practices, will serve as an up-to-date resource designed to help achieve nationwide consistency in improving the reliability of levees and resiliency of communities behind levees throughout the United States. The guidelines are being developed with extensive stakeholder input and are intended to be used by a broad audience such as regulators, levee owners/operators, design and construction professionals, emergency management professionals, states/tribal/local governments, and floodplain managers. It is anticipated that potential topics in the guidelines will range from basic concepts and terminology to consistent approaches for the life cycle of a levee. Strategies to reduce flooding impacts to people, property, and the environment, to include risk management, communication and engagement, are also initial ideas to be included in the guidelines. This presentation will provide information on how the guidelines are being developed,

describe key topics that are proposed for inclusion, relay a summary of stakeholder feedback received to date, and address what's next for the guidelines.

**Biography:** Ms. McVicker has a background in civil engineering and is a manager with the U.S. Army Corps of Engineers. She formerly led a nationwide program conducting levee inspections in all 38 Corp's Districts, co-authored chapters in the International Levee Handbook; served as training facilitator for levee-related courses and managed the initial work associated with levee inventory, inspection and risk assessment activities across the nation. Jamie is currently leading the creation of National Levee Safety Guidelines.

### **National Levee Database & Data Collection: Supporting Levee Management Decisions**

Brian Vanbockern, US Army Corps of Engineers, [brian.d.vanbockern@usace.army.mil](mailto:brian.d.vanbockern@usace.army.mil)

**Co-presenters:** Brad Arcement, PE, [brad.j.arcement@usace.army.mil](mailto:brad.j.arcement@usace.army.mil) and Michael Gonia, PE, [michael.j.gonia@usace.army.mil](mailto:michael.j.gonia@usace.army.mil)

**Abstract:** Data underpins decisions made in every industry today. Levee management decisions are no different. The National Levee Database (NLD) provides a consistent set of data and information about levees in the U.S. that can help those who fund, construct, manage, and benefit from levees make decisions that promote reliable levees and resilient communities. The NLD documents levees in the U.S. including their location, general condition, and an estimate of the number of structures and population in the leveed area. The U.S. Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) are already partnering to populate the NLD and use it as a consistent data source to support levee management decisions. As part of the National Levee Safety Program, a joint effort led by USACE and FEMA, efforts are underway to get a better understanding of levees in the U.S., the true cost of maintaining levees, and quantifying the Nation's flood exposure. These data can help users with levee management and investment decisions. This presentation will provide an overview of the NLD, current and planned data collection efforts, initial findings on the cost of managing levees, and preview future opportunities to provide feedback on or hear more about data collection efforts and the NLD.

**Biography:** Brian Vanbockern is a Section Chief of the Survey & Geospatial Data Section at the Kansas City District US Army Corps of Engineers. He is the National Levee Database Program lead.

## **D7: Local, State, and Regional Watershed Management Initiatives**

### **A Comprehensive Watershed Management Plan Aimed at the Rehabilitation of a Culturally Significant Urban Creek and Bayou in the Heart of Pensacola, FL**

Christine Mehle, PE, CFM, ENV SP, Wood, [christine.mehle@woodplc.com](mailto:christine.mehle@woodplc.com)

**Co-presenters:** Jeanette Kelson, [jeanette.kelson@woodplc.com](mailto:jeanette.kelson@woodplc.com)

**Abstract:** Carpenter Creek and Bayou Texar are in the heart of the Pensacola, FL area. The creek and bayou have played a very important role in the lives of Pensacola ancestors, but few know of their importance today. Impacted by channel modifications, eroded banks, non-attenuated stormwater, gray infrastructure, and diminishment of the protective riparian zone, the creek and bayou are suffering from poor water quality, nuisance invasive species, high sediment loading, and overall poor ecosystem health. Escambia County and the City of Pensacola are developing a comprehensive Watershed Management

Plan (WMP) for the Carpenter Creek and Bayou Texar watersheds. Funding for the WMP development has been secured through the Escambia County Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast State Act (RESTORE Act), Direct Component allocation (Pot 1). This WMP will provide a roadmap for identifying, addressing, and recommending actions to; improve water quality and control water quantity (flooding), promote fish and wildlife habitat, develop public access and recreation opportunities, and heighten community resiliency to sea level rise. Escambia County contracted with Wood Environment and Infrastructure Solutions, Inc. (Wood) to assist with the development of this WMP. The Wood team also includes Scape, Wetland Sciences, and Impact Campaigns. The WMP is very comprehensive in that it includes detailed assessments for hydrologic/hydraulic conditions, water quality and pollutant loading, and stream classification and restoration. Best management practices recommendations will also be comprehensive and will also look to provide value to the community in providing additional public access to this very significant urban system. This project's aim is to improve Carpenter Creek and Bayou Texar, while also increasing its visibility to, and appreciation of, its natural beauty and regional importance. This presentation will demonstrate the Team's process in developing such a multi-focused comprehensive WMP, while working to preserve and restore the community's personal attachment to Carpenter Creek and Bayou Texar.

**Biography:** Christine (Crissy) Mehle has more than 20 years of experience in water resource engineering, including comprehensive watershed assessments and improvement planning with a focus on flood protection, habitat improvement, and water quality improvements. As the Florida Water and Infrastructure Service Line Lead, she leads a team of 80+ water resource engineers and scientists with a mission to help our clients restore their natural systems and built environments. Key services include comprehensive watershed planning; streams, lakes, and estuarine restoration; water quality analysis and improvements; floodplain mapping; integrated groundwater and surface water modeling; green infrastructure and stormwater design; civil design; mining reclamation; and resiliency planning.

### **Snapshot of the Louisiana Watershed Initiative**

LaKesha Hart, Louisiana Office of Community Development, LaKesha.Hart@la.gov

**Co-presenters:** None

**Abstract:** The Louisiana Watershed Initiative (LWI) was established by Gov. Edwards in 2018 to serve as a coordinated, interagency structure at the state level for watershed-based flood risk reduction efforts. The LWI program activities include: (1) establishing statewide regional watershed boundaries, (2) forming Regional Watershed Coalitions to conduct watershed management, (3) funding flood risk reduction structural and nonstructural projects, and (4) developing hydrologic and hydraulic watershed models to analyze data in real time to guide planning, policy, and project decision-making. In September 2020, the U.S. Department of Housing and Urban Development signed a grant agreement with Louisiana establishing a \$1.2 billion line of credit in CDBG-Mitigation funds for priorities outlined in the state's Action Plan. During the first year of implementation, the LWI awarded over \$450M in flood risk reduction projects including over \$87M in residential buyouts in neighborhoods that repeatedly flood. This presentation will cover four major ongoing components of the Louisiana Watershed Initiative: (1) the current Legislative package up for deliberation in the Louisiana Legislature that has the potential to enable a statewide framework for watershed management, officially stand up Regional Watershed Coalitions (RWC's), and enact consistent mitigation standards across five state agencies; (2) the Nature-Based Solutions Program's "Working with Nature Training Series" that's educating local public officials

and stakeholders about the design and development process of nature-based flood mitigation projects and an NBS Explorer Tool that will be used to quantify benefits, measure performance, and justify investment in such projects; (3) the Council on Watershed Management's approval of a long-term watershed Model Use, Storage and Maintenance Plan that ensures statewide consistency in watershed planning, policy, and projects; and (4) the nonstructural Statewide Buyout Program that's assisting homeowners in seven flood-prone communities relocate to safer and higher ground.

**Biography:** LaKesha Hart serves as the Deputy Director of the Louisiana Office of Community Development's Economic Development & Infrastructure Section, where she oversees the state's Community Development Block Grant—Disaster Recovery programs funded by the U.S. Department of Housing and Urban Development. Hart's oversight includes planning and administering programs in economic development and infrastructure for recovery from hurricanes Katrina, Rita, Gustav, Ike and Isaac; The Great Floods of 2016; as well as planning and administering long-term resilience activities. Previously, Hart worked as a long-term community recovery specialist with the Federal Emergency Management Agency and as an environmental specialist in the private and public sector of water quality engineering at Industrial Water and Wastewater Services and the Louisiana Department of Environmental Quality. Prior to her state service, Hart served as an engineer at Halliburton Energy Services and at AECOM. Hart earned a bachelor's degree in chemical engineering from the University of Louisiana at Lafayette in May 2003.

### **Watershed Management Planning in the Coastal Environment: Recent Lessons from the Florida Keys and Coastal Georgia**

Jason Evans, PhD, Institute for Water and Environmental Resilience, Stetson University,  
jevans1@stetson.edu

**Co-presenters:** None

**Abstract:** The Community Rating System (CRS) has in recent years provided coastal communities with an option to utilize long-term assessments of flood risks from sea-level rise as a mechanism for developing a Watershed Management Plan (WMP) as a necessary prerequisite for achieving Class 4 CRS status. However, very few coastal communities have to date attempted to avail themselves of this option, much less successfully fulfilled all of the requirements for a Class 4 compliant WMP based on sea-level rise analyses. This presentation will provide a detailed technical overview of my experiences in working with two communities - Monroe County, FL, and Chatham County, GA - for the purpose of incorporating long-term assessments of sea-level rise vulnerability into their floodplain management and CRS programs. Monroe County is especially notable because these efforts resulted in a WMP that was certified as compliant with the Class 4 prerequisite and that serves as a critical component of this coastal community's current Class 3 CRS status. The road to a compliant WMP has, however, been considerably more challenging for Chatham County, although technical efforts in support of this goal are still continuing. Both of these case studies provide important insights and lessons for other coastal communities that may wish to utilize the WMP guidance from CRS as both a key technical reference and aspirational goal in support of sea-level rise planning efforts.

**Biography:** Dr. Jason Evans is the Executive Director of the Institute for Water and Environmental Resilience and Associate Professor of Environmental Science and Studies at Stetson University. Jason's current research, outreach, and teaching activities focus on conducting climate vulnerability assessments and implementing green infrastructure projects in collaboration with local, state, and

federal authorities across the southeast Atlantic coastal region. He is particularly interested in identifying and implementing opportunities for ecological restoration in combination with flood risk mitigation and water quality improvement in the context of urbanized coastal environments. Jason also serves as Co-Editor-in-Chief for the Journal of Environmental Management, a highly ranked international publication within the fields of environmental science, engineering, planning, and governance. He holds a B.A. in Philosophy from New College of Florida (1998, Philosophy) and both his M.S. and Ph.D. in Interdisciplinary Ecology, with a concentration in Environmental Engineering Sciences, from University of Florida.

## **D8: Wood Showcase: Free the Data to Manage Risk and Improve Resilience**

1. The path of developing 2D flood risk data sets for the historically 1D NFIP regulatory process – Building models for the Future and Beyond.
2. Frustrated with only providing great Flood Risk Data Set Impacts – Develop Flood Resilience Blueprints One Community at a Time.
3. We are the Flood Risk Data Experts and we are here to help you! – Skit with a Floodplain Manager, State NFIP Coordinator, 2D Modeler (SME) and Mayor.

## **Session E: 1:30 - 3:00 pm**

### **E1: State Floodplain Management Initiatives**

#### **160 CACs in 6 Months: How to Streamline Your Community Assistance Process**

Elijah Kaufman, CFM, Nebraska Dept. of Natural Resources, [Elijah.Kaufman@nebraska.gov](mailto:Elijah.Kaufman@nebraska.gov)

**Co-presenters:** None

**Abstract:** After the unprecedented flooding of 2019 impacted two-thirds of the State of Nebraska, the State's Floodplain Management Division set the ambitious goal of conducting a Community Assistance Contact (CAC) with each one of the 160 NFIP communities impacted by the disaster. To accomplish this, the team designed a workflow and supporting tools to ensure reaching this goal. This presentation will share the nuts and bolts of our process design so that other States may implement as well. We'll also share the many lessons learned from the process, and how we adapted the approach to ensure that communities of all capabilities were accommodated.

**Biography:** I am an Environmental Specialist for the Nebraska Department of Natural Resources Floodplain Management Division. I graduated from the University of Nebraska at Omaha in 2019 with a BA in Emergency Management and Disaster Preparedness. For NeDNR, I serve as a point of contact for floodplain management questions for Nebraska's floodplain administrators and the general public. I assist with outreach events to help communities communicate flood risk, as well as outreach events related to mapping projects. I also assist with maintaining NFIP databases, ordinance review,

Community Assistance Contacts (CACs) and Community Assistance Visits (CAVs), and with monthly trainings provided to floodplain officials in Nebraska.

### **Leveraging the NFIP for Resiliency: New Jersey's Strategies for Effective Equitable Climate Change Adaptation**

Rebecca Jones, CFM, New Jersey Department of Environmental Protection, [rebecca.jones@dep.nj.gov](mailto:rebecca.jones@dep.nj.gov)

**Co-presenters:** Joseph Ruggeri, [joseph.ruggeri@dep.nj.gov](mailto:joseph.ruggeri@dep.nj.gov) and Kenya Lovill, [kenya.lovill@dep.nj.gov](mailto:kenya.lovill@dep.nj.gov)

**Abstract:** New Jersey has leveraged the National Flood Insurance Program regulations to strengthen and align State and local floodplain management through the adoption of a statewide Model Code Coordinated Ordinance and by using a combination of “old school” NFIP principles, science and engineering analyses, and a re-thinking of outreach messaging. These “old school” principles were enacted with adaptation and resiliency in mind but were never fully aligned with statewide regulations and are often overlooked. The NFIP Coordinator’s Office has also identified science-based options for empowering NFIP communities to enact even higher standards at the community level. Throughout the new model ordinance roll-out, the NFIP Coordinator’s Office developed messaging that makes the economic case for best practice implementation and promotes equitable decision-making as part of local adaptation planning.

**Biography:** Rebecca Jones is Grant Manager and Floodplain Specialist for the NFIP Coordinator's Office at the New Jersey Department of Environmental Protection. She works as a liaison between FEMA and participating communities and manages a \$50M Post-Sandy CDBG-DR HUD grant that is financing infrastructure in 8 New Jersey communities. She has a B.S. in Geosciences from Penn State and an MBA from Rutgers.

### **Indiana's New Floodplain Information Portal**

Doug Wagner, CFM, Indiana Department of Natural Resources, [DWagner1@dnr.IN.gov](mailto:DWagner1@dnr.IN.gov)

**Co-presenters:** None

**Abstract:** The session will cover the process using the old tool and process verses the new process for obtaining floodplain information for properties within the state. I will review use of the tool and information that is provided to the users. We will also highlight some of the challenges that were encountered in the development of the tool. This tool reduces the time to obtain a Floodplain Analysis and Regulatory Assessment from 60-90 days to a few minutes. The tool provides local floodplain administrator information and BFE data for the user. Attendees will be able to see the tool that Indiana has developed to communicate flood risk and communicate that to individual property owners & professionals.

**Biography:** Doug Wagner, CFM, Senior Water Planner for Indiana Department of Natural Resources, Division of Water’s Floodplain Management Section. Doug received a B.S. from Purdue University in Building Construction and Contracting. He has been involved in the construction industry for over 30 years with his primary focus being on residential and light commercial structures. He has worked as a local building inspector, floodplain administrator, and zoning administrator since January 2014. Doug joined the Department of Natural Resources in November of 2018. In his current role his primary duties

are education and outreach across the state with floodplain management and the National Flood Insurance Program.

## **E2: Local Mitigation Case Studies**

### **Local Government Perspectives on Buyout Programs**

Adam Short, CFM, AICP, CZO, Lenoir County & City of Kinston, adam.short@lenoircountync.gov

**Co-presenters:** None

**Abstract:** This presentation will provide local perspectives on buyout programs in general. We will discuss and explore the good and the bad of these programs. We will consider the human impacts and the impacts to long-standing communities. We will discuss and consider the impact to local governments and their ability to manage growing areas of open space. We will discuss buyouts as a mitigation tool and consider the benefits of this versus other potential options to mitigate impacts. We will discuss and consider gaps in the program and lesson-learned from a community that has hundreds of properties acquired following floods from Hurricanes Fran, Floyd, Dennis, Matthew, and Florence to name a few.

**Biography:** I have worked in floodplain management, in various capacities, for about 15 years. As floodplain manager for the City of Kinston for nearly 10 years, I directly experienced major floods following Hurricanes Matthew and Florence. Kinston and Lenoir County were the location of the largest buyout program before Katrina, and the ongoing impacts and lessons learned are considerable and ever-present in the minds of our citizens. Now, with Lenoir County, I am responsible for floodplain management and emergency services oversight for the entire county. With experience across the Coastal Plain of North Carolina, I have gained valuable perspective on the impacts of flooding and hazards we face on an ongoing basis. I have also gained perspective on the human impacts and how many communities can be disrupted and altogether wiped out by flooding and the subsequent response. I hold a BA in Environmental Studies and a MA in Public Administration from UNC-Wilmington. I am also a Certified Floodplain Manager and AICP.

### **Mitigation Successes/Failures - Post-Ida Mitigation Assessment in Jefferson Parish**

Maggie Talley, CFM, Jefferson Parish, mtalley@jeffparish.net

**Co-presenters:** Michelle Gonzales, mgonzales@jeffparish.net

**Abstract:** Jefferson Parish has mitigated over 2000 structures since Hurricane Katrina devastated the area in 2005 through either elevation or reconstruction. Hurricane Ida hit as a Category 4 on the 16th anniversary of Hurricane Katrina and brought damaging winds and rain. While focusing on recovery efforts, Jefferson Parish was able to capture photos and other data to assess how the mitigated properties fared. This presentation will highlight the various components of the mitigation assessment report including our process for conducting the mitigation assessment, a breakdown of the data compiled, and a discussion of our best practices and flawed/failed practices that are informing our mitigation efforts moving forward.

**Biography:** Maggie became a Certified Floodplain Manager in 2009 and is currently the Director of Floodplain Management and Hazard Mitigation for Jefferson Parish, Louisiana. She facilitates the CRS

Program and the CRS Users Group Jefferson United Mitigation Professionals (JUMP). She also led JUMP's development of a multi-jurisdictional Program for Public Information - an outreach program focusing on flood awareness and safety. Maggie oversees the management of the parish's Hazard Mitigation Programs and advises homeowners on their flood insurance, flood risk and mitigation options. Maggie serves as a local community representative on the CRS Task Force.

### **Tyndall Air Force Base – Coastal Flood Mitigation Approach for Future Military Bases**

Jason Bird, CFM, Jacobs, [jason.bird@jacobs.com](mailto:jason.bird@jacobs.com)

**Co-presenters:** Luce Bassetti, [luce.bassetti@jacobs.com](mailto:luce.bassetti@jacobs.com)

**Abstract:** Coastal military installations, like coastal communities face a range of risks due to extreme weather, sea level rise and storm surge. During this session we will share the approach developed for Tyndall Air Force Base to enhance coastal resilience from severe weather events as experienced during Hurricane Michael in 2018, using innovative planning, engineering and cooperative partnerships with local, state and federal stakeholders. This approach reconciles regulatory requirements with the need to build back better to prepare for and mitigate future flood risk over the expected service life of the built assets. This approach incorporates awareness of climate change and asset criticality to enhance service reliability, resilience and operational continuity for mission assurance. The multiple-lines of defense approach focuses on cost effectiveness solutions that meet today's needs while incorporating design flexibility allowing the system to adapt to evolving conditions, with the goal of making Tyndall AFB a resilient, sustainable and smart Installation of the Future. A Key focal point will include the 'system of system's approach that integrates grey, green and natural infrastructure to increase coastal resilience while also creating locally-relevant shared social, environmental and economic benefits. The stakeholder engagement process and partnerships that have been developed enhances cross-jurisdictional collaboration to achieve alignment of multi-disciplinary objectives and support for the nature-based elements of the coastal resilience. This project serves as a template for others to follow that focuses on regional collaboration to mitigate coastal flood risk for the benefit of our infrastructure and our communities. This presentation will demonstrate an approach to building long-term coastal resilience to severe weather events and climate change through a stakeholder driven process that leverages multiple funding sources and integrates ecological and social benefits while supporting the base's mission.

**Biography:** Jason Bird, CFM is the Florida Resilience Leader and the US South Water Resources Regional Solutions Lead at Jacobs. Mr. Bird utilizes his 20+ years of experience to help communities reduce risk and improve their resilience to severe weather and climate threats. His experience ranges from developing climate scenarios, evaluating vulnerabilities and risk, and identifying adaptation strategies to protect critical infrastructure for coastal and inland communities, including buildings, utilities, stormwater management and transportation systems/facilities. As the former United Nations ARISE US Network Chair, Mr. Bird has been involved in development of tools to evaluate and promote disaster risk reduction and enhance collaboration between public and private organizations, to enhance broader system performance and build community resilience.

## **E3: Compound Flooding: Modeling Coastal and Inland Interaction**



### **When Every Minute Counts: Real-Time Forecasting During the Storm**

Garrett Johnston, PE, CFM, Freese and Nichols, Inc., [jgj@freese.com](mailto:jgj@freese.com)

**Co-presenters:** Mat Mampara, PE, CFM, [mmampara@dewberry.com](mailto:mmampara@dewberry.com) and Tyler Payne, PMP, [tyler.payne.glo@recovery.texas.gov](mailto:tyler.payne.glo@recovery.texas.gov)

**Abstract:** The Texas General Land Office (GLO) is leading a multi-year River Basin Flood Studies project to assist counties and municipalities with determining cost-effective mitigation and abatement strategies that reduce the impact of flooding disasters and increase community resilience. The current phase of the project will build out a library of riverine and coastal flood models to define baseline flood risk across the Central Region, which spans 20 counties and over 12,000 square miles. The Central Region team has developed a custom data management system to collect and organize existing riverine and coastal models from local communities and stakeholders, FEMA, and USACE. The team's model catalog includes a search engine, maps of georeferenced modeling data, and customized reports summarizing models collected in each county and HUC watershed. Where models are not available, or where additional detail is needed to support alternatives analysis, the team will develop new riverine and coastal models with HEC-HMS and HEC-RAS. Future phases of the project will leverage these models to develop alternatives analysis, mitigation projects, cost-benefit analyses, and grant applications, with a focus on supporting underserved communities. This presentation will highlight the team's approach to cataloging existing flood models and prioritizing development of new flood models across the Central Region. The presenters will provide a detailed overview of the team's prioritization approach, which incorporates numerous flood risk metrics as well as social vulnerability and community metrics. This prioritization was used to scope and sequence the baseline flood modeling effort for the current phase of the project. This presentation will also describe the development of the project's data management system and demonstrate its model catalog.

**Biography:** Garrett Johnston is a project manager and stormwater engineer who works for Freese and Nichols' Central Texas Stormwater group. Garrett has 14 years of research and stormwater consulting experience, including hydrologic and hydraulic modeling, floodplain mapping, evaluation of flood mitigation alternatives, development and design of capital improvement projects, benefit-cost analyses, municipal development reviews, and automation of H&H and GIS processes. Garrett holds bachelor's and master's degrees in Civil Engineering from Texas A&M University.

### **A Comprehensive Model to Develop Mitigation Plans for Extreme Flooding Events in Coastal Urban Areas.**

Noemi Gonzalez Ramirez, Ph.D., FLO-2D Software, Inc., [noemi@flo-2d.com](mailto:noemi@flo-2d.com)

**Co-presenters:** Jimmy O'Brien, Ph. D., P.E., [jim@flo-2d.com](mailto:jim@flo-2d.com)

**Abstract:** Rising sea level predictions are being refined and in response, coastal urban flood hazard mapping must be more accurate in support of flood mitigation plans. Predictions foretell of higher rates of rise and higher sea levels that have increased urban vulnerability. Coastal urban areas need more accurate and efficient tools to predict flooding impacts associated with increased storm intensities, higher storm surges, increased groundwater levels with saltwater intrusion, diminished storm drain system capacity, and nuisance flooding. High-cost mitigation plans need to be supported by a detailed understanding of the physical interaction of flooding with the complex drainage system of coastal urban areas. In recent years, most floods are associated with frequent storm events and gradual cumulative impacts generated by the loss of storm drain capacity, rising groundwater levels, etc. Drainage

management, especially in low-lying coastal areas, is going to be both difficult and expensive. A comprehensive flood hazard inundation model to accurately predict urban flooding is discussed. Buildings, walls, street flow, drainage channels, storm surge conditions, and storm drain systems add to the complexity of unconfined coastal flooding. The replication of Hurricane Irma flooding in Naples, Florida will be presented. Some areas are inundated by the storm surge while other areas are flooding by rainfall and still, other areas are impacted by a combination of rainfall-runoff and storm surge. The results illustrate the value of detailed flood simulation to support effective mitigation plans in coastal communities.

**Biography:** Noemi Gonzalez Ramirez is a water resources engineer with 20 years of experience in several projects developing and applying mathematical models and computer codes of numerous complex hydrologic and hydraulic conditions. These include numerical models of physical systems and hydraulic conveyance design. She has been a project engineer and a developer for Riada Engineering, Inc. and FLO-2D Software for the last 12 years. Dr. Gonzalez is the developer of many of the specific tools and features in the FLO-2D model and supporting processor programs.

### **Advancements in Compound Flood Risk Analysis and Application for the Texas Coast**

Patrick Kerr, PhD, PE, U.S. Army Corps of Engineers Galveston District, Patrick.C.Kerr@usace.army.mil

**Co-presenters:** Mohammad “Shahidul” Islam, Mohammad.S.Islam@usace.army.mil and Chris Moss

**Abstract:** Flooding in coastal regions of Texas is exacerbated due to the compound interactions of multiple flood drivers such as storm surge, river discharge, and extreme rainfall that occur simultaneously or sequentially during a storm event. There is thus a clear need to couple inland watershed models (e.g., HEC-HMS and HEC-RAS) with coastal hydrodynamic models (e.g., ADCIRC, STWAVE) to understand these interactions and faithfully reproduce total flood hazards. Additionally, due to the limited availability (and duration) of observational data, there is need for a robust statistical framework to facilitate the development of defensible probabilistic compound flood hazards. In response to Hurricane Harvey, Texas General Land Office (GLO) is leading a multi-year river basin study to assist counties and municipalities with determining cost-effective mitigation and abatement strategies to reduce the impact of flooding and increase community resilience. As part of this effort, GLO is working to ascertain compound flood risk via three regional coastal pilot studies (East, Central, and West) aimed at unearthing challenges, identifying data gaps, evaluating compound flooding, and understanding differences between regions. This presentation will highlight GLO’s successful partnership with federal and state agencies (e.g., US Army Corps of Engineers, Texas Water Development Board, Louisiana Watershed Initiative), academia (e.g. Purdue University, University of Iowa), vendors, and academic centers of excellence in leveraging the latest advancements in numerical, statistical and probabilistic modeling for application to compound flood risk assessment. Moreover, the presentation will describe 1) the application of recent advancements in H&H models and multivariate statistical analyses in examining the joint probability of compound storm events; 2) present findings from pilot studies; 3) discuss the differences between regions and the necessity of practicing state-wide uniformity of strategies deployed in separate regions; 4) highlight the best-practice guidance for near-term and long-term compound flood risk assessment for Coastal Texas.

**Biography:** Dr. Kerr is currently the Chief of the Coastal Engineering Section for the U.S. Army Corps of Engineers (Corps) Galveston District Engineering and Construction Division. He is responsible for overseeing the preparation of designs and studies for civil works water resource coastal projects in an

area of jurisdiction encompassing the Texas coast from Louisiana to Mexico, which spans across 50,000 square miles, includes 48 counties, two parishes and 367 miles of coastline. Projects include navigation, coastal storm and flood risk management, and eco-system restoration. Example features include navigation channel improvements, nourishment, jetties, groins, and breakwaters all subject to massive hurricane tidal surges from the area's frequent major hurricanes.

Mohammad "Shahidul" Islam, PhD, PE

Dr. Islam is a Professional Engineer with 20 years of specialized experience in hydrologic, hydraulic, and coastal engineering with an emphasis in numerical modeling, in-situ monitoring, and environmental information system implementations. Previously, he worked as an Associate scientist at NOAA's National water Center, and as a Research Assistant professor at Clarkson University, NY. In his current position at the U.S. Army Corps of Engineers, Galveston District, as the subject matter expert in the coastal engineering section, he leads the design and review of hydraulic engineering, hydrologic engineering and coastal engineering aspects of Flood Risk Management, Coastal Storm Risk Management, and Deep-draft Navigation Projects. He is also leading technical oversight of the coastal aspect of the on-going GLO River Basin Flood Study Project.

Chris Moss has over 20 years of industry experience working with flood risk and floodplain management. Chris is currently a Senior Project Engineer in the Water Resources Group for Taylor Engineering, Inc in Jacksonville, FL. Chris holds a Master of Science and Bachelor of Science and degrees in the Biosystems and Agricultural Engineering Department from the University of Kentucky. His professional experience includes hydrologic and hydraulic modeling to support flood risk analysis and floodplain mapping, floodplain management, and flood risk mitigation. He has led both riverine and coastal projects throughout the Midwest, Northeast, and Southeast regions of the US. His most recent efforts have focused on flood risk analysis and mapping projects including two-dimensional modeling along the Gulf Coast in the coastal/inland transition zone.

## **E4: Local Flood Warning System Innovations**

### **Flood Warning Systems: One Size Doesn't Fit All**

Andrew Yung, PE, CFM, D.WRE, Walter P Moore, ayung@walterpmoore.com

**Co-presenters:** Christina Hughes, P.E., CFM

**Abstract:** Flood Forecasting in Texas can come in many shapes and sizes. Storms that cause flooding generally move west to east in Texas and advance warning gives First Responders and Public Agencies advance notice of potential flood risk locations. Maximizing advance warning allows communities to better address the consequences of risk associated with heavy rainfall. A community flood forecasting system can be useful for a range of conditions, from a small community without existing rain or elevation gauges to a large community with an advanced network of gages and many years of historical data. This presentation will provide an overview of the development and operation of flood forecasting and flood warning systems for communities of varying sizes. The flood warning systems in those communities have a range of sophistication commensurate to the length of time the system has been in place. The presentation will describe how the flood warning system makes use of familiar hydrologic and hydraulic models common to floodplain studies. It will also present the uses and benefits of the system from the perspective of community staff who rely on the information.

**Biography:** Mr. Yung is a Principal and the Chief Hydrologist for WALTER P MOORE AND ASSOCIATES, INC., and has more than 30 years of experience as an engineer, planner, and hydrologist. He has worked numerous floods in the Houston area, coordinating post-flood data collection. Additionally, he has managed a wide range of engineering projects involving floodplain studies, hydrology, hydraulics, master drainage studies, channel modification and hydraulic structure designs, watershed impact analyses, detention facility designs, dam safety analyses, and flood forecast systems.

### **Real-time Flood Modeling for Live Traffic Routing using Waze**

Juliette Murphy, PE, FloodMapp, juliette@floodmapp.com

**Co-presenters:** None

**Abstract:** The Hampton Roads region, Virginia, USA experiences frequent flooding due to tidal, sea level rise, storm surge, riverine and pluvial flooding. The City of Norfolk experiences flooding 12 times per year. During flooding events, communities experience significant disruptions to transportation, affecting private, commercial, emergency vehicles and public transportation. This detracts from local business' viability, the quality of life for residents, and in extreme cases may threaten vehicle and driver safety. The difficulty in managing this issue is the lack of situational awareness of the location and severity of the flooding, and how to navigate around these hazards. As part of an innovation project with RISE resilience, FloodMapp deployed its real time flood modelling technology with an integration to the traffic routing application, Waze, to assist residents to navigate around flooded roads. Real-time data pipelines were developed to collect and aggregate river discharge, river height, rainfall and tidal data from the US Geological Society (USGS), National Oceanographic Atmospheric Administration (NOAA) National Weather Service (NWS) and local sensor networks. These inputs were stored in a live database and fed into a cloud-based rapid hydrology and hydraulic flood model, DASH to simulate pluvial, riverine and coastal flooding. Models were calibrated using flood extent data and ground truth data from a series of flood events. A software integration was developed to undertake analytics to determine road hazards and road closures based on flood extent and depth logic, and feed these into traffic routing application WAZE to enable live hazard data to assist drivers navigate around flooded roads. The system has been through extensive pilot testing and is now going through a validation phase in collaboration with the City of Virginia Beach and the city of Norfolk.

**Biography:** Juliette Murphy (CPEng, RPEQ, BEng) is a Professional Surface Water Engineer with over 12 years industry experience in flood modelling, hydrology and water resources engineering across Australia, North America and South East Asia. In each of her roles, Juliette has gained a breadth of expertise in hydrologic and hydraulic modelling, GIS, mapping, software development and project management. As CEO and Co-founder, Juliette created FloodMapp in 2017, a world-first real-time rapid flood forecast model, and has been instrumental in the software engineering vision of the product using her flooding subject matter expertise.

### **Case Study on Low-Cost Flood Sensor Deployment in Southeast Texas**

Liv Haselbach, PE PhD BCEE, Lamar University, lhaselbach@lamar.edu

**Co-presenters:** None

**Abstract:** L.B. Foster's Flood Monitoring system utilizes never before seen technology, provides accurate and robust data with visual verification, and can be deployed anywhere with a cell signal. The system includes features that alert end users in real-time of imminent floods, providing highly accurate data and

photographic evidence through an easy to use online portal. This presentation will cover the operating principals of the system, features for flood sensing, alerting, and device management, procedures and results from a recent case study, and accuracy and precision test results in a laboratory setting.

**Biography:** Dr. Liv Haselbach is the Director for the Center for Resiliency at Lamar University. She leads the Southeast Texas Flood Coordination Study, an adhoc multi-agency/entity group working on communication and data exchange to aid in flood mitigation in this region of the Gulf. Dr. Haselbach is a licensed professional engineer, a LEED AP, a Fellow of ASCE and Board Certified in Environmental Engineering with the specialty of Environmental Sustainability by the American Academy of Environmental Engineers and Scientists. Prior to her academic career she founded an engineering consulting company in the New York – Connecticut area. Her degrees include a BS in Civil Engineering from Cornell with distinction, an MS in Chemical Engineering from UC Berkeley, and a PhD in Environmental Engineering from the University of Connecticut. She was an assistant professor at the University of South Carolina, an Associate and then Full Professor in Civil and Environmental Engineering at Washington State University, an Associate Director of the USDOT Tier 1 UTC: Center for Environmentally Sustainable Transportation in Cold Climates (CESTiCC) and a Fulbright-ALCOA Distinguished Chair in the Environmental Sciences and Engineering in Brazil. In 2019 she was named Engineer of the Year by the Sabine Chapter of the Texas Society of Professional Engineers.

## **E5: Communicating Risk through Art, Technology, and Youth**

### **ArtWorks: Connecting art with mitigation in a new FEMA initiative**

Tony Mendes, CFM, FEMA R8, [tony.mendes@fema.dhs.gov](mailto:tony.mendes@fema.dhs.gov)

**Co-presenters:** Kristin Cypher, Michael Baker International

**Abstract:** In 2018, Region 8 estimated that only 7.5% of structures located within the high hazard flood areas under its purview carried flood insurance. Region 8 needed an innovative and unique way to reach property owners and communicate the value of flood mitigation and flood insurance. ArtWorks is a new program initiative by Region 8 that uses art to reach new audiences. The ArtWorks program seeks to collaborate with artists to bring natural hazard mitigation into the community in a fun, new way through eye-catching and interactive art that tells a story. ArtWorks recently completed its first pilot project in Denver and has more programs in development. In this interactive session, the Region 8 ArtWorks team will share an example of inspiring art for flood mitigation and the collaborative process needed to arrive at a successful pilot project. Participants will leave with a clear understanding of the ArtWorks process, lessons learned, and how art and flood mitigation can come together through a creative and engaging process. During the session, audience members will review the top three submission for the ArtWorks pilot project and select the one that they think best aligns with goals. The ArtWorks team will then reveal the selected project and share the visually rich content of the art installation. The team will end the presentation with an invitation to share potential partnerships and innovative ideas that fit within the ArtWorks program. The team will also provide the FEMA Arts and Experiential Learning Inspiration Book as a resource to participants. Come share in the excitement of FEMA's new ArtWorks program!

**Biography:** Tony has more than thirty years of emergency management experience at the state and federal levels, with over sixty disaster deployments throughout the nation. He is the Risk MAP Community Engagement & Risk Communication (CERC) program manager for FEMA Region 8, helping state, local and tribal governments and citizens understand the wide variety of natural hazards they face, and what we can do to minimize their impacts on our homes, businesses, and communities. He spends free time in Colorado's mountains biking, hiking, skiing.

### **Using Augmented Reality to Communicate Flood Risk & Risk Management Solutions**

Daniel Gwartney, GISP, CFM, Wood, [daniel.gwartney@woodplc.com](mailto:daniel.gwartney@woodplc.com)

**Co-presenters:** None

**Abstract:** Communicating Flood Risk Data and Risk Management alternative impacts is an important step in building a community's floodplain management program. Typical communication uses paper floodplain boundary maps which do not convey the depth or magnitude of the risk. Enhancements in communication using 3-D imaging and/or animations has attempted to convey an understanding of the true risk. Virtual Reality is the next obvious step in truly conveying the sensation of the risk and the reductions of risk per mitigation solutions. Stakeholders with typical 3-D or Virtual Reality based systems are immersed in the flood risk data environment and tied to a desktop or stuck to a specific location in which the virtual environment has been developed. Many of the new flood risk projects have enhanced data development activities using 2-D flow modeling and resultant geospatial analytic data. The next step is a fully interactive communication method in the field called Augmented Reality. This presentation (and demonstration) will discuss an application of an Augmented Reality Mobile Flood Risk Application performed in a Kansas community. The requirements, advantages & challenges of the application as a flood risk data and risk management communication tool will be provided. Attendees will be able to assess whether the application is applicable in their community. This application will provide a vision of future of flood risk communication which can be utilized throughout the globe.

**Biography:** Daniel Gwartney, CFM, GISP is the GIS Group Lead and Associate Geospatial Scientist for the Wood Environment & Infrastructure Kansas Operations. He has more than 15 year of experience in the GIS industry, with more than 10 years directly related to working with Remote Sensing and LiDAR data products. His primary interests are in LiDAR point cloud processing, image interpretation and analysis, web feature service creation, web app development, and constructing automated geoprocessing models using ModelBuilder, Python, and C#.

### **RISE Challenge: A Replicable Model for Youth Engagement**

Nicholas Bruscato, FEMA, RISE Challenge: A Replicable Model for Youth Engagement, [nicholas.bruscato@fema.dhs.gov](mailto:nicholas.bruscato@fema.dhs.gov)

**Co-presenters:** Vince Meldrum, [vmeldrum@earthforce.org](mailto:vmeldrum@earthforce.org) and Jane Healy, [jhealy@sfdshs.org](mailto:jhealy@sfdshs.org)

**Abstract:** Join FEMA Region 5, Earth Force, educator Jane Healy, and Resilience Action Partners to learn how to inspire young people to learn about the critical role they can play in making communities more resilient by learning about the risks of flooding and natural hazards and addressing environmental issues in their own neighborhoods. By participating in this presentation, you will learn how, through FEMA partnerships, the RISE Challenge engaged students from St. Francis de Sales High School on the Southeast side of Chicago. They developed a project about reducing urban flooding by disconnecting downspouts from storm sewers to reduce storm sewer backup during rain events. Amazingly, the

students did all this work during a global pandemic. The RISE Challenge is part classroom learning, part competition, and part summit, focused on natural hazards and student-led learning. The RISE Challenge helps young people investigate natural hazard risks in their community and propose actions to reduce their risk. The Challenge takes place, first and foremost, in the classroom with partner educators. Then, projects are explored in the real-world including connections to local leaders and experts. Finally, the projects are presented at a summit where the winning team(s) receive small grants to implement their project. The RISE Challenge helps prepare the next generation of engaged citizens to play a role in community resilience and sustainability. These future leaders are armed with knowledge and awareness of the natural hazards and the abilities to identify what to do (mitigation) and how to do it (civic engagement) in their communities. Strong partnerships between FEMA, Earth Force, Resilience Action Partners, the ASFPM Foundation, educators, and local champions have helped more than 750 students across 40 classrooms learn about natural hazards and the actions they can take to reduce their risk.

**Biography:** Nick Bruscato is an Emergency Management Program Specialist in FEMA's Risk Analysis Branch at the Region V Office in Chicago. Primarily, Nick works on FEMA's Risk MAP program to coordinate flood risk studies with native sovereign nations across the Upper Great Lakes. Functioning as the RV Mitigation Division Tribal Liaison, he also leads FEMA RV's Mitigation Tribal Integration Group and an inter-regional working group to rewrite FEMA's National Tribal Floodplain Mapping Guidance. He is also a chapter author on the Tribe and Indigenous People's Chapter of the National Climate Assessment. Nick frequently speaks at national Tribal and Indigenous people's conferences and has presented on several topics including: Cooperation and Mutual Aid and FEMA's Tribal Disaster Declaration Process. He has also worked to develop Tribal centered workshops and factsheets to build capacity and resilience through mitigation. Prior to arriving at FEMA, Nick served in the US Peace Corps as a Coastal Resources Management Volunteer in Catmon, Cebu, Philippines. He worked with Catmon's municipal agriculture office to compile the town's first Coastal Resource Management Plan. Through the implementation of this plan, Nick was instrumental in establishing two marine protected areas to conserve coral reefs and promote sustainable fisheries.

Concurrent to serving in the Peace Corps, Nick was in the Master's International Program at the University of Michigan where he received a Master's of Science in Natural Resources and Environment, as part of the Environmental Justice track. In his spare time, Nick loves to sing karaoke!

## **E6: Pursuing Equitable Floodplain Management in Your Community**

### **Blight or Flight? Establishing a Toolkit to Combat Social Injustice While Building Resilient Communities**

Kelly Keefe, CFM, AECOM, [kelly.keefe@aecom.com](mailto:kelly.keefe@aecom.com)

**Co-presenters:** None

**Abstract:** Oftentimes, underserved communities have high climate vulnerability because they are the most affected by natural disaster events. Blighted neighborhoods are typically overlooked during rebuilding efforts due to the perception that they lack value. In a world that prioritizes financial incentives, it is important to analyze and address non-monetary aspects before projects are implemented to maximize the use of least-harm solutions for the affected communities involved. Non-monetary societal impacts may include culture, visions, demographics, and, socioeconomics. This abstract aims to provide a toolkit in the form of recommendations to help reduce the susceptibility of

underserved communities to natural disasters. Steps are outlined below that could be used to conduct a social impact assessment before initiating a community rebuild project following a natural disaster. We have not found examples of policies or programs that address unintended consequences, so we strongly recommend that policymakers consider these steps to help minimize burdens in already highly impacted communities.

1. Scope: a. Collect data on community demographics, socioeconomic variables, needs, and aspirations. b. Incorporate public participation and feedback by engaging with community stakeholders through various strategies to capture input from multiple voices.
2. Assess social benefits and unintended social burdens a project might have on a community.
3. Address the unintended social burdens by outlining an appropriate mitigation strategy.
4. Continue community outreach to ensure unintended project consequences are mitigated and project benefits are maximized.

This presentation will focus on a toolkit that can be easily adapted to accommodate resilience projects across different scales. The steps not only identify the societal impacts of a project, but also ensure that those impacts are monitored and addressed. Empowering communities to remain and rebuild with the entire community in mind leads to more equitable outcomes with stronger relationships and increased levels of health/safety standards, resulting in more resilient communities.

**Biography:** Ms. Keefe has more than 20 years of experience assisting and supporting local, state, and Federal Governments with building robust emergency management and public health programs. Since 2018, she has overseen specialized mitigation planning functions, such as large-scale new development proposals. And is a CAM providing support for maintaining the integration of outreach and communication efforts across all Risk MAP providers on the Compass PTS Team. From 2007-2016, Ms. Keefe served as a Policy, Grants, Planning Development Specialist for GEMA specializing in risk reduction and hazard mitigation. Ms. Keefe also served as a Duty Officer reviewing and processing emergency response resource requests and situation reports. In 2006, she served as Grants Specialist for SCEMD under the South Carolina Department of Military. From 2016-2018, she had worked as a Program Analyst for FEMA specializing Risk Analysis and Hazard Mitigation Planning. Ms. Keefe also facilitated FEMA Region IV Mitigation Program Consultations. She has been deployed for DR 4285 North Carolina Hurricane Matthew as a Hazard Mitigation Outreach Planner for technical assistance for community planning; specializing in a statewide community college plan initiative. She was also deployed for DR 4337 Florida Hurricane Irma as DSA Cadre Management support staff assisting in field operations, surge capacity force coordination, local hiring, administrative/strategic planning; as well as serving as Virgin Islands & Puerto Rico (VIPR) Airport Mission Reports Writer for White House review. She attended Florida Atlantic University where she graduated with a Bachelor of Science degree in Public Management from the College of Architecture and Urban Public Affairs.

### **Leveraging Open-Source Data to Drive Equitable Communication Development**

Alyxandra Colgan, Guidehouse, acolgan@guidehousefederal.com

**Co-presenters:** None

**Abstract:** For many individuals living in low-income communities, their position within society puts them at a greater risk for disaster and creates longer-lasting impacts when disaster strikes. Disasters



compound existing inequality and scarcity within society, leaving low-income individuals and other historically underserved communities unable to recover from the impacts. This inequality of outcome can be mitigated through targeted communications that utilize the right partners, channels, and messages. Our presentation will suppose a disaster in a specific location in the United States, quickly identify key information that will allow us to learn about the communities within the given area, and share how we would make decisions about where and how to communicate risk-related information. We will share how the dashboard (non-proprietary tool) was built and how information was populated. We will take participants through the process of defining the disaster area and identifying key metrics that indicate vulnerability, including, but not limited to, % of individuals with disabilities and location, % of non-English speaking individuals, % of individuals living below the poverty line, % of households without access to the internet, and education levels. We can also identify data that may indicate strengths within the community and can help highlight important partners that can be leveraged to help get messages out when disasters strike. Our team will couple this data with what we know about the importance of message delivery, message channels, and message contents to help mitigate risk and help individuals and communities respond after a disaster. Guidehouse will demonstrate how individuals and agencies can use open-source and crowd-sourced data to build simple data analytics dashboards and how that information can be used to inform the development and delivery of risk communications.

**Biography:** Alyx Colgan, MPH, is a Managing Consultant at Guidehouse. She has 10 years of experience in education and non-profit leadership, and uses this experience to provide training, communications, and strategy solutions to federal clients. Alyx has supported directorates across the Federal Emergency Management Agency (FEMA) including the Office of the Chief Financial Officer (OCFO), Mission Support (MS), the Office of External Affairs, and the Federal Insurance and Mitigation Administration (FIMA), providing communications, training and development, strategy and project management, and facilitation support. Alyx has a master's degree in public health and a culminating thesis on community-driven disaster risk reduction. She has a Diversity and Inclusion Certificate from Cornell and has used this certification to help bring equitable solutions to her clients.

### **Holding up the Mirror: Conducting Equity Diagnostics and Building a Reflective Culture**

Katrina Tavanlar, Booz Allen Hamilton, tavanlar\_katrina@bah.com

**Co-presenters:** Santiago Milian, milian\_santiago@bah.com

**Abstract:** Achieving equity in a community requires a consistent effort helping community members reach the same destination, regardless of individual factors or where any one person begins. It means providing assistance based on a person's specific needs and where they are in life. Critical to achieving equity is an understanding of current demographics, resource needs, and the history of the community, as well as collaboration to begin to provide people what they need. How does one even begin? Human Centered Design and Mitigation experts will share specific approaches to designing and improving programs and services that address the needs of your community member and incorporate an equity lens. Learn how to conduct ethnographic research and diagnostics to inform your government program and products, design workshops and meetings that promotes co-creation and inclusion, and build concrete steps to shifting organizational culture and norms to reflect your community and lead it down a more equitable path.

**Biography:** Ms. Katrina Tavanlar, a Senior Associate at Booz Allen Hamilton, has more than 20 years professional experience in organizational development, transformation, and change management for a

diverse portfolio of government initiatives. Ms. Tavanlar led the development of organizations and teams through strategic planning, performance management, process improvement, stakeholder engagement, and strategic communications using approaches and techniques from human centered design. Ms. Tavanlar has supported FEMA Mitigation initiatives for close to a decade. In this role, she facilitates discussions between FEMA and critical stakeholders on how to address equity in their programs. Ms. Tavanlar led the development of the Department of Defense's (DoD) Environmental Justice Handbook, which provided consistent guidance to DoD military and civilian personnel in recognizing and addressing EJ concerns related to DoD programs, policies, and activities. She was also instrumental to DoD's implementation of the DoD American Indian and Alaska Native Policy, helping the creation of the DoD Policy Implementation Reference Guide and the DoD Policy Implementation Demonstration Project. Prior to Booz Allen, Ms. Tavanlar was a fellow at the Greenlining Institute--a multi-ethnic advocacy, research, and leadership development organization working for racial and economic justice.

## **E7: Navigating the Post-Disaster Substantial Damage Process**

### **Substantial Damage for "Safer" Communities Where Disaster Doesn't Strike Often**

Celinda Adair, CFM, Atkins, [Celinda.Adair@atkinsglobal.com](mailto:Celinda.Adair@atkinsglobal.com)

**Co-presenters:** Mitch Paine, CFM, FEMA Region 10, [mitch.paine@fema.dhs.gov](mailto:mitch.paine@fema.dhs.gov)

**Abstract:** This presentation will look at the need for scalable Substantial Damage assessment tools and resources for "safer" communities where disaster doesn't strike often. What a community considers to be a "major" natural disaster varies significantly by the size of a community and the frequency with which they experience disasters. Communities that don't frequently experience disasters (flood disasters in particular) often face challenges with Substantial Damage assessment and determination work required under the National Flood Insurance Program (NFIP). We will be looking at both the challenges these "safer" communities face and some of the approaches utilized in FEMA Region 10 to address those Substantial Damages over the last few disaster cycles. Our goal is to support continued discussion regarding how to make our post-disaster tools more scalable, adjustable, and user friendly for "safer" communities. We will also discuss the important roles that State and FEMA Regional floodplain management staff can play post-disaster to ensure floodplain management practices are effectively implemented.

**Biography:** Celinda Adair, CFM is a Senior Planner with Atkins and the ASFPM Regional Director for Region 10. She was previously the National Flood Insurance Program (NFIP) Coordinator and a Natural Hazards Planner for the State of Oregon Department of Land Conservation and Development (DLCD). Celinda has local floodplain management experience through her role as a Planner and Community Rating Systems (CRS) Coordinator for Thurston County, Washington. Celinda also held the role of Map Modernization/Risk MAP Program Coordinator for the State of Montana for four years. Celinda's other roles included: Project Manager for a landmark native title settlement project for the State of Western Australia and Business Development Consultant for Haefeli-Lysnar Geospatial. Celinda possesses a Bachelor's Degree in Political Science from the University of Texas at San Antonio and a Master's Degree in Environmental Studies from the Evergreen State College.

## **Getting Ahead of the Next Disaster: Additional Resources for Meeting Your Post-Disaster Requirements**

Adrienne Sheldon, PE, CFM, FEMA, [Adrienne.sheldon@fema.dhs.gov](mailto:Adrienne.sheldon@fema.dhs.gov)

**Co-presenters:** None

**Abstract:** When disaster strikes, many communities have hundreds, if not thousands, of structures to protect against future damage or restore to local codes and standards. Many communities don't have the resources they need to rebuild. Section 1206 of the Disaster Recovery Reform Act (DRRA) authorizes the Federal Emergency Management Agency (FEMA) to provide communities with the resources needed to effectively administer and enforce building code and floodplain management ordinances. This represents new funding for communities to carry out required post-disaster activities (e.g., building inspections, permitting, etc.)—increasing the overall speed of recovery and enhancing NFIP compliance. Our panel of experts will share lessons learned with using DRRA Section 1206 resources including best practices for meeting eligibility requirements, tips for preparing for substantial damage determinations, and ways to use mutual aid agreements to gain access to trained professionals ready to assist with long term recovery tasks.

**Biography:** Adrienne Sheldon, PE, CFM is the Regional and Field Support Branch Chief for FEMA HQ's Floodplain Management Division. The branch works closely with each of the 10 regional Floodplain Management and Insurance Branches, as well as FEMA's disaster workforce, to provide technical assistance, guidance and support with FPM program implementation. Since joining FEMA 4 years ago, Ms. Sheldon has led HQ SD initiatives to improve enforcement of SD provisions of local FPM regulations. Ms. Sheldon has over 20 years of experience supporting mitigation programs at the local, state and federal level. Ms. Sheldon is a Subject Matter Expert in resilience and hazard mitigation including floodplain management; flood provisions of building codes; mitigation project development; mitigation grant reviews; and hazard-resistant design, construction and retrofits of buildings. She also has experience in hazard identification and risk assessment, training program development, guidance and policy document development, and outreach activities.

### **Navigating DRRA 1206 Post-disaster Resources**

Molly Kaput, FEMA Region I, [molly.kaput@fema.dhs.gov](mailto:molly.kaput@fema.dhs.gov)

**Abstract:** Louisiana and Massachusetts were selected to receive FEMA pilot workshops in 2021 that would 1) assist in understanding DRRA 1206 implementation; 2) foster coordination between emergency management (wherein the Public Assistance program is administered at the state level) and building officials/ floodplain managers to prepare post-disaster assessment teams and plans; and 3) result in the development of 1206 products such as job aides for local officials and content for training sessions. This presentation will highlight the results of those pilot workshops as well as the products and training opportunities available to state and local floodplain managers for carrying out post-disaster responsibilities for building code enforcement. While this is not a substantial damage (SD) training presentation, basic SD concepts will be discussed along with other post-disaster code enforcement tasks and opportunities. Because the DRRA 1206 resource option is relatively new, this session is recommended for all floodplain managers and building officials.

**Biography:** Molly Kaput started in January 2022 as the FEMA Floodplain Management Division's first Disaster Operations Coordinator. In this new role, she serves as an important connection point between

the FPM program and the disaster workforce as she integrates program changes and improvements into program delivery via guidance, tools and outreach. She has already begun working on several program post-disaster initiatives within Floodplain Management. Prior to joining FEMA HQ, Molly worked for over ten years in both FEMA Regions I and III supporting communities to ensure compliance with the National Flood Insurance Program. During her FEMA tenure, she has completed multiple deployments in support of disaster recovery efforts with a specific focus on substantial damage and has served as FEMA's National Floodplain Management SD and Disaster Operations Committee Co-Chair for over 3 years. She helped lead the development of the Substantial Damage Playbook in 2018-2019 which focuses on long-term community support and accountability for implementing and enforcing floodplain management provisions post-disaster. In addition, She has supported FEMA SD initiatives including the development programs for SD analytics, SD operations planning, and implementation of the Disaster Recovery Reform Act.

## **E8: Coastal Information and Data**

### **New Coastal Inundation Information and Services Coming to Address Climate Timescales**

Doug Marcy, NOAA Office for Coastal Management, [doug.marcy@noaa.gov](mailto:doug.marcy@noaa.gov)

**Co-presenters:** [william.brooks@noaa.gov](mailto:william.brooks@noaa.gov); [william.sweet@noaa.gov](mailto:william.sweet@noaa.gov); and [mark.osler@noaa.gov](mailto:mark.osler@noaa.gov)

**Abstract:** U.S. states and territories are increasingly at risk of inundation from rising seas, changing Great Lakes water levels, and more frequent and intense storms in addition to other risks from a changing climate. This increased threat of inundation compels floodplain managers to plan for adaptation investments that reduce risk and improve resilience to coastal flooding events on time frames ranging from hourly, daily, and weekly (weather timescales) to sub-seasonally, seasonally, annually, decadal, and beyond (climate timescales). The National Oceanic and Atmospheric Administration (NOAA) continues to develop and improve a nationally uniform set of data, products, applications, and other information across time and communities. As part of the National Climate Assessment (NCA) update process, NOAA and other federal agencies, via a Sea Level Rise (SLR) task force, are updating critical sea level rise, high tide flooding, extreme water level, and vertical land motion information. This presentation will provide a high-level overview of the NOAA technical report that will serve as input to the 5th NCA. Updated global and regional SLR extrapolations and projections will be discussed as well as implications for increasing coastal flood risk, including high tide flooding. New gridded extreme water level data, regional vertical land motion information, and HTF probability mapping case studies will be highlighted. This new information will be ingested into existing agencies tools, products, and services to enable the floodplain management community map and plan for future conditions both near and long term.

**Biography:** Douglas (Doug) C. Marcy is a Coastal Hazards Specialist at the NOAA Office for Coastal Management in Charleston, SC. He has been with the NOAA 19 years working on flooding and sea level rise geospatial mapping projects, storm surge assessments, and coastal hazards assessment projects contributing to more disaster resilient communities. Doug worked as a Hydraulic Engineer with the U.S. Army Corps of Engineers, Charleston District from 1999 to 2002, where he focused on flood control projects, H&H modeling, flood inundation mapping, shoreline change analysis, and coastal engineering.

From 1997 to 1999 Doug worked at the South Carolina Office of Ocean and Coastal Resource Management. Doug has a M.S. in marine geology (1997) from the University of North Carolina at Wilmington and a B.S. in geology (1994) from the College of Charleston. Doug's current interests include using geospatial technology combined with meteorological, hydrological, and coastal modeling (including sea level change) to enhance inundation forecasting, mapping, and risk assessment.

### **Correlating Water Level Observations Reported during King Tides with Spatial Inundation through Aerial Photography**

Daniel Tomczak, CFM, Jacobs Engineering, daniel.tomczak@jacobs.com

**Co-presenters:** None

**Abstract:** The North Carolina King Tides (NCKT) Project has been working with volunteers and community groups to assist with photo-documenting tidal high water events in coastal communities since 2014. Volunteers will go out during scheduled King Tide events and photograph high water along roadways, beaches, docks, yards, and properties. Photographs taken by volunteers are shared with the NCKT project with the Coastal Observer app for the smartphone or other social media outlets (such as Facebook, Instagram, etc). In 2019 and 2021 the NCKT Project teamed with the nonprofit organization SouthWings, which coordinates flights over environmentally sensitive areas, to fly over areas during King Tide events near the towns of Beaufort and Morehead City (NC), the Village of Ocracoke (NC), and Cape Lookout National Seashore. During the September 2019 (pre-Hurricane Dorian), October 2019 (post-Hurricane Dorian), and November 2021 tidal events, SouthWings flew flights with members of the NCKT Project team and other groups in a Cessna 182 to survey and photograph areas of high water and inundation. Aerial photographs of the high water captured during the 2019 and 2021 flights could then be compared with the photographs submitted by volunteers during the same events. This presentation will develop a more comprehensive understanding of the extent of high water inundation during these tidal events, impacting roadways, properties, salt marshes, and beaches, through the use of on the ground observations by volunteers as well as aerial photographs.

**Biography:** Daniel is a project manager in the Cary, North Carolina office of Jacobs Engineering Group. Daniel has over 22 years of experience in consulting in the areas of water resources, sediment management, environmental assessment, and flood mitigation. He is a Certified Floodplain Manager (CFM) and is the Outreach and Education Chair of the NC Association of Floodplain Managers with involvement in the association's scholarship program, the NC King Tides Project, and outreach activities in schools and community events.

### **Natural Design Enhancements for Wave Attenuation and Storm Surge Mitigation**

Erin Hague, CEP, ENV SP, Tetra Tech, Inc., erin.hague@tetrattech.com

**Co-presenters:** James Costello, James.Costello@tetrattech.com

**Abstract:** This presentation showcases Tetra Tech designed projects in Florida, Alabama and New York that augmented grey design features with natural solutions to increase wave attenuation and provide storm surge mitigation. Increased storm frequency, intensity and SLR have prompted many coastal communities to consider resiliency measures that raise seawalls, incorporate flood walls and gates. These hardened structures, particularly seawalls, can obstruct the viewshed, limit water access and interrupt the fabric of the community. Nature-based solutions must first consider the local ecosystem for determining habitat features that can be incorporated into the design and achieve the desired effect.

These features must also be able to adapt to sea level rise and persist so that they can continue to provide the frictional components necessary for coastal resilience. In southeast Florida, sensitive marine resources are extensive and include mangroves, oysters, seagrass, corals, coral reefs and hardbottom habitat. Design considerations must therefore be able to obtain regulatory agency buy-in that balance storm surge mitigation with marine resource impacts. This presentation will include the alternatives considered and the ranking system for determining optimum mitigation strategies that incorporate nature-based solutions into grey infrastructure for coastal resilience.

**Biography:** Erin Hague is director of Tetra Tech's Center of Coastal Services in southeast Florida more than 25 years of experience specializing in shoreline protection and coastal restoration projects. She is a Certified Environmental Professional and Envision Sustainability Professional. Her expertise is in designing solutions and strategies for coastal and ecosystem protection, restoration and resilience; natural resource management; biological resource assessments; threatened and endangered species management. She has served as a technical expert for numerous small and large-scale projects in the coastal US and is proficient in managing multi-disciplinary projects involving geotechnical and biological field investigations, coastal planning, engineering design, stakeholder coordination and permitting. She also has managed the environmental components of significant, award-winning coastal restoration projects in North Carolina and Florida. The Florida Association of Environmental Professionals recognized her with its Outstanding Collaboration Award for the Port Miami Harbor Deepening Project. She has a bachelor's degree in geology from Northeastern University and a master's degree in Coastal Zone Management from Nova Southeastern University.

## **Session F: 3:30-5:00 pm**

### **F1: Highlighting Local Higher Regulatory Standards**

**Falling Rain, Rising Standards – Climate-Informed Updates to Floodplain Regulations in Washington,**  
Victor Ukpolo, CFM, DC DOEE, victor.ukpolo@dc.gov

**Co-presenters:** Benita Lily Cheng, LEED AP, CPHD, Department of Energy and Environment,  
lily.cheng@dc.gov

**Abstract:** Recent models prepared by the U.S. Army Corps of Engineers (USACE) using rainfall and sea level rise projections show that the current 500-year floodplain for the District of Columbia will be more like the 100-year floodplain in the 2080s. The expected amount of precipitation over the course of 6 hours during a 100-year storm is expected to increase by 76%, and the District experienced a record of 22 high tide flood days in 2018, compared to an average in 2000 of just 3 high tide flood days per year. To address this risk, the District of Columbia Department of Energy and Environment (DC DOEE) has proposed to update its floodplain management ordinance to regulate the 500-year floodplain, create a Tidal Shoreline Buffer overlay zone, and implement a "No-Adverse-Impact" (NAI) encroachment standard. To develop the Tidal Shoreline Buffer, DOEE used NOAA and USACE climate data and state-of-the-art probabilistic modeling to synthesize ranges of predictions and identify a benchmark climate projection. To identify a design lifespan for new development to anchor climate projections to a

reasonable timeframe, DOEE used construction industry research and best practices from other jurisdictions. Residents and engineering professionals helped inform exceptions for existing homes in the 500-year floodplain that promote practical safety measures while limiting the need for complete structural elevation. DOEE also leveraged new FEMA documentation to create provisions for mixed-use and multifamily development in the 500-year floodplain that offer performance-based flexibility for common urban building uses such as underground parking and residential amenity spaces. To help developers comply with the NAI standard, DOEE prepared a set of standard operating procedures inspired by unique infrastructure permitting situations. This presentation will outline our outreach and decision-making process and illustrate case studies of higher regulatory standards.

**Biography:** Victor Ukpolo is Certified Floodplain Manager and Environmental Protection Specialist for the District of Columbia's Department of Energy and Environment. He's been a floodplain manager since 2018, and a Community Rating System coordinator for three years. Victor has a wide range of local government experience enforcing environmental regulations in the State of Maryland and in Washington D.C. He has served in this role for almost two decades and has developed an interest in understanding how outreach, engagement, and inclusive decision making are integrated into the regulatory process. Victor has also used his knowledge and skills to advocate as a citizen on the Chesapeake Bay Program's Citizen Advisory Committee where he worked to have diversity and environmental justice included into the framework of the 2014 Chesapeake Bay Agreement. Also, as a Maryland resident he continues to organize community clean ups and participate in neighborhood initiatives throughout his community.

### **Rising Waters, Higher Standards: New York City's Recently Enacted Floodplain Ordinance**

James P. Colgate, Esq., AIA, CFM, Bryan Cave Leighton Paisner LLP, james.colgate@bclplaw.com

**Co-presenters:** None

**Abstract:** This program will provide examples of higher local standards recently enacted by New York City that could serve as examples for other jurisdictions for their local floodplain ordinances. These include special inspections for flood compliance, applicability of construction standards to minor alterations and enlargements to Pre-FIRM buildings, adoption of PFIRMs as regulatory products, mandatory warnings in the notations of certificates of occupancy, annual inspections and triennial deployment tests for flood shields, prohibitions on dry floodproofing for fire protection system equipment, 0.2% floodplain construction standards, maintenance of access/egress during flood shield deployment, etc.

**Biography:** James P. Colgate Esq. AIA CFM is a partner at Bryan Cave Leighton Paisner LLP, where he serves primarily real estate development clients with regulatory compliance as well as special permit and variance applications. Prior to coming to Bryan Cave Leighton Paisner in November 2014, he was the Floodplain Administrator for New York City and the Assistant Commissioner for Technical Affairs and Code Development for the New York City Department of Buildings. He previously served as a member of the International Building Code – General Code Development Committee and as a member of the ASCE 24 Committee for Flood Resistant Design and Construction Standards. Mr. Colgate received a Bachelor of Arts degree from New York University, a Master of Architecture and a Certificate in Historic Preservation from the University of Pennsylvania, and a Juris Doctor from Fordham University School of Law.

## **The Next Generation of Floodplain Management Regulations: Incorporating Additional Types of Flooding, Climate Change, and Watershed Development.**

Vince DiCamillo, PMP, CFM, Stantec, vince.dicamillo@stantec.com

**Co-presenters:** Mike DePue, PE, PMP, CFM, Atkins Global, Michael.DePue@atkinsglobal.com

**Abstract:** Since the inception of the National Flood Insurance Program (NFIP) in 1968, the minimum floodplain management regulations have allowed for some development in the floodplain. These regulatory requirements do not address how activities outside the Special Flood Hazard Area (SFHA) should be managed to limit future increases in flood levels. Historically, both the hydraulic modeling and floodplain management assumption was that one foot of increase in the 100-year Water Surface Elevation (WSEL) would occur with full buildout in the floodplain. It was assumed that flood insurance losses would be relatively low due to this requirement and that the losses would decline over time as more new buildings replaced older, less resilient buildings. In practice, however, this assumption has proven to be erroneous. One recent report indicates that a high percentage of flood insurance damage and claims occur with less than a 100-year flood event. Conversely, it has long been held that up to 25% of flood claims occur outside the mapped 100-yr floodplain. These statements, apparently contradictory, can both be explained by driving forces not accounted for in the original floodplain mapping. Furthermore, as the regulations in 44CFR60.3 are under revision, now is the time to rebalance the requirements for future development with the more complex current situation. This presentation will examine the questions using Ellicott City, Maryland as an example. Ellicott City is a 250-year-old community near Baltimore, Maryland, that suffered “1000-year floods” in 2016 and 2018 but has had relatively minimal actual development in the historical town since the inception of the NFIP. Through a series of historical evidence and models, the authors will document what changed in this town’s watershed, how the existing regulations functioned versus that change, and what regulations would have been more effective. Finally, the authors will discuss the likely future for Ellicott City and explore how regulations, insurance, mitigation, and disaster recovery can work together to visibly improve long-term resilience.

**Biography:** Vince DiCamillo, CFM, PMP, is Senior Principal with Stantec Consulting. He has over 45 years of experience in FEMA’s mapping program. He currently serves in a key leadership role in the STARR II FEMA PTS contract. Following graduation from the University of Maryland, Vince began working as a consultant to HUD and then FEMA supporting the mapping program for the NFIP. He has managed and directed teams of engineers, scientists, and mapping specialists through multiple transitions and evolutions of the mapping program and played a significant role in the transition to a digital mapping platform.

Mike DePue, P.E., CFM, PMP, is a Vice President and Principal Technical Professional with Atkins' Federal Business Unit. His current work focuses on 1-D and 2-D national-scale floodplain mapping, national-scale Average Annualized Loss (AAL) analyses, programmatic cost estimation, and on-demand analytics to predict flooding extents, severity, and damage pre-and post-disaster. In 2017, Mr. DePue developed a Machine-Learning model of wind and flood damage from Hurricanes Irma and Maria to predict damage to individual structures. Mr. DePue also led an engineering team that developed 2-D models of 36 dams in Puerto Rico in 72 hours immediately following Hurricane Maria to map the flood risk if those dams were to breach due to high rainfalls. He is an invited keynote and panel speaker on climate



change and flooding issues. He is an author, co-author, or contributor to 24 papers and 84 presentations and seminars on water resources issues.

## **F2: Risk Assessment and Mitigation Option Tools**

### **Evaluating Mitigation Options – Which One is Worth it?**

Eliza Ledwell, Niyam IT, eliza.ledwell@gmail.com

**Co-presenters:** Sean McNabb, sean.mcnabb@fema.dhs.gov; Lawrence Frank, lawrence.frank@atkinsglobal.com; Ricky Passarelli, richard.passarelli@atkinsglobal.com; and Steve Bourne, stephen.bourne@atkinsglobal.com

**Abstract:** FEMA's Open Source Flood Assessment Structure Tool (FAST), part of the Hazus suite of risk assessment tools, has been enhanced with additional functionality to help users determine the Return on Investment (ROI) for several common types of mitigation projects. By answering a few simple questions about hazard events, vulnerable infrastructure, or vulnerable buildings the tool analyzes ROI for five common mitigation strategies: Elevating a building, Acquisition, Elevating Building Utilities, Wet Floodproofing, and Culvert Enlargement. The outputs of the tool provide information about which mitigation action options may be suitable for specific situations. The tool will help stakeholders compare mitigation options, both at the structure and community level, as well as help to determine if it is worth developing a mitigation grant application. This presentation will demonstrate how local government officials who are contemplating how to address the various natural hazard risks and vulnerabilities within their community can run the tool to screen various mitigation options using ROI. This tool can help communities assess the potential value of mitigation project ideas in a range of settings from during the mitigation planning process to post-disaster scenarios to the Resilience Meeting during the flood mapping process. We will demonstrate a case study showing how to prepare the data and run the tool to evaluate mitigation options to reduce the risk of buildings in a community.

**Biography:** Eliza Ledwell is an avid skier and backpacker. She became a CFM in 2012 and has been supporting FEMA on the NFIP program since. Driven by the technology advancements in GIS she takes pride in connecting the business mission with the IT capabilities to help FEMA achieve its goals and improve users experience with the NFIP program.

### **Evaluating our Readiness through Geospatial Intelligence Solutions - Case Studies in Risk Analysis**

Patrick Heck, CSM, Guidehouse, pheck@guidedhousefederal.com

**Co-presenters:** Natee Johnson, njohnson@guidedhousefederal.com and Hector Artze, hartze@guidedhousefederal.com

**Abstract:** This presentation will include overviews of two case recent studies that leveraged geospatial intelligence to predict emerging crises. Anticipating a disaster can mean saving lives, limiting damage, or even averting disaster altogether. Geospatial intelligence can play a crucial role in helping to identify risks and even future crises before they unfold. Guidehouse will showcase its applied capabilities in establishing a geospatial intelligence framework, applying machine learning models to help predict emerging crises, and leveraging advanced analytic capabilities using geospatial platforms and federal data sets. Case studies will include recent work for a private utility in which we assessed grid infrastructure hardening programs in Florida to reduce the impacts of major storm events; and secondly

how we leveraged two machine learning techniques and geospatial data sets to identify an emerging crisis involving public fisheries and illegal trade. The session will focus on addressing the following questions and issues: • How to consider geospatial intelligence techniques that can work with sparse or incomplete data can still generate insight to evolving and complex scenarios; • How to improve situational awareness and conduct locational cost-benefit analyses using detailed geographic models to develop probabilistic forecasts of major storm events; • How teams can leverage available data layers including: FEMA flood layers, hourly National Oceanic and Atmospheric Administration (NOAA) weather station data, and United States Geological Survey (USGS) vegetation layers to generate insights; •

How machine learning modeling techniques (including the “random forest” and the “linear stochastic gradient descent” models) can fill in gaps when assessing risks where the uneven character of the data is a concern while also controlling for sample and measurement bias.

**Biography:** Patrick Heck, CSM, is a Director at Guidehouse. Mr. Heck brings more than 15 years of experience advising clients in areas of strategic planning, change management, agile application development, and technology implementation to Federal clients. Mr. Heck is a leader in Guidehouse’s Technology Consulting practice and has spoken at ASFPM on emerging technology trends impacting emergency management, mitigation, and community resilience.

### **Exploring Open Source Alternatives to Hazus Flood**

Andrea Jackman, PhD, ABS Group, [ajackman@absconsulting.com](mailto:ajackman@absconsulting.com)

**Co-presenters:** None

**Abstract:** The FEMA Hazus Flood Model provides vetted and standardized methodology for estimating structural damage and economic loss due to variable flooding conditions. With the expansion of open-source tools in recent years, alternative options are being explored for adapting the current desktop Hazus methodology to an open environment. Numerous efforts are underway by both FEMA Hazus developers and private-sector partners. This session will review and summarize options currently in development and production, such as the Hazus FAST module available on GitHub, and other publicly available, open-source flood modeling tools. Special focus will be given to alternative options designed for integration across FEMA’s Risk Mapping, Assessment, and Planning program, especially those using Python, ArcPy, SQL Spatial, and PostGRE frameworks.

**Biography:** Dr. Jackman has a BS in Meteorology from Valparaiso University and a PhD in Wind Engineering from Texas Tech. She currently works on the FEMA Risk MAP contract team in data science and consulting for ABS Group. Her research interests include the application of engineering principles to human processes in emergency management, and she has over 15 years experience developing multi-hazard analysis tools for local, state, and federal agencies.

## **F3: Academic Research in Mitigation and Flood Impacts**

### **Parks: Hazard Mitigation Tool or Economic Development Boon?**

Carrie Beth Lasley, [cblasley@gmail.com](mailto:cblasley@gmail.com)

**Co-presenters:** None

**Abstract:** Parks and open space have been valued as both a driver of economic growth through quality of life improvements, and as a tool for mitigating flood loss through reducing impervious surfaces. As these policy goals of development and preservation can conflict, this study evaluates the impact of park expansions in 13 communities. The study looks at park expansions from 2010-2020, and examines their impact on local growth and the creation of increased property losses due to flooding, looking at metrics related to property improvement, population growth, floodplain impact and downstream impact. The goal is to better develop our understanding of the interplay of green space, development and flood risk reduction to create better policy around using parks as a mitigation tool.

**Biography:** Dr. Lasley is a former (and hopefully future) CFM with a doctorate in Urban Studies from the University of New Orleans focused on hazard mitigation. She has also worked as an elected official, Land Bank deputy director and university researcher. She is interested in the interplay of economic development and hazard mitigation and recovery.

### **Evaluating Mental Health Risk Factors in Hurricane Survivors**

Holly Davies, LMSW, MBA, Graduate College of Social Work, University of Houston,  
hmdavie2@cougarnet.uh.edu

**Co-presenters:** None

**Abstract:** This presentation will identify demographic, psychosocial and clinical factors which help predict mental health recovery and deterioration in 2114 survivors from Hurricane Harvey through a secondary data analysis. This can assist disaster responders in understanding which factors correctly identifying flood survivors needing additional mental health support in disaster shelters, or the short-term flood period. **Background/Purpose:** Recent flood research suggests that 25%-75% of survivors experience PTSD. Mental health deterioration postdisaster has severe economic and quality of life consequences for impacted persons, their families, and communities. Little research has been conducted on other forms of mental health sequelae or factors which may impact mental health risk and recovery after disasters. This study identified demographic, psychosocial, and clinical factors to predict mental health recovery vs deterioration in survivors of Hurricane Harvey. **Methods:** Data from two cross-sectional randomized surveys by Roper Institute for Public Opinion Research at 3 months and 1 year after Hurricane Harvey were compiled into one. A subsection (n = 2,114) of respondents impacted by Harvey were asked additional questions on mental health. The dichotomous composite variable "Mental Health Recovery", created from 3 questions, was regressed using binomial logistic regression on demographics and clinical proxy measures to identify factors most likely to predict poor mental health recovery. Multiple imputation was utilized for missing data. **Results:** Of the 2,114 respondents, 25% percent were classified as poor mental health recovery. The final regression model accounted for 28% to 42% of the variance in mental health with a success rate of 82%. Factors that significantly predicted poor mental health recovery and those that were not salient will be discussed. **Conclusions/Implications:** This study addresses important research gaps for flood responders, to help identify survivors requiring additional mental health support postdisaster. Future research implications will be discussed.

**Biography:** Holly Davies, LMSW, MBA, is a doctoral candidate at the Graduate College of Social Work, University of Houston. Her clinical research focuses on trauma with a special emphasis on mental health surrounding natural disasters and force-majeure events. Holly's passion for trauma studies was informed by her work as the founder of a Community Emergency Response Team in Houston, where the challenges and inequities surrounding recovery from multiple floods became apparent. She has

received mayoral and presidential awards for her flood recovery work in Houston. Prior to discovering her interest for social work, Holly worked in the energy industry using path analyses and Monte Carlo simulations to evaluate tail-end risk in commodities and clearance & settlement. She currently teaches quantitative research method labs to doctoral students in the social sciences and is passionate about developing rigorous evidence-based interventions and assessment tools to facilitate trauma recovery for all. Ms. Davies believes that an interdisciplinary approach to flooding across federal, state, and local levels is necessary to ameliorate structural, economic, and mental health issues in flood-prone areas while creating resilient communities throughout the USA.

### **Climate Change, Ecosystem Loss & Disaster Risk: A Case of Burlington, Ontario**

Megan Sipos, York University, [msipos@yorku.ca](mailto:msipos@yorku.ca)

**Co-presenters:** Nirupama Agrawal, PhD., York University, [nirupama@yorku.ca](mailto:nirupama@yorku.ca)

**Abstract:** In 2021, global, human-caused warming reached approximately 1.2°C above pre-industrial levels, causing profound changes to both natural and human systems. These alterations include increases in the frequency and magnitude of extreme weather events such as floods, droughts and heat waves. In addition to increased warming, changes in landscape and seascape and ecosystem degradation have led to the rapid decline of ecosystems and biodiversity. The IPBES states that approximately one million of the world's eight million species are facing extinction, and despite current action, biodiversity and ecosystem services continue to deteriorate. Ecosystems currently provide a range of services valued at \$3.6 trillion per year in Canada, such as carbon sequestration, climate regulation, food, water and air purification, habitat for flora and fauna, while also protecting communities from natural disasters. This presentation will highlight the interdependence of climate change, ecosystems and biodiversity, and disaster risk reduction. Addressing these crises requires cross-sector collaboration between levels of government and between government and institutions. This can be achieved through the use of nature-based solutions as they provide an opportunity to mitigate and adapt to climate change, reduce the risk of disasters and enhance biodiversity. Using the City of Burlington (Ontario, Canada) as a case study, this presentation examines nature-based solutions to reduce flood risk while tackling multiple hazards and maximizing co-benefits. Using geospatial mapping and modelling, a flood inundation simulation for a 100-year return period event on a 1 km × 1 km grid resolution will be presented. I will also present Burlington's floodplains based on water surface elevation generated from multiple hydraulic models. Taking into account the socioeconomic clusters within the floodplain, I will discuss vulnerability and nature-based solutions to reduce flood risk while providing multiple co-benefits.

**Biography:** Megan Sipos is a Research and Policy Analyst at the Greenbelt Foundation. She holds a Master's degree in Disaster and Emergency Management from York University. Her research focuses on disaster risk reduction, with an emphasis on nature-based solutions. She completed the Nature-based Solutions for Disaster and Climate Resilience certificate offered by the United Nations Environment Programme in 2021, and has ample volunteer experience with various non-governmental organizations including Amnesty International, the Toronto Environmental Alliance, COSTI Immigrant Services, and the Canadian Red Cross. Megan is also a member of the Ontario Association of Emergency Managers and received the Brian Hook Memorial Award in 2021.

## F4: Modeling Complex Systems

### **Leveraging Local Data to Prioritize Texas Flood Modeling**

Garrett Johnston, PE, CFM, Freese and Nichols, Inc., [jgj@freese.com](mailto:jgj@freese.com)

**Co-presenters:** Mat Mampara, PE, CFM - [mmampara@dewberry.com](mailto:mmampara@dewberry.com) and Tyler Payne, PMP - [tyler.payne.glo@recovery.texas.gov](mailto:tyler.payne.glo@recovery.texas.gov)

**Abstract:** In response to Hurricane Harvey, the Texas General Land Office (GLO) is leading a multi-year River Basin Flood Studies project to assist counties and municipalities with determining cost-effective mitigation and abatement strategies that reduce the impact of flooding disasters and increase community resilience.

The current phase of the project will build out a library of riverine and coastal flood models to define baseline flood risk across the Central Region, which spans 20 counties and over 12,000 square miles. The Central Region team has developed a custom data management system to collect and organize existing riverine and coastal models from local communities and stakeholders, FEMA, and USACE. The team's model catalog includes a search engine, maps of georeferenced modeling data, and customized reports summarizing models collected in each county and HUC watershed. Where models are not available, or where additional detail is needed to support alternatives analysis, the team will develop new riverine and coastal models with HEC-HMS and HEC-RAS. Future phases of the project will leverage these models to develop alternatives analysis, mitigation projects, cost-benefit analyses, and grant applications, with a focus on supporting underserved communities.

This presentation will help public agencies understand the value of cataloging existing flood models in a searchable, reportable database, demonstrate how such a catalog was used to prioritize development of new flood models across the GLO River Basin Flood Study's Central Region, and provide a detailed overview of the team's prioritization approach, which incorporates numerous flood risk metrics as well as social vulnerability and community metrics. This prioritization was used to scope and sequence the baseline flood modeling effort for the current phase of the project. This presentation will also describe the development of the project's data management system and demonstrate its model catalog.

**Biography:** Garrett Johnston is a project manager and stormwater engineer who works for Freese and Nichols' Central Texas Stormwater group. Garrett has 14 years of research and stormwater consulting experience, including hydrologic and hydraulic modeling, floodplain mapping, evaluation of flood mitigation alternatives, development and design of capital improvement projects, benefit-cost analyses, municipal development reviews, and automation of H&H and GIS processes. Garrett holds bachelor's and master's degrees in Civil Engineering from Texas A&M University.

### **Old Meets New: Combining Tradition with Innovation to Catalyze Change**

Samuel Acosta, PE, CFM, HDR, [samuel.acosta@hdrinc.com](mailto:samuel.acosta@hdrinc.com)

**Co-presenters:** Michael Lopes, EI, CFM, [mlopes@calibre-engineering.com](mailto:mlopes@calibre-engineering.com) and Jonathan Villines, PE, [jvillines@mhfd.org](mailto:jvillines@mhfd.org)

**Abstract:** Englewood is a fully built-out, underfunded urban municipality working with regional resources and engineers to provide immediate change and impact. The City's flood mitigation efforts implement recommendations from ASFPM's "Urban Flood Hazards: Challenges and Opportunities"

(2020). In response to flooding that caused vehicle-sized sinkholes, incalculable damage, and a tragic fatality, the City and Mile High Flood District (MHFD) have taken a multipronged approach to address flooding. With goals ranging from immediate citizen impact to long-term flood reduction, our teams have incorporated modeling, master planning, online mapping, fluvial and rain-on-grid mapping, and a pivotal capital improvement project (CIP). The hydrologic study is one of the first in MHFD to feature pluvial rain-on-grid modeling for an entire jurisdiction (10 watersheds) to refine baseline hydrology, identify pluvial flood risk, and prioritize improvements. It is among the MHFD's first attempts at utilizing its calibrated hydrologic model CUHP for rain-on-grid modeling. The Team has contended with topography, obstructions, Manning's N, and velocity calibration in a built-out, mixed-use area. The Teams' efforts have resulted in public-facing maps that allow users to locate their homes, identify flood risk, and estimate anticipated water level by storm event, allowing citizens to address flood risk. This mapping is coupled with techniques that enable citizens to floodproof properties while the City undertakes the multi-million-dollar, multi-year effort to upgrade storm infrastructure. Impactful physical improvements include a CIP that transforms flooded urban industrial blocks into open space recreation. This presentation will discuss how to impart real change by focusing on separate but parallel initiatives that capitalize upon existing information and investigate the origins of urban flooding to: identify and mitigate risk that arises from highly complex hydrology and hydraulics; incorporate new 2D Rain-on-Mesh pluvial flood modeling, map floodplains in highly urbanized areas without open channel, and construct to eliminate flooding and provide amenities.

**Biography:** A Hydraulics Lead at HDR, Sam brings experience in hydrologic and hydraulic analysis and design. Sam's drainage experience includes urban and rural stormwater analysis including basin hydrologic modeling, inlet and conveyance system design, water quality treatment and detention design, and 1D/2D hydraulic modeling. Samuel has additional experience in preparing construction plans, SWMP preparation, specifications, quantities, cost estimating, and design services during construction. His modeling program experience includes, ArcMap, HEC-RAS, HEC-HMS, SWMM, MicroStation InRoads, AutoCAD Civil3D, and StormCAD. Sam has a Bachelor's Degree in Civil Engineering from Gonzaga University and is a Professional Engineer and Certified Floodplain Manager. Outside the office, Sam enjoys mountain biking, running, and spending time with his two boys Levi and Beau and his wife Elspeth.

### **Modeling Rush to Resiliency – A Minnesota 2D CLOMR Story**

Rachel Pichelmann, PE, CFM, SEH Inc, [rpichelmann@sehinc.com](mailto:rpichelmann@sehinc.com)

**Co-presenters:** Riley Mondloch, PE, CFM, [rmondloch@sehinc.com](mailto:rmondloch@sehinc.com)

**Abstract:** Highway 93 between the City of Henderson and US Highway 169 in Sibley County has been closed 10 times in the past 30 years because of flood events on the Minnesota River. In 2019 alone, flood levels of the Minnesota River forced a 43-day closure of Highway 93, and the roadway was closed an additional 6 times due to flooding of Rush River. With the 2020 State Bonding Bill, nearly \$25 Million was allocated to MnDOT and the City of Henderson to raise the grade of Highway 93 to significantly minimize risk of closure due to flooding. Rush River crosses Highway 93 as it simultaneously enters the Minnesota River floodplain. Rush River displays complex flow patterns as it crosses the highway, with around two thirds of the flow splitting north and overtopping the road during high flow events. Hydrologic and hydraulic modeling of Rush River was needed to properly analyze the stream, floodplain, and the potential impacts associated with the Highway 93 grade raise project. After initial hydraulic modeling with HEC-RAS 1D proved challenging for the flow split condition, it was determined that a 2D

hydraulic model was needed to properly represent the complex flow conditions associated with Rush River. An SRH-2D model was created to represent Rush River and analyze the proposed roadway design, size the new main channel and relief bridges, and communicate impacts associated with the project. An application for a CLOMR is currently being reviewed based solely on the 2D modeling. During this presentation, we will share lessons learned from this hydraulic modeling experience and provide an update on this 2D-based CLOMR.

**Biography:** Rachel Pichelmann is a Sr. Professional Engineer and Certified Floodplain Manager at SEH specializing in water resources engineering. Her project experience spans across the Midwest and includes hydrologic and hydraulic analyses, water quality analysis and stormwater management designs, floodplain management, dam failure analyses, and designing hydraulic structures and systems. She is a 2009 graduate of Iowa State University where she earned a degree in Civil Engineering with an environmental emphasis.

## **F5: Predictive & Real-Time Inundation Mapping**

### **Emerging Role of Big Data for Climate Change and Flood Hazard Analyses**

Namrata Batra, PE, CFM, Atkins, [namrata.batra@gmail.com](mailto:namrata.batra@gmail.com)

**Co-presenters:** None

**Abstract:** Climate change is real and is happening now with adverse impacts being felt everywhere. For example, sea levels are rising, glaciers are melting, floods are increasing, and wildfires are on the rise. Climate scientists have been gathering climate data for a long time but use of big data is comparatively recent with significant potential insights. Big data is a term also used for predictive analytics to extract value from data sets that are so large or complex that traditional data processing applications are inadequate. Now that cloud computing, distributed storage, and massive amounts of processing power are affordable, these large data sets can be used to provide potential new insights. Big data includes the data collected from the growing number of electronic devices we use every day. And the rise of social media means more and more data is being generated when people post messages or upload photos and videos of their environment. Often people affected by the floods tweet how they are affected, if they need help and how deep the water is at a given location. Twitter information thus provides almost unlimited scope for qualitative situational analysis right before, during, and after the disasters. This presentation will include a case study in Jakarta where data from social media is used for decision support during the floods by overlaying a Digital Elevation Model with flood depth observations and location references in tweets, thus producing real-time flood maps. By combining information from social media, satellite observations, climate models and other resources, use of big data can lead to better and faster emergency response.

**Biography:** Namrata is a Senior Water Resources Engineer at Atkins with 12 years of professional experience working with FEMA National Flood Insurance Program on hydrologic and hydraulic studies. She has a PhD in Civil and Environmental Engineering from the University of Illinois at Urbana-Champaign and been involved with modeling the impact of climate change on water resources.

## **Real-time Inundation Maps Using New Sensor Data: Case Studies from Great Lakes Watersheds**

Brandon Wong, Hyfi, [brandon@hyfi.io](mailto:brandon@hyfi.io)

**Co-presenters:** None

**Abstract:** Starting in 2020, a new generation of wireless water level monitors were used to enable real-time inundation maps and flood alerts across the Great Lakes region. The sensor deployments span tens of communities and nearly a thousand square miles, across Michigan, Ohio, and New York. Over fifty new locations are monitored in Metro Cleveland alone. Live flood maps help flood managers better pinpoint, anticipate, and respond to site-specific flood conditions. Long-term water level measurements help stormwater managers evaluate infrastructure performance. We also discuss how water level data can be used to engage the broader community -- for example, by providing real-time paddling maps at National Water Trails. These case studies are enabled by an entirely new technology platform, designed specifically to support stormwater managers. The platform integrates data from new, easy-to-maintain water level monitors with federal gages and weather services. The data are processed using a new generation of models to enable real-time inundation maps. Flood managers can also pre-set any number of triggers to notify them where and when water levels exceed action levels or flood conditions.

**Biography:** Brandon P. Wong is the co-founder of Hyfi and recently completed his PhD at the University of Michigan. He is a systems engineer with a dual training in Electrical Engineering & Computer Science, as well as Civil and Environmental Engineering. He led the development and deployment of the technologies behind Open-Storm.org, an open source blueprint for smart water systems.

## **Moving Toward Near-Real-Time Forecast Flood Inundation Mapping Services in the Northeast U.S.**

Jason Elliott, NOAA/National Weather Service, [jason.elliott@noaa.gov](mailto:jason.elliott@noaa.gov)

**Co-presenters:** David Vallee, [david.vallee@noaa.gov](mailto:david.vallee@noaa.gov); Jeane Wallace, [jeane.wallace@noaa.gov](mailto:jeane.wallace@noaa.gov); and William Saunders, [william.saunders@noaa.gov](mailto:william.saunders@noaa.gov)

**Abstract:** The National Weather Service (NWS) has a mission to issue forecasts for the protection of lives and property and enhancement of the national economy. Partners across the nation have expressed an urgent need for more detailed flood forecasts and the resulting inundation. In support of the 2018-19 Department of Commerce (DOC) / National Oceanic and Atmospheric Administration (NOAA) Agency Priority Goal (APG) to mitigate flood impacts, the NWS's Office of Water Prediction demonstrated a novel approach to real-time flood inundation mapping capability, implemented as a service, over the state of Texas. This capability uses the Height Above Nearest Drainage (HAND) method to infer forecast stage given forecast streamflow, and forecast inundation extent given forecast stage. Following the successful completion of the Texas Demonstration, a new 2020-21 DOC/NOAA APG was established. Its purpose was to improve flood related decision support services by expanding the demonstration of these capabilities to at least an additional 10% of the U.S. continental population residing in flood-vulnerable freshwater basins. The added coverage includes National Water Model (NWM) hydrography downstream from a subset of NWS official forecast locations Nationwide, plus populations in the NWS Northeast River Forecast Center (NERFC) service area. One of the major milestones of the 2020-2021 APG was to develop and conduct two tabletop exercises with core partners in the NERFC service area to demonstrate these new services: one for the state of Rhode Island based on the devastating floods of March 2010; the other for New York State's Schoharie Valley based on the passage of Tropical Storm



Irene in August of 2011. This presentation will provide an overview of each tabletop exercise and will summarize the major findings and recommendations, along with a preview of the path forward beyond the APG to further engage and educate partners.

**Biography:** Jason Elliott is the Service Coordination Hydrologist at the National Weather Service Northeast River Forecast Center in Norton, Massachusetts. In this role, Jason coordinates with internal and external partners throughout the water and weather enterprise regarding flooding issues within a service area encompassing all the New England states and much of New York. Jason has held this position since March 2021. Previously, Jason was the Senior Service Hydrologist at the Baltimore/Washington Weather Forecast Office for over a decade. Before that, Jason served as a meteorologist at NWS offices in Huntsville, Alabama; Memphis, Tennessee; and Mobile, Alabama. Jason holds a Bachelor of Science in Geography with a concentration in Meteorology from the University of South Alabama, and a Master of Education in Human Resource Education, specializing in Distance Learning, from the University of Illinois, Urbana-Champaign.

## **F6: Risk Perception and Understanding**

### **It Won't Happen to Me! Perceptions of household flood risk in America**

Matt Lyttle, Guidehouse, [mlyttle@guidancehousefederal.com](mailto:mlyttle@guidancehousefederal.com)

**Co-presenters:** Megan Robinson, [mrobinson@guidancehousefederal.com](mailto:mrobinson@guidancehousefederal.com)

**Abstract:** This presentation will review the latest publicly available data from FEMA's National Household Survey, a nationally representative phone survey that tracks levels of American household preparedness, as well as Americans' risk perceptions. By reviewing survey data, ASFPM attendees will gain insight into the collective state of mind of Americans facing flooding in their communities. How many people in flood prone communities believe their homes might flood? What percentage of residents have experienced flooding in the past? How many are taking active steps to prepare their families for floods? How does preparedness in flood-prone communities compare to preparedness among the general public?

This session will provide answers to these critical questions and share new findings from the National Household Survey not found in FEMA's public report. With fresh insights from the Guidehouse Data Analytics Team, ASFPM attendees will learn how to leverage this survey to prepare their own communities by reaching more residents with targeted messaging.

**Biography:** Matt Lyttle is a Director at Guidehouse. He supports Strategy and Transformation projects within the Federal Emergency Management Agency. Before Guidehouse, Matt was a FEMA official focused on local disaster preparedness and capacity building. In 2021, Matt was accepted as a Security Fellow in the Truman National Security Project for his work on climate resilience. Matt is a Returned Peace Corps Volunteer in Nicaragua from 2008 to 2010, and still volunteers his time to support disaster resilience in Latin America, most recently on behalf of the US Embassy in Tegucigalpa, Honduras.

### **What Does Your Flood Zone Really Mean?**

Dina Bautista, PE, CFM, AC Disaster Consulting, [dbautista@acdisaster.com](mailto:dbautista@acdisaster.com)

**Co-presenters:** Jaimie Portelle, [jportelle@acdisaster.com](mailto:jportelle@acdisaster.com) and Jose Morales, PE, Florida Division of Emergency Management, [Jose.Morales@em.myflorida.com](mailto:Jose.Morales@em.myflorida.com)

**Abstract:** Hurricane Michael had devastating impacts on Mexico Beach, Florida resulting in widespread, substantial damage to infrastructure and housing city-wide. The storm surge was catastrophic with 95% of the City inundated with flood waters. City leaders recognized the unique challenges and opportunities that were present and began the recovery process at ground-zero. This process began with understanding the need to approach floodplain management through the lens of resiliency and mitigating the impacts of future disasters. Through assessing the damages from Hurricane Michael, the City was able to identify specific locations and existing infrastructure that were highly susceptible to catastrophic damages caused by flooding from hurricanes and storm surges. To ensure the success of their response efforts, engaging community members to gain their buy-in was paramount. This was accomplished through public-meetings and workshops to educate and communicate to community members on flood risks and measures that can be taken to mitigate against future damages. The results of this process saw community members gaining a better understanding of what flood zones mean and how the flood risks can impact their properties, identification of new local floodplain ordinances that were more stringent than FEMA and NFIP standards to protect city-wide property and infrastructure from future flooding and community-wide understanding of what floodplain management means and its impacts on their community. This presentation will provide community leaders with best practices and lessons learned on how to effectively communicate flood risks to community members and how to successfully implement effective floodplain management.

**Biography:** Dina is a licensed Civil/Environmental Engineer and Certified Floodplain Manager who has worked on a diverse array of infrastructure design projects and performed grant management for these projects throughout construction. She graduated from the University of Missouri with a Bachelor of Science in Biological Engineering, with an emphasis in Environmental Engineering, and has a second Bachelor of Science degree in Biology. Dina began her career by serving for two years in the United States Peace Corps where she secured funding, designed, and managed construction of potable water and sanitary systems. After returning to the U.S., Ms. Bautista's project experience has included watershed planning and hydrologic analysis, stormwater collection and treatment, utilities design (water distribution and sewer collection systems), Phase I Environmental Site Assessments (ESA), and project permitting through local, State, and Federal agencies. As a Certified Floodplain Manager (CFM), Ms. Bautista has gained experience in municipal floodplain management including planning/ordinances, elevation certificates, and the Community Rating System. Dina has secured millions of dollars of Federal and State Grant money for projects, including debris removal, beach re-nourishment, resiliency planning, Sea Oat replacement, Triumph Funds etc., for numerous communities. Ms. Bautista recently worked with the City of Mexico Beach to prepare applications for city-wide recovery and mitigation projects through HMGP and CDBG-DR including cost estimating, mapping, and BCA analysis. These projects required a diverse technical understanding of the City's infrastructure and how to maximize mitigation benefits by overlapping projects which could work in tandem to improve the City's overall resiliency.

### **Combating Misperceptions About Flood Magnitude**

Kim Dunn, PE, D.WRE, CFM, T&M Associates, [kdunn@tandmassociates.com](mailto:kdunn@tandmassociates.com)

**Co-presenters:** Robert Pierson, [Robert.Pierson@fema.dhs.gov](mailto:Robert.Pierson@fema.dhs.gov)

**Abstract:** As a Floodplain Administrator, how many times have you heard “we just had a 500-year flood and I was not flooded, why do I need flood insurance”? After an event, the media and locals often talk about flood frequencies that do not necessarily align with statistics, and the numbers get repeated as facts. This misperception creates a false sense of security that helps people to justify risky behavior. To hydrologists and engineers, it is obvious that rainfall frequency does not necessarily equal flood frequency but attempting to explain this to a layperson can jeopardize your credibility. When the remnants of Hurricane Ida passed through Pennsylvania, we heard this again, and took a closer look at a few areas to help illustrate why the observed peak frequency did not align with streamflow frequencies. Using statistical rainfall and stream gage data for example watershed draining approximately 75 square miles, we illustrated that the 200+-year rainfall in the town at the downstream end of the watershed really was less than a 20-year event at the gage. We are able to support this with over 25 years of personal observations, a stream gage with 54 years of record, multiple high water marks, a recently developed hydraulics model of the stream, and a strong understanding of current and historic land use patterns in the watershed. This was combined in graphical format. This presentation will share the analysis and story behind our example site and how to use real life examples to help dispel this common misperception.

**Biography:** Kim Dunn, D.WRE, P.E., CFM, works for T&M Associates as part of the Compass JV Team in support of FEMA. For the last 30 years she has conducted and managed flood studies, including hydrologic and hydraulic analyses, levee analyses, floodplain mapping, mitigation and community outreach. Ms. Dunn holds a B.S. in Civil Engineering from the Pennsylvania State University and a M.S. in Civil/Environmental Engineering from Villanova University. She is an American Academy of Water Resources Engineers (AAWRE) Diplomate Water Resources Engineer, a Professional Engineer in Pennsylvania and Delaware and a Certified Floodplain Manager. She currently serves on AAWRE’s Admissions Committee. Ms. Dunn also serves on the East Pikeland Township, PA Planning Commission.

## **F7: Advocating for Natural Floodplain Functions**

### **Save Guilford Woods - Community Advocacy for Its Natural and Ecological Benefits and Functions to Reduce Flooding.**

Stuart Adams, EI, CFM, ENV SP, Stantec, [stuart.adams@stantec.com](mailto:stuart.adams@stantec.com)

**Co-presenters:** Jan-Michael Archer, [jarcher3@terpmail.umd.edu](mailto:jarcher3@terpmail.umd.edu); Marilyn Yang, [marilyn1@terpmail.umd.edu](mailto:marilyn1@terpmail.umd.edu); and Ross Salawitch, [rsalawit@umd.edu](mailto:rsalawit@umd.edu)

**Abstract:** Climate-informed action to preserve the natural and ecological benefits of a publicly owned, wooded forest and the beginning of the Guilford Run stream united the College Park, Maryland community to successfully rally to save Guilford Woods. In February 2020, the University of Maryland requested support from the City of College Park to pursue zoning amendments for a student housing development. The request deviated from the University’s recent redevelopments that revitalized underutilized properties into higher density sites with better stormwater management. Instead, the University proposed to develop the Guilford Woods, which is upstream from neighborhoods with limited historical flooding issues but have recent flooding due to climate change with events in 2009, 2010 and September 2020. Save Guilford Woods sent hundreds of letters to the University of Maryland

Administration and elected officials; hosted an on-campus rally with 300+ students; gathered support from the Anacostia Watershed Society, City and County Councilmembers, State Delegates and Senators, and the State Comptroller; achieved support from 400+ University faculty and staff including experts in climate change and ecology; all asserting the value of Guilford Woods and calling on the University to seek alternative sites for student housing. This presentation, co-presented with University student activists, will provide insights on steps the community took to demonstrate the natural and ecological benefits of the Guilford Woods. The advocacy continues, and its efforts can inform advocacy to achieve similar headlines: “University of Maryland officials to pause controversial graduate student housing project” – Washington Post; “President Pines made the right decision today halting the plan ... (that) generated intense opposition from faculty, graduate and undergraduate students, and College Park residents who understand climate change, flooding, and smart growth.” State Senator; “Given the unknowns about the stormwater in the watershed, and the potential impact on local biodiversity, this is good news...” City Councilmember.

**Biography:** Stuart Adams is senior associate at Stantec and active community advocate specializing in the implementation of resilient building codes and standards in design and mitigation. He serves as the STARR II Building Science Program Manager for contract support to FEMA Building Science where he manages a team of trusted A/E professionals to develop actionable building performance guidance for designers, governmental agencies, and community stakeholders. Stuart supports the FEMA’s Building Codes Strategy, Building Resilient Infrastructure and Communities program, and was a member of the Building Codes Save Loss Avoidance Study Advisory Panel. He is an active contributor to resilience committees including the Federal Alliance for Safe Home Technical Advisory Council, the ASCE IRD Disaster Response & Recovery Committee, and ASTM E54.02 Work Group on Community Resilience Planning. As the President of the Calvert Hills Civic Association, Stuart partnered with neighbors, elected officials, and NGOs to elevate local, county, and state-wide stormwater management issues and highlight the natural and ecological benefits and functions of our floodplains. He has championed Smart Growth, infill development and successfully advocated to preserve critical greenspace. Stuart has a strong knowledge of the legislative and civic processes, and extensive experience in partnering with multiple levels of government including mayors, councilmembers, NGOs, SHMOs, and other elected officials to enhance floodplain management in communities, both personally and professionally.

### **Nature-based Solutions for Flood-Induced Chemical Risk Reduction in the Galveston Bay**

Shannon Cunniff, Environmental Defense Fund, secunniff@gmail.com

**Co-presenters:** None

**Abstract:** Galveston Bay, in the Gulf coast of Texas, is vulnerable to episodic storms, heavy rainfall, flooding, and sea level rise. Many petrochemical facilities, including oil and gas infrastructure, are concentrated along this region and hurricanes like Harvey have exposed their vulnerability to storms. Flooding-related damage has triggered the release of petroleum products and chemical contaminants into the air, into waterways, and into surrounding neighborhoods. This study aims to further our understanding of how increasing flood threats may lead to release and distribution of chemical contaminants into the Gulf Coast ecosystems. It will explore how Natural and Nature-based Features (NNBF) could be incorporated into community and facility plans to reduce risks of chemical release and exposure. To this end, we will prioritize petrochemical facilities that pose the greatest environmental risk in terms of flood vulnerability, exposure, and hazard potential. We will then identify the optimal NNBF and locations for reducing flood risk and/or transport of contaminants. By modeling current and

future conditions, both with and without selected natural Infrastructure features, we will determine strategies that have the biggest impact on flood-risk scenarios. Finally, the optimization of NNBs will be translated into an easily accessible decision tree. The focus of this presentation is the development of a decision support tool for cost-effective and scalable nature-based applications to mitigate flooding and contamination risks in the Galveston Bay.

**Biography:** Shannon E. Cunniff directed Environmental Defense Fund's Coastal Resilience program to accelerate restoration of natural infrastructure and adoption of nature-based solutions to build resilience to flooding, coastal storms and sea level rise. Previously she held executive positions with the departments of Defense and Interior and worked at the U.S. EPA and Army Corps of Engineers on flooding and other water resources issues. She holds a Master's Degree in Geography and Bachelor's Degree in Biology from the University of California, Los Angeles.

### **San Pedro Creek Culture Park: Turning a Flood Control Project into A World Class Linear Park**

Christine Clayton, PE, CFM, San Antonio River Authority, [cclayton@sariverauthority.org](mailto:cclayton@sariverauthority.org)

**Co-presenters:** Joe Fernandez, CFM, [josef@sariverauthority.org](mailto:josef@sariverauthority.org)

**Abstract:** Nearly every city in the country has to manage creeks and water runoff. While traditional options were to channelize runoff and move it out of the City as quickly as possible, the San Pedro Creek Improvements Project showcases a new design alternative for major cities throughout the world. The San Pedro Creek Improvements in San Antonio, Texas, transformed a 2-mile stretch of creekway that runs through dense urban development. Constrained in concrete channels and hidden in culverts, the creek eventually lost the close connection with the community. The revitalization of San Pedro Creek sought to provide flood control, improve water quality, catalyze economic development, and connect the public with the 300-year history along the creek. The channel improvements replicate a more natural stream ecosystem, with variable water depths and continual flows similar to historic spring flow conditions prior to urbanization. By expanding the creek, the 100-year floodplain is contained within the banks of the creek. Water quality is further enhanced through innovative use of green infrastructure. In combination with CDS units, bioretention ponds and vegetated swales, surface flows are filtered through natural means and media before releasing the runoff into the creek. This presentation will dive into how a partnership between the San Antonio River Authority, Bexar County, and the City of San Antonio led to an innovative way to provide flood control while revitalizing a once-sacred site with inspired art, splendid paseos (walkways), places of respite and cultural reflections.

**Biography:** Christine Clayton is an engineer at the San Antonio River Authority. Ms. Clayton received her B.S. in Civil Engineering from Rice University. She worked as a consultant engineer before joining the River Authority. Her experience includes drainage studies, floodplain management, and drainage design in support of flood reduction and roadway improvements. As a member of the Design & Construction Department, she serves as a project manager for a variety of projects for community partners such as Bexar County and the City of San Antonio. She is the project manager for the San Pedro Creek Improvements Project which revitalizes a 2.2 mile stretch of San Pedro Creek on the western edge of downtown San Antonio.

## **F8: Guidance for Local Stormwater Management Programs**

## **Creating and Maintaining Resilient Stormwater Infrastructure**

Jennifer J. Walker, PE, D.WRE, ENV SP, CFM, QSD, Watearth, jwalker@watearth.com

**Co-presenters:** None

**Abstract:** This presentation will share lessons learned on Green Infrastructure /stormwater BMP projects ranging from storm drain CIPs to parking lots to roadways to industrial to rail and to Port and coastal facilities. You'll leave with practical nuts-and-bolts solutions to improve maintenance practices within your organization. We will cover issues and pitfalls related to designs that reduce and consolidate maintenance, improper maintenance, activities to avoid around and in/on Green Infrastructure, and challenges with landscaping and maintenance crews related to irrigation and other items. You will benefit from seeing all angles of Green Infrastructure from conception through Maintenance. Example projects are located in a plethora of soils, rainfall, climate, and weather conditions.

**Biography:** Walker, President of Watearth, Inc., has an earned reputation for bringing unique insights to projects, whether the focus is green infrastructure or gray. As a water resources engineer chiefly concerned with developing sustainable and resilient solutions, 30 years of practice producing foundational environmental documentation and master plans, nuanced and complex hydraulic and hydrologic models, and civil designs grounded in solid science and reality have prepared Walker to work on a variety of project types. Walker is widely considered an expert in stormwater, water quality, flood control, green infrastructure, hydrology and hydraulics, water resources, and complex projects with multiple stakeholders. Walker has provided operations training and continuing education to more than 10,000 client staff and engineers the world over through programs at ASCE, CASQA, FMA, USACE, and Stanford University. For the truly sensitive matters of litigation, Walker has been called upon time and time again as an expert witness.

## **Stormwater Fees: The Good, the Bad, and the Ugly**

Warren Campbell, Ph.D., PE, CFM, Western Kentucky University, warren.campbell@wku.edu

**Co-presenters:** None

**Abstract:** More than 1850 stormwater utilities (SWUs) have been created in the U.S. They are becoming increasingly popular around the world and are promoted as the fairest way to provide consistent funding for stormwater programs. They can be much fairer than funding using ad valorem taxes. However, many SWUs do not use fair fee systems. The Equivalent Residential Unit (ERU) system is the most popular fee system in the U.S. ERU systems can be very fair or can be unfair. An ERU is usually defined by ordinance to be the average or median impervious area of a single family residential property within a SWU community. The importance of an accurate ERU will be demonstrated through an example. The second most popular fee system in the U.S. is the tier system. This system has a constant fee for several ranges of impervious area. Tier systems can be made fair, but many are placing a more than fair burden on some classes of property owners than others. A method for selecting tiers and tier fees is demonstrated that is fair. A third fee system is the Residential Equivalent Factor (REF) system which is very popular in Minnesota. Runoff per acre is calculated for a particular single-family land use and a standard storm. The runoff from other land uses such as commercial is also calculated per acre and ratioed to that for single family residential. This ratio is used to calculate the fee for other properties. Unfairness comes from how the storm and soil type are chosen. The importance of fair selections are demonstrated along with a recommended way to determine the all-important ratios.

This presentation will instruct participants on BMPs for stormwater fee systems that will reduce legal exposure.

**Biography:** Dr. Campbell is the Hall Professor of Civil Engineering at Western Kentucky University and the publisher of the Western Kentucky University Stormwater Utility Surveys. His database of utilities contains information on more than 1800 U.S. stormwater utilities and 50 in Canada. He was an invited keynote speaker at Stormwater 2021 in Australia, and 64 of his students have passed the CFM exam. At WKU he teaches courses in floodplain management, hydrology, hydraulics, and fluid mechanics. He was formerly the CFM Exam Workgroup Chair and served on the ASFPM Certification Board of Regents for 10 years.

### **Utilizing 2D Modeling in Stormwater Management and Master Planning**

Maria Neeland, PE, CFM, Alfred Benesch & Company, mneeland@benesch.com

**Co-presenters:** None

**Abstract:** Two-dimensional HEC-RAS modeling, utilizing enhanced base level engineering methods, was performed for the City of Topeka in 2019 as part of a Technical Assistance project provided by the Kansas Department of Agriculture, funded by FEMA Region 7. The City of Topeka has found innovative ways to use the two-dimensional modeling to improve their stormwater program. The modeling was instrumental in determining stormwater quantity performance standard requirements for the various sub-basins throughout the City by analyzing stream sensitivity to peak flow and volume changes. The requirements are now documented in a City's BMP Stormwater Design Handbook. The two-dimensional modeling was also the basis for new science-based stream buffer setbacks, now established in City ordinance; and has been used in streambank instability predictions and streambank mitigation efforts. Additionally, the City has utilized the two-dimensional modeling for stormwater master planning purposes and ultimately the development of the Capital Improvement Plan. This was done two-fold through the development of Business Risk Exposure scoring and the determination of recommended mitigation projects, which were established through alternatives analysis performed on the sub-basins with the highest Business Risk Exposure scores. The two-dimensional modeling had a variety of uses in the master planning efforts, and overall allowed a larger portion of the City to be analyzed for potential alternatives than traditional modeling would have allowed, given the limited budget available. The information presented will show other municipalities ways that two-dimensional modeling can be used to improve stormwater management and planning efforts.

**Biography:** Maria Neeland is project manager and water resources engineer for Alfred Benesch & Company in Topeka, Kansas. She has 10 years of professional experience. Her work focuses on hydrologic and hydraulic engineering, stormwater drainage analysis, flood inundation mapping, flood reduction studies, and water quality analyses. She has experience with FEMA DFIRM and RiskMap projects, community management planning, stormwater mitigation and alternatives analysis, and technical review of engineering analyses and stormwater management plans.

**Thursday, May 19**

**Session G: 10:30am-Noon**

## **G1: CRS - National and Regional Focus**

### **CRS Next: What We've Heard and Where We Go Next**

Rachel Sears, FEMA, [Rachel.Sears@fema.dhs.gov](mailto:Rachel.Sears@fema.dhs.gov)

**Co-presenters:** None

**Abstract:** FEMA is currently working to transform the Community Rating System (CRS) in a multi-year effort. There have been a series of engagements with specific groups as well as the public through meetings and a Request for Information. Simultaneously, FEMA has been analyzing a variety of data related to CRS and NFIP communities to have detailed analytics that can support reviewing the current program and developing a new program. This presentation will discuss what we have heard from our partners and stakeholders through these engagements, and what we have learned through data analysis. We will also highlight how we will use this information to continue to develop the transformed CRS. Participants will walk away from the presentation with a sense of where FEMA is heading with a transformed CRS and the many opportunities to be a part of this change.

**Biography:** Rachel Sears joined the Federal Emergency Management Agency (FEMA) in 2004 and currently serves as the Director for the Floodplain Management Division. In this capacity, Ms. Sears provides leadership in the implementation of the floodplain management requirements of the National Flood Insurance Program (NFIP) and oversees FEMA's work as the lead agency under the Unified National Program for Floodplain Management and as the consultation agency under Executive Order 11988, Floodplain Management. In her previous capacity as the Senior Policy Advisor for the Federal Insurance and Mitigation Administration, Rachel played a lead role in advancing FEMA's work in national climate adaptation and resilience policy, supporting the development and implementation of the Federal Flood Risk Management Standard (EO13690), Presidential Policy Directive 8 - National Preparedness, the President's Climate Action Plan, the Hurricane Sandy Rebuilding Strategy, and the Principles and Guidelines to Water Resource Management. Rachel has also been involved in the many reforms of the National Flood Insurance Program. She has worked multiple disasters in the national operations center and has been deployed to disaster field assignments in Florida, Mississippi, Louisiana, and Iowa. Ms. Sears has a B.S. in Environmental Sciences from Shepherd University and a Masters of Public Policy from George Mason University.

### **Effectiveness of the Community Rating System in reducing flood damages**

Jesse Gourevitch, PhD, UC Davis, [jgourevitch@ucdavis.edu](mailto:jgourevitch@ucdavis.edu)

**Co-presenters:** None

**Abstract:** In response to growing threats of climate change, the US federal government is increasingly supporting community-level investments in resilience to natural hazards. As such federal programs become more widespread, evaluating their efficiency and effectiveness becomes essential. The Community Rating System (CRS), which is part of the National Flood Insurance Program (NFIP), is a promising example of a federal policy designed to incentivize community-level investment in climate adaptation. This analysis assesses the program, asking whether it has been effective in reducing flood losses, how it can be improved, and what lessons it has for similar types of programs. We find



participation in CRS is associated with reduced flood damage claims. On average, the percent reduction in claims for each CRS score roughly aligns the premium discount for that class. Among the menu of available CRS activities, those related to “Flood Damage Reduction” are associated with the greatest reduction in NFIP claims. In all but five years since 1998, the annual program costs outweighed its annual benefits. Cumulatively though, the benefits of flood damage reduction from CRS between 1998 and 2020 were approximately \$10.1 billion; over the same period of time, the cumulative costs of NFIP premium discounts were \$10.0 billion. The 1:1 match between the cost of CRS and its estimated benefits is an endorsement of CRS historically and supports its continuation. As climate change increases the frequency and severity of major flood events, such as those in 2005, 2012, and 2017, we expect CRS will become crucial in mitigating damages and will yield greater net benefits to the NFIP.

**Biography:** Jesse Gourevitch is a postdoctoral research fellow in the Department of Earth and Planetary Sciences at the University of California - Davis and the Wharton Risk Center at the University of Pennsylvania. His research aims to understand the relationships among climate and land use change, ecological and hydrological processes, and economic and human health outcomes. Underlying this work is a broad interest in how the impacts of climate and land use change are distributed among different demographic and socioeconomic groups, and in turn, how public policy can achieve more equitable outcomes. Currently Jesse’s research examines the flood risk capitalization in US housing markets and the effectiveness of federal policies designed to reduce flood damages. Jesse earned his PhD from the University of Vermont in 2021 and his bachelors’ degree from Carleton College in 2014.

### **Growing the CRS in Virginia: Local Government CRS Program Evaluation Trainings**

Mary-Carson Stiff, CFM, Wetlands Watch, mc.stiff@wetlandswatch.org

**Co-presenters:** None

**Abstract:** Since 2019, Wetlands Watch has worked across Virginia’s Coastal Zone to increase local government staff knowledge and interest in the CRS Program. As of fall 2021, Wetlands Watch has led fifteen ‘Local Government CRS Program Evaluation Trainings’ that helped increase awareness of the CRS and offered an opportunity for community staff to get a head start on the application to join the Program. The trainings provided communities with straightforward information, translating FEMA-ese into language locality staff could relate to programs and policies currently underway in the community. Trainings brought department representatives into one room, forming a “CRS Team,” to learn about programs and policies executed by other departments and witness the benefits of the CRS Program’s comprehensive approach to floodplain management. Each community received several deliverables from the training. Two highlighted resources include: (1) a detailed and community specific version of the CRS Quick Check and (2) a ‘Training Summary Report’ that includes an estimated CRS class rating, based on community activities underway, and corresponding flood insurance premium savings for the community. This presentation will explain why and how Wetlands Watch designed a CRS training and evaluation program for local governments interested in learning about the CRS and potentially joining the Program. We will share the feedback received from communities that completed a training, report the number of communities that are pursuing applications to join the CRS, and offer advice and lessons learned to others seeking to develop a similar training program.

**Biography:** Mary-Carson Stiff is Director of Policy at Wetlands Watch where she specializes in the National Flood Insurance Program and sea level rise adaptation planning and policy. She is a Certified Floodplain Manager, Chair of the Coastal Virginia Community Rating System Workgroup, & Board

Member of the Virginia Land Conservation Foundation, Virginia Floodplain Management Association, and the Living River Trust. Before joining Wetlands Watch, she worked as Consulting Manager for Policy & Programs for the Virginia Coastal Policy Center at William & Mary Law School, where she obtained a J.D. in 2013. Mary-Carson graduated from Bates College with a B.A. in 2008.

## **G2: International Floodplain Management**

### **COVID 19 Pandemic impacts on disaster events in Latin America and the Caribbean**

Alejandro Riano, PE, CFM, AECOM, [alejandro.riano@aecom.com](mailto:alejandro.riano@aecom.com)

**Co-presenters:** None

**Abstract:** The international committee has been keeping tabs on the reported disaster events occurring in Latin America and the Caribbean (LATAM) for the period of 2018 and 2021. The COVID 19 pandemic resulted in reduced air pollution, water pollution and other human influenced changes to the environment. Also, the pandemic forced communities to lockdown for an extended period of time reducing the exposure to the risk of storm or rainfall driven disasters. Disasters that have been tracked include, extreme rainfall, hurricanes, landslides, mudslides, flash floods and riverine flooding. The impacts can involve reduced number of reported disaster and casualties.

**Biography:** Mr. Riano has been a senior water resources engineer at AECOM since 2018 and has many years of experience providing design and consulting services for clients in the Western United States and abroad. Mr. Riano develops plans and analyses for complex hydrologic and hydraulic infrastructure and water resources projects, including urban hydrology, drainage master planning, regional climate model analysis, technical reviews, and software testing. He is an active member of the ASFPM International Committee where he serves as the Latin America and Caribbean Regional Leader. He enjoys the outdoors and loves spending time with his kids.

### **Flood Risk Management and Disaster Recovery in Mexico: Past, Present, and Future**

David Powers, PE, PH, D.WRE, CFM, CDM Smith, [powersdb@cdmsmith.com](mailto:powersdb@cdmsmith.com)

**Co-presenters:** Francisco Febronio Peña Guerra

**Abstract:** Mexico is the United States' closest neighbor to the south. We share a border that is a source of much needed water in an often dry landscape, but is also a source of flooding and international cooperation on flood risk reduction. Mexico is home to the largest city in the Americas, which was founded on and around a high altitude lake and is subject to urban flooding as well as frequent geologic activity. Mexico's coastal areas are the frequent destination for tourists from the United States, but both the Atlantic and Pacific coasts are also visited by hurricanes that have caused significant damage. This presentation will look at the flooding history in Mexico, as well as how the country manages flood risk management. Through interviews and conversations with academics, government officials and practitioners throughout the country, we will describe how the country approaches flooding, and how they respond when disasters occur. This presentation will also look at what is being done to protect the tourism industry from the effects of climate change on sea level rise along with both the marine and terrestrial ecosystems.

**Biography:** David Powers is a senior water resources engineer for CDM Smith in their Richmond, Virginia office. He has over 25 years of experience throughout the US and internationally. Mr. Powers' technical background is in performing hydrologic and hydraulic analyses using a wide range modelling methods. His areas of expertise include flood risk management, ecosystem engineering, and urban drainage. Mr. Powers is a co-chair of ASFPM's International Committee and enjoys exploring what the ASFPM community can contribute to the international flood risk management community as well as what we, in the US, can learn from flood risk management practices around the globe.

### **Flood Recovery in Indigenous Communities of Central Guatemala**

Erin Hughes, PE, Solidarity Engineering, [erin@solidarityengineering.org](mailto:erin@solidarityengineering.org)

**Co-presenters:** None

**Abstract:** In November 2020 Alta Verapaz, Guatemala was Hurricane Eta (Cat 4) and Hurricane Iota (Cat 5) causing widespread damage and displacing many residents of this area. In response to this disaster, Solidarity Engineering, along with Global Response Management, deployed an emergency response team to assess the medical and WaSH (Water, Sanitation, Hygiene) needs of Sesajal and Chibut, two indigenous communities affected by the disaster. Solidarity Engineering returned to Alta Verapaz in March of 2021 with a team made entirely of engineers to focus on the basic WaSH needs of these communities. Through donations from organizations including LifeStraw, Dr. Bronners, Period.org, and The Footprint Project, this team installed water filters in 188 households and taught each family why and how to use them. The team also installed two community sized LifeStraw water filters at a local health clinic and a local schoolhouse. This presentation will discuss the geologic conditions present in this area that contributed to the vulnerability of these populations and the results of surveys of the local population regarding perceptions of flood risks prior to this disaster. Additionally, the presentation will discuss the measures that were put into place immediately following the disasters, and the longer-term resources that were provided to allow these communities to continue to recover from these extreme flood events

**Biography:** Erin Hughes founded Solidarity Engineering, a 501c engineering company, with her colleagues Christa Cook, and Chloe Rastatter after meeting at the US-Mexico border where they were working as volunteers to support the refugee camp at Matamoros, Mexico. Ms. Hughes serves as the organization's lead engineer. Prior to her current role, she spent 10 years working in both the private and public sectors in the areas of water treatment, stormwater management, and construction. Ms. Hughes earned her bachelor's and master's degrees in Environmental Engineering from Drexel University.

## **G3: Resiliency and Climate Adaptation Planning**

### **Integrating Hazard Mitigation and Climate Adaptation Planning in Frederick County, MD**

Scott Choquette, CFM, Dewberry, [schoquette@dewberry.com](mailto:schoquette@dewberry.com)

**Co-presenters:** Jack Markey, Director, Frederick County, MD Emergency Management Division, [jmarkey@FredericCountyMD.gov](mailto:jmarkey@FredericCountyMD.gov)

**Abstract:** Like many communities in the mid-Atlantic and northeast regions, Frederick County, MD has been experiencing increasing occurrences of extreme storms and, particularly, high intensity short duration rainfall events that are overwhelming drainage systems and stormwater infrastructure. To address these changing conditions and other climate adaptation needs, the County overhauled its hazard mitigation plan to develop the 2021 Frederick County Hazard Mitigation and Climate Adaptation Plan. The plan includes a high-level pluvial flood hazard model and associated exposure and vulnerability analysis, in addition to traditional fluvial analysis and loss estimation. The plan includes climate change projections for MD and the region, organizes along a climate change and natural hazards taxonomy and identifies climate change interactions addressed by each action. The plan is fully integrated with the recommended actions from the Frederick Climate Emergency Mobilization Work Group's Climate Response and Resilience Plan and The Livable Frederick Master Plan (2019), which has a focus on sustainability and resiliency. Social vulnerability is overlaid with hazard areas to create a visual for where the most vulnerable populations and increased hazard exposure intersect, providing a more complete picture of risk. Using the Livable Frederick Master Plan, future development, including proposed community facilities, proposed highway additions and community growth areas are overlaid with hazard areas to help identify areas of future risk due to increased exposure from planned development. Mitigation actions centered around policy and planning are included to address future development. This presentation will illustrate best practices for the integration of climate adaptation, social vulnerability and future development into a mitigation planning process and framework. It will also demonstrate a lower cost alternative to address pluvial flooding risks by building baseline modeling and analysis that can be expanded upon during subsequent plan updates.

**Biography:** Scott R. Choquette, CFM is a land use and regional planner by training. He is a Sr. Associate and Resilience Planning Lead in Dewberry's Resilience Solutions Group, managing its hazard mitigation planning practice. Prior to joining Dewberry in 2002, Scott was Connecticut's State Floodplain Manager and Deputy State Hazard Mitigation Officer. As a former board member and officer of ASFPM, he was involved by FEMA invitation in development of regulatory language for 44 CFR 201. Under various contracts Dewberry has held with FEMA, Scott was involved in hazard mitigation guidance and review tool development and co-managed the Contract Assistance for Mitigation Plan Reviews (CAMPR) program for Regions II, III and VI. Scott has served as project manager or quality manager for more than 25 hazard mitigation plan or updates for states, counties, regional planning organizations, tribes and colleges and universities throughout the nation. In addition to hazard mitigation planning, Mr. Choquette works in the areas of CRS support, community resilience planning and program management, climate adaptation, grants procurement and management and building centric resilience programs. He is a founding member and current board member of the Connecticut Association of Flood Management.

### **Exploring a Community's Quest for Resilience: Struggling with Past Plans**

Bob Freitag, CFM, Institute for Hazard Mitigation Planning and Research, University of Washington, [bfreitag@uw.edu](mailto:bfreitag@uw.edu)

**Co-presenters:** None

**Abstract:** This presentation will provide a narrative policy analysis showing how applying different resilience definitions can result in different resolutions. The author uses a fictional account to explore how, in the search for resilience, a community devises a new trajectory while recovering from storm damage. The story is based on a collage of actual experiences but does not refer to any particular person or community. The account applies three different resilience metaphors and bodies of research to a

problem demonstrating which application hinders long-term recovery and which offers support. The material will be drawn from a published article of the same name.

<https://ascelibrary.org/doi/full/10.1061/%28ASCE%29NH.1527-6996.0000471?mi=3i1ciu>

**Biography:** Bob Freitag is Senior Instructor Part-time and Director of the Institute for Hazards Mitigation Planning and Research (IHMP). The University of Washington Institute for Hazards Mitigation Planning and Research is an interdisciplinary academic Institute housed in the Department of Urban Design and Planning within the College of Built Environments at the University of Washington.

<http://mitigate.be.uw.edu>) He is a past member of the Association of State Floodplain Managers' Board of Directors. (<http://www.floods.org/>), and received the Outstanding Part-time Teaching Award, College of Built Environments, UW, and the Louthain Award for Distinguished Service to ASFPM, in 2020. He has published many articles and written courses for FEMA and others concerning hazards mitigation and floodplain management, and was lead author of "Floodplain Management: a new approach for a new era" (Island Press 2009).

## **From Hazard Mitigation Planning to Resiliency Planning: A Logical Next Step in Rocky Mount, NC**

David Stroud, CFM, Wood, [david.stroud@woodplc.com](mailto:david.stroud@woodplc.com)

**Co-presenters:** None

**Abstract:** After multiple devastating flood events from the Tar River in Rocky Mount, NC, including Hurricane Floyd in September 1999, Hurricane Matthew in 2016, heavy rainfall in June of 2020 which led to the 3rd highest level of the Tar River on record and many other events, the Mayor and City staff decided to develop a resiliency plan by building upon the natural hazard vulnerability data and mitigation projects in the NEW (Nash, Edgecombe and Wilson Counties) Regional Hazard Mitigation Plan. Rocky Mount leadership realized that the hazard mitigation plan was only part of the solution to the flooding problems and the impacts from other natural hazards. City leaders indicated a strong desire to develop a resiliency plan to make sure that Rocky Mount could more easily recover from future events by implementing development policies and other resilient strategies which can lead to better outcomes than before. A crucial part of this planning effort was looking at the social vulnerability impacts which a hazard mitigation plan usually doesn't. Social vulnerability refers to a community's capacity to prepare for and respond to the stress of hazard events. The Center for Disease Control and Prevention (CDC) has developed a social vulnerability index (SVI) as a way to measure the resilience of communities when confronted by external stresses such as natural disasters. This brings vulnerability data down to the census tract level and some information to the block group level. The methodology for the resiliency plan for Rocky Mount was built around these principles: 1. Identify threats 2.

Identify assets 3. Evaluate vulnerability Once the threat/asset pairs were established (a threat/asset pair could be property and flooding or people and flooding), a sensitivity analysis (the degree or extent to which an asset is impacted by a threat) and adaptive capacity analysis (the extent to which an asset can cope with a threat or the ability to handle or adjust to a given threat event) were developed which resulted in a risk rating matrix for each threat/asset pair based on probability and magnitude, or an overall vulnerability (Vulnerability is the propensity or susceptibility of assets to be adversely affected by threats or hazards). From this vulnerability assessment and through a process of public engagement, resilient strategies were developed for Rocky Mount to implement to become more resilient. This presentation will:

- Show the linkage between hazard mitigation planning and

resiliency planning and where they differ • Identify the reason Rocky Mount chose to develop a resiliency plan • Describe the resiliency planning process and how public engagement was vital • Present the vulnerability assessment and highlight how it is different than a hazard mitigation plan vulnerability assessment • Discuss the various resilient strategies that Rocky Mount intends on implementing

**Biography:** Mr. Stroud is the Emergency & Hazard Mitigation Lead for Wood Environment and Infrastructure Solutions in Durham, NC. He has 30 years' experience in hazard mitigation planning, the National Flood Insurance Program (NFIP), and Community Rating System (CRS). Previously, David worked 18 years as the Flood Training Coordinator and lead hazard mitigation planner for FEMA's Community Rating System (CRS) Program. For 16 years, David was an instructor for E-278, the CRS Course at the Emergency Management Institute (EMI) in Emmitsburg, MD. For the past 12 years David has been contracting back to the CRS Program performing mitigation plan reviews and other CRS program assistance. David has a bachelor's and master's degree in Urban and Regional Planning from Ball State University in Muncie, IN.

## **G4: New Approaches to Hydrologic Data and Analysis**

### **Don't Judge a Flood by Its Peak: Hydrologic Considerations for 2D Hydraulics**

Ana Simões, Ph.D., PH, CFM, STARR II / ATKINS, [ana.simoes@atkinsglobal.com](mailto:ana.simoes@atkinsglobal.com)

**Co-presenters:** Pallavi Pathak, PE, CFM, Project Manager, [pallavi.pathak@atkinsglobal.com](mailto:pallavi.pathak@atkinsglobal.com)

**Abstract:** As the application of two-dimensional (2-D) hydraulic models becomes increasingly common, the need for developing flow hydrographs as model input has increased as well, which has been the case for recent FEMA flood studies. These flood studies are typically conducted in a way where the "hydrology" phase – when flow quantities, usually peak flows, are estimated – is completed or is near completion, while the "hydraulics" phase is still under development. As a result, the development of synthetic flow hydrographs to support 2 D hydraulic modeling becomes constrained by already estimated peak flows. The same happens when FEMA base level engineering (BLE) studies become the basis for more detailed analyses. In such cases, hydrology results are typically leveraged, and peak flows are rarely revised. FEMA provides extensive guidance on which methodologies should be used for estimating peak flows. When it comes to the development of flow hydrographs, the same level of guidance is not yet available, allowing different approaches to be equally acceptable despite potentially providing substantially different results. This problem is usually compounded by insufficient data for calibration or verification of hydraulic analysis results. Currently unmapped, the Colville Indian Reservation, WA, is nearing release of its first preliminary FEMA floodplain maps. A Mass Zone A study, completed in 2019, covered areas of concern by the Confederated Tribes of the Colville Reservation. Most hydrologic analyses conducted then were leveraged to support the next phase of the study, including limited detailed hydraulic analyses and 2 D modeling. This presentation will provide a brief overview of peak flow estimation methods used in FEMA flood studies and will discuss applicable approaches for developing flow hydrographs, as well as associated challenges. Then, it will show examples from the Colville project, highlighting issues and assumptions in the development of flow hydrographs and the hydraulic analysis results obtained.

**Biography:** Ana Paula Simões has been with the STARR II / FEMA Region 10 Service Center for over 10 years, where she works as senior hydrologist. She is responsible for providing technical support to FEMA Region X staff and mapping partners. Her work includes conducting and reviewing hydrologic analyses to support new and revised Flood Insurance Studies in FEMA Region 10.

### **Can HEC-RAS Be a ‘One Stop Shop’?**

Vahid Zahraeifard, PE, CFM, Atkins- Member of SNC-Lavalin, Vahid.Zahraeifard@atkinsglobal.com

**Co-presenters:** Valdete Celaj; Valdete.Celaj@atkinsglobal.com

**Abstract:** Traditionally, HEC-HMS software is widely accepted and used for hydrological studies, whereas HEC-RAS is utilized to compute hydraulic analysis. Since, HEC-RAS now has hydrological computations capabilities with rain-on-grid application, this presentation will compare hydrological results between HEC-RAS and a corresponding HEC-HMS model. A gaged stream in Monroe County, PA will be used to set up these models. Results will be compared for both calculated and calibrated-to-gage parameters and further investigated if rain-on-grid HEC-RAS application yields comparable results to those from HEC-HMS model for small to moderate size subbasins. If results are promising and show that HEC-RAS can be used to conduct hydrological studies along with hydraulic ones, then HEC-RAS can be used as a “One Stop Shop” software. This will ensure that all data and results are within one software insuring a more efficient process; eliminating the need to transfer data between models; remove broken links or separated models.

**Biography:** Vahid Zahraeifard has about 10+ years of experience (academic and industry) in the field of water resource. He has been with Atkins since 2017 during which he has been involved in FEMA studies in different regions across the county. He has PhD, MSc, and Bsc degrees all in Civil Engineering. He is a CFM and PE.

### **1-percent-plus Discharge for Flood Resiliency and its Relationship with 1-percent Discharge**

Kaveh Zomorodi, PhD, PE, CFM, Dewberry, kzomorodi@dewberry.com

**Co-presenters:** None

**Abstract:** Floods are intensifying due to climate change and urbanization in many areas. In response, we need to add to flood resiliency by using more conservative alternatives to the traditional values of design discharges such as the 1% discharge (Q1%). Federal Emergency Management Agency (FEMA) uses the “1-percent-plus” discharge (Q1%+) to account for uncertainties in discharge calculations. The Q1%+ represents the 84% upper confidence limit of Q1% and may be viewed as a reasonable conservative value for it. However, the relationship between Q1%+ and Q1% is generally unknown, making it hard to judge if Q1%+ would be a good choice for the intensified value of Q1%. This study looked for trends in Q1%+ evaluated by frequency analysis using Bulletin 17-C. The goal was to offer a simple way of estimating the Q1%+ as a function of the current Q1%. Starting with many USGS gauges and applying a multi-step filtering process, 41 reliable peak discharge data sets were selected from USGS stations located in 25 different states. Each station has a minimum recent record length of 35 years and a drainage area smaller than 20 square miles. Dependable skew coefficient and its mean square error are available for each station making a formal frequency analysis of the peak discharges possible. The results showed a strong linear regression fit to data indicating that Q1%+ can be approximated by adding 26% to the value of Q1%. Better fit to data was obtained by residual analysis resulting in a two-parameter equation that predicts Q1%+ using both Q1% and Q0.2% (500-year) values. The frequency

analysis results also indicated that Q0.5% (200-year) and Q0.2% are generally 17% and 42.5% higher than Q1% (100-year), respectively. A sample calculation suggested that Q1%+ could be a reasonable indicator of future Q1% intensified by climate change.

**Biography:** Dr. Kaveh Zomorodi is a Principal Engineer and a Senior Hydrologist at the Dewberry Companies. He received a Ph.D. in Civil and Environmental Engineering (Hydrology and Water Resources) from Utah State University in 1988. He has over 33 years of work experience in academic and consulting engineering work dealing with surface water, groundwater and water resources planning and management. Dr. Zomorodi has published or presented over 60 technical papers in various journals and conference proceedings and numerous R&D and project reports. His work has led to the development of new simplified approaches to several flood hazard analysis problems including frequency analysis of flood damage data and evaluation of average annual number of floods for evaluation of cost-effectiveness of flood mitigation projects. Dr. Zomorodi is the primary author of the computational procedures of the 2014 Federal Transit Administration HMCE tool and its Coastal Flooding Recurrence Interval Estimator which is used to assess cost-effectiveness of resiliency projects in areas impacted by super-storm Sandy. Recently, he has developed the equivalent risk method for integrating the impact of sea level rise in design coastal flood elevations. Other technology developments by Dr. Zomorodi include new methodology and equations for estimating design peak discharges impacted by climate change, post-fire peak flow rates, groundwater mounding, modified sheet flow travel time and prediction of levee breach geometry and probabilistic flood analysis.

## **G5: Advancing Flood Risk Communication & Outreach Platforms**

### **Is this Heaven? No, it's the Iowa Digital Platform**

Marc Pearson, GISP, CFM, Stantec, marc.pearson@stantec.com

**Co-presenters:** Katherine Osbourne, Stantec, katherine.osborne@stantec.com

**Abstract:** As Iowa approaches the next phase of our statewide floodplain management program, it was quickly realized that a new approach was needed to better manage, store, and provide access to our rapidly expanding library of digital flood data. The goal of this presentation is to introduce the new Iowa Digital Platform. This solution ties cloud-based computing to machine learning to accomplish: - Increased speed and efficiency of engineering through cloud computing; - optimized decision making through machine learning; and - more data accessibility through advanced APIs, dashboards, and web services. While in its infancy, the Iowa Digital Platform is live and we will demonstrate and discuss how we can generate engineering models more than 7 times faster than traditional approaches, achieve data-driven science in minutes, and rapidly deploy secure visualization services to engage and protect our citizens.

**Biography:** Marc Pearson is a Senior Principal for Stantec, working in Nashville, TN. He has nearly 18 years of experience in FEMA programs and flood risk studies, with expertise in project management, community outreach, and NFIP training. He has also been active on the national Guidelines and Standards (G&S) Team since 2013 and the CTP Steering Commitment since 2014. Marc also serves as one of Stantec's CTP Program Leads having served as the Program Manager for the Iowa Department of



Natural Resources since 2012. Marc earned a B.A. from Colgate University and an M.S. from the University of Memphis.

### **Flood Risk Under the Big Sky**

Katie Shank, CFM, Montana Department of Natural Resources and Conservation,  
Katherine.Shank@mt.gov

**Co-presenters:** Peri Turk; Peri.Turk@mt.gov

**Abstract:** Montana's CTP program strives to provide products that a community can fully understand and ultimately take ownership of. Through their unique process of early community engagement, joint reviews with FEMA's PTS, and taking advantage of local knowledge, Montana's CTP program staff play a pivotal role in floodplain map updates, allowing errors to be corrected early and products to be tailored to a community's needs. The end goal of Montana's CTP program is to create high quality map products and tools that communities can understand and take ownership of. This presentation will dive into ways that Montana has sculpted their CTP program with the end user, the communities, in mind. Through community engagement, joint reviews, and use of local knowledge, the Montana CTP creates floodplain products that a community can utilize and take control of.

**Biography:** Katie obtained a BS in Geography (GIS) and Environmental Sciences from University of Wisconsin-Whitewater. She then went on to get an MS in Geography from The University of Montana in 2017. She has been working for the Montana DNRC Water Operations Bureau since February 2019, receiving her CFM in December of 2020. She spends her free time traveling the world, making maps, and exploring Montana with her two cattle dog.

### **What's Next: Management of the Modeling, Assessment, and Awareness Project (MAAPnext)**

Todd Ward, PE, CFM, Harris County Flood Control District, Todd.Ward@hcfcd.hctx.net

**Co-presenters:** None

**Abstract:** Led by Harris County Flood Control District and in support from FEMA, the Modeling, Assessment, and Awareness Project (MAAPnext) will provide a comprehensive set of flood risk tools, maps, communications products, and online applications to empower a diverse set of user bases and needs in Harris County Texas. A balance was struck to develop one of the most comprehensive and powerful set of regional flood risk models and maps of its kind while taking into consideration the needs of future floodplain management, model management, and public outreach needs. The result is a significant increase in the mapped flood risk presented to the public that ultimately will be important to how future development occurs and is regulated, how flood risk is communicated, and how mitigation strategies will be developed. This presentation will provide an overview of some of the key changes coming to Harris County flood risk maps and communication tools while discussing the management strategies and lessons learned that were successfully employed to foster collaboration between the engineers behind these flood risk products and the various future users of them.

**Biography:** Todd Ward, PE, CFM (HCFCD) - Todd Ward is the Risk Mitigation Department Manager at Harris County Flood Control District and has more than 12 years of experience in H&H modeling, GIS analysis, and FEMA Cooperating Technical Partners projects involving updates to, management of, and communication of flood risk information.

## **G6: Mapping for Risk Communication**

### **Storm Tide Pathways on Cape Cod: Mapping, Use, and Outreach**

Shannon Hulst, CFM, Barnstable County Cape Cod Cooperative Extension / Woods Hole Sea Grant,  
shannon.hulst@barnstablecounty.org

**Co-presenters:** Mark Borrelli, Provincetown Center for Coastal Studies and Steve Mague, Provincetown Center for Coastal Studies

**Abstract:** Barnstable County, MA and the Provincetown Center for Coastal Studies completed the first phase a of a new type of storm surge flood mapping: Storm Tide Pathways. This mapping (not modeling) allows the user to follow the track of flood waters through a community in 6-inch, ground-truthed increments. The mapped result is two-fold: the user can see when there are distinct pathways that floodwaters will follow, and can see total area inundated with each 6-inch increase in storm surge (or sea level rise). The mapping extends four vertical feet beyond the storm of record to account for sea level rise and larger storms. Unlike the Flood Insurance Rate Maps from FEMA which depict static projected flooding from the 1% and 0.2% annual chance storms, this type of mapping allows the user to demonstrate storm surge flooding decoupled from probabilistic storms. Instead, flood extents are tied in directly to local tide gauges and the National Weather Service's storm surge predictions and can be viewed in increments rather than a static overlay. This allows for a better understanding of where a community should anticipate flooding in storms that happen more frequently than the 1% annual chance storm. An intensive outreach campaign accompanied the mapping efforts, seeking feedback from community officials as the maps were developed and providing a training on the final product (stormtides.org). The mapping was well-received by town officials, including planners, public works departments, police and fire, engineering, GIS, and administration. Several towns as well as the National Weather Service intend to incorporate the data into their maps, and to use it to determine when certain roads need to be closed, what public works projects should be pursued, or when evacuation orders should be issued to specific neighborhoods based on storm surge projections.

**Biography:** Shannon Hulst, CFM is Deputy Director of Cape Cod Cooperative Extension as well as Floodplain Specialist and Community Rating System (CRS) Coordinator for Barnstable County, MA through Cape Cod Cooperative Extension and Woods Hole Sea Grant. She is a Certified Floodplain Manager® with a Master's degree in Marine Affairs from the University of Rhode Island, and serves on the board of the Massachusetts Association for Floodplain Management. Shannon assists communities, businesses, and residents with Community Rating System (CRS) and flood-related technical assistance with an overall goal of improving flood resiliency. Barnstable County's regional CRS program has been recognized nationally, earning the Association of State Floodplain Managers' 2017 James Lee Witt Local Award for Excellence in Floodplain Management and serving as the inspiration for a bill from Congressman Keating in the pending National Flood Insurance Program reauthorization. Shannon is also the recipient of the 2019 CRS Award for Excellence.

### **Understanding User Needs for Coastal Flooding to Improve Resilience: NOAA's Evolving Water Information**

Cayla Dean, NOAA, cayla.dean@noaa.gov

**Co-presenters:** None

**Abstract:** The frequency of coastal flooding has risen substantially over the last few decades, placing coastal communities, ecosystems and economics at increased risk. The need to build coastal resilience to increasing combined hazards of storm surge, high tide flooding and sea level rise is a growing concern for our coastal regions. To address this challenge, the National Oceanic and Atmospheric Administration (NOAA) with partners is striving to improve stakeholders' understanding of coastal total water level information and develop products and services tailored to meet society's evolving needs. This will be achieved through improved coordination, collaboration and continuous user engagement across a variety of stakeholders. Through a series of virtual workshops targeting different sectors, NOAA's Center for Operational Oceanographic Products and Services and the Office for Coastal Management are collecting user needs related to coastal products and services at climate timescales (subseasonal to decades) to better address current challenges and fill gaps. The ultimate goal of this effort is to better understand stakeholder data and information needed to evolve capabilities into seamless coastal water information services to inform sound decision-making and build coastal resilience. This presentation will share a brief overview of recently updated coastal products from NOAA, preliminary workshop findings and an update on upcoming coastal activities.

**Biography:** Dr. Cayla Dean is an Outreach Specialist with Ocean Associates, Inc. on contract with NOAA's National Ocean Service, Center for Operational Oceanographic Products and Services (CO-OPS). She is the collaborative lead for the Coastal Coupling Community of Practice. As such, Cayla works closely with subject matter experts at CO-OPS, the Office for Coastal Management, the National Weather Service, USGS, US Army Corp of Engineers, academics, and others working toward the integration of coastal hydrodynamic models with inland hydrologic models with the goal of advancing NOAA's water prediction tools and decision-support services. She also works closely with NOAA's Office for Coastal Management on projects funded under the NOAA Water Initiative to conduct needs assessments of NOAA data, products, and services.

Cayla holds an M.S. in Marine Biology and a Ph.D. in Physical Oceanography from Nova Southeastern University. Her research focused on computational fluid dynamics modeling, biologically-generated turbulence, and dynamics of small-scale processes in the near-surface layer of the ocean. Her Ph.D. research primarily focused on the electromagnetic signatures of these small-scale oceanographic processes, including surface and internal waves.

### **Telling the Story of Local Flood Risk to Improve Resilience**

Kathleen Fallon, New York Sea Grant, kmf228@cornell.edu

**Co-presenters:** Jessica Kuonen; jak546@cornell.edu

**Abstract:** New York's coastal regions are experiencing rising sea levels, more frequent and intense storm events, and heavy downpours, which can result in compounding flooding issues and other shoreline hazards such as erosion. A lack of general knowledge about natural shoreline and watershed processes can lead to decisions that exacerbate these risks. Even when significant effort is dedicated to education and technical assistance for communities, the benefits may be lost over time due to turnover of elected officials, municipal staff, and the influx of new residents. Through a Cooperating Technical Partnership between FEMA Region 2 and New York Sea Grant (NYSG), Specialists serving Long Island and the Hudson Valley conducted a needs assessment with shoreline decision-makers (e.g. residents, municipal officials, contractors, and business owners, etc.) to better understand their experience with the risks and hazards of living on or working along the shoreline. Key findings included the need for an understanding of

shoreline management options, more clarity around NY's complex permitting process, and the importance of highlighting the link between disaster resilience and water quality. These results were then incorporated through storytelling in order to ensure local relevancy of the end products. A novel approach to branding and advertising an online resource was developed to improve the accessibility and uptake of the resources. We conclude that ArcGIS Story Map Collections can be an effective tool for watershed-scale risk communication by weaving together flood and erosion hazards, stories from the community, and other local resources in an engaging way. This presentation will describe the process to create the separate Story Map Collections for two different regions in New York State that weave together the complex story of flood risk under a changing climate alongside options for mitigative actions and other useful resources and tools.

**Biography:** Dr. Kathleen Fallon is the Coastal Processes and Hazards Specialist with New York Sea Grant. She graduated with a BS in Marine Sciences from Stony Brook University and conducted her graduate research on coastal storm impacts at Florida International University. Currently in her position she provides technical information and outreach about coastal issues such as flooding and erosion to various stakeholders including researchers, municipal officials, and residents.

## **G7: Planning for Dam and Levee Risk Management**

### **CTA- Collaborative Approach to Understanding and Planning for Dam Risk on a Watershed Level**

Edward Beadenkopf, PE, CFM, Atkins, [edward.beadenkopf@atkinsglobal.com](mailto:edward.beadenkopf@atkinsglobal.com)

**Co-presenters:** Preston Wilson, [preston.wilson@fema.dhs.gov](mailto:preston.wilson@fema.dhs.gov) and John Wolfhope, [jsw@freese.com](mailto:jsw@freese.com)

**Abstract:** The Federal Emergency Management Agency's (FEMA) National Dam Safety Program collaborates with FEMA's National Integration Center to deliver the Dam Safety Collaborative Technical Assistance (CTA) program. The CTA assists communities in building their "toolbox" to effectively coordinate planning efforts for dam risks. The CTA program helps communities at risk for flooding due to operational discharge or dam-related infrastructure failure to gain a better understanding of the consequences of dam-related emergencies and to develop risk-informed plans. The CTA engages participants in a facilitated process to build relationships, develop plans, and collaborate with community partners to achieve the goal of increased preparedness to dam-related hazards. As opposed to an individualized dam focus, communities work together to consider the risks associated with the entire watershed from the headwaters to the floodplains. Communities look at dam risks and its associated data in the upper watershed and plan for the impacts of the risks in the lower watershed. This presentation will also highlight the CTA in the Rio De Le Plata Watershed to enhance understanding of risk in Puerto Rico. Four dams in services provide irrigation, power generation, and water supply. The lower watershed dam, La Plata, is used for water supply, is gated and is upstream of a significant populated area. As part of the CTA a watershed approach to dam safety was evaluated to understand the impacts of potential cascading dam failures and to evaluate the operations rules for the gated lower dam. The foundation of understanding the watershed risks builds the fundamentals of risk and crisis communication strategies for dam emergencies. This effort also led to the completion of benchmark activities by key stakeholders in Puerto Rico, such as forming planning teams; conducting community

analysis; compiling dependency information; identifying operational priorities; goals, and objectives; and developing or refining current plans.

**Biography:** Edward Beadenkopf has over 46 years of experience specializing in flood hazard identification and infrastructure risk assessments. This experience includes the planning and design of structural flood control measures and planning to support non-structural mitigation actions. For the past decade, Mr. Beadenkopf served as a Subject Matter Expert to Federal Emergency Management Agency (FEMA) Headquarters to support FEMA efforts to manage the National Dam Safety Program. Ed was the principal author of FEMA P-946 Guidelines for Standard Approaches to Inundation Mapping of Flood Risk Associated with Dam Incidents and Failures, assisted FEMA implement the High Hazard Potential Dam Rehabilitation Grant Program, and supports the Collaborative Technical Assistance Program risk assessment for dams.

### **Flood Risk and Environmental Benefits from Setting Levees Back from the River**

Randall Behm, PE, CFM, Behm Hazard Mitigation, LLC., [floodfighter@q.com](mailto:floodfighter@q.com)

**Co-presenters:** Mr. Dan Fricke, PE, CFM, LEED AP; [dfricke@jeo.com](mailto:dfricke@jeo.com)

**Abstract:** If repeating the same actions and hoping for a different outcome is the definition of insanity, then this country's traditional course of action for managing flood risk through levees located next to major rivers could be described as just that. The presenters (Mr. Randall Behm and Mr. Dan Fricke) will provide background and examples of mitigation activities associated with failed levees requiring reconstruction/rehabilitation. While the understood purpose of these levees is often to protect all development, infrastructure and land uses behind them (seemingly at any cost), purposeful levee mitigation can lead to increased natural and beneficial functions of the floodplain while increasing the resiliency to future flooding and dampening the effects of climate change impacts. If other civil works sectors such as transportation have increased their number of tools to serve the public and increase safety, then managing our water resources and adapting to flood risks should be no different. As the impact of climate change continues to escalate the amount of annual dollar damages associated with natural climatic events, the response to and the mitigation of these events is becoming more critical to the management of flood risk across the country. This presentation will provide recommendations for mitigation actions and strategies leading to increased resiliency of levees to future flooding while supporting the environment through the natural and beneficial functions of the floodplain. This presentation will provide the audience with information regarding the flood risk benefits and environmental benefits associated with setting problematic levees further back from their location next to a river. The presenters encourage consideration of, and planning for (e.g., Hazard Mitigation Plans), relocating levees which have been significantly damaged by flooding, rather than perpetuating the myth of repeating the same actions while counting on different outcomes.

**Biography:** Mr. Behm has 37 years combined experience as a hydraulic engineer focusing on flood risk reduction and increased resiliency through the US Army Corps of Engineers and Behm Hazard Mitigation, LLC. For the past twenty years Mr. Behm has sought to reduce flood damages and increase resiliency to flooding through implementation of nonstructural techniques, including modification to existing levee systems which continue to fail and be reconstructed, which is counterintuitive to recent significant flooding events, which may be attributable to climate change. Mr. Behm was involved in a project to set a damaged federal levee back from the river after the 2011 Missouri River flood event and has most recently assisted in the development of a white paper for the Theodore Roosevelt

Conservation Partnership on the flood risk reduction and environmental benefits of setting some levees back from the river and with The Nature Conservancy on documenting their involvement and partnership in setting another Missouri River levee back from the river after the 2019 flood event.

### **Preparing for Failure: How Levee Emergency Preparedness Plans Reduce Risk**

Rebecca Appleford, CFM, JEO Consulting Group, [rappleford@jeo.com](mailto:rappleford@jeo.com)

**Co-presenters:** Brooke Seachord, [bseachord@jeo.com](mailto:bseachord@jeo.com)

**Abstract:** Prior to March 2019, many Nebraskans coexisted with levee systems that provided significant flood risk reduction to their neighborhoods, businesses, and communities. The majority of levees across the state were built more than 50 years ago, becoming part of the community's identity or an unremarkable feature of the city landscape. Some of these levees had been tested by significant floods during their lifespan, but many systems had never been fully utilized. Since the floods of March 2019 where dozens of levees broke or overtopped, communities along the Platte and Missouri Rivers are asking what could have been done to be more prepared. However, eight communities across the region were better prepared during this event by having a Levee Emergency Preparedness Plan (EPP) to activate, which allowed responders to act ahead of the floods. EPPs are designed to provide holistic community planning specific to each levee system. Through an innovative planning process, critical stakeholders attend a planning workshop to allow for planners to capture and understand the nuances of the community's response structure. At the end of the planning process a tabletop exercise is held to test the developed plan with plan partners and stakeholders. This exercise is designed to reduce plan inaccuracies and eliminate assumptions by engaging those who would be vital during emergency response. By the end, communities have a plan that includes: risk reduction strategies, emergency preparedness measures, documentation for emergency response activities, and considerations relative to long-term recovery should failure occur. The document merges engineering language utilized by levee sponsors with the language employed in the field of emergency management. This presentation will breakdown the components of a current emergency preparedness plan as well as educate levee engineers and stakeholders about the value of EPPs and levee failure exercises in order to plan for the unthinkable.

**Biography:** Becky serves as senior planner and team leader for JEO's award winning Hazard Mitigation and Emergency Planning Team. In 2015, Becky and her team developed the first Levee System Emergency Preparedness Plan (EPP) in Nebraska. Since that time, Becky has assisted nine more communities across Nebraska and Iowa on their resiliency efforts through the development of an EPP. In addition to their work on EPPs, Becky and her team have updated 22 of the 24 hazard mitigation plans across Nebraska and have completed several more mitigation plans in Colorado, Iowa, and South Dakota. Becky's breadth of experience also includes facilitation of dam and levee failure exercises, evacuation planning, risk awareness communication plans, and continuity of operations plans. Becky has a bachelor's degree in Meteorology and Climatology from the University of Nebraska – Lincoln and a master's degree in Atmospheric Science with a Graduate Certificate in Geographic Information Science from the University of North Dakota.

## **G8: Understanding and Planning for Climate Change**

## **A Path to Flood Resilience in a Changing and Uncertain Climate**

Christine Gralher, PE, CFM, Stantec, Christine.Gralher@Stantec.com

**Co-presenters:** None

**Abstract:** Many of us are under the impression that extreme events are becoming more extreme, more intense, and more frequent and that this is driven by climate change. Events recently observed, and covered extensively in the media, worldwide, reinforce the perception of a growing imbalance of temperature and precipitation distribution and storminess. While some areas suffer from flooding, others struggle with drought and wildfires or wind and hail events, seemingly more often and more intensely. In 2020 alone New South Wales, Australia, experienced its worst fire season in history with 13.6 million acres burned, the US experienced a record-breaking hurricane season, and in 2021 several European countries were affected by catastrophic floods causing deaths and widespread damage. Some researchers have linked the global increase of frequency and intensity of weather events to earth's warmer climate and many media outlets have highlighted the connection. But earth's climatic system is complex and there are many factors that contribute to extreme weather events, so is the connection so clear and so direct? Climate Change and extreme weather events are hot topics and they are continued to be studied. Nearly 40% of the US population alone lives on or near the coast. Hence, it is important to understand these natural destructive forces and what is causing them so that we can mitigate risk and plan for a more resilient future. This synoptic literature research will review existing data and publications on extreme weather events in the US, with a particular focus on coastal flooding, to gain a better understanding of the relationship between the recently observed weather anomalies and climate change.

**Biography:** Christine Gralher is a Coastal Engineer with a master's degree in Civil Engineering from the University of Delaware where she graduated in 2012. She joined Stantec in 2018. Her background is in riverine/ coastal dynamics and her experience includes the numerical modeling of coastal processes to assess sediment transport, surge, wave, and hydrodynamic behavior in coastal environments. Besides her contribution to design projects in coastal environments, Christine has been extensively involved in coastal studies for several FEMA Regions (Region I, II, III, IV, V, VI, and IX) over the past 9 years.

## **Climate Driven Changes in Frequency and Intensification of Extreme Weather Events, Perception or Reality? – A Synoptic Literature Review**

Siamak Esfandiary, PhD, PE, Dewberry, sesfandiary@dewberry.com

**Co-presenters:** Daniel Wilusz, dwilusz@Dewberry.com

**Abstract:** Floodplain managers rely heavily on hydrologic data and analysis as well as floodplain maps that are typically developed by Federal Agencies such as FEMA, USGS, NOAA and USACE. For example, communities participating in the National Flood Insurance Program (NFIP) use FEMA's Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRM) to oversee the administration and enforcement of all local floodplain regulations. Currently, the vast majority of flood information and floodplain maps used by floodplain managers, are developed using historical data. This is based on the assumption that the hydrological cycle is stationary, which means it has no significant trend and it has a constant variance over time. In other words hydrologic data and its statistics, such as its mean, does not depend on the time it was observed. Climate scientists have demonstrated that climate change could introduce nonstationarity into the hydrologic processes such as timing and distribution of precipitation, snowpack, and snowmelt, sea level and temperature rise. Failure to account for such nonstationary risks could

compromise the effect of floodplain management actions and mitigation investments in communities. Collaborative efforts and a common understanding of terms and definitions between climate scientists, engineers, planners, and floodplain managers are essential to harmonize climate change inputs and mitigation strategies. Climate scientists are constantly developing and improving online tools for climate-smart floodplain management, such as the USGS National Climate Change Viewer and the FWHA CMIP Climate Data Processing Tool. This presentation will provide an overview of the series of climate change reports published by the Intergovernmental Panel on Climate Change, go over some basic terms, and demonstrate where relevant climate data can be obtained and how floodplain managers and planners can use it, when reviewing development plans and permit applications and evaluating local ordinance such as building codes and zoning.

**Biography:** Siamak is a licensed professional engineer and has a Ph.D. in civil engineering from the City University of New York. He has more than 20 years of experience in flood risk management and water resources engineering, modeling, and design. He worked in FEMA's risk management directorate for 11 years, and returned to private sector in 2019. Siamak has a deep understanding of the NFIP and has contributed significantly to developing mapping policies, guidelines and standards. Siamak completed a 6-month detail assignment with US Army Corps of Engineers HQ working under the direct supervision of USACE's Special Assistant for Dam and Levee Safety. He served as the Chair of the Subcommittee on Hydrology 2017-2019, and advised FEMA's National Dam Safety Program Manager. Siamak is currently the engineering director of the resilience solutions group at Dewberry HQ in Fairfax, where he manages multiple teams with expertise in coastal and water resources engineering, geospatial engineering and applied analytics, computational science and informatics, and resilience planning.

### **The State of Climate Knowledge: An Overview and Update for Floodplain Managers**

Paul Robinson, Jacobs, [Paul.Robinson@jacobs.com](mailto:Paul.Robinson@jacobs.com)

**Co-presenters:** Elise Ibendahl, PE, PMP, F.ASCE, CFM, [elise.ibendahl@jacobs.com](mailto:elise.ibendahl@jacobs.com)

**Abstract:** Many recent and newsworthy flood events have raised public question and concern about increased frequency and magnitude of flooding associated with climate change, including flooding in the northeast associated with Hurricane Ida and with nearly double the 1000-year precipitation in McEwan, Tennessee. Climate change is frequently in the news, and everyone now has a definition of resilience. But what is the science telling us, and how do we practically prepare our communities and infrastructure for uncertain future flooding threats? Current flood management and planning principles often do not address risk that changes over time, leaving society exposed to more risk than anticipated. Existing social inequities can further compound this problem. The last National Climate Assessment (published in 2018) discussed the evolution of risks over time and how risks interweave and compound each other. Recent discussion and publications by the international community, including IPCC AR6 and COP26, highlight the importance of planning now for flooding in a future climate. Infrastructure asset management planning is intended to manage system risks, but often does not really consider how the external threats may change over time, or if we can truly bracket those risks within a range of possible scenarios to understand their impact. By combining methods, tools and datasets that are often frequently already available, it is possible to identify how compounding threats may affect communities and infrastructure, how the consequences of those threats change over time, and how to mitigate those risks. This presentation will explain how floodplain managers already have many of the resources needed to prudently plan for robust and resilient systems, even in the context of a changing and



uncertain future climate. The methods described contribute to addressing concerns raised by the public, media, regulators, insurers and investors.

**Biography:** Paul Robinson is a Senior Water Resources Leader and Jacobs' Community of Practice Lead for Flood Modeling and Planning, based in Houston, Texas. Having earned his Master's in Civil and Environmental Engineering from the University of Sheffield in England, he has since gained 23 years of experience helping clients grapple with flood risk, climate resilience, and water resource issues. He has successfully led large multi-disciplinary teams delivering projects, including coordinating the client-consultant technical team's delivery for the multi-award winning 2017 Central Valley Flood Protection Plan Update in California. Paul has helped deliver water resources and flood planning projects across the US, Caribbean, and Europe.

Paul is currently engaged on projects to reduce flood impacts in Texas, California and southeast Asia. In recent years, he has worked with both government and utility clients, facilitating workshops, to help them through the process of climate resiliency planning, demystifying the potential climate impacts and identifying practical strategies to enhance their resilience.

## **Session H: 2:00-3:30 pm**

### **H1: No Adverse Impact Legal Guide: A Resource for Floodplain Managers**

#### **No Adverse Impact How-To Guides and Legal Guide to Flood Risk Management**

Terri Turner, AICP, CFM, Planning & Development Dept., [tturner@augustaga.gov](mailto:tturner@augustaga.gov)

**Co-presenters:** Janet Thigpen, [jthigpen@chemungcountyny.gov](mailto:jthigpen@chemungcountyny.gov) and Jeff Stone, [jeff@floods.org](mailto:jeff@floods.org)

**Abstract:** Since 2013, ASFPM and the ASFPM Foundation have invested significantly in the development of No Adverse Impact (NAI) How-To Guides. Development of the Guides was encouraged by ASFPM members who read ASFPM's popular publication, the NAI Toolkit, which gave examples of NAI techniques, but didn't explain how to implement them. The Toolkit identified seven "building blocks" or areas of community involvement that can have an impact on successful NAI: 1) Hazard Identification and Floodplain Mapping; 2) Education and Outreach; 3) Planning; 4) Regulations and Development Standards; 5) Mitigation; 6) Infrastructure; and 7) Emergency Services. The entire How-To Guide series is available for download on ASFPM's Information Resource Center website. In 2020, the ASFPM Board of Directors approved funding for the Legal Guide to Flood Risk Management, which is essentially the 8th Guide for the series. The Legal Guide is being written for community attorneys and will include descriptive narrative for floodplain managers. This presentation will provide an overview of the NAI How-To Guide series and take a deeper dive into the How-To Guide for Planning. The session will then make the connection between the current How-To Guides and the need for the legal guide and show participants how to access all of the guides.

**Biography:** Ms. Turner has worked for City and County government for over 25 years. Terri serves as the No Adverse Impact (NAI) Committee Co-Chair for the Association of State Floodplain Managers (ASFPM). Terri spends countless hours writing for national publications and touring the nation speaking as a local

government expert on community planning initiatives such as green infrastructure, sound floodplain management, the need for hazard mitigation, and promoting community sustainability and resiliency.

### **Making the Case for a No Adverse Impact Approach to Floodplain Management**

Jerry Murphy, JD, AICP, CFM, Program for Resource Efficient Communities, University of Florida,  
jerry@murphyplanning.com

**Co-presenters:** Emma Campbell, ecampbell131@gmail.com and Jeff Stone, jeff@floods.org

**Abstract:** NAI is a principle that leads to a process that is beneficial, legally acceptable, palatable, and understandable to the community as a whole. Courts have broadly and consistently upheld performance-oriented floodplain regulations including those that exceed minimum FEMA NFIP standards. Regulations that require additional freeboard, establish setbacks, impose tighter floodway restrictions, or very tightly regulate high risk areas have consistently been upheld by the courts. This presentation will give participants an overview of the common law, constitutional law, and legal foundation of the NAI approach to floodplain management. It will also provide an introduction to the forthcoming Legal Guide to Flood Risk Management and its organization as a tool for floodplain stewards and their legal representatives.

**Biography:** Mr. Murphy is a certified floodplain manager, certified urban and regional planner, and legal scholar. His work and research involve land use planning and control law, community based planning, code and regulation drafting, floodplain management, growth and infrastructure finance, post disaster redevelopment planning, community resiliency/sustainability. He currently works with local governments through UF to assemble teams of expert faculty, researchers, and student assistants to craft planning approaches and strategies to climate change, extreme weather, sea level rise and the other challenges facing local governments in the 21st Century.

### **Constitutional Law and Property Protections in Floodplain Management**

Thomas Ruppert, Esquire, Florida Sea Grant, truppert@ufl.edu

**Co-presenters:** None

**Abstract:** Low elevation coastal zones characterized by permeable strata and unconfined aquifers are particularly prone to surface-subsurface water interactions and groundwater-induced flooding. In recent years, the duration and frequency of these events have increased due to climate change and sea level rise. Groundwater flooding is not well understood and has been understudied compared to other flood hazards as a result of code limitations and burdensome compatibility between physically-based surface hydrology models and groundwater models. Recent technological advancements in hydroinformatics and computational power are allowing flood modelers to simulate the compound effects of pluvial, fluvial, and coastal flood hazards by linking numerical models. Nevertheless, the groundwater component is often neglected in modeling frameworks. This presentation will present a loosely-coupled modeling framework that simulates surface-subsurface water interactions to advance flood vulnerability assessments in locations vulnerable to groundwater-induced flooding conditions. A hybrid probabilistic-deterministic approach is implemented to simulate the compound flooding potential of the most extreme combination of rainfall and tide levels with predefined water table thresholds for current and future climate change scenarios. Understanding the impact of the water table in flood simulations is of great importance to improve flood hazard mapping, damage estimation and reveal hidden risks that may not be accounted for when the subsurface component is overlooked.

## **Biography:**

## **H2: Mitigation Partnerships**

### **Leveraging Federal Funding and Partnerships to Support Community Resilience**

Kayed Lakhia, AIA, NCARB, LEED AP, CFM, Federal Emergency Management Agency,  
kayed.lakhia@fema.dhs.gov

**Co-presenters:** None

**Abstract:** Dams play a key role in the nation's infrastructure; they enhance economic growth and add to the social welfare of the American public. Dams provide a life-sustaining resource to people in all regions of the United States and serve several functions at once. Although the benefits of dams are many, they can also be negatively affected by natural hazards, man-made threats, limited resources, and aging infrastructure. In fact, the average age of dams listed in the US Army Corp of Engineer's National Inventory of Dams is 59 years old. There are over 91,000 dams in the United States, and they are used for numerous purposes such as flood protection, hydropower, water supply, irrigation, mining, and recreation, which provide huge benefits for communities. Upgrades and rehabilitation are necessary due to deterioration, changing technical standards, improved techniques, climate change, and changes in downstream populations or land use. The estimate to rehabilitate the nation's non-federal dams exceeds \$65 billion. To rehabilitate just those dams categorized as most critical, or high-hazard potential, would cost over \$20 billion, a cost that continues to rise with deferred maintenance. This situation demands greater attention and investment in measures that reduce risks to public safety and economic assets. Recently, President Biden signed the Infrastructure Investment and Jobs Act (IIJA) into law. This Act contains significant increases in funding for several dam safety programs and will undoubtedly improve the safety of many dams across the country and create stronger state and federal dam safety programs. The session will discuss the increased funding opportunities through IIJA via federal and public-private partnership, as well as FEMA's Rehabilitation of High Hazard Potential Dams Grant Program.

**Biography:** Kayed Lakhia is the Deputy Director of Hazard Mitigation Assistance at the Federal Emergency Management Agency. Prior to this appointment, Mr. Lakhia served as the Deputy Division Director for Risk Reduction. He has also held the position of Acting Deputy Assistant Administrator for FEMA's Recovery Division. Mr. Lakhia has over ten years' experience in emergency management at the federal level and in the private sector. Mr. Lakhia has significant experience in disaster operations including Grants Management, Floodplain Management, and Building Sciences. During Hurricane Sandy, Mr. Lakhia represented FEMA at the Rebuild by Design Competition led by HUD and advocated for resilient building and sustainable land-use practices. In the aftermath of Hurricanes Sandy and Maria, Mr. Lakhia has led the implementation of FEMA's largest mitigation portfolio. Prior to his Federal Service, Mr. Lakhia was a Principal at a global A/E/C firm. Mr. Lakhia studied at a joint program at Harvard University and the Massachusetts Institute of Technology. He holds a Master of Science degree from MIT. Mr. Lakhia is a Registered Architect in New York and Florida, is a Certified Floodplain Manager, and is a LEED Accredited Professional. He has completed post-graduate studies at Harvard's

National Preparedness Leadership Institute and University of Virginia's Darden School of Business. He is an OPM Certified member of the Senior Executive Service (SES).

### **Execution of Flood Mitigation Projects through Private-Public Partnerships**

Jeanne Hornsby, MS, PE, CFM, C.H.Fenstermaker & Associates, L.L.C., [jeanne@fenstermaker.com](mailto:jeanne@fenstermaker.com)

**Co-presenters:** Jan-Scott Richard, City of Scott, Louisiana Mayor, [jrichard@cityofscott.org](mailto:jrichard@cityofscott.org) and Jordan Daigle, Cottage Developers, L.L.C Owner, [jordan@cottagedevelopers.com](mailto:jordan@cottagedevelopers.com)

**Abstract:** As with many municipalities, the City of Scott Louisiana is challenged with the balance of economic growth, flood protection, and flood mitigation. They have looked toward innovative ways to achieve this balance, and one such way has been through Private-Public Partnerships. With approximately 85% of the City located in a flood hazard area and decades of little to no policy, the City of Scott is faced with many older developments that are havocked with frequent flooding. The City has worked to develop a Drainage Master Plan and utilize various funding sources to help implement mitigation projects; however, these funding sources have proven to be slow and sometime difficult to navigate. This all changed when the City was approached by Cottage Developers, LLC who was interested in developing 150 acres of mixed use development in the heart of Scott. However, excited about this opportunity, the City also voiced their concerns about the flooding of the older neighborhoods and how they were working to implement mitigation projects. This was the beginning of what turned into a Private-Public Partnership between the developer and City. They worked together to cost share several improvements including a 7 acre pond and conservation area, increased drainage crossings, as well as a dog park, fishing pier, and playground. In all the development detains 40% more stormwater, capturing 340 additional acres of drainage area. These improvements reduced the 100 year BFE by approximately 0.7 ft. This presentation will detail the success story of how a Private-Public Partnership was utilized to implement flood mitigation projects within a community in Louisiana; and how this benefited both the community and the development. The mayor, developer, and engineers will all be on hand to share their experience, lessons learned, and how similar partnerships can be leveraged for future flood mitigation projects.

**Biography:** Jeanne Arceneaux Hornsby, M.S., P.E., C.F.M. is an Engineering Director at C.H. Fenstermaker & Associates, L.L.C. with 16 years of numerical modeling, water resource engineering, planning, and project management experience. Currently Mrs. Hornsby leads Fenstermaker's Water Resources Team throughout the company's offices in Lafayette, Baton Rouge, Lake Charles, and New Orleans, Louisiana. Mrs. Hornsby's main responsibilities include leading multi-million-dollar projects that range from coastal and watershed modeling and management to drainage design and construction for both the public and private sectors. She has obtained her experience and expertise by working on projects in Louisiana, Texas, and Florida, with the majority of her hydrologic and hydraulic modeling experience focused on South Louisiana. Within these systems Mrs. Hornsby has completed numerous numerical modeling analyses on inland and coastal systems, floodplain mapping, FEMA Letter of Map Revisions (LOMR), stormwater planning, hydraulic design, environmental impact studies, field reconnaissance, hydrologic and hydraulic data collection, and flood mitigation projects. As a Certified Floodplain Manager Mrs. Hornsby assists many area communities in flood mitigation project funding through HMGP, CDBG, and other grant programs. She also assists communities in drafting flood protection and drainage ordinances as well as leading participation and renewal activities in the FEMA Community Rating System (CRS).

## **Building Community Resilience through Partnerships: FEMA's Guides to Expanding Mitigation**

Kelly Pflicke, AICP, FEMA FIMA, [kelly.pflicke@fema.dhs.gov](mailto:kelly.pflicke@fema.dhs.gov)

**Co-presenters:** Jason Tudor, AARP, [jtudor@aarp.org](mailto:jtudor@aarp.org), Maria Mercedes Carruthers Ferrero, [maria.carruthersferrero@fema.dhs.gov](mailto:maria.carruthersferrero@fema.dhs.gov) and Danielle Arigoni, [darigoni@aarp.org](mailto:darigoni@aarp.org)

**Abstract:** FEMA's Guide to Expanding Mitigation series equips communities to identify and engage with partners across a variety of topics. The guides cover a diverse range of subjects, including equity, transportation, municipal financing, and the arts. This session will provide an overview of the series, featuring three new guides focusing on coastal communities, building codes and standards, and planning for the impacts of natural hazards on older adults. The session will highlight how FEMA and partners are encouraging a whole community approach to resilience and will challenge participants to seek out new and non-traditional partnerships in their own communities. Attendees of this session will come away with practical tips for connecting across their own communities and a broader perspective on the role of floodplain managers in a whole community approach to resilience.

**Biography:** Kelly Pflicke, AICP serves as a Community Planner for the Planning and Safety Branch within the Risk Management Directorate, Federal Insurance and Mitigation Administration, Resilience at the Federal Emergency Management Agency (FEMA). Kelly is responsible for the development of strategic partnerships and communications to advance the Hazard Mitigation Planning Program, a key resource for states, locals, tribes and territories in breaking the cycle of disaster damage and reconstruction. She has focused her career on helping communities adapt and build resilience to hazards exacerbated by climate change with particular attention to coastal communities and at-risk populations most impacted by disasters. Kelly holds a Master of City and Regional Planning from Rutgers University and a Bachelor of Arts in Geography from Georgia Southern University.

## **H3: 2D & Dynamic Modeling Solutions**

### **Pluvial Flood Hazard Assessment using 2D Rain-on-Grid Models: Faster, Cheaper, and Ready for Prime Time**

Siamak Esfandiary, PhD, PE, Dewberry, [sesfandiary@dewberry.com](mailto:sesfandiary@dewberry.com)

**Co-presenters:** Jessica Seipp, [jseipp@dewberry.com](mailto:jseipp@dewberry.com)

**Abstract:** Flood hazard assessments at the state, county, and local level typically rely on FEMA mapping products, which account for fluvial (riverine) but not pluvial (stormwater) flooding. This is problematic because pluvial flooding is a large and growing threat to people and property across the country. In this presentation we show how state and local floodplain managers are using the latest generation of 2D rain-on-grid models to understand and mitigate their local pluvial flood hazard without breaking the bank. We overview recent advances in 2D rain-on-grid model functionality and highlight the pros and cons of the most popular modeling choices (e.g., HEC-RAS version 6, PCSWMM, XPSWMM). We also describe a variety of recent rain-on-grid projects including a hazard mitigation plan (HMP) update in Frederick County, MD; a drainage capacity study in Clover Hill, MD; a watershed management plan in Cecil County, MD; a military installation stormwater master plan in Alexandria, VA; and a private utility scour prevention plan in the greater Washington, D.C. region. We conclude with our top ten best

practices to maximize performance and cost-effectiveness of rain-on-grid modeling in small and medium-sized projects.

**Biography:** Siamak is a licensed professional engineer and has a Ph.D. in civil engineering from the City University of New York. He has more than 20 years of experience in flood risk management and water resources engineering, modeling, and design. He worked in FEMA's risk management directorate for 11 years, and returned to private sector in 2019. Siamak has a deep understanding of the NFIP and has contributed significantly to developing mapping policies, guidelines and standards. Siamak completed a 6-month detail assignment with US Army Corps of Engineers HQ working under the direct supervision of USACE's Special Assistant for Dam and Levee Safety. He served as the Chair of the Subcommittee on Hydrology 2017-2019, and advised FEMA's National Dam Safety Program Manager. Siamak is currently the engineering director of the resilience solutions group at Dewberry HQ in Fairfax, where he manages multiple teams with expertise in coastal and water resources engineering, geospatial engineering and applied analytics, computational science and informatics, and resilience planning.

### **Static vs. Dynamic Sea Level Rise Inundation Mapping in Hollywood, Florida**

Jordon Cheifet, PE, CFM, Cummins Cederberg, Inc., [jcheifet@cumminscederberg.com](mailto:jcheifet@cumminscederberg.com)

**Co-presenters:** Leonard Barrera Allen, PE, WEDG, [lbarrera@cumminscederberg.com](mailto:lbarrera@cumminscederberg.com)

**Abstract:** This presentation will discuss different inundation mapping techniques relative to sea level rise and king tides as part of the City of Hollywood's Tidal Flooding Mitigation and Shoreline Protection project. The primary topic of interest is to summarize the advantages and disadvantages of using static (i.e., bathtub) vs. dynamic (i.e., hydrodynamic) modeling techniques to delineate the extent and depth of flooding. Static methods are commonly used to develop sea level rise inundation maps due to their simplicity; however, flood pathways and duration of flooding are not captured using these methods. Dynamic modeling utilizing hydrodynamic forcing can simulate both spatial and dynamic results. A comparison of techniques and modeling output of static and dynamic inundation mapping will be presented. Results of bathtub modeling using ArcGIS and hydrodynamic modeling using MIKE 21 HD for various current and future water level projections will be presented. Identification of flood pathways can provide decision makers better tools to prioritize adaptation and resiliency projects to vulnerable areas of waterfront. The duration of flooding for different water level scenarios will also be presented to describe the effect of pedestrian, bicycle, and vehicular traffic.

**Biography:** Jordon is a Coastal/Marine Engineer with more than 15 years of technical and project management experience, including coastal engineering, beach nourishment design, waterfront structural design, FEMA coastal floodplain mapping, shoreline restoration/stabilization design, numerical modeling, and marina design. His field experience includes underwater waterfront facility inspections, GIS/GPS data collection and analysis, surveying, and construction administration. He has designed and inspected waterfront facilities for multiple municipalities including the City of West Palm Beach, City of Deerfield Beach, City of Miami, Martin County, and City of Dania Beach. These projects include bulkheads, docks, jetties, revetments, beach nourishments, and kayak/boat launch ramps. Jordon is a registered Professional Engineer in the State of Florida, Alabama, and Texas, as well as a Certified Floodplain Manager.

## **FEMA Floodway Boundaries Solved for Any Unsteady Modeling**

Ataul Hannan, HCFCF, ataul.hannan@hcfcd.hctx.net

**Co-presenters:** None

**Abstract:** FEMA Floodway Boundaries Solved for Any Unsteady Modeling The Federal Emergency Management Agency (FEMA) oversees the preparation of Flood Insurance Studies (FIS) and Flood Insurance Rate Maps (FIRMs) which depict the land area that has a 1% chance of being inundated in any given year. The Base Flood Elevations (BFEs) and other flood hazard parameters defined in the FIS form the basis for administering the National Flood Insurance Programs (NFIP's) regulations and flood insurance requirements and adopted by most states and communities for regulatory and permitting purposes. Traditionally, steady-state, one-dimensional models have been used to establish those. Floodway and floodway fringes are developed based on criteria established under a steady state paradigm. One dimensional steady state flow was the only technique for riverine flooding. A floodway is defined by FEMA as the channel of a river or other watercourse and the adjacent land areas that must be reserved in-order-to discharge the base flood without cumulatively increase the water surface elevation by more than a designated height. Some communities impose more restrictive criteria to the floodway definition. The use of the unsteady one/two-dimensional modeling in the engineering community is rapidly increasing due to computer power and accurate terrain (LiDAR). This presentation will provide a floodway computational method that can be applied in unsteady modeling environment. Harris County Flood Control District in Texas are using the depth and velocity product data to develop improved floodway delineations in their communities. This floodway method complies with the FEMA floodway regulations and consider volume which is very important for flat terrain.

**Biography:** Ataul Hannan, P.E., CFM, is working as the Planning Division Director for Harris County Flood Control District. Hannan brings more than 25 years of experience in watershed management and water resources engineering to the position. He was appointed as Director of Planning Division on April 7, 2015. The Planning Division devises the plans that guide the District's CIP and identifies the projects that the District designs and constructs. Once risk areas are identified, this Division produces project-specific and/or watershed-based studies that recommend flood damage reduction strategies. In addition to identifying projects, the Planning Division also provides critical support for new projects and other District responsibilities by managing right-a-way acquisition, Buyout Program, environmental regulatory support, storm water quality, and coordination with FEMA. HCFCF's Model and Map Management Program, near real time inundation mapping tool and buyout program policies were developed under Mr. Hannan's leadership

## **H4: Unique Challenges to Analyzing Rainfall and Runoff**

### **GIS Tools for Post-Wildfire Hydrologic Analysis**

Michael Schultz, CFM, GISP, CDM Smith, schultzmd@cdmsmith.com

**Co-presenters:** coxmc@cdmsmith.com; shihh@cdmsmith.com and Mark.English@fema.dhs.gov

**Abstract:** Wildfires are of increasing concern and can cause significant incremental impacts to a watershed. The reduction of vegetation cover within a burn area can initiate rapid hydrologic responses to precipitation within a burnt watershed, greatly increasing surface runoff and sediment yield. To

increase awareness of post-fire flood risk modeling product availability, and to assess the potential to incorporate hydrologic and hydraulic modeling into disaster responses, CDM Smith, a member of the Compass JV, has developed an automated Geographic Information Systems (GIS) tools based on the United States Department of Agriculture (USDA) Burned Area Emergency Response (BAER) methodology to evaluate the pre- and post-fire hydrologic properties of a watershed. This presentation will focus on a case study that includes burnt watersheds from the Grizzly Creek fire that affected approximately 33,000 acres in Western Colorado in August, 2020. Discussion topics will include data acquisition, the incorporation of hydrologic functions including Curve Number, Time of Concentration, and Recover Time into a GIS toolset, as well as a presentation of the initial results. This project is meant to provide a foundation for continued tool development. Our goal is that these new GIS tools will ultimately be applied to more efficiently evaluate the watershed hydrologic responses from a wildfire event and better prepare post-fire flood hazard protections and mitigation actions.

**Biography:** Mike Schultz is a GIS Specialist with 18 years of experience supporting data collection, development and management needs for a variety of clients. He has completed projects across a number of disciplines including transportation, utilities and environmental. Mr. Schultz specializes in adapting the latest technology and developing GIS processes to meet the wide range of needs of his clients.

### **Adaptive Flood Mitigation Techniques**

Gamal Hassan, P.E., HWR, [ghassan@hwr-plc.com](mailto:g Hassan@hwr-plc.com)

**Co-presenters:** Camylyn Lewis, P.E.

**Abstract:** The recent advances in numerical analysis software, powerful computing machines, and the ever increasing availability of data resources give rise to novel and creative approaches to flood mitigation practices. Recognizing that flooding hazards are increasing in frequency and severity and overwhelming existing Flood Risk Management practices (FRM), modernizing the current FRM state-of-practice by incorporating continually adaptive flood prediction techniques will keep pace with the ever changing climate and increase in rainfall intensities. Furthermore, adaptive flood mitigation approaches can be used to explore the possibilities for smart growth, sustainable urban drainage systems (SUDs), and Best Management Practices and develop systems and strategies to increase flood resiliency. This paper presents an intrinsically flexible/adaptive approach to reduce risks, mitigate flooding, and maximize the use of available resources. This adaptive flood prediction approach depends on the integration of watershed-wide available data which can be easily updated to represent current and future watershed responses to climate changes and urban planning. This presentation uses available GIS data to demonstrate the watershed response to rainfall events; a Map-To-Map approach. The Map-To-Map approach (rainfall map to flood map, or rainfall map to runoff and drainage system map) incorporates watershed topography, associated land uses, and utilizes spatially distributed rainfall events to produce a dynamic simulation of the watershed runoff response. The Map-To-Map approach develops a dynamic numerical analysis modeling system of the entire watershed that is ideal to evaluate and continually adapt over the short, mid-, and long-term to increase resiliency and continually maximize the use of the available resources. This paper demonstrates with case studies how to continually adapt, maximize resources, and minimize risks and losses. It virtually presents multiple solutions to real problems in real urban areas, including climate change impacts such as increased rainfall intensities. The Map-to-Map model becomes the basis for sensitivity analysis, evaluation of future land-use changes, and evaluation of climate change induced risks. It can easily become an



essential planning tool to improve flood prediction and response, flood resiliency, and mitigation of flood losses. Finally, it provides a distinct understanding of the local risks, provides essential information for well-informed decision making, and provides justification to invest in long-term community well-being

**Biography:** Mr. Hassan possesses 33 years of practical experience in the fields of Hydrology and Hydraulic studies and designs. Particular expertise is in GIS Integrated Watershed Modeling, FEMA Studies, River Mechanics and River Hydraulics, Scour and Sediment Transport Modeling, and Stormwater Management and Water Quality Studies and Modeling.

### **Cloudburst Analysis - Forecasting, Tools and Methods**

Zachary Ranstead, PE, CFM, LEED-AP, T&M Associates, zranstead@tandmassociates.com

**Co-presenters:** Charles Ross, State Hydrologist, NWS State College PA, charles.ross@noaa.gov

**Abstract:** Cloudbursts are extreme amounts of precipitation occurring for a short duration and often over a relatively small area. Official data sources such as NOAA weather stations are sparsely distributed over a wide area. Privately operated weather stations help to improve the dataset. However, this shared data varies in quality, and often with no record during power outages caused by the event. As such, localized cloudbursts will typically not be fully quantified by ground based collection methods. On August 29, 2013, a precipitation event occurred over a point in the City of Allentown, PA which caused extreme flood damage and received much media coverage. The city requested that T&M Associates investigate to determine if this was a typical design storm. The presentation demonstrates fast processing of public NOAA NEXRAD Radar Precipitation Data to help quantify the August event, facilitating correlation to stream gauge data. This was presented to the City and those affected, identifying the storm as a cloudburst primarily within 5 square miles and one hour duration, exceeding a 500-year event. The data was also used to consider storm sewer infrastructure performance. Potential event causes and a history of Pennsylvania cloudbursts will be discussed. A more severe Cloudburst on July 12, 2021 affecting Bensalem PA will also be discussed. Cloudburst forecasting and observations from a meteorological standpoint will be presented by NOAA. This presentation will review the state of the art of forecasting of cloudbursts, discuss case studies and investigate design strategies to improve community resiliency to these extreme events.

**Biography:** Mr. Ranstead is a Project Manager with 23 years of experience in Civil Engineering. His work involves the design and management of residential, commercial, industrial, and institutional projects with an emphasis on stormwater, flood study, erosion control and BMP designs largely within FEMA Region 3. His experience includes permitting work for PADEP, County Conservation Districts, FEMA and PennDOT on projects throughout Pennsylvania and New Jersey. Mr. Ranstead also serves as a due diligence advisor for a private client involved with land development investments across the US. Additionally, Mr. Ranstead is currently Project Manager of the Compass RTO FY20 Northampton County, PA project and is performing QaQc reviews and assisting in mentoring/training for FY19 projects in Virginia. Mr. Ranstead was selected as Deputy Task Order Manager for Region III RTO FY21.

## **H5: Future Conditions & Flood Risk Mapping Products**

## **Leveraging Probabilistic Flood Risk Data to Develop Climate-Informed Future Flood Risk Data for Communities**

Justin Vandever, PE, PMP, AECOM, [justin.vandever@aecom.com](mailto:justin.vandever@aecom.com)

**Co-presenters:** Doug Bellomo, [doug.bellomo@aecom.com](mailto:doug.bellomo@aecom.com); Ricky Torres-Cooban, [ricky.torres-cooban@aecom.com](mailto:ricky.torres-cooban@aecom.com); and Andy Bonner, [andrew.bonner@aecom.com](mailto:andrew.bonner@aecom.com)

**Abstract:** Global climate change is projected to affect flood risk due to changes in storm frequency and intensity, sea level rise, and watershed hydrology. Many communities are facing the challenge of having to manage their floodplains for future hazards using flood risk data that reflects historical, and not future, climate conditions. While some communities have been able to fund and conduct their own analysis, modeling, and mapping studies to develop localized future flood risk products, these studies typically involve in-depth modeling and technical analyses that are beyond the technical or budget capabilities of most communities. The recent development of approaches to develop probabilistic flood hazard and risk data by FEMA provides an opportunity to leverage these datasets to estimate future risks and hazards. Because probabilistic flood hazard datasets span a range of return periods beyond just the commonly considered 1-percent annual chance flood event, flood frequency curves can be shifted to account for future climate trends. Appropriate frequency shifts can be estimated through direct analysis of downscaled climate model projections of future precipitation or runoff or through published nationwide projections in the literature (for example, today's 200-year event may be representative of a future 100-year event). The shifted flood frequency curves can then be leveraged to characterize future flood hazards and develop future flood risk mapping products without having to repeat time and cost-intensive watershed or coastline-specific hydrologic and hydraulic analysis and modeling. This presentation will provide conceptual examples of how readily available local and regional climate trends and projections can be combined with recently developed probabilistic flood hazard and risk data to efficiently develop future flood hazard and risk products for local communities. Application of the methodology to representative locations across the country will be presented to illustrate the potential repeatability of the approach, along with its opportunities, challenges, and recommendations.

**Biography:** Mr. Vandever is a coastal engineer and climate adaptation specialist with fifteen years of consulting experience in coastal and marine science, wetland restoration, coastal engineering, and climate change adaptation. He is AECOM's Global and US West Region Water Resources Resilience and Climate Change Sub-Market Lead and the Climate Science subject matter expert for the Compass Joint Venture's Technical Excellence Program, providing Production and Technical Services to FEMA. His project experience includes coastal hazard analysis, climate change vulnerability and risk assessments, sea level rise inundation mapping, coastal processes and flooding, and response of coastal and estuarine environments to sea level rise. Mr. Vandever has served as a quality reviewer and technical advisor on numerous coastal flooding and climate change-related projects across the country. He has co-authored numerous technical articles related to climate change vulnerability, including sea level rise impacts in San Francisco Bay, effects of coastal erosion on the California coast, and mitigating climate change through coastal wetland restoration and has presented at regional, nationwide, and international coastal conferences.

## **Leveraging Coastal Risk MAP Non-Regulatory Products to Enhance Community Flood Resilience and Achieve the Administration's Goals**

Elena Drei-Horgan, Ph.D, CFM, AECOM, elena.drei-horgan@aecom.com

**Co-presenters:** Mark A. Vieira, PE, FEMA Region IV, mark.vieira@fema.dhs.gov

**Abstract:** Over the past 10-years coastal communities have seen updated Flood Insurance Rate Maps go into effect across the Nation. With the release of the maps, a large amount of non-regulatory GIS-based products have been released to communities as well. These products provide tools that allow communities to more easily disseminate explanations of the flood risks within the coastal floodplain in a simple manner, giving floodplain managers the ability to quickly identify, assess, plan and mitigate socioeconomic and natural resources exposed to hurricane hazards. Recent recommendations released by the U.S. Government Accountability Office (GAO) have underscored the need to put in place mechanisms to evaluate the usefulness of non-regulatory products in increasing flood resilience. Given their simplified nature, could these non-regulatory products help meet the call for “Justice 40” and help enhance the benefits for disadvantaged communities by helping identify solutions to reduce or eliminate the risk of repetitive flood damages to buildings? The presentation will focus on showing examples of how coastal non-regulatory products are being put to work to better serve communities. Such examples include capturing increased wave intensity pushed inland during a hurricane, as done by the severity hazard area products developed in Region III; showing increased erosion enhanced by SLR as non-regulatory erosion maps are getting presented to Region I communities; understanding the changes in floodplain extent due to increased flooding, and how average annualized loss determination can drive enhanced mitigation solutions, through the non-regulatory products that are getting delivered to the Florida coastal communities as new FIRMs become effective and resiliency meetings are getting scheduled. These non-regulatory products’ success can be leveraged to increase flood resiliency, and their usefulness assessed to determine how they can help disadvantaged communities in reducing their flooding risks.

**Biography:** Dr. Drei-Horgan has 20 years of private and academic experience in the study of coastal processes. Her expertise covers a broad array of engineering and science disciplines in the field of coastal engineering, including coastal geomorphology, flood hazard analysis and mapping, geospatial data analysis, coastal risk and sea level rise assessment and cost/benefit analysis. Elena is currently a Project Manager and the Compass Coastal Control Account Manager. She was the recipient of the 2016 ASCE Orville Magoon “Sustainable Coast Award”.

### **The Best Available Science: A Roadmap to Future Conditions Flood Hazard Mapping**

Sarada Kalikivaya, PE, CFM, PMP, Atkins North America, SARADA.KALIKIVAYA@ATKINSGLOBAL.COM

**Co-presenters:** Phetmano Phannavong, P.E., PMP, CFM; phetmano.phannavong@atkinsglobal.com

**Abstract:** The impacts of global climate change are already happening in the United States and are projected to continue intensifying. Sea levels along the coastlines are rising at inconsistent rates—higher rates along the Gulf of Mexico coastline where land is sinking. Precipitation is also changing, with increases in the Northeast, Midwest, and Great Plains and decreases in the Southwest and Southeast. Examining future conditions means looking at how changing drivers over time will have an impact on risks to communities. Changes to land development, weather patterns, and sea levels may result in a community having a greater risk of flooding in the future. Congress has recognized the impacts of climate change on the National Flood Insurance Program (NFIP). The Biggert-Waters Flood Insurance Reform Act of 2012 established of the Technical Mapping Advisory Council to provide recommendations to FEMA to ensure that the Flood Insurance Rate Maps continue to incorporate the best available

climate science to assess flood risks and that FEMA uses the best available methodology to consider the impact of sea level rise and future development on flood risks. The October 2021 GAO report pointed out that FEMA needs to ramp up its mapping program that incorporates climate change and other future conditions. Where future conditions present both increasing and decreasing changes, future-conditions flood hazard and risk identification are challenging and requires an understanding of many influencing drivers and any combination of those drivers. State, local, tribal, and territorial (SLTT) governments can take steps to implement flood hazard mapping activities that incorporate different changing drivers over time that are applicable to them. The presentation will focus on 5 drivers (Land Use, Precipitation, Sea Level Rise, Coastal Erosion, and Riverine Erosion) and highlight their existing and evolving methodologies and case studies by federal, state, local government, academia and non-profit organizations.

**Biography:** Sarada Kalikivaya is a Project Director with Atkins North America working in the Dallas Office. She currently serves as the Deputy Mapping Program Manager for STARR 3 PTS contract and project manager for various Cooperating Technical Partners. Also, she is currently involved managing multiple Flood Risk studies and works with FEMA HQ innovations team in developing, implementing the new technologies such as Future Flood Risk Database, 2D modeling and Cloud computing to gain efficiencies. Ms. Kalikivaya has a Master of Civil Engineering from the University of Louisiana at Lafayette with Water Resources focus. She is registered as a Professional Engineer in the State of Louisiana and Missouri.

## **H6: Communication about Nature-based Resilience**

### **Resiliency Implementation Planning in Coastal Georgia: Assessing Risks and Incorporating Nature-Based Infrastructure**

Ashby Worley, CFM, The Nature Conservancy, [ashby.worley@tnc.org](mailto:ashby.worley@tnc.org)

**Co-presenters:** Courtney Reich, [courtney.reich@gmcnetwork.com](mailto:courtney.reich@gmcnetwork.com)

**Abstract:** This presentation will be based on the NFWF National Coastal Resilience Fund project, A Resiliency Implementation Workplan for Camden County, Georgia, involving the county, all three cities (Kingsland, St. Marys and Woodbine), Naval Submarine Base Kings Bay, Cumberland Island National Seashore, The Nature Conservancy, the Carl Vinson Institute of Government at the University of Georgia/Georgia Sea Grant Legal Program, the Georgia Sentinel Landscape Partnership, and Southeast Regional Partnership for Planning and Sustainability (SERPPAS), and a technical consultant. The overall goal of the project is to develop a Resiliency Implementation Workplan (RIW) for Camden County, its cities and other jurisdictions by utilizing a robust stakeholder process, including community survey, steering committee and targeted interviews, and a resiliency prioritization tool to identify shoreline vulnerabilities and resiliency projects. This plan will help local decision makers with their collective and individual priorities for specific, actionable projects that will reduce flooding impacts and risks by utilizing innovative green infrastructure and nature-based approaches. Additional goals are increasing community capacity for resilience, building awareness of adaptation needs and planning, and assisting in implementation of identified resiliency projects that can help lead the community to success. This presentation will discuss the stakeholder process and tool development, emphasizing the connection between risk assessment and nature-based infrastructure. Project partners will also describe how the

process is designed to increase community understanding about how investing in green infrastructure and nature-based strategies brings value to the community, protects property, and restores and/or preserves ecosystems by developing shared messaging and communication processes between all of the various jurisdictions in Camden County.

**Biography:** Ashby Nix Worley joined The Nature Conservancy as their Coastal Climate Adaptation Director in November 2016, where she works with coastal partners and communities to bring nature-based solutions to help address coastal hazards in order to build a more resilient Georgia Coast. Ashby has an undergraduate degree in Environmental Science from Mercer University and Master of Science Degree in Environmental Science, specializing in Wetland studies, from Louisiana State University. Ashby has worked as coastal scientist in the coastal Georgia region for over 10 years, working for the Department of Natural Resources Coastal Resources Division and the University of Georgia in conducting long term ecological research, oyster restoration, water quality monitoring and marsh studies. From 2013-2016, she served as the Executive Director of the non-profit organization Satilla Riverkeeper, where she worked with local communities on environmental outreach, education, awareness, advocacy and policy. Ashby currently serves on the Georgia DNR's Coastal Advisory Council and Chair of Coastal Wildscapes, a local non-profit promoting native coastal habitats. Ashby is a Certified Floodplain Manager since November 2017.

### **How Goats Can Help Floodplain Managers Educate the Public About the Natural and Beneficial Function of Streams and Riparian Corridors**

Tom Jacobs, PE, CFM, City of Lenexa, KS, [tjacobs@lenexa.com](mailto:tjacobs@lenexa.com)

**Co-presenters:** None

**Abstract:** Healthy stream corridors are a key component when trying to maximize the benefits of the natural and beneficial functions of a stream. The City of Lenexa, Kansas has 23 miles of public stream corridor and 43 miles of privately owned corridor. Invasive species are a constant issue in the corridors. They tend to decrease biodiversity by out competing native plants, encourage erosion and diminish the effectiveness of the corridor in managing stormwater runoff. Lenexa employees spend many hours maintaining the public stream corridors. Many of the privately owns stream corridors go unmanaged altogether. To educate citizens on the importance of stream corridors and what they can do to manage their own property the City created an outreach program. This program involved using goats to manage a section of highly visible stream corridor in the city. The goats are great at eating invasive species and can access areas that are difficult or dangerous for workers to access. And, as it turns out, people love goats! Lenexa publicized the upcoming goat grazing event on social media. It immediately became so highly anticipated that we had to keep the start date secret for fear of a large crowd. Once the goats were on site, a media day was organized, people were encouraged to watch the goats work and a "meet and greet the goats" event was organized at the culmination of the goats' work. This presentation will highlight a public relations success story in which an alternative approach to corridor management, specifically the use of goat grazing, was used to draw the attention of the public and educate them on the importance of stream corridors. The activity is relevant for CRS activities 330, 420 and 540 as well as satisfying the education and outreach minimum control measure for the NPDES permit.

**Biography:** Thomas Jacobs is a licensed professional engineer and certified floodplain manager with 35 years of experience working for consulting engineering firms and local government. For the past 20

years, he has served in his current position with the City of Lenexa as Stormwater Engineer. Tom's duties focus on stormwater related items including project management for regional stormwater projects, stream restoration projects, and storm system rehabilitation projects. He is also Lenexa's Stormwater Group leader responsible for NPDES Phase II compliance, floodplain management, and flood insurance. Tom is active in the Kansas City chapter of the American Society of Civil Engineers, previously serving as Chapter President and committee Chair for production of the Kansas and Missouri Infrastructure Report Cards. He is member of the Association of State Floodplain Managers and is active in the American Public Works Association, serving as a Member of MARC/APWA task force for the original writing of the Regional Manual of Best Management Practices for Stormwater Quality. This document has served as the regional water quality design manual since 2003.

### **Nature-Based Solutions: Achieving Sustainable Water Resources Infrastructure by Implementing Engineering With Nature Principles**

Jane Thompson, CFM, GISP, AECOM, jane.thompson@aecom.com

**Co-presenters:** David Rubenstein, david.rubenstein@aecom.com and Burton Suedel, Burton.Suedel@usace.army.mil

**Abstract:** This presentation will cover Natural and Nature-Based Solutions that utilize Engineering With Nature Principles and will look at International Guidelines on Features for Flood Risk Management. When implemented correctly, multiple grant programs can be accessed by utilizing nature-based solutions. Floridians are adapting to best management practices in the floodplain leading to innovative multi-purpose solutions. Promoting Ecosystem Restoration and designs that stabilize riverine and coastal features is improving community resilience in Florida. It is abundantly clear that Engineering With Nature Principles must play a role in restoring Florida's future water. Sustainable development of water resources, coastal, and port infrastructure poses both challenges and opportunities to the country. The U.S. Army Corps of Engineers (USACE) is pursuing such an objective and must evolve conventional approaches to implementing nature-based solutions to our engineering. Advancing practice involves identifying the practical actions that can be taken to better align and integrate engineering and natural systems to produce more socially acceptable, economically viable and sustainable projects. Engineering With Nature® (EWN®) is an initiative that supports more sustainable practices, projects, and outcomes by working to intentionally align natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes. USACE EWN offers multiple projects that provide successful examples of what can be achieved through the application of these nature-based solutions, allowing for the opportunity to work with the HMA program including the opportunity to work with three grant types for pre- and post-disaster mitigation projects to reduce loss or damage to life and property.

**Biography:** Mrs. Thompson earned her bachelor's degree from the University of South Florida in Environmental Geography. Her class was the first graduating class that utilized solely heads up digitizing and was the last graduating class of 1999. Jane volunteered for an internship in the data library of the Florida Marine Research Institute in St Petersburg in 2000 while continuing her studies in Remote Sensing of the Environment. Jane worked for a year as a Geospatial Analyst in Military Mapping performing feature extraction in a 3D environment. In 2005, Mrs. Thompson had the opportunity to join a brand-new team in Tampa that was beginning the first time Countywide FEMA DFIRMs for Florida's Flood Insurance Studies. She performed Engineering GIS Support and DFIRM Mapping for

Florida's three CTPs. Jane continues today to leverage this data in the local communities and counties where she helps to find grant funding for mitigation. Jane has had the great privilege of working with other disciplines at AECOM over her 17 years. She manages the permitting of a 100,000 acre mine site and has taken this client to the next level by designing their GIS Master database to support all regulatory reporting. Jane understands the GIS required for PD&E studies for Transportation, Environmental Field work for Pipeline, Roadways, Airports, Wastewater, Stormwater, Mining and Environmental Resource Permitting and even performed the GIS for the feasibility studies for the Panama Canal Expansion and a Bridge Crossing. Mrs. Thompson earned her CFM in 2009 while raising a family and earned her GISP in 2013. Jane is currently the Water Resources GIS Manager in the Tampa Office and is the Associate Membership Coordinator for the Florida Floodplain Managers Association. Jane promotes annually Florida's Flood Awareness Week working on outreach and education in Public Schools on Flood Awareness, Water Conservation and Water Quality issues. She joined the Pinellas County Public Schools, Journeys in Journalism Program Advisory Council and piloted a project this year in which the student journalists from grades K – 8 create the content for a digital newspaper on Flood Awareness. Jane aspires to continue working creatively with the scholars to teach them what to teach in the hopes to bridge a generational knowledge gap when it comes to Risk Awareness.

## **H7: Strategies for More Equitable Floodplain Management**

### **Equitable Alternatives to the Traditional Benefit-Cost Analysis**

Robyn Williams, CFM, Texas Water Development Board, [robyn.williams@twdb.texas.gov](mailto:robyn.williams@twdb.texas.gov)

**Co-presenters:** Alexandra Bernard, [alexandra.bernard@twdb.texas.gov](mailto:alexandra.bernard@twdb.texas.gov)

**Abstract:** Protecting communities from flood through improved infrastructure is essential to creating a more resilient future. Generally, the first step in obtaining funding approval to upgrade flood infrastructure is the benefit-cost analysis (BCA). Funding often requires the proposed project to have a benefit-cost ratio (BCR) that exceeds unity. However, we must consider what happens when a community is in dire need of drainage improvements but cannot acquire funding because the calculated benefit is low due to the value of properties and structures. The traditional BCA has come under scrutiny by researchers who have found that it “prioritizes dense, high-value property areas and promotes retreat from low-density, low value areas” (Siders 2019). Further, BCA does not consider the distributional impacts of projects and how disadvantaged communities may be disproportionately impacted by them. With the added pressures of climate change and sea level rise, it is important for floodplain managers to provide equitable outcomes for all communities. This presentation will review the traditional BCA approach and highlight several alternatives with the goal of offering equitable solutions to ensure that communities in need do not fall through the cracks. Such alternatives range from modifying traditional BCAs by including the use of distributional weights in considering benefits and costs and the estimation of explicit distributional impacts to more radical changes, as argued by economics Nobel prize winner Amartya Sen. For example, Sen suggested the use of explicit social choice judgments to move BCA beyond market-centered valuation and to better represent a broader set of values. A consideration of these alternatives represents a step forward in providing the capacity-building required for communities to mitigate floods.

**Biography:** Robyn is an Engineering Specialist in the Flood Science and Community Assistance division at the Texas Water Development Board. As a member of the Flood Modeling team her focus is building 2-D Base Level Engineering (BLE) models for Texas watersheds, with the goal of providing flood risk data for the entire state by 2024. In addition to model building, she researches strategies to mitigate flood-related social vulnerability and improve benefit-cost analyses. As a member of the ASFPM Social Justice Task Force she aims to bring awareness to equity issues in floodplain management. Robyn holds a B.S. in Biology from Texas State University and an M.S. in Civil and Environmental Engineering from the Sustainable Water Development program at the University of Iowa.

### **Place-Based Inequality: How Its Persistence Impacts Floodplain Management**

Heather Hilliard, CEM, CFM, IEM, [heather.hilliard@rre-llc.com](mailto:heather.hilliard@rre-llc.com)

**Co-presenters:** None

**Abstract:** This presentation will consider the evolution of place-based inequalities and disparities as it pertains to flood zone areas of communities. Using recent data analysis and publications that will help bolster floodplain managers' future grant applications, present and historical community disparate impacts will be reviewed on how societal past actions have exacerbated already economically depressed communities or inequality by perception "fencing" between desirable property and access to typical flood zones. Patterns created hundreds of years ago both in the United States and abroad are being exponentially enhanced with climate change impacts. This session will conclude with how we can be catalysts for mitigation in both potential grant projects as well as community action to shift engagement, behaviors, and resources.

**Biography:** Heather Hilliard, CEM, CFM is an experienced homeland security and emergency management professional with more than 25 years of service. Ms. Hilliard has recently transferred from working for various Louisiana governmental organizations at the state, parish and local level to Project Manager of Response and Recovery at IEM. She is an Adjunct Instructor at the George Washington University School of Medicine in Clinical Research and Leadership and has served as an Adjunct Professor at Tulane University for more than a decade. She is currently a member of the International Association of Emergency Managers USA Diversity Committee. Among her accomplishments, Ms. Hilliard has earned federal and local commendations in New Orleans for her contributions to the response of Hurricanes Katrina and Gustav and her role in the Deepwater Horizon oil spill response. In addition, she worked in the state Department of Health in the 2009 Pandemic Influenza and has worked declared disasters such as F5 tornadoes, international typhoons, earthquakes, and public health epidemics. Ms. Hilliard's after action report for the international response to a Pacific typhoon was shared with the United Nations to help reshape the way the world responds to catastrophe. Ms. Hilliard has published several emergency management articles - two most recently on Covid - and also written and edited textbooks. She has presented on crisis communications for numerous organizations and the federal government as well as spoken at national conferences and to international attendees including IAEM 2021, AACAP 2021 and ASFPM 2021.

### **Driving Change by Creating an Equitable Experience**

JaQuisha Hudson, APR, Ogilvy, [jaquisha.hudson@ogilvy.com](mailto:jaquisha.hudson@ogilvy.com)

**Co-presenters:** Marlice Johnson, Ogilvy, [marlice.johnson@ogilvy.com](mailto:marlice.johnson@ogilvy.com)



**Abstract:** All communities experience disasters but not all communities experience disasters equally. While the same natural disaster may be a temporary inconvenience for some, it will be a “life” destroyer for others due to disparities that persist in socially vulnerable populations. Research shows that vulnerable populations experience the greatest impact from natural hazards. These populations experience barriers to resilience whether it's regards to socioeconomic status, disability status, race, ethnicity, language, immigration status, etc. As leaders and floodplain managers work to engage these communities, the barriers must be removed, and an equity-centered approach, including equity-centered experiences, must be executed so that these communities can succeed. This presentation will share how leaders and floodplain managers can apply equitable considerations to empower communities to become more resilient. Attendees will be introduced to foundational knowledge of how to assess their diversity deficit, understand their audience, and develop equitable strategies to support them in advancing resilience. Learn how: - Diversity, Equity, and Inclusion (DEI) have emerged as worldwide practices that are critical to an organization's success and how they serve their audience. - New ways to establish criteria to measure and monitor progress towards equity, including a new audit product developed by Ogilvy in partnership with the Center for Global Inclusion to assess an organization's Diversity Deficit. - A diversity audit can guide organizations to achieve best practices to implement strategies that work as an integrated system of interactive parts connected through relationships, practices, and processes. - Understanding equity can inform new approaches to community engagement, from experiences to community meetings that represent and reflect all voices of the community.

**Biographies:** JaQuisha Hudson is an Accredited Public Relations Practitioner who has built her career building relationships between organizations and the audiences they serve by implementing communication principles that yield effective solutions and executive strategies that help organizations render positive impact. She enjoys using the art of communications to solve problems, ignite change, connect people to essential resources, improve public health and help make high quality education accessible to everyone. Since joining the Ogilvy Washington, D.C. office, JaQuisha has supported the Federal Emergency Management Agency's (FEMA) Community Engagement and Risk Communications (CERC) program with a specific focus on equity and innovation. Drawing from an integrated communications background, JaQuisha has supported a variety of initiatives and goals through strategy development, crafting messaging and event planning to help communities become more resilient. JaQuisha also provides education entertainment communications support for the CDC to implement Early on Set Breast Cancer accurate depictions in television and video games targeting young women of color and women of Ashkenazi Jewish descent. Prior to joining Ogilvy PR, JaQuisha worked at a public relations and advertising agency. She provided counsel to c-suite and senior level leadership throughout the southern region regarding brand management, crisis communication, innovative strategy development and policy change. Some of her work included managing the launch of the Southern AIDS Coalition's Inaugural Southern HIV/AIDS Awareness Day and working with the Mayor's Office of the City of Birmingham to reimagine public safety.

Marlice Johnson is the Director of Diversity, Equity and Inclusion for North America. Marlice is a strategically minded international Business Executive, with 20+ years in growth and innovation of category leaders, including LG, T-Mobile, Nike, and Red Bull. She is well versed in navigating cultural and diplomatic business practices and perspectives for US brands in foreign markets, bringing them closer to consumers in the global marketplace. She is an active change agent and advocate for DE&I in the private

sector through leadership and actions that improve the way the organizations work with, think about, and activate. Having gained the ability to approach challenges from varied cultural, diplomatic, and business perspectives, she has become a go-to expert for successfully connecting the dots between creative prowess, consumer needs, and go-to-market execution in the global marketplace

## **H8: Post-Harvey Statewide Flood Reduction Initiatives in Texas**

### **A Story of State-Focused Regional Flood Mitigation**

Shonda Mace, Community Development & Revitalization Department of the Texas General Land Office, [Shonda.Mace.GLO@recovery.TEXAS.GOV](mailto:Shonda.Mace.GLO@recovery.TEXAS.GOV)

**Co-presenters:** Stephanie Castillo, PE, CFM [stephanie.castillo.ctr@recovery.texas.gov](mailto:stephanie.castillo.ctr@recovery.texas.gov)

**Abstract:** The Texas General Land Office (GLO) is responsible for administering HUD's Community Development Block Grant - Disaster Recovery (CDBG-DR) and Community Development Block Grant - Mitigation (CDBG-MIT) programs. The GLO's mission is to collect, analyze, and communicate disaster-related data to help communities protect themselves from future disasters. In line with this mission, GLO partnered with State and Federal entities including FEMA, USGS, Texas Water Development Board (TWDB), Texas AgriLife Extension, Texas Division of Emergency Management (TDEM), UT-Center for Space Research (UT-CSR) and the US Army Corps of Engineers (USACE) to envision the Combined River Basin Flood Study (i.e. Study). The \$85 million Combined River Basin Flood Studies were initiated in 2020 to support long-term recovery by evaluating flood risk consistently across the 52-county impact area and identifying mitigation projects. Unique to this Study is the evaluation of local, state, and federal funding strategies to successfully advance mitigation projects and the consideration of equity and social vulnerability as a component of flood risk analysis and project prioritization. Additionally, the data collected and produced by the Study will inform a separate GLO-funded initiative – the Texas Disaster Information System or TDIS. TDIS will be designed and maintained through a partnership between Texas A&M and UT-Center for Space Research and will provide critical flood risk information, on demand, to support future Texas flood resiliency. TDIS will reduce the complexity, access and understanding of flood risk information when needed most by a variety of audiences, including individuals, local decision-makers, and academia. The presentation will provide an overview of the Combined River Basin Flood Study, Texas Disaster Information System, and review how the Texas General Land Office submitted a successful Planning section to the HUD Action Plan to receive \$147 million in CDBG-DR and CDBG-MIT funds to support this large-scale regional flood planning effort. Further, it will discuss the benefits of regional planning to support flood mitigation objectives and optimize return on investment for potential flood mitigation projects

**Biography:** Ms. Mace serves on the planning team with the Texas General Land Office's Community Development and Revitalization (GLO-CDR) program. During her tenure with GLO-CDR, Ms. Mace has assisted in the development of a regional planning studies program and Housing technology improvement and studies that utilize HUD's CDBG-DR funding to conduct large-scale studies in disaster-impacted areas to assist communities in their planning efforts. Prior to joining the GLO-CDR team, Ms. Mace worked for 10 years as an Architectural Historian, spending much of her time working as a

consultant for TxDOT reviewing environmental documents and projects for compliance with NEPA, Section 106, and 4(f) requirements.

### **Empowering Decision Makers in Texas with Information They Want**

Tyler Payne, PMP, Community Development & Revitalization Department of the Texas General Land Office, [tyler.payne.glo@recovery.texas.gov](mailto:tyler.payne.glo@recovery.texas.gov)

**Co-presenters:** Charlie Cook, FEMA Region 6, [charles.cook4@fema.dhs.gov](mailto:charles.cook4@fema.dhs.gov); Samuel Brody, Texas A&M University [brodys@tamug.edu](mailto:brodys@tamug.edu); and Mat Mampara Dewberry, a member of the Freese & Nichols, Inc. team, [mmampara@dewberry.com](mailto:mmampara@dewberry.com)

**Abstract:** In the wake of Hurricane Harvey, the Texas General Land Office (GLO) embarked on an ambitious program to characterize flood hazards, assess risks, identify mitigation strategies and align strategies to funding sources, for multiple major river basins across the state. In seeking to advance the entire hazard mitigation cycle for communities over a large swath of Texas, GLO has sought a wide array of partners at the Federal, regional, state and local level, recognizing that mitigation is a team sport and empowering decision making at all levels is critical to progress. To support robust preparedness, response and recovery decision making throughout the State, the GLO has engaged Texas A&M and the University of Texas to develop a system called the Texas Disaster Information System (TDIS). TDIS is envisioned as an interactive, web-based, spatial platform where localities and Texans of all walks will be able to access authoritative information that informs everything from event recovery to mitigation opportunities. GLO has led an intentional process to engage partners and develop TDIS, enshrining principles of trust, empathy, and accessibility. GLO aims to have TDIS serve as a trusted data resource for all Texans. This requires presenting information that is science-based and free of the taint of advocacy. Similarly, TDIS recognizes that serving a wide set of users requires varied approaches to data presentation. An empathetic approach recognizes and enables tailored solutions for presentation and interaction. With its strong focus on community and demographic context, TDIS will use a data services approach to enable such tailoring and feed collaborations and applications built by partners and users. In this session, GLO representatives, members of the TDIS team, and contributors from Federal, state, and private sector partners will discuss the TDIS vision of data accessibility and discoverability and how each partner is supporting that vision.

**Biography:** Tyler works for the Texas General Land Office (GLO), the governor-designated agency responsible for administering all federal Community Development Block Grant Disaster Recovery and Mitigation funds allocated to the state. For 9 years, he has worked exclusively on long-term disaster recovery and mitigation programs created and administered by the GLO's Community Development and Revitalization (CDR) division. Tyler's work on the planning team focuses on creating the tools and information necessary to empower decision makers with the information they need to make informed decisions. Currently, Tyler designs and manages planning studies, including several interagency mitigation efforts. He continues to develop innovative solutions and initiatives to better protect Texans for future disasters. Tyler earned a Master's in Public Service and Administration from University of Texas A&M.

### **Updates on Texas's First Ever Statewide Flood Planning Effort**

Reem Zoun, PE, CFM, ENV SP, Texas Water Development Board, [reem.zoun@twddb.texas.gov](mailto:reem.zoun@twddb.texas.gov)

**Co-presenters:** Krista Bethune Melnar, PE, CFM, PMP, Principal and Vice President, Freese and Nichols, Krista.Melnar@freese.com

**Abstract:** Following historic flooding in Texas in 2017 and the continued rise of flood-related fatalities, the 86th Texas Legislature passed Senate Bill 8 that expanded the Texas Water Development Board's (TWDB) role as the administrator of the new state and regional flood planning process. The Texas State Flood Plan process follows a similar bottom-up planning approach that has been successfully used for water supply planning in the state since 1997. Regional flood plans will be developed by the 15 regional flood planning groups (RFPGs) and merged to create a statewide flood plan that will be updated every five years. Regional flood plans will identify flood management evaluations, strategies, and projects that reduce flood risk. Only projects identified in the Texas State Flood Plan, once approved, will be eligible for funding from the newly established Flood Infrastructure Fund (FIF) – also created as a result of the 86th legislature to finance flood-related projects. To meet the September 1, 2024 requirement to deliver the first Texas State Flood Plan, the TWDB has accomplished numerous feats including; establishing a new Flood Planning division, adopting state and regional flood planning rules, , forming 15 RFPGs each with representation from 12 stakeholder groups, developing the state's flood planning technical guidelines, and developing the flood planning data hub. This presentation will provide an overview and update of the Texas's first ever statewide regional flood planning efforts. Additionally, it will highlight topics currently being discussed by various flood planning groups across the state including addressing data gaps, evaluating unique hydrology, considering undersized infrastructure, addressing environmental issues, evaluating non-structural solutions, assessing co-benefits, planning for future conditions and coordinating with other State and Federal initiatives.

**Biography:** Reem Zoun, PE, CFM, is the Director of the Flood Planning Division at the Texas Water Development Board and is leading the effort for developing the statewide flood planning program and the delivery of the first sets of regional flood plans and the state flood plan for the State of Texas. She previously served as the Supervising Engineer for the Local Flood Risk Reduction Section at the City of Austin's Watershed Protection Department, where she led a section of engineers and technical professionals, was responsible for the storm drain improvement projects in the City, and managed over \$80M 5yr budget of Capital Improvement Projects (CIP). Prior to moving to the City, Reem worked for AECOM, Pasminco Elura Mine, and Victoria Department of Natural Resources and Environment in Australia. Reem has multiple publications and presented in various conferences. Reem has a MS in Civil Engineering from the University of Texas at Austin and an undergraduate degree in Environmental Engineering with First Class Honours from Royal Melbourne Institute of Technology in Melbourne, Australia. Reem received the American Society of Civil Engineers (ASCE) Austin Branch 2017 Civil Engineer of the Year award. In 2011, she was awarded as the Young Engineer of the Year by Texas Society of Professional Engineers Travis Chapter.

## **Session J: 4:00-5:30 pm**

### **J1: Local FPM Programs and Processes**

## **Beyond the FIRM, Using Best Available Data for Best Floodplain Management Practices**

Lisa Foster, CFM, Pinellas County Government, [ldfoster@pinellascounty.org](mailto:ldfoster@pinellascounty.org)

**Co-presenters:** Hank Hodde, CFM, ENV SP; [hhodde@pinellascounty.org](mailto:hhodde@pinellascounty.org)

**Abstract:** As heightened flood risk continues to threaten the nation, communities should be looking beyond the FIRM to help ensure resiliency. New development and construction can change how water flows and drains. Climate change also contributes to flooding with sea level rise and increased rainfall in short periods of time. With continuously changing conditions, it is important to use flood data that reflects this info. In many areas alternative data sources are developed prior to FEMA updating the FIS and FIRM for the area. Using alternative available data, such as vulnerability assessments, in conjunction with the FIRM can help communities maintain best floodplain management practices. This presentation will discuss how local flood studies may be applied to compliment the FEMA Flood data to ensure development is held to the standards appropriate for current and/or future flood risks.

**Biography:** Lisa Foster is a Certified Floodplain Manager with a Master of Science in Water Resources Engineering Science from the University of South Florida Civil and Environmental Engineering Department, Center for Modeling Hydrologic and Aquatic Systems (CMHAS). She has 15 years of experience in watershed and floodplain management planning and education and currently serves as the Floodplain Administrator for Pinellas County. Foster manages Pinellas County's Comprehensive Floodplain Management Program and NFIP Community Rating System (CRS) participation. She is also the Vice Chair of the Florida Floodplain Managers Association (FFMA), past President of the Florida Local Environmental Resource Agencies (FLERA) and sits on the Association of State Floodplain Managers (ASFPM) Climate Change Task Force. She was awarded the national Award for Excellence in CRS by the FEMA Federal Insurance & Mitigation Administration (FIMA) in 2018 for her extensive work with the real estate industry and partnerships with communities across Florida.

## **Continuing to Work Together to Simplify Permitting in the Trinity River Corridor**

Lisa Biggs, P.E., CFM, City of Fort Worth, [lisa.biggs@fortworthtexas.gov](mailto:lisa.biggs@fortworthtexas.gov)

**Co-presenters:** Stephanie Griffin, PE, CFM, F.ASCE; [sGriffin@half.com](mailto:sGriffin@half.com) and Craig Ottman, PE, CFM; [Craig.Ottman@trwd.com](mailto:Craig.Ottman@trwd.com)

**Abstract:** The Trinity River Common Vision program is a collaboration of 10 cities, 4 counties, 2 special utility districts, NCTCOG, USACE, FEMA, and TWDB formed over 30 years ago to address the cumulative impacts of flooding in the Dallas-Fort Worth area based on increasing levels of floodplain development within the Trinity River corridor. The 1st Edition of the Corridor Development Certificate (CDC) Manual was produced under this program in 1991, outlining a permitting process to allow development and projects to continue in a low impact way on regulated streams through consistent regional criteria and peer review. Over 200 projects have been permitted along the Trinity River in the Dallas/Fort Worth Metroplex using the CDC process. Models are continuously being refined and updated to reflect new construction and redevelopment as well as updates utilizing state-of-the-art modeling tools allowed by program funding contributions. As part of the modeling updates, an agreement was reached in 2017 between FEMA, the USACE, and NCTCOG to collaborate, utilizing a single model to combine and geo-reference the CDC and NFIP models for administering both programs. This new consolidated model only applies to FEMA LOMCs and USACE permitting within the Trinity River CDC corridor. A committee of regional partners and communities has been meeting since 2018 to establish the new process and ensure a smooth transition to the use of the Consolidated CDC Model as it nears completion. Team

Goals and Objectives included: Establish policies and procedures to keep both models simplified and in sync with permit actions for each program; recommend policy and procedure updates into the CDC Manual and the NFIP LOMC instructions; and Identify resources and funding needs. This presentation will provide an update to the committee's progress that includes an updated program manual and launch of a new process administration and tracking website. The presentation will also lay out the collaborative planning approach that could be replicated as a floodplain management permitting method across the nation; saving time, resources, and frustration.

**Biography:** As an Assistant Floodplain Administrator for the City of Fort Worth since 2015, Lisa Biggs draws on her over 17 years of experience in floodplain management. She is responsible for floodplain permitting, risk communication, and oversees Fort Worth's CTP program. Prior to joining the City of Fort Worth, Lisa worked for a private engineering firm where she focused on FEMA floodplain mapping updates and hydrologic and hydraulic modeling. Lisa holds a B.S. in Civil Engineering from Texas A&M University.

### **The FM Area Diversion: Navigating NFIP Requirements on a Large Regional Flood Control Project**

Joel Paulsen, PE, Metro Flood Diversion Authority, [Paulsenj@fmdiversion.gov](mailto:Paulsenj@fmdiversion.gov)

**Co-presenters:** Greg Thompson, PE, CFM, Houston Engineering, Inc., [gthompson@houstoneng.com](mailto:gthompson@houstoneng.com)

**Abstract:** The Fargo-Moorhead Area Diversion Project (Project) is designed to protect Fargo and West Fargo, North Dakota, Moorhead, Minnesota, and the surrounding communities during times of extreme flooding. The U.S. Army Corps of Engineers (USACE) and Diversion Board of Authority are partnering in the Project's design and construction. The Project consists of a 30-mile-long Diversion Channel, river control structures on the Red River, Wild Rice River, and Diversion Inlet, a 20-mile-long Southern Embankment that retains floodwater during Project operations, an upstream mitigation area, and in-town flood protection. The Project's size impacts a significant number of communities and watercourses, including 28 communities/jurisdictions in North Dakota and Minnesota along with 24 flooding sources that include mapped floodplains, and in many cases, regulatory floodways. Because of the scale of the Project, navigating NFIP requirements was challenging. Navigating the challenges was made easier by the cooperative approach toward NFIP compliance that was taken by FEMA, USACE, the states of ND and MN, and the Diversion Authority. This cooperation started early on in Project development, when the agencies met to discuss the Project and its impacts. These discussions ultimately led to the development of the FEMA/USACE Coordination Plan that set the framework for NFIP compliance as well as mitigation. One of the outcomes from the Coordination Plan was defining the process for completion of a Conditional Letter of Map Revision (CLOMR) for the Project. An initial CLOMR was issued for the Project by FEMA in August 2017. Subsequently, changes were made to the Project as a result of litigation and a second CLOMR was issued in September 2020. The size of the CLOMR submittal made it one of, if not the largest, CLOMR that FEMA has ever processed. A key part of the CLOMR and other state and local permitting is mitigation. A detailed Property Rights Acquisition and Mitigation Plan (PRAM) is a major part of the Project and details the process for acquiring properties, flowage easements, and mitigating impacts to structures. The PRAM is a living document and continues to be refined based on input from FEMA, USACE, and the states of ND and MN. Project construction has commenced on many components of the Project and it is expected to be operational in 2027. At that point, a LOMR will be submitted as the final step in NFIP compliance. This presentation

will provide an overview of the process that is being used to achieve NFIP compliance on a large regional flood-control project.

**Biography:** Joel Paulsen, PE, serves as the executive director of the Metro Flood Diversion Authority, which oversees the development of the Fargo-Moorhead Area Diversion project. Through a P3 (public-private partnership), the project will provide permanent, reliable flood protection for Fargo, ND, Moorhead, MN, and the surrounding communities by its completion in 2027. When Paulsen joined the MFDA in September 2019, he brought 20 years of experience in engineering, civil works, and traffic-related projects. He previously worked as an engineer and office leader for Stantec Engineering, where he worked on utility replacements, transportation improvements, levee systems, and community planning. He earned a civil engineering degree from North Dakota State University in Fargo. Paulsen, a native of Moorhead, previously served on the Moorhead City Council as well as the Governor's Task Force focused on achieving permanent flood protection for the region. He is a certified FEMA Floodplain Manager and is certified as a stormwater pollution prevention plan designer.

## **J2: Nature-Based Mitigation Policy and in Practice**

### **Once in a Generation Federal Funding Opportunity to Enhance Community Resilience**

Sarah Murdock, The Nature Conservancy, [smurdock@tnc.org](mailto:smurdock@tnc.org)

**Co-presenters:** Cheyenne Young; [cheyenne.young@tnc.org](mailto:cheyenne.young@tnc.org)

**Abstract:** With the passage of the Infrastructure Investment and Jobs Act of 2021 (IIJA a/k/a Bipartisan Infrastructure bill\*), there is an unprecedented amount of funding available to invest in nature-based strategies to reduce disasters, including flood risk. Programs funded include the new FEMA disaster revolving loan program, transportation resilience grants, culvert enhancement funding, NOAA coastal resiliency grants, and many more. This legislation represents a once in a generation magnitude of funding available for communities to draw on for planning, developing strategies, assessing feasibility, and implementing projects that will enhance resilience in the face of increasing climate impacts. Through existing and new programs, Congress is funding hundreds of billions of dollars in restoration related programs and if invested effectively could result in greatly advancing community resilience. Come hear from The Nature Conservancy's policy experts who work directly with federal agencies and programs discuss their insights on the opportunity related to federal funding of a broad array of programs. This is an opportunity to think differently on the types of nature-based solutions that can contribute to enhanced community resilience. The presentation will provide the audience with a summary of the federal funding available through the Bipartisan Infrastructure bill (IIJA) and the various existing and new programs that support investments in nature-based work to enhance resilience to flooding. The presenters will also discuss how this provides a unique opportunity rethink the scale and types of community actions and investments that could lead to significantly enhanced resilience. \*This abstract is being submitted before passage of the IIJA with the anticipation of its passage.

**Biography:** Ms. Murdock serves as the Director of U.S. Climate Resilience and Water Policy at The Nature Conservancy. Her 30-year career has spanned work in the public, private and now nonprofit sector on environmental and energy policy. In the past 18 years working at the Conservancy, Ms. Murdock's work has focused on policy, advocacy, communications, and executing projects that inform

The Nature Conservancy's climate resilience and water policy work. Currently, she manages the development and implementation of the Conservancy's climate resilience and water related policy positions. Prior to working at the Nature Conservancy, she served as a consultant working with environmental and energy clients to develop strategic solutions to government, regulatory, and community outreach challenges. Prior to being a consultant, she served on the staff of United States Senator John F. Kerry of Massachusetts concentrating on environmental and energy policy. She holds a B.A. in environmental science from Colby College and a M.A. in urban and environmental policy from Tufts University. She also completed the Sea Education Association semester of independent oceanographic research aboard 100-foot schooner. She is married, a mother to a teenage son, loves all active and inactive outdoor activities, and resides in Scituate, MA.

### **Mitigation: Coast to Coast**

Lauren Dozier, CFM, Hagerty Consulting, [lauren.dozier@hagertyconsulting.com](mailto:lauren.dozier@hagertyconsulting.com)

**Co-presenters:** Kalindi Fitch, [kalindi.fitch@hagertyconsulting.com](mailto:kalindi.fitch@hagertyconsulting.com)

**Abstract:** Every region of the country faces different impacts as a result of climate change. Increasingly, these impacts have proven to be root cause of flooding. In order to mitigate these flooding risks, we have seen communities take different approaches, increasingly incorporating innovative nature based solutions (NBS) in a proactive approach to move away from grey infrastructure. In this presentation, we will take you on a coast-to-coast mitigation tour to familiarize and incentivize communities with some insight into lesser known and exciting NBS mitigation projects or strategies communities are pursuing in order to reduce their risk, and enhance recovery from devastating flooding events. We hope to provide communities inspiration for incorporating NBS into their mitigation strategies and by utilizing funding through FEMA Mitigation grants. Our Tour will focus on the main regions in the United States: East Coast: Duck, NC Building Resilient Infrastructure and Communities (BRIC) Town of Duck Living Shoreline and NC 12 Resiliency Project North East: Vermont's focus on Stormwater Management and Green Infrastructure New York, New York- Waterline Square Midwest: Kansas City, Missouri- The City pledged to use grey infrastructure over a decade ago to incorporate green and NBS solutions. Kansas City developed a different solution: 230 green infrastructure projects integrated with new digital technology to monitor stormwater flow. Mitigation projects include rain gardens and green roof technology Gulf Coast: Virginia Point, Texas- Shoreline, wetland and marsh restoration through use of native seedlings West Coast: California Cardiff State Beach Living Shore Line Project All aboard!

**Biography:** Lauren Dozier is a certified Flood Plain Manager and a Senior Managing Associate in Hagerty Consulting Mitigation and Recovery Division. Lauren has over a decade of experience in mitigation, post-disaster grant administration and management. She possesses an extensive understanding of the grant administration process, eligibility requirements, regulations and policies across many federal programs allows clients to maximize reimbursement. She provides oversight throughout the grant administration period and is intimately familiar with such steps involved as application development, environmental review, project and process monitoring, closeout and audit activities

### **Measuring the Risk Reduction Benefits of Coral Reef Conservation: The Importance of Nature-Based Solutions**

Ashley Hoke, Niyam IT inc., [ahoke@niyamit.com](mailto:ahoke@niyamit.com)

**Co-presenters:** Doug Bausch, [dbausch@niyamit.com](mailto:dbausch@niyamit.com); Jesse Rozelle, [Jesse.rozelle@fema.dhs.gov](mailto:Jesse.rozelle@fema.dhs.gov); and Casey Zuzak, [Casey.Zuzak@fema.dhs.gov](mailto:Casey.Zuzak@fema.dhs.gov)



**Abstract:** The degradation of near-shore habitats, particularly coral reefs, increases the risk of flooding in coastal communities. However, mitigation and protective prioritization often fails to account for the economic protection of natural or nature-based solutions, instead opting for artificial defenses like seawalls. The USGS documented the risk reduction benefits of coral reefs across Hawaii in 2019 using Census block exposure information to compare flood losses with full and reduced coral reef habitat. Working with the U.S. Coral Reef Task Force, FEMA's Hazus Team built on this study completing a detailed structure-level flood analysis using the Hazus Flood Assessment Structure Tool (FAST) to identify areas where coral reef conservation would lead to the highest economic benefit for the five main islands of Hawaii. Hazus FAST, an Open Source Hazus tool, was used to model losses with and without the upper 1 meter of reef protection for 10-, 50-, 100-, and 500-year wave-energy return periods. The National Structure Inventory 2.0 was used to provide site-specific building exposure and vulnerability information. The multi-return period approach provided the capability to annualize losses avoided and quantify annual benefit of the reefs. Results from this study estimate an annual value of over \$300 million for reef protection across the five main islands of Hawaii. The exposed building value reduced by coral reef protection is over \$600 million, indicating a 50% flood loss ratio in Hawaii's reef-adjacent coastal communities. Hot spots based on the analysis highlighting large differences in annualized losses provide decision makers with locations where reef restoration and protection measures will be most cost effective. This presentation will provide local governments and coastal communities with methods and results for quantifying flood protection benefits of coral reefs as a nature-based solution, and emphasize the importance of exploring other coastal, nature-based solutions in lieu of building gray infrastructure.

**Biography:** Ashley Hoke is a GIS Analyst for Niyam IT Inc., who is currently finishing up a Masters Degree in Applied Geography and Geospatial Sciences at the University of Colorado at Denver. She has been working with the Natural Hazard Risk Assessment Program at FEMA on the Hazus Program for two years. During her time she has helped with several risk assessment projects as she leads the Hazus Help Desk and continues to help the Hazus Team create new natural hazard risk assessment guides, tools, and outreach materials to further communicate the importance of understanding natural hazard risk, how to assess it, and best mitigation practices.

### **J3: Local Case Studies of Prioritizing Mitigation Actions**

#### **Elevating Windsor Heights – Prioritizing Resilience**

John Callen, PE, CFM, JEO Consulting Group, Inc., [jcallen@jeo.com](mailto:jcallen@jeo.com)

**Co-presenters:** Dan Fricke, PE, CFM, LEED AP, JEO Consulting Group, [dfricke@jeo.com](mailto:dfricke@jeo.com)

**Abstract:** As a community on the downstream end of the rapidly urbanizing Walnut Creek Watershed in the Des Moines, IA metro, Windsor Heights (City) faces great challenges when it comes to reducing the impact of severe flood events. Impacts from recent flooding in 2018 along with updated flood studies have shown that flood risk for the community will likely increase over time unless action is taken to reduce stormwater runoff due to urbanization. Additionally, after updates to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) published in February 2019, approximately \$15 million in property value was added to the City's floodplain. Because of existing flood

risks, the expansion of the community's floodplain, and potentially increasing flood risks, the City chose to invest in establishing a Flood Reduction and Resiliency Plan to protect residents, property, and the financial resources of the community. JEO assisted the City to identify technically feasible and cost-effective flood risk reduction actions alongside public input to form actionable steps that not only protect lives and property, but also decrease the threat of increasing damage from future flooding events. JEO assisted the community with development of updated event calibrated hydrologic and hydraulic modeling, including a two-dimensional (2D) hydraulic model. This data was used to develop a building-by-building flood risk assessment. This assessment was utilized to identify which parts of the City are most at risk of flooding damages and to develop a flood risk reduction action plan. The plan considered flood risk reduction effectiveness, costs, benefits, and public feedback to identify the most feasible and cost effective programmatic, structural, and nonstructural flood risk reduction actions. This presentation will discuss the flood risk assessment and planning process and how the resulting action plan will contribute to reduced flooding damage risk for Windsor Heights.

**Biography:** John Callen has over 18 years of industry experience working with flood risk and floodplain management. John is currently a Senior Project Engineer in the Water Resources Engineering Department at JEO Consulting Group, Inc. John holds a Bachelor of Science degree in Biological Systems Engineering from the University of Nebraska at Lincoln and is a licensed Professional Engineer in Nebraska, Iowa, and South Dakota. John is also an Association of State Floodplain Managers Certified Floodplain Manager. His professional experience includes hydrologic and hydraulic modeling to support flood risk analysis and floodplain mapping, floodplain management, and flood risk mitigation. John's experience also includes 4 years with the Nebraska Department of Natural Resources where he worked on floodplain mapping projects and also served as NFIP State Coordinator for Nebraska. John has worked with flood risk awareness and communication through both structural flood risk reduction projects as well as nonstructural projects such as parcel by parcel flood risk identification and alternatives analysis. His recent efforts have been focused on large scale flood risk assessment and reduction projects.

### **Resilience Planning and Structure Specific Mitigation Benefit Estimating**

Tom Morey, RS, CFM, Stantec, [thomas.morey@stantec.com](mailto:thomas.morey@stantec.com)

**Co-presenters:** Chad Bunger, [bunger@cityofmhk.com](mailto:bunger@cityofmhk.com)

**Abstract:** Manhattan, KS has experienced multiple flood events over the last decade and has strived to put in place a program that breaks the cycle of flood damage/rebuild/repeat. With over 7,000 residential and non-residential buildings potentially at risk of flooding, this is not an easy task. Potentially impacted structures range from single-family to multi-family housing, small commercial structures, retail centers and industrial buildings. The City has committed resources to leverage grant funding and mitigate structures at risk. However, it is always a challenge to prioritize at-risk assets and focus efforts and resources on the areas that not only need it most but get the best return on investment. As part of a technical assistance project for FEMA Region 7, Stantec, as part of STARR II, completed a structure-based flood risk assessment and structure specific mitigation project alternative analysis for Manhattan, KS. This project analyzed at-risk buildings throughout the city to understand building-specific risk, identify cost-effective mitigation alternatives, and facilitate risk communication with the community. Using the Mitigation Benefits Estimator (MBE), each structure was analyzed for the following: depth of potential flooding, associated damages (dollar loss), and estimated costs/benefits of elevation or acquisition. The project included outreach assistance, public engagement, and local official

training use of the developed data. As part of the planned mitigation action, through a Brownfields Grant from the EPA, a known flooding area has been identified for re-development. Using the data developed with the MBE effort, and past knowledge of flood events, future use is being considered that will allow for safe redevelopment with an analysis of the potential impacts outside of the project area. As the community is sensitive to activities that might result in increased flooding impacts, re-development proposals will be limited to those that do not pose a negative impact, as described in our analysis.

**Biography:** Mr. Morey is a Project Manager with Stantec in Kansas City managing floodplain mapping and resiliency projects for federal, state, local and private clients. He has over 26 years of experience in floodplain management, natural resource management and education. He formerly served as the State NFIP Coordinator for Kansas. Tom currently serves as the ASFPM member representative to the CRS Task Force. Tom spends his free time making sure his kids are not doing what he was doing when he was their age and cutting down weeds on his farm.

### **Building a Watershed Master Plan Program for Flooding Resiliency - From the Ground Up**

Alicia Lanier, PE, City of Fayetteville, Public Services, [AliciaLanier@fayettevillenc.gov](mailto:AliciaLanier@fayettevillenc.gov)

**Co-presenters:** Sheila Thomas-Ambat. [SheilaThomasAmbat@FayettevilleNC.gov](mailto:SheilaThomasAmbat@FayettevilleNC.gov) and ByronReeves. [ByronReeves@FayettevilleNC.gov](mailto:ByronReeves@FayettevilleNC.gov)

**Abstract:** City leaders embarked on an ambitious \$13M Watershed Master Plan program in 2019 to better understand the magnitude and severity of flooding across the entire city and proactively develop flood mitigation projects. Leaders understood that a comprehensive evaluation would support resiliency by providing a pool of prioritized projects for both short-and long-term implementation. This effort will serve to stretch resources equitably, identify creative regional-scale projects, and ensure inter-governmental and cross-departmental collaborations. This program is unique in that the foundation was established within four years, to include an intensive rebuild of the City stormwater GDB and Schema, a city-wide survey, parallel modeling efforts by several consulting teams, scoring and ranking concern areas, and development of over a hundred projects. This presentation will provide an opportunity for participants to learn about elements needed to build or augment their own program, visualize and communicate flooding impacts and proposed mitigation solutions, and inform their own scoring and prioritization schemes.

**Biography:** Alicia Lanier is the internal Program Manager for the City of Fayetteville's Watershed Master Plan Program. With over 20 years experience in both private and public sector, Alicia has brought a deep level of understanding managing for complexity to this program. Over the past year and a half, she has worked closely with internal team members, the City's consulting Program Management team, as well as several H&H modeling consulting teams to bring potential projects to the Capital Improvement Program. She holds a MS in Biological & Agricultural Engineering, and most recently ran her own consultancy providing management consultancy, facilitation, and project management training.

## **J4: 2D Modeling: Large Scale and Rain-on-Grid**

### **Lower Missouri River: Flood Risk Data for the Future**

William Zung, PMP, CFM, Stantec, will.zung@stantec.com

**Co-presenters:** Rick Nusz, rick.nusz@fema.dhs.gov; Tony Krause tony.d.krause@usace.army.mil; and Paul Boyd paul.m.boyd@usace.army.mil

**Abstract:** The Missouri River experienced historic flooding in 1993, 2011 and again in 2019. The Lower Missouri River Comprehensive Flood Protection Study is an opportune time for FEMA Region 7 and the USACE Omaha and Kansas City Districts to collaborate in the development of new engineering data to support floodplain management, reduce flood risk, and improve resiliency across multiple States. The Lower Missouri River study area is from Gavin's Point Dam down to the confluence with the Mississippi river. A total of approximately 811 river miles, 7600 square miles of floodplain, 358 levee systems, 60 bridge crossings, 52 counties, and 5 states are impacted by this study. A key component of this study is the collaboration of subject matter working groups comprised of experts within the USACE, FEMA, and STARR II to develop and validate approaches to accomplish three primary objectives: 1. Successfully establish a framework for multi-federal agency collaboration towards analyzing flood risk from very large river systems that impacts multiple States. 2. Provide a consistent product in a baseline platform ready for future customized enhancements by both agencies to support individual needs. 3.

Produce flood risk data in support of FEMA's Future of Flood Risk Dataset initiative. USACE will provide an updated flow frequency relationships that uses a Monte Carlo analysis. USACE will also bring focus on evaluation of infrastructure performance and its impact on stage frequency. STARR II is producing a detailed 2D HEC-RAS model. The study includes: compilation of LiDAR into a seamless dataset; incorporation of hydrographic survey data of the river channel; compilation of survey data of bridges; leveraging flow frequency data produced by the USACE; performing stream gage analysis; performing rain-on-grid analysis and hydrograph routing of major contributing tributaries; producing 2D HEC-RAS with-levee model; and production of flood risk data.

**Biography:** Will is the Levee Lead for STARR II, a Professional Technical Services (PTS) provider to FEMA, as well as the Officer Manager and Water Resources Manager in the Kansas City office of Stantec. He leads teams of subject matter experts providing levee related flood risk analysis, flood hazard mapping, and flood risk communication. He is a Project Management Professional and Certified Floodplain Manager, with 23 years of experience with FEMA's National Flood Insurance Program as a hydrologist with a background in hydrologic and hydraulic modeling.

### **Using 2D Rain on Grid Modeling for Rapid Emergency Response Flood Mapping**

Mitchell Blum, PE, CFM, HDR Engineering Inc., mitchell.blum@hdrinc.com

**Co-presenters:** None

**Abstract:** The National Weather Service (NWS) publishes predictive hydrographs at select stream gages through their River Forecast Center. A major challenge floodplain managers have during extreme events is that NWS models are coarse and do not provide sufficient reporting points to forecast these events in areas where flooding occurs. These river forecasts can also change in a matter of hours as storm conditions change. In these areas of missing river forecast data, rain-on-grid simulations can provide a physically based approach for modelling a watershed's response to rainfall. The (NWS) issues predictive gridded rainfall estimates known as Quantitative Precipitation Forecasts (QPF). These QPF, along with river forecasts can be used to simulate flood events in advance of the weather event to help emergency responders mitigate impacts. In the winter of 2017 the north eastern Sierra Nevada Range in Douglas

County, NV experienced an atmospheric river event that flooded many of the roads in the region. Variability of conditions led to significant shifts in the river forecasting on a 3-6 hr. basis. Approximately 50% of the runoff volume was also not accounted for in the river forecasts. These factors, along with limited modeling in the region, made it difficult for forecasters to predict timing and magnitude of flood impacts. In response, the Carson Water Subconservancy District is working with HDR Engineering to create a US Army Corps of Engineer's HEC-RAS 2D Rain on Grid Model, that will run in a matter of hours, to use for emergency response operations. The model will ingest QPF rainfall and river forecast estimates to produce near real-time flood mapping. This presentation will cover the concepts of rain on grid modeling, model validation using historic data, processing and use of predictive QPF rainfall and river forecasts and use of this product for flood fighting efforts.

**Biography:** Mr. Blum has a M.S. in Hydrology from University of Nevada, Reno. While in graduate school his research was focused on mercury in sediment and water and the integration of GIS and hydraulic modeling. Mr. Blum has over 20 years in the industry in the public and private sectors. His experience includes wetlands restoration specialist with University of Nevada, Reno specialist, staff hydrologist for WRC Nevada and water resource engineer with HDR Engineering in Reno. He attained his professional engineering license in the state of Nevada and is currently working on a multitude of water resource engineer projects for HDR Engineering Inc. His specialties include hydrologic and hydraulic modeling and analysis, floodplain management and mapping, and drainage design. He has been actively working with US Army Corps of Engineers' Hydrologic Engineering Center Staff as one of a limited number of beta testers of HEC-RAS 5.0 since 2013.

### **Challenges with 2D Rain on Mesh (RoM) and Detailed Studies for Communities**

Meredith Miller, EIT, CFM, AECOM, meredith.miller@aecom.com

**Co-presenters:** Terri Fead, Colorado Water Conservation Board, terri.fead@state.co.us and Marta Blanco Castano, Colorado Water Conservation Board, marta.blancocastano@state.co.u

**Abstract:** What does the use of 2D hydraulic models mean for local floodplain managers? FEMA/CTPs/and Engineers continue advancing into the 2D workspace by developing large scale Rain on Mesh (RoM) and 2D detailed studies across the country, particularly when determining flood hazard potential for unidentified flood sources. While 2D and RoM can provide a benefit of large scale flood risk identification, it can also necessitate additional expertise and resources to manage the data. This can vary from managing larger datasets, requiring engineers to work with larger/more complex models, and complying with evolving FEMA guidance and standards. Specific challenges arise when considering mapping, floodplain analysis, tie ins for map revision requests, and other modifications. While guidance and best practices evolve, floodplain managers should be aware of potential considerations for studies conducted in their areas. This presentation will focus on considerations and potential recommendations surrounding floodplain management with 2D hydraulic analyses.

**Biography:** Meredith Miller is a project engineer for AECOM and has been conducting large scale floodplain analyses for the past 3 years. During this time, she has focused on 2D analysis across the country to include Colorado, South Dakota, Texas, and Hawaii. She has a BS in Environmental Engineering from Colorado State University. Meredith is a member of the Colorado Association for Stormwater Floodplain Managers and the Association of State Floodplain Managers (ASFPM). In her free time, Meredith likes to take advantage of the beautiful Colorado weather by playing soccer, golfing, and skiing.

## J5: Mapping Tools and Processes

### **LOMC Revalidation Best Practices**

Jamie Hughes, GISP, CDM Smith, [hughesjn@cdmsmith.com](mailto:hughesjn@cdmsmith.com)

**Co-presenters:** Diana Rodriguez, [Rodriguezad@cdmsmith.com](mailto:Rodriguezad@cdmsmith.com)

**Abstract:** The Summary of Map Actions (SOMA) process requires extensive information-gathering and assessment activities in order to determine the Letter of Map Change (LOMC) status for all communities impacted by a Flood Risk Study. The status of a LOMC directly impacts a property owner's requirement, or exemption from requirement, for purchasing federal flood insurance. Improvements to the SOMA categorization workflow, in the long and short term, will improve the precision of LOMC classification during the Flood Risk study process. This presentation will demonstrate how normalizing and implementing far-reaching best practices throughout the SOMA categorization workflow is an immediate method to improve the accuracy and validity of LOMCs throughout the Risk MAP program. Recent efforts have focused on integrity and standardization within the LOMA shapefile layer. As part of that effort, LOMCs with unclear statuses were examined and corrected. This effort included comparing LOMC case numbers to effective revalidation letters, identifying reissuances, assessment of LOMCs compared to effective mapping, and other logical strategies of assessment. These best practices pave the way for an all-digital application for SOMA and Revalidation activities in the future, which could result in greater accessibility for impacted communities, businesses, and homeowners.

**Biography:** Ms. Hughes is a GIS Specialist with twelve years of experience that includes utilities such as water, wastewater, and electricity systems, transportation networks, linear referencing systems, storm water management, environmental management, disaster management, water resources and planning. Ms. Hughes is proficient in Esri ArcGIS Desktop software, including the Data Reviewer, Spatial Analyst, Utility Analyst and Network Analyst extensions as well as ArcGIS Online. Ms. Hughes provided assistance with Summary of Map Actions (SOMA) and revalidation letter production for multiple studies. The work included determining the study footprint and reviewing the existing Letter of Map Change/Amendment (LOMC/LOMA) cases to determine validity based on the new effective. Jamie also provided support to produce Flood Risk Reports (FRR) and Digital Flood Insurance Rate Maps (DFIRM) for various studies.

### **2D Models to Maps: Understanding Variability Between Different Mapping Methods**

Andrew C. Reicks, CFM, GISP, CDM Smith, [reicksa@cdmsmith.com](mailto:reicksa@cdmsmith.com)

**Co-presenters:** Eli Gruber, PE, CDM Smith, [grubere@cdmsmith.com](mailto:grubere@cdmsmith.com)

**Abstract:** The introduction of the two-dimensional (2D) Base Level Engineering (BLE) process five years ago revolutionized the production of Zone A floodplain determination across the country. The process has shifted over the last six years with improvements in software and with increased understanding of 2D rain-on-grid modeling from engineering, mapping, and community perspectives. Studies across different topographic regions have highlighted a need for standard mapping methods. Translating HEC-RAS model results into mapped products is one important aspect of the 2D process that is often overlooked. The methods employed on the engineering side are generally well represented in the public domain, while translating those into floodplains often involves proprietary tools and processes. Since it is mapped floodplains and not the models alone that drive regulatory products it is important to

understand how models are translated into maps and to have processes that produce consistent floodplains. This presentation focuses on the potential variability of mapped results based on different mapping processes and different topographic regions.

**Biography:** Andrew C. Reicks, CFM , GISP, has a Masters degree in GIS and is a GIS Specialist/Developer with CDM Smith a member of Compass PTS JV with a background in Python scripting, remote sensing, and urban and regional planning. Andrew has experience ranging from development to project management. Andrew's experience covers a wide variety of tasks including community outreach, discovery, flood risk products, data development (hydrology, hydraulics, floodplain mapping, terrain), and production mapping in Regions I, II, IV, V, VI, VIII.

### **eLOMA – A Collaborative Tool for Licensed Professionals, Communities, and FEMA**

David Mummert, Michael Baker International, dmummert@mbakerintl.com

**Co-presenters:** None

**Abstract:** The Federal Emergency Management Agency's (FEMA) Electronic Letter of Map Amendment (eLOMA) tool provides licensed land surveyors and professional engineers with an internet-based system to submit a variety of LOMA requests as a faster alternative to the standard application process. The eLOMA tool is available to any licensed professional who registers through FEMA's Mapping Information Platform, which is located online at <https://hazards.fema.gov>. This presentation will:

- Provide a summary of the eLOMA tool;
- Outline improvements to the eLOMA process, such as the expansion of accepted request types and application tracking via the new user workbench;
- Highlight plans for future user trainings and web-based learning opportunities;
- Provide insight into how the accuracy of eLOMA submittals correlates directly with audit frequency; and
- Discuss the steps necessary to achieve an eLOMA Super User status to reduce the number of audited submittals.

**Biography:** David Mummert has over 20 years of National Flood Insurance Program (NFIP) experience with Michael Baker International in the MT-1 (LOMA) Group. He is a graduate of St. Mary's College of Maryland with a degree in Biology with a specialization in Environmental Science. He is currently the Northwind Resource Consulting (NWRC) eLOMA Coordinator for all 10 FEMA Regions, Technical Manager for the NWRC MT-1 Group, and Subject Matter Expert for LOMA and eLOMA processing through FEMA's Mapping Information Platform (MIP) website.

## **J6: Climate Change and Risk Communication**

### **To Infinity and Beyond: Managing Flood Risks Now and Into the Future**

Marcia Tobin, AICP, AECOM, [marcia.tobin@aecom.com](mailto:marcia.tobin@aecom.com)

**Co-presenters:** Doug Bellomo, PE [doug.bellomo@aecom.com](mailto:doug.bellomo@aecom.com) and Justin Vandever, PE [Justin.Vandever@aecom.com](mailto:Justin.Vandever@aecom.com)

**Abstract:** As our climate and landscapes change so do flood hazards and risks. Individuals, academics, government officials, volunteer and non-profit organizations, and the private sector all play a role in reducing loss of life and injury, property damage, and harm to the environment. Effective flood risk management is more than assessing potential exposure to a hazard and sharing the information.

Effective flood risk management requires engaging stakeholders in discussions about what they value, developing plans to safeguard what matters, taking action, adapting, and monitoring change over time. In this session, Marcia Tobin, Doug Bellomo and Justin Vandever will present a life cycle approach to flood risk management along with strategies and project examples that have been utilized for getting ahead of the next flood and recovering stronger after disaster does strike.

**Biography:** Marcia Tobin is an urban planner trained in environmental and climate science. Marcia's work centers on integrated approaches and solutions to build and sustain thriving communities. Marcia focuses on climate adaptation and resilience planning, working with communities, cities, state and federal agencies to anticipate and plan for changing climate conditions. A key approach is to expand solutions that use natural processes, bring multiple benefits to the community, are balanced with traditionally engineered solutions, and begin with quick action. Recent work includes climate adaptation planning in Naples and Collier County, FL; development of the Resilience Program in Miami Beach FL; assessing sea level and flooding impacts in the Hampton Roads Virginia region; statewide climate change vulnerability assessments in New York State; and initiatives with FEMA to strengthen the use of Risk MAP data by communities for greater hazard mitigation and resilience.

### **Tools and Visualizations for Communicating Sea Level Rise and Coastal Flood Risk**

Dan Rizza, Climate Central, [drizza@climatecentral.org](mailto:drizza@climatecentral.org)

**Co-presenters:** Kelly Van Baalen, [kvanbaalen@climatecentral.org](mailto:kvanbaalen@climatecentral.org)

**Abstract:** Despite floods causing billions of dollars of damage annually in the United States, the public continues to underestimate the risks they pose—just 10% of people believe their house is at risk of flooding (FEMA, 2013). This lack of awareness is a key factor driving development in high-risk zones, inadequate flood insurance uptake rates, and a lack of emergency preparedness. As rising sea levels continue to increase the frequency and severity of coastal flooding, it's imperative that the risk of coastal flooding is communicated to the public in ways that break through the current unawareness. Climate Central has found success in communicating sea level rise and coastal flood risk using online tools, maps, and visualizations, grounded in peer-reviewed research. Our Coastal Risk Screening Tool maps the areas at risk from coastal flooding and sea level rise under different climate and flooding scenarios. Our Risk Finder tool provides detailed information on the people, infrastructure, and contamination risks exposed to different flood levels, as well as when those floods could occur. Finally, our photorealistic images and fly-over videos depict what hundreds of iconic locations around the world could look like after sea levels rise. These tools and visualizations have been shared by the news media thousands of times, used by millions of people, and featured at the UN climate conference. Now, we are working to expand our capacity to visualize what coastal flooding could look like in places people care about, update our tools with new data, and continue to improve them based on the input of coastal stakeholders. This presentation will walk the audience through our communications toolkit, provide examples of how our tools and visualizations have been used for floodplain management, and seek input from the audience regarding their communications needs to inform our next generation of tools.

**Biography:** Dan Rizza manages the Program on Sea Level Rise at Climate Central, a non-profit research organization providing localized, evidence-based information on climate science, impacts & solutions. Dan has managed the rollout of Climate Central's coastal risk screening and visualization tools designed to enable coastal stakeholders to explore sea level rise and coastal flood risk over time, for nearly



anywhere in the world, and under multiple pollution scenarios. He earned his MA at Georgetown University's Graduate School of Foreign Service and his BA at Colby College.

### **Engaging Communities and Residents on Current and Future Coastal Flood Risk**

Andrew Medhurst, SLR/MSU/Sea Grant

**Co-presenters:** None

**Abstract:** Communication is hard on its own, but when you further that to think about engagement of communities – from residents to city staff and officials – it becomes even more challenging. Engagement comes with the idea of working together to pursue a goal, such as flood resilience for both current risk and risk exacerbated by sea-level rise. It is also a step that shouldn't be ignored; proper engagement is integral to impactful, long-term flood resilience measures. However, effective engagement requires a significant amount of work that is not typically taught together in any coursework. Relationship- and trust-building, clear and understandable communication of issues, research into the specific local situation, and ensuring a just and equitable strategy is just the start of many engagement plans. While there is no set equation to reaching effective engagement, there are many successful and failed examples that we can learn from and keep in mind when pursuing flood risk engagement. In this presentation, multiple examples will be reviewed and lessons learned from engagement specialists in the flood resilience realm will be discussed.

**Biography:** Andrew is a Resilience Coordinator with PLACE:SLR, a Mississippi State University Extension and Sea Grant program. His work focuses on conducting extension and outreach activities related to the transition and translation of sea-level rise information for coastal decision making. Prior to joining the Program for Local Adaptation to Climate Effects: Sea-Level Rise, Andrew worked for multiple coastal research and stewardship programs including with the National Audubon Society in Mississippi and the United States Peace Corps in the Philippines. He received a M.S. in Environmental Science from Florida Atlantic University.

## **J7: Natural and Beneficial Functions: How-To**

### **Developing an Action Plan for No Net Loss of Floodplain Functions**

Eileen Shader, American Rivers, [eshader@americanrivers.org](mailto:eshader@americanrivers.org)

**Co-presenters:** Audra Martin, National Association of Wetland Managers, [audra @aswm.org](mailto:audra@aswm.org)

**Abstract:** Due to the continued increase in damages and loss of life from reactive flood management policies, a more proactive approach to floodplain management is imperative. With a fundamental national policy direction change, we can leverage the benefits of nature-based solutions and current technologies to focus on protection, restoration, and mitigation. In 2018, the Natural Floodplain Functions Alliance and the Wetland Mapping Consortium joined forces to host a workshop on exploring opportunities for integrated mapping and functional assessment of riverine and coastal floodplains and wetlands. This effort led to three subsequent workshops that discussed data needs, gaps, and interoperability for maps of wetland and floodplain functions, the federal program and policy changes that are needed to advance integrated, functional mapping of these functions, and a final workshop focused on developing a new national floodplain management strategy leading to no net loss of

floodplain functions and reduced flood risk in local communities. This presentation will share the results of this final workshop, including federal policy recommendations and near-term actions that can be taken to fundamentally transition our current reactionary approach to floodplain management into one that prioritizes avoidance of impacts to floodplain functions, restoration of floodplains, and mitigation of functions lost due to unavoidable impacts. Participants will be encouraged to review and provide feedback on the recommendations, target audience, and outreach/implementation strategy.

**Biography:** Eileen Shader is Director of River Restoration at American Rivers. She leads the organization's national Floodplain Program to build capacity for equitable, integrated, and nature-based floodplain management. Through this initiative she seeks reforms to local, state and federal floodplain management policies; fosters a nation-wide Community of Practice to support equitable, integrated and nature-based floodplain management; and builds institutional capacity to implement and manage floodplain restoration projects across the United States. Eileen works at the confluence of the river conservation and flood management fields to break down silos and foster integrated planning and management strategies that maximize the benefits that rivers and floodplains provide to communities. She has more than fifteen years of experience advocating for improvements to federal water resources policies to foster support for river restoration and the use of nature-based solutions. She serves as Co-Chair of the Natural and Beneficial Functions Committee, and Co-Chair of the Social Justice Task Force for the Association of State Floodplain Managers and participates in the leadership teams for numerous coalitions including the Natural Floodplain Functions Alliance and the Water Protection Network. Eileen is a Certified Floodplain Manager and has a M.A. in Natural Resources Policy from the George Washington University.

### **Financing the Restoration of Mangrove Ecosystems to Protect Florida's Coastal Communities**

Laura Geselbrach, The Nature Conservancy, lgeselbracht@tnc.org

**Co-presenters:** Rod Braun, rod.braun@tnc.org; Martha Rogers, martha.rogers@tnc.org; and Joseph Schmidt, joseph.schmidt@tnc.org

**Abstract:** Mangroves play a vital and cost-effective role in protecting people and property. Recent research by The Nature Conservancy (TNC) and our partners showed that mangrove forests dissipate wave energy and slow storm surge penetration, which can lower flood damage and minimize erosion. In Florida, TNC scientists, along with partners, estimated that mangroves would avert \$1.5 billion in flood-related property damage from an Irma-like hurricane. In another study, TNC and our partners assessed the benefits of mangroves over 745 miles of coast and found that approximately 250 miles of coastline have cost effective opportunities for mangrove restoration. Going forward, mangrove forests can serve as a vital first line of defense, but only if they are maintained, restored, and managed with science-based policies and practices. This presentation will consider two specific projects aimed at maintaining and restoring mangroves in Florida. First, we will present a project that incorporated mangroves into city-planning to cost-effectively protect public park assets. We will present work completed in partnership with the City of Miami to design and construct a coastal resilience project at Morningside Park in Miami, a 42-acre park with 1,900 feet of waterfront on Biscayne Bay that is subject to frequent flooding. Second, we will present recent work aimed at identifying opportunities for the pilot of a mangrove insurance product in Florida. This work will review what groups in Florida are most interested in purchasing a mangrove insurance product and what such a product would look like. Overall, this presentation will highlight the need for innovative finance solutions to ensure the resilience of mangrove forests in Florida for generations to come.

**Biography:** Laura Geselbracht has been involved with marine science and conservation work for over 30 years along the U.S. Pacific Coast and along Florida's Atlantic and Gulf of Mexico coasts. For the last several years, Laura's work has focused on developing and using scientific information to promote the use of nature-based solutions to enhance shoreline resilience and to improve methods for siting and monitoring coastal ecosystem restoration projects. Laura serves as a scientific advisor to the Southeast Florida Climate Change Compact, Apalachicola Bay System Initiative, Florida Sea Grant, Statewide Ecosystem Assessment of Coastal and Aquatic Resources, Florida Oyster Recovery Science Working Group and on several Nature Conservancy projects. She previously served on the Board of the Florida Ocean Alliance for 5 years. Laura holds a master's degree in Marine Affairs from the University of Washington and a B.A. in Aquatic Biology from the University of California, Santa Barbara. Recent publications include Valuing the Flood Risk Reduction Benefits of Florida's Mangroves (2019), Shellfish Reef Restoration in Practice, In Restoration Guidelines for Shellfish Reefs (2019) and A Multiscale Natural Community and Species Vulnerability Assessment of the Gulf Coast, USA (2018). Laura has been interviewed on BBC Business Matters, Voice of America, the Weather Channel and National Public Radio among other media outlets.

### **Application of the USACE International Guidelines on Natural and Nature-Based Features for Beaches and Dunes**

Chris Mack, PE, PMP, D.CE, Stantec, [chris.mack@stantec.com](mailto:chris.mack@stantec.com)

**Co-presenters:** Jeff Tabar, [jeff.tabar@stantec.com](mailto:jeff.tabar@stantec.com)

**Abstract:** Interest to Conf Attendees: With the release of the USACE's International Guidelines on Natural and Nature-Based Features September 16, 2021, the interest to ASFP members in applying this state-of-the-art guideline to beach and dune projects is high. Objective: Demonstrate an application of the 2021 USACE's International Guidelines on Natural and Nature-Based Features guidelines using representative beach and dune projects along the Atlantic Coast in FL, GA, and Carolinas. Methods/Approach/Results: USACE and collaborators from the public and private sector around the world have been building, learning, and documenting the best practices for constructing Natural and Nature Based Features (NNBF) for decades. The consolidation of these lessons into a single +1,000-page guidance document gives decision makers and practitioners a much needed resource to pursue, consider, and apply NNBF for flood risk management while expanding value through infrastructure. Application of this guideline with examples from the Atlantic Coast will include the following topics: • Defining the Beach and Dune System • Management Strategy • Design Principles and Pathways • Addressing Uncertainty with Dynamic Adaptive Policy Pathways (DAPP) Approach • Performance, Benefits, and Costs Conclusions/Lessons Learned: Using examples from the Atlantic Coast states such as FL, GA, and the Carolinas, Stantec will describe the application of the USACE NNBF guidelines and its usefulness to planning, design, and engineering practitioners involved with beach and dune projects. Supporting information from other sources will complement this application.

**Biography:** Chris Mack, PE, MBA, PMP, D.CE. Mack serves as a regional director for Stantec's Coastal Solutions practice in Charleston, SC. He brings more than 30 years of engineering, management, and leadership experience, including 13 years with the U.S. Army Corps of Engineers (USACE) Charleston District. He is an expert in hydrology, hydraulics, coastal engineering, resilience, and project management. Chris has academic degrees in water resources, coastal engineering, software

engineering, and business administration from North Carolina State University, The Citadel, and College of Charleston. He currently serves as President of the American Society of Civil Engineers - Eastern Branch (Charleston, SC)

## **J8: Professional Development**

### **ASFPM Spotlight: The Official Guide to Taking the CFM Exam and Maintaining Your Certification**

Louie Greenwell, GISP, CFM, ASFPM, [louie@floods.org](mailto:louie@floods.org)

**Abstract:** So your boss just told you that your community is required to have a Certified Floodplain Manager (CFM), and that person is now you. Maybe earning your CFM credential was in your employee performance goals and you need to pass the exam in the next few months or you won't get that big promotion with the corner office. Whatever the reason, you probably have lots of questions as you begin to prepare. How many questions and what subject matter is on the exam? Where can you find study resources? Where can you take the exam? How much does it cost? What can you bring with you on exam day? How long does it take to get your results? How long do you have to wait to take it again if you don't pass? How do you sign up? We'll answer all of these questions and more including the requirements for maintaining your certification. How many continuing education credits CECs do you need and how often? What qualifies and what doesn't? What proof do you need to submit? Where can you find free or low-cost CECs? All will be revealed!

**Biography:** Louie began his career over 30 years ago and currently serves as the Certification, Training, and Technology Director for ASFPM. With a background in GIS, Louie has managed complex technology implementation projects at many levels of federal, state and local government. His passion for professional development and continuing education led him to ASFPM where he served as a volunteer and President for the Certification Board of Regents (CBOR). He now provides leadership for the national CFM® Program, training, and efforts to modernize and integrate ASFPM's technology platforms. He also serves in a coordination role for the Flood Mitigation Certification Program.

### **Taking the Mystery Out of Floodplain Management Education: Providing the Right Clues for Aspiring CFMs**

Michael Rimoldi, CFM, CBO, MPA, Florida Floodplain Managers Association, [mike@rimoldi.org](mailto:mike@rimoldi.org)

**Co-presenters:** None

**Abstract:** Recent data has shown that a significant number of individuals with limited floodplain management experience are now entering the floodplain management discipline. Building Officials, plans examiners, building inspectors, zoning technicians and permit clerks are now being charged with some aspect of floodplain management in their day-to-day duties. Even design professions including architects and engineers who may never have dealt with NFIP requirements are now becoming more involved with aspects of FPM. With that, there exists a need to provide training for these individuals based on their expected performance and with what may be a limited floodplain management experience background. This session will discuss how the Florida Floodplain Managers Association have been working to reach those goals with specialized classes and webinars such as their "FBC + FRC = FPM" class or the "Disaster Management for Floodplain Managers" offering. Time will be spent on how

custom class creation is done based on needs and requests from members and prospective CFM members. The overall goal is to not only provide ongoing continuing education that existing CFMs find beneficial but also to provide fundamental concept training for those just entering the CFM realm with limited FPM experience yet may already possess a strong knowledge base of construction and building codes.

**Biography:** Mike is a Senior Project Manager with J.S. Held and serves as the lead for building codes and floodplain management aspects for the organization. He is a licensed Building Official and Certified Floodplain Manager with over 35 years in the industry. He holds numerous ICC Certifications and is currently a PhD Candidate at the University of South Florida in Tampa. Mike is also the Education Champion for the Florida Floodplain Managers Association.

### **The Emerging Workforce of Programming Engineers**

Geoff Uhlemann, PE, PMP, CFM, Michael Baker, [geoff.uhlemann@mbakerintl.com](mailto:geoff.uhlemann@mbakerintl.com)

**Co-presenters:** Jon Villines, Mile High Flood District Watershed Manager; [jvillines@mhfd.org](mailto:jvillines@mhfd.org)

**Abstract:** Technology continues to rapidly evolve and so must our workforce. As large datasets become increasingly accessible, tools more efficient, and computing more powerful, our work paradigm inevitably trends toward automation. Computing costs are a fraction of engineering labor and so model optimization is not as influential as automation now is. Programming skills that were once an uncommon niche in an engineer will soon become a base expectation to enter the engineering field and a core skillset to develop as part of an engineer's career path. This presentation will overview the various business models for programming services (subcontract, specialty group, team integration, or team distribution), along with their pros and cons and strategy for talent acquisition and development. We will consider the prolific expansion of coding languages and the precedents that paved the way for this in floodplain mapping. We will feature a number of brief case studies highlighting increased efficiency and quality through tool development and automation and close with consideration to future career paths, engineering services, challenges, and opportunities.

**Biography:** Geoff is a Project Manager and team leader at Michael Baker with experience leading floodplain mapping studies and probabilistic flood risk assessments. He enjoys planning and leading innovative work. Basically, Geoff likes working on cool sciency stuff with great coworkers and clients. He is also a proud father of five girls, happily involved at church, camps a lot, and rock climbs.