In-person Concurrent Sessions Narrative Program

ASFPM Annual National Conference – Salt Lake City, Utah

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Concurrent Session A

A1: Nature-Based Solutions in Mitigation Projects
Track: Mitigation

Coastal Texas Mega Project

HimangshuDas, , US Army Corps of Engineers himangshu.s.das@usace.army.mil
Co-presenters: Jacob Garrett, Jacob.Garrett@usace.army.mil and Jason Thies, Jason.Thies@usace.army.mil

Abstract: The United States Gulf Coast cities including Houston, Corpus Christi, New Orleans, and many other coastal cities are vulnerable to periodic storm surges and rainfall extremes. Since 1900, hurricanes striking in this region have killed in the range of 6000 to 12000 people and caused tremendous economic damage to infrastructure. In 2015, the U.S. Army Corps of Engineers (USACE), in partnership with the Texas General Land Office (GLO), began to explore viable solutions for coastal storm risk, management, and ecosystem restoration along the Texas coast. The study is known as the comprehensive Coastal Texas Study (http://coastalstudy.texas.gov). The objective of the Coastal Texas Study was to improve our capabilities to prepare for, resist, recover and adapt to extreme events. A "Multiple Lines of Defense" strategy was used in the Coastal Texas study to design cost-effective, environmentally friendly solutions that will reduce risks of storms impacting the coastal communities and restore important wildlife habitat at the same time. Various numerical models were used as tools to better understand the potential environmental impacts. The integration of a variety of modeling tools, along with qualitative evaluations, was a critical part of the assessment of environmental impacts to the health and ecology of the unique Galveston Bay complex. This presentation will describe the coastal engineering analyses used to develop this world class mega project.

Biography: Dr. Himangshu Das graduated from University of South Carolina with a Ph.D. in Civil and Environmental Engineering. Currently he is serving as the Chief of Coastal Section at the Galveston District. Prior to that Dr. Das served as the District's Subject Matter Expert (SME) providing expert guidance in coastal hydrology and hydraulics. Recently he served as the technical lead for the Coastal Texas Mega project - $20 million feasibility study to better understand coastal risk and resilience to develop and engineer innovative solution to reduce infrastructure risk specific to the Texas coast from Louisiana to Mexico border. Prior to joining at the U.S. Army Corps of Engineers, from 2008 to 2017, he worked as a tenured Associate Professor at the Department of Civil and Environmental Engineering, Jackson State University (JSU). At JSU, he served as Principal Investigators to numerous research projects. At JSU, he secured and executed about one and half million-dollar worth of applied and research projects that focused on urban, coastal and near-shore processes, and ocean engineering and have authored or coauthored more than 40 peer reviewed technical publications.   Dr. Das is a

registered Professional Engineer (P.E.) in the state of Florida and have over 25 years of progressive experience in conducting fundamental, applied studies in coastal hydrodynamic and sediment transport modeling and design. Between 2003 and 2008, he worked for AECOM Engineers (Former URS Corporation) where he gained extensive experience in storm surge modeling, parallel computing and sediment transport in shallow and deep-water environment. At AECOM, he participated numerous hydrodynamic and morphodynamic studies in river, tidally and wind dominated coastal regions along the Atlantic, Pacific, and Gulf coasts. These works required expertise in physical oceanography, coastal and estuary processes, and sediment dynamics. At USACE Dr. Das parodically review projects in coastal hydraulics, climate impacts, navigation, and inland hydrology

Flooding to Renewal: Brentwood Bound Flood Mitigation

Elise Ibendahl, CFM, PE, PMP®, F.ASCE, Jacobs, elise.ibendahl@jacobs.com
Co-presenters: Ritu Gupta, PE, CFM, Jacobs, ritu.gupta@jacobs.com

Abstract: Flooding has long severely impacted the City of Brentwood, MO along Deer Creek between Hanley Road and South Brentwood Boulevard, with 26 floods since 1957. The repeated flooding in this landlocked, urban community of ~8,200 residents in the core of the metropolitan St. Louis region has caused significant public safety issues and property damage. The Brentwood Bound Project is an integrated, comprehensive plan to renew the Manchester Road corridor via three main components: Deer Creek Flood Mitigation, Manchester Road Improvements, and Deer Creek Greenway Connector. The flood mitigation component of Brentwood Bound includes floodplain restoration and mitigation to reduce flood elevations, increase public safety, and provide environmental and recreational amenities. In addition to the flood mitigation improvements, the City of Brentwood is constructing the Deer Creek Greenway Connector, a new park pavilion with amphitheater, retention ponds and a destination playground. The completed improvements have the potential to connect to more than 28 miles of greenways in the St. Louis region. A groundbreaking event occurred in April 2022 for the Deer Creek Greenway Connector with many of the project's amenities. The historic St. Louis area floods of July/August 2022, with multiple large rain events (including one with over 8" of rain in 6 hours), tested out the project's effectiveness during construction. Another storm event, which would have required boat rescues in pre-project conditions, went largely unnoticed just before the flood mitigation project was completed and Brentwood Park opened in the summer of 2023. The Brentwood Bound Project has actively worked with stakeholders and the community over nearly 15 years of project planning, design, and development. The $81M project is funded through a combination of grant funding, partnerships, funding from certificates of participation, and a one-half of 1% economic development sales tax.

Biography: Elise Ibendahl is the Jacobs Global Principal for Flood Modeling and Planning. With over 26 years of experience in engineering and hydraulic modeling, she leads the development of effective strategies and solutions to mitigate the impact of floods on communities and infrastructure. She utilizes advanced modeling techniques, data analysis, and collaborations with multidisciplinary teams to create comprehensive flood studies and mitigation plans, particularly in urban environments. Elise's passion for protecting communities and her commitment to sustainable development make her a leading contributor in addressing the challenges posed by floods and ensuring resilient and safe environments. She is a champion of innovation for flood modeling technologies, and throughout her career she has performed the roles of project manager and/or subject matter expert for over 90 projects related to flood risk management for Federal, State, and Local entities. She has contributed to projects throughout the United States and globally in over 15 countries, including hydrologic and hydraulic modeling, flood

risk management studies, drainage and stormwater management studies, CSO long term control plan implementation, hazard mitigation planning and design, stormwater master planning, green infrastructure solutions, and floodplain mapping and permitting related projects. Ms. Ibendahl specializes in urban flood risk management modeling and planning, including integration of 1D and 2D modeling environments in a variety of software platforms. She also contributes to the development of advanced modeling software and platforms such as Flood Modeller and Flood Platform. She is proficient in the analysis of hydrology, sewer systems, open channels, floodplains, and watersheds for a wide range of scales and applications.

Strategic Planning for Co-Benefits in Flood Mitigation and Habitat Restoration in Pierce County, Washington

Rachel Bradley, ICF, rachel.bradley@icf.com
Co-presenters: Rebecca Lee; rebecca.lee@piercecountywa.gov and Laura McMullen; Laura.McMullen@icf.com

Abstract: Pierce County, Washington is home to national parks, wilderness areas, agriculture, urban areas, and tribal land. Historical riverine flooding events have threatened public safety and infrastructure in flood-prone areas and will increase with climate change. Given the magnitude of watershed area and the presence of disadvantaged communities, critical infrastructure, and endangered species, Pierce County undertook several planning efforts to identify and prioritize projects that generate co-benefits in flood mitigation and habitat restoration. This included evaluation of fish habitat using Ecosystem Diagnosis & Treatment (EDT) and the Comprehensive Flood Hazard Management Plan (FHMP) in 2023. The outcome of the EDT and FHMP was the identification of capital projects the County will undertake over the next several years. Due to funding constraints for these projects, the County took proactive steps in planning for and pursuing grants funded under the Bipartisan Infrastructure Law (BIL) and Inflation Reduction Act (IRA). The County was selected under FEMA's Building Resilient Infrastructure and Communities (BRIC) program for two projects totaling $25.5 million federal share – the Construction of Jones Setback Levee and the Acquisition of Valley Brook Mobile Home Park & Floodplain Reconnection projects – that will protect communities from flooding, restore the natural and beneficial functions of the floodplain, and support fish species. Additionally, the County developed a Funding Strategy Dashboard, a centralized, cloud-based system for tracking all federal and state grant programs, developing a multi-year strategy for pursuing grants for capital projects, and collaborating across diverse grant stakeholders. Through continuous updates and evolution, the Funding Strategy Dashboard will help the County track grant deadlines, foster collaboration, and demonstrate return on investment for grant pursuits. This presentation will provide the audience with an understanding of how Pierce County has combined analysis, planning, and technology to achieve co-benefits for its community and environment while showcasing two BRIC success stories.

Biography: Ms. Bradley has 11 years of diverse professional experience in hazard mitigation and program management. She has supported agencies in managing highly technical and complex projects from the national to the local level, including over 6 years supporting the FEMA National Flood Insurance Program. Ms. Bradley brings valuable experience of managing a national practice focused on FEMA policy, funding, program management, and implementation planning. With a background in public policy and program evaluation, Ms. Bradley advises clients on compliance with federal regulations and methods for enhancing program effectiveness and efficiency. She has extensive experience with the

FEMA HMA programs, including BRIC and HMGP. Ms. Bradley has used her experience in hazard mitigation, economic impact analysis, and BCA to analyze return on investment for flood, seismic, and wind hazard mitigation projects. She has led federal grant application development in the District of Columbia, Delaware, North Carolina, New York, California, Washington, Virginia, Texas, and Pennsylvania. Ms. Bradley has also developed hazard mitigation plans (HMPs) and managed grants to implement diverse, impactful projects. Ms. Bradley holds a Master of Public Policy (MPP) and is a Certified Floodplain Manager (CFM).

A2: CRS – Tracking What's New on the National Front
Track: NFIP

Evolving the Community Rating System
ShilpaMulik, CFM, FEMA Shilpa.Mulik@fema.dhs.gov
Co-presenters: None

Abstract: FEMA is working to transform the Community Rating System (CRS) through a multi-year effort. FEMA has been working to analyze and evaluate the current program along with several options for transforming the program. The CRS Redesign effort focuses on incentivizing communities to take measurable actions that reduce flood risk, embedding equity as a fundamental principle into the CRS, encouraging property owners to obtain flood insurance, and delivering a community-centric and modernized program. This presentation will focus on presenting some of the highlights from the past year of the CRS Redesign project and the upcoming milestones for stakeholder engagement.

Biography: Shilpa Mulik works for the Floodplain Management Division (FPMD) at FEMA HQ and is the CRS Redesign Program Manager. She has over 23 years of NFIP experience including both private sector and the federal govt. Prior to moving to FEMA HQ, she served in Region 9 Floodplain management branch as well as the Risk Analysis branch. For the past 7 years at FEMA HQ, Shilpa has served in various roles to include serving as a Regional Liaison to provide technical assistance on various engineering and compliance issues, review of the LOMC Potential Violations, liaison with the Risk Management Directorate and the Federal Insurance Directorate. Shilpa has also supported various efforts at FEMA HQ to include serving as FPM SME and outreach, training, and communication lead for Risk Rating (RR 2.0), 2-D modeling and Floodway, FEMA's Community Rating System Transformation effort, spearheaded the development and training for the National Violation Tracker, and the most recent revisions to the Elevation Certificate and the Floodproofing Certificate. She also serves on the Technical Mapping Advisory Council as a FPM SME.

Floodplain Administrator Roles in the CRS Discount
Charles Baker, FEMA, charles.baker@fema.dhs.gov
Co-presenters: None

Abstract: As the organization charged with overseeing a compliance program as part of the NFIP, the Floodplain Management Division (FPMD) within the Mitigation Directorate of FEMA Resilience (formerly Federal Insurance and Mitigation Administration) developed a standardized, centralized system for federal, state, and community partners to document and track NFIP property violations which provides information into PIVOT, Flood Insurance's Program that assists in NFIP Flood Insurance Premium

Ratings. As such, violations may impact a citizen's premium. In this session we will specifically discuss what steps a floodplain administrator and other local official should engage upon should a citizen approach them concerning the loss of their CRS Discount on NFIP Flood Insurance. We will also cover in this session how a community may request information and then utilize that information to promote compliance with the NFIP and lessen a community's flood risk.

Biography: Charles Baker is a Program Analyst for FEMA Headquarters, Floodplain Management Division, Regional and Field Support Branch. Charlie's duties include being support for FEMA Regions I, III, and IX and being the liaison between Floodplain Management and Building Science. Charlie is also the lead for the National Violation Tracker (NVT) and Potential Violations. Charlie was previously employed as a Floodplain Specialist with FEMA Region III for five years. Prior to his employment with FEMA he served as a local floodplain administrator, building code official, planning director, and historic landmarks director at the local level. While at the local level Charlie was active in the West Virginia Floodplain Management Association, serving as chair, vice-chair, and secretary. Charlie has received awards from the DHS Administrator for work associated with the Substantial Damage Administrative Procedures while at FEMA Region III and was previously named the WV Floodplain Manager of the Year.

Working with the National Violation Tracker
French Wetmore, French & Associates, Ltd., FRENCH@FRENCHASOC.COM
Co-presenter: Charles Baker, charles.baker@fema.dhs.gov

Abstract: The National Violation Tracker (NVT) is a new tool introduced by FEMA to provide a standardized and centralized system to document properties that are not in compliance with the minimum standards of the National Flood Insurance Program. Such properties do not receive the Community Rating System discount on an NFIP insurance policy. The NVT has over 75,000 properties in both CRS and non-CRS communities. Because many questions have arisen on the NVT, ASFPM's Risk Rating 2.0 Workgroup created a subworkgroup to get appropriate information on how the NVT works to its members, state and local floodplain managers, insurance agents, and property owners. This session will cover the following concerns about the NVT: ▯ What qualifies as a "noncompliant" property ▯ How properties get on the NVT ▯ What it means to be on the NVT ▯ How to access the NVT for your community ▯ How properties can get taken off the NVT by bringing them into compliance ▯ How properties can get taken off the NVT by documenting that they are already in compliance This presentation will provide the information needed by state and local floodplain managers to assist their constituents and insurance agents understand the process and what needs to be done to remove a property from the list.

Biography: French has been active in floodplain management for 50 years as a local official, Illinois' state NFIP Coordinator, and consultant. From 1988 to 2016, he was the lead consultant in the development and implementation of the Community Rating System. He is on ASFPM's Risk Rating 2.0 Workgroup and chairs the National Violations Tracker Subworkgroup.

A3: Storytelling as Communications
Track: Risk Communication

Storytelling for Community Resilience: The Role of Inclusive Partnerships

TiffanyTupper, Resilience Action Partners tiffany.tupper@associates.fema.dhs.gov
Co-presenter: Peter Herrick, Jr., peter.herrickjr@fema.dhs.gov

Abstract: People often underestimate the power of storytelling. However, sharing experiences helps to build resilience. Research shows that stories help people form emotional connections to learn new concepts and build empathy. This session will explore the power of storytelling. It will look at how stories can address challenges and share first-hand accounts of the importance of mitigation. Floodplain managers will learn how to incorporate stories into overall actions to reduce risk. Participants will also learn how strong, mutually beneficial partnerships can foster unique chances to capture and share stories. This leads to more trust and a stronger social fabric that helps communities identify mitigation priorities and work together towards climate resilience. Attendees will have a chance to hear stories through mediums like audiograms. They will also learn tips for incorporating storytelling and partnerships best practices into their work. Participants will also have a chance to record their own story in a recording booth.

Biography: Tiffany Tupper is a Communiations and Engagement Manager with Resilience Action Partners. Tiffany has over 13 years of experience leading public relations and communications for international organizations, the federal government, and the private sector. Her skills and expertise include branding, storytelling and media training, and public affairs and thought leadership. Key topics include foreign policy and governance, public health and COVID-19, and climate change. She has previously worked at USAID, the international development INGO Catholic Relief Services, the Carnegie Endowment for International Peace, and the World Affairs Council of Pittsburgh. As a strategic relationship builder, Tiffany has managed high-visibility partnerships and global projects, resulting in over 350 domestic and international events in North America, Europe, the Middle East, and Africa. She was previously a contributing feature writer to Forbes Middle East. Tiffany holds an MSc. in climate change and international development from SOAS University of London and a BA from Chatham University. She is from Pittsburgh, PA.

Can Communications Pros Help Save the World? Reframing the Climate Narrative from Fear to Hope

Pamela Roach, Ogilvy Public Relations, pamela.roach@ogilvy.com
Co-presenters: None

Abstract: Renowned storyteller, natural historian, biologist, and narrator of "The Planet," Sir David Attenborough, once stated, "Saving our planet is now a communications challenge. We know what to do; we just need the will." In the battle against climate change, communications, outreach, and media professionals play a vital role in shifting the narrative from fear and disempowerment to hope and action. While the constant bombardment of alarming headlines can leave the public feeling helpless and uncertain, if we're going to achieve change, it's crucial to recognize the immense potential for change and progress. Communications and engagement experts have the skills to shift public opinion and highlight the inspiring stories of individuals driving positive change. According to the Yale Program on Climate Change Communication, effective public engagement on climate change entails connecting with people's values, utilizing participatory approaches that embrace inclusivity, promoting positive cultural and social norms, and constructing honest and empowering narratives. Climate Outreach, an international nonprofit devoted to public engagement with climate change, highlights the power of

stories and images in shaping understanding rather than relying solely on numbers, probability statements, or technical graphs. To facilitate this transformation, Climate Outreach's partner organization, Climate Visuals, offers an extensive image library for communication professionals, providing a resourceful tool to convey impactful stories about climate change. In this session, participants will learn how to use impactful and empowering storytelling to drive climate action and foster resilience among individuals. And learn the importance of humanizing climate communications, inspiring others to join the fight against climate change. Communications professionals have an exciting opportunity to lead and make a difference in the battle for a sustainable future.

Biography: A recipient of the Martin Luther King Advancing the Dream Award, Pam Roach is Vice President in the Social Change Group of Ogilvy Washington D.C. Pam leads a diverse team of experts who research, design and execute risk communications plans, design messaging strategies, and measure impact. With over 30 years of experience, Pam has worked with public, private, and nonprofit organizations to revitalize distressed communities in Texas by successfully creating partnerships with Non-Governmental Organizations, Government Sponsored Enterprises, National Foundations, Financial Institutions, and Federal Government agencies. Pam's work has been recognized by state and local leaders for her transparent approach to community problem-solving. Accordingly, she provided outreach and engagement support for controversial flood-mitigation projects, bridging communication gaps and restoring trust between municipal government and marginalized and affluent neighborhoods. She was also appointed by the Texas Railroad Commissioner to the state-level Alternative Fuels Advisory Committee, which promotes using alternative fuels in Texas. Pam has been a trusted leader in Arlington, Texas for over 20 years. During times of major transition, Pam was appointed by the Mayor and City Council to serve as the Vice chairman of the City's Planning and Zoning Commission, Chair of the Civil Service Commission, and Chairman of Arlington's Convention & Visitors Bureau Board of Directors. Following the civil unrest in 2020, Pam was appointed to the Unity Council, which aims to gather community input, research best practices, and recommend strategies for greater equity and eliminating institutional racism.

Thanks for Coming to My TED Talk: Reaching New Audiences Through Partnerships
Vince Hancock, Resilience Action Partners, vince.hancock@ogilvy.com
Co-presenter: Margaret Doherty

Abstract: Reaching residents at public outreach meetings can be challenging – there are afterschool activities for parents and happy hours for young professionals, and many don't want to spend their free evening with the government. FEMA Region 8 realized they needed a new way to engage with thought leaders and decisionmakers where they were already present. In 2019, Region 8 launched a new partnership with TEDx - locally organized TED events. Our first partnership was with TEDxMileHigh, a locally organized TED Talks-centered organization in Denver, Colorado. In 2023, our partnerships have expanded to TEDxSaltLakeCity, Utah and TEDxBillings, Montana. With TEDx, FEMA Region 8 has been able to reach an audience primed for curiosity. This session will share how exploring new opportunities with unlikely partners can expand reach and influence. FEMA leveraged the partnership with TEDxMileHigh to transform innovative in-person and virtual outreach opportunities. FEMA showcases augmented (FloodWalk mobile app), virtual reality (IMMERSED), and ArtWorks installations, to engage with thousands of influential stakeholders in Metro Denver to educate them about hazard risk awareness and the importance of mitigating those risks. Engagement includes in-person exhibits at TEDxMileHigh events; virtual exhibits to showcase key messages, people and projects; and both in-

person and virtual "Adventures," designed to directly engage stakeholders in hazard risk awareness and actions. While each locally organized TEDx event is unique, there are numerous repeatable/replicable experiences that can be customized for each event.

Biography: Vince Hancock serves as the communications lead for FEMA Region 8 on the Community Engagement and Risk Communications (CERC) contract. The CERC contract, a partnership between Ogilvy and Michael Baker International, assists FEMA in collaborating with state, local and tribal entities to increase the public's risk awareness, drive action to reduce risk, and help communities become more resilient when confronting natural disasters. Prior to joining Ogilvy in 2016, Hancock spent more than 15 years serving in a variety of communications roles – crisis management, public relations, employee communications – in the health care, telecommunications and nonprofit arenas.Margaret Doherty is a Senior Program Manager with FEMA Region 8. An inspiring educator and leader, Margaret organizes FEMA's regional Community Engagement and Risk Communications contract, while also championing ArtWorks and managing the Region 8 floodplain mapping projects in Utah. Throughout her roles, Margaret focuses on innovative ways to raise awareness of mitigation and adaptation to at-risk communities. She is driven by a commitment to helping underserved groups build hazard awareness and resilience, understanding that meeting people where they are and communicating in meaningful ways can help reduce barriers and inspire risk-reduction actions. Prior to her work with FEMA, Margaret was a Community Planner for local governments in Colorado and Virginia and for URS. Margaret obtained a Bachelor of Metropolitan Studies from Michigan State University and a Master of Urban and Regional Planning from the University of Colorado at Denver.

A4: Floods After WildFires Initiatives
Track: Arid Regions

Colorado Flood Threat Bulletin – Where We've Been, Where We Are, and Where We are Going
Mathew Mampara, Dewberry, MMampara@Dewberry.com
Co-presenters: None

Abstract: The saying in Colorado goes, "If you don't like the weather, wait 15 minutes." These drastic swings in weather can often lead to significant flood threats. Even more so, Colorado has a storied history of volatile swings in year to year precipitation - some years can have very limited flooding while others see consistent flood threats through the entirety of the warm season. The Colorado Water Conservation Board (CWCB) manages the Colorado Flood Threat Bulletin with the double objective of producing and disseminating reliable forecasts, as well as incorporating the frontier of hydro-meteorological research into operations to increase lead-time for significant flood events. Over the years, forecasts and rainfall analysis have been provided for some of the biggest flood and weather events in state history - the historic September 2013 floods in Northern Colorado, the explosive 2020 wildfire season, and subsequent 2021 flood season where massive debris flows were reported on several burn scars; including on the Grizzly Creek scar, where a series of slides closed Interstate-70 through Glenwood Canyon in June 2021. Year over year, CWCB has continued to develop and improve the Flood Threat Bulletin program and associated products, which now includes the daily Flood Threat Bulletin (FTB), State Precipitation Map (SPM), Fire Burn Forecast (FBF), and the twice-weekly Flood Threat Outlook (FTO). In 2017, meteorologists began to forecast threats over burn areas known to have

flooding issues that put people and property at risk. This expanded to the stand-alone FBF in 2021 for selected large-scale burn scars, those that correspond to a higher runoff threat, and those that are in close proximity to high population and/or major roads. Lastly, improved Quantitative Precipitation Estimates (QPE) were expanded in 2017 to include 48-hour and 72-hour accumulated precipitation, along with maximum 1, 3, and 6-hour precipitation. All of this has resulted in improved forecast metrics for each year and allowed a wider audience of end-users to receive the product. CWCB's vision for the future includes several key program improvements: A major website overhaul to provide a more user-friendly and interactive interface will go operational for the 2023 season; local storm reports and streamflow information will be displayed on the SPM web-map; and lastly, localized debris-flow and flood hazard impacts will be disseminated for particularly sensitive burn areas. These planned enhancements over the next 4 years illustrate CWCB's commitment to the Flood Threat Bulletin's user community and desire to advance the State's preparedness for flood related threats.

Biography:

Cost Effective Post-Fire Mitigation Methods

Joshua Prettyman, PE, CRS Engineers, joshua.prettyman@crsengineers.com
Co-presenters: None

Abstract: Wildfires in the west have increased in size and frequency over the last several decades. Some of the worst areas can burn every few years. The aftermath of these burns leaves watersheds and local communities vulnerable to flooding and debris flows. Runoff can increase many times, overwhelming or circumnavigating existing infrastructure and flood protection measures. Mitigation efforts after large fires can be daunting and expensive for local communities. Fires are unplanned by nature and cannot be included in typical budgets. Work must be completed rapidly to be effective and tight schedules can often increase cost as well. In addition, not all mitigation measures are equally effective with some yielding little results or requiring constant maintenance. In many instances, flow paths through burned areas can vary rapidly, bypassing even the best mitigation efforts. This presentation will provide participants with the tools and strategies they need to assess risk to their watershed, select the right mitigation strategies for each area, and reduce runoff and debris flows while minimizing overall cost. We will also discuss available grants and strategies for rapidly procuring grant funding and implementing projects.

Biography: Joshua started in Civil Engineering as an intern for his dad at 14. Since that time, he's worked on projects ranging from small pipelines, to canals, and large dams. He's an expert in hydrology, open channel hydraulics, and debris basins. When he's not working, he's usually found fishing, camping, and working in his yard.

Post-Wildfire Debris Flood Risk Assessment for Alluvial Fans in British Columbia

Amelia Ochsenbein, Stantec, amelia.ochsenbein@stantec.com
Co-presenters: None

Abstract: Throughout much of the US and Canada there is an increase in wildfire frequency and magnitude, while at the same time it is anticipated extreme rainfall will increase in these areas. The potential for increased flooding and debris floods relative to pre-burn conditions exists and could be further aggravated by climate change. Homes and essential infrastructure are prone to significant damage from debris floods. Debris flow hazards have long been recognized as an issue in mountainous

regions and areas with developments on alluvial fans. One example of this is the White Rock Lake Wildfire in July, 2021, which severely burned portions of the Okanagan Indian Band Reserve No. 1 in British Columbia. This included the upper watersheds for three active alluvial fans (Whiteman, Naswhito, and Equesis Creeks). Stantec conducted a risk assessment to determine the threat posed to infrastructure on the alluvial fans during the design event (200-year debris flood with consideration for climate change and burn impacts). The event was simulated using a non-Newtonian, HEC-RAS 2D hydraulic model. On May 2nd, 2023, OKIB issued an evacuation alert for Parker's Cove residents due to rising waters in Whiteman Creek from what they declared as a 200-year storm event (Castanet 2023). At the time of the event, Stantec provided draft 200-year debris flood modelling results to emergency crews in KMZ format, which accurately identified areas of flooding. These model results were used to develop conceptual designs for berms to mitigate flood impacts and to evaluate freeboard and erosion protection requirements. Additional maps were provided to the client with depth, velocity, and flood hazard vulnerability classifications to inform decision-making and public safety efforts. This presentation will discuss the modeling approach used for this study in the larger context of post-wildfire debris flood modeling on alluvial fans.

Biography: Amelia Ochsenbein is an Environmental (Water Resources) Engineer with six years of experience in hydrologic and hydraulic (H&H) modeling and flood hazard mitigation projects. She is a registered Professional Civil Engineer in the state of Arizona. She has her Bachelor's and Master's in Civil Engineering (with focus in Hydrosystems) from Arizona State University. She has performed H&H modeling using primarily HEC-RAS and FLO-2D in support of various flood mitigation projects such as: Watershed Plan Environmental Assessments, Area Drainage Master Studies/Plans, Feasibility Studies, and FEMA Risk Map Production and Technical Services.

A5: Technical Assistance and Partnerships for Equity
Track: Equity

Community Engineering Corps - Pro-Bono Consultants Addressing Stormwater Challenges in Underserved Communities
Molly Sullivan, PE, CFM, American Water Works Association, msullivan@awwa.org
Co-presenters: Gerard Dalziel, PE, Engineers Without Borders-USA/Community Engineering Corps, gerard.dalziel@ewb-usa.org and Tate Howes, PE, Engineers Without Borders-USA/Community Engineering Corps, tate.howes@ewb-usa.org

Abstract: The connection between low-income communities and flood-prone areas is not new. Land in flood-prone areas is less expensive and readily available, resulting in high concentrations of low-income and minority residents occupying flood-prone areas. Nearly one out of every 10 low-income housing projects is in a flood zone.* Half a million Americans live in government subsidized housing that is at direct risk for flooding.* Underserved communities require significant assistance and funding after flood events and are least capable - both technically and financially - of recovery. Therefore, flooding in underserved communities can having lasting impacts. While wealthier communities have the resources to bounce back quickly after a flood, many low-income residents have a harder time finding the resources to recover. Community Engineering Corps is supporting low-income and underserved communities across the US with addressing their drainage and stormwater challenges on a pro-bono

basis. Community Engineering Corps – an alliance partnership between the American Society of Civil Engineers, the American Water Works Association, and Engineers Without Borders-USA - utilizes a co-creation model where communities leverage the expertise and humanity found within our network to gain access to improved infrastructure. This session features an informational presentation about the Community Engineering Corps program, followed by a case study highlighting the work being done by Community Engineering Corps volunteers in an effort to improve stormwater management and infrastructure in underserved communities in the US. Source: *Cross, L. 2019, 'Low-income housing in flood zones traps families in harm's way', Inhabitat, 25 April.

Biography: Molly Sullivan is the Community Engineering Programs Manager at the American Water Works Association (AWWA) where she manages AWWA's participation in the Community Engineering Corps program. Molly also serves as a Program Engineer in the Community Engineering Corps program where she develops projects and project teams and manages projects from conception through delivery. Prior to joining AWWA, Molly consulted as a Professional Engineer in the Stormwater sector for nearly a decade. Outside of work, Molly volunteers as the Responsible Engineer in Charge of an Engineers Without Borders clean water project with a community in the remote mountains of northern Nicaragua.

Regional Resiliency Partnership: Integrating Future Climate Flood Risk in Vulnerable Coastal New Hampshire Communities

Jennifer Gilbert, CFM, NH Department of Environmental Services - Coastal Program, jennifer.r.gilbert@des.nh.gov
Co-presenters: None

Abstract: This presentation will provide an overview of the New Hampshire Flood Smart Seacoast Project, a collaborative partnership to build regional coastal capacity with a focus on coastal floodplain management and hazard mitigation. The goal of the project was to assist coastal communities that are grappling with present-day and future coastal flood risk and their vulnerability and how they are limited by a lack of capacity and barriers to accessing FEMA funding and incentive programs. The presentation will include a discussion of how state agency, regional, and local project partners worked collaboratively to achieve several project objectives: establishing a staffed technical assistance partnership, providing direct assistance to help coastal communities incorporate best available coastal flood risk science in decision making, the adoption of higher floodplain management standards, and accessing FEMA funding for coastal resilience projects. In addition, information will be presented about the project's pilot floodplain mitigation and relocation program that focused on flood-prone and socially vulnerable neighborhoods in one coastal community. The presentation will wrap up with the project's challenges, successes, and lessons learned. This presentation will provide project information and outreach and training resources that can be used by other states and communities to help build regional coastal capacity to address coastal and future climate flood risk.

Biography: Jennifer Gilbert is the Resilience Project Manager at the New Hampshire Department of Environmental Services (NHDES) Coastal Program where she manages coastal resiliency technical assistance grants and provides outreach and technical assistance to state agencies, coastal municipalities, and other stakeholders in understanding and incorporating coastal floodplain management higher standards and best-available coastal flood risk science in decision-making. Prior to joining NHDES in August 2023, Jennifer was New Hampshire's National Flood Insurance Program (NFIP) coordinator and was in that position for 18 years. Jennifer has a B.S. in Environmental Science and

Environmental Planning and a M.A. in Urban and Regional Planning. Jennifer has been an ASFPM member and a CFM since 2006 and is currently a first year ASFPM Board member as the Region 1 Director.

Bridging the Gap: Empowering Flood Resilience in Underserved Rural Communities

Bridget Mitchell, Headwaters Economics, bridget@headwaterseconomics.org
Co-presenters: None

Abstract: Rural and lower-resourced communities are often the most vulnerable to flooding and yet the least able to implement solutions – either from lack of personnel to address the challenges, lack of funding, or lack of expertise in flood mitigation. Compounding the difficulty, many state and federal programs lack resources to meet the specific needs of rural communities. Using a bottom-up, community-informed approach to technical assistance, Headwaters Economics' Floodwise Community Assistance program helps communities build partnerships, navigate flood assistance and mitigation programs, and secure funding for transformational projects. Through the recent Justice40 Initiative, federal agencies are tasked with directing resources to "disadvantaged communities that are marginalized, underserved, and overburdened by pollution." This presentation highlights success stories in these communities and the methods for that success that the Headwaters Economics team implemented through collaboration with our local partners. This presentation features case studies of several rural, low-capacity community collaboration projects highlighting: • Tools used to identify communities that may need special assistance, including the Headwaters Economics Rural Capacity Index and Neighborhoods at Risk tool, the Climate And Economic Justice Screening Tool (CJEST), and the National Risk Index (NRI). • Methods used to bridge the gap between available resources (grants, technical expertise, etc.) and underserved communities. • Our innovative, community-informed approach to providing flood technical assistance, including best practices, lessons learned, and future goals. The 2022 Justice40 Initiative directs federal resources to vulnerable communities that have been overlooked in the past. Funding opportunities are growing. Working together, public, private, and nonprofit sectors can provide more effective technical assistance to rural and lower-resourced communities to take advantage of new opportunities, address inequities, mitigate flood hazards, and invest in resilience.

Biography: Bridget Mitchell leads the FloodWise Community Assistance program for the nonprofit organization, Headwaters Economics based in Bozeman, MT. Bridget is a licensed Professional Engineer and Certified Floodplain Manager with more than 20 years of experience in permitting, design, planning, and construction of water resource and stormwater projects for public and private clients. In addition to her technical strengths in stormwater, watershed management, flood management, and stream restoration, Bridget excels at working collaboratively on local efforts. She has served on a volunteer basis for numerous stormwater and land management task forces, lending her expertise in drafting best practices, bylaws, and coordinating technical councils. Bridget holds a Master of Science in Environmental Engineering and is currently pursuing a second masters, a Master of Public Administration (MPA) degree. She is passionate about community assistance and using her experience as a civil and environmental engineer to help communities be more flood resilient.

A6: Coastal Planning for Climate Change
Track: Climate Change

High Water in the Holy City: The Charleston Integrated Water Plan
Andy Sternad, AIA, AICP, Waggonner & Ball, andy@wbae.com
Co-presenters: Stephen O'Connell, oconnells@bv.com and Dale Morris, morrisda@charleston-sc.gov

Abstract: At over 350 years old, Charleston, South Carolina—the Holy City—is one of the most historic cities in America. It is also one of the most vulnerable to all types of flood risk, from storm surge to sea level rise to groundwater rise to stormwater. Parts of the historic downtown already flood on average sixty days per year from high tide alone. Charleston's landscape and character are shaped by water, and the city is taking a comprehensive approach to address flood risk in a way that embraces water as an asset. High Water in the Holy City will explore the flood risk, future vision, and actionable adaptation strategies in Charleston's Comprehensive, Integrated Water Plan, set to be released in spring 2024. Presented by the Chief Resilience Officer guiding the city's adaptation on multiple fronts and the co-project managers leading the Water Plan, the session will provide new lessons and approaches for managing existential flood challenges.

Biography: Andy is a principal and the business leader of Waggonner & Ball, a New Orleans-based architecture, landscape and planning studio within Moffatt & Nichol, the global coastal engineering and infrastructure firm. Andy focuses on urban- and building-scale projects that integrate issues of climate, landscape, economy, and culture. A graduate of the Yale School of Architecture, he has developed the firm's Living With Water™ and Dutch Dialogues™ approaches to help cities and citizens adapt to changing environments in cities across the U.S. and Asia. Andy led Dutch Dialogues Charleston, the land and water data analysis for Charleston's Comprehensive Plan, and currently serves as project lead for the Charleston Integrated Water Plan.

Water Rises, Water Falls: Scenario Planning for Changing Lake Levels and Climate Change
Eleanor Rappolee, ASFPM, eleanor@floods.org
Co-presenter: Jenna Moran, jenna@floods.org

Abstract: The Great Lakes shorelines are dynamic and constantly moving, with lake levels rising and falling 10-15 feet decadally. While it is unclear how climate change will affect the Great Lakes overall, it will likely increase not only the frequency and extremity of storms but also lake level fluctuations, both of which may lead to more aggressive erosion along the shorelines. These compounding phenomena - along with the challenge of already armored shorelines – present a unique challenge to coastal Great Lakes communities, creating a wide range of possible scenarios and hazards that communities must consider as a part of their current and future coastal management plans. There is little technical assistance and guidance available on best practices for managing Great Lakes coastlines during high and low water periods. In support of this need, ASFPM, APA, CSO, and the Great Lakes Sea Grant Network via Wisconsin Sea Grant are working to help three Great Lakes coastal communities (St. Clair Shores, MI; New Baltimore, MI; and Duluth, MN) better manage their dynamic coastlines and prepare for flood hazards through the improvement of local master plans, regulations, and infrastructure policies. To fully capture the potential for risks to each community from coastal hazards, we use a scenario planning

method that employs three distinct climate futures and three best management practice options, yielding nine separate scenarios for comparison. This presentation will walk you through our scenario planning process, scenario results for the three coastal communities, and lessons learned to date. The overall goal of the technical assistance is for teams to identify areas where natural resource restoration efforts can have the greatest impact for social, economic, and environmental resilience to coastal flooding, and to develop plans based on those results.

Biography: Eleanor Rappolee is a GIS Research Analyst working in ASFPM'S Flood Science Center providing technical support to various projects that engage with and assist communities on enhancing their resilience to flood hazards. A Michigan native, Eleanor holds a Bachelor of Science Geological Sciences, with a minor in Geographic Information Systems, and Master of Science degree in Environmental and Social Sciences, both from Michigan State University. Before becoming a fulltime ASFPM employee, she was a NOAA Digital Coast Fellow of the 2020-2022 class, working on a joint project with ASFPM and Coastal States Organization that focused on providing technical assistance to communities on repetitive loss properties.

Rising Tides, Elevating Shorelines: Effective Adaptation Roadmaps for Sea Level Rise

Millicent Cowley-Crawford, Woodard & Curran, mcrawford@woodardcurran.com
Co-presenters: None

Abstract: With billions of dollars of property at risk from sea level rise over the next 30 years, communities from coast to coast need to rapidly adapt and protect both infrastructure and future tax revenues. Acknowledging this risk, regulators are beginning to put more pressure on agencies to understand and address the risks of future inundation. But an absence of clear guidelines, funding, and regulatory structure presents huge hurdles to agencies already dealing with aging infrastructure, staff turnover, and resulting budget shortfalls from year to year. Leveraging several case studies from across the nation, this presentation will identify pragmatic approaches to identifying risks, planning for, designing, funding, and implementing shoreline protection projects. Entire shoreline communities are at risk, not only areas of future inundation. Utilities and transportation that connect and serve entire regions and provide tax revenues that fund broader community services will suffer. From roadways, to drainage, to wastewater treatment, adaptation strategies should address interconnected issues, and the overall vision must consider how near- and long-term projects can be accomplished in parallel and support each other. In this model, near-term solutions address items under the owner's control, while long-term solutions reflect geographic areas that can be isolated with a single continuous line of protection. Long-term solutions will necessarily need to be negotiated and implemented in collaboration and across jurisdictional boundaries. Near-term work cannot, however, occur in a vacuum; it must support the long-term vision. This presentation will offer practical approaches coastal communities can use to build adaptation roadmaps. By starting at a local level and understanding vulnerability to making the case for action through cost-benefit analyses, to building regional consensus for long-term implementation, this session will give attendees strategies they can apply within their jurisdiction. It will also present thoughts on bold regional solutions to spur broader action and collaboration.

Biography: Millie is a senior expert in water resources management and planning at Woodard & Curran with over 20 years of experience in State government and private practice. She supports clients in identifying funding, preparing detailed hydrologic and hydraulic modeling, adapting to sea level rise and climate change, asset management and master planning, performing levee, canal, and channel

inspections and risk assessments, identifying and prioritizing mitigation, disaster response and recovery, and complying with the National Flood Insurance Program. As a certified floodplain manager, she helps communities understand and manage flood control risk and prepare capital planning and design of critical infrastructure to meet a wide variety of project needs.

A7: Dam and Levee Failure Planning
Track: Dams & Levees

Is the dam about to break- The need to update FEMA P-946
Edward Beadenkopf, PE, CFM, AtkinsRealis, edward.beadenkopf@atkinsrealis.com
Co-presenters: None

Abstract: The mapping of flood risk associated with dam failures and incidents is required by most state dam safety programs to establish the hazard potential classification of dams and for use in the preparation of Emergency Action Plans (EAPs). With the aging of dams and considering population growth, the likelihood of dam incidents is increasing as is the consequences resulting from dam failures. FEMA and state/ federal partners are aware of this increased dam risk and are supporting risk communication, risk mitigation, and enhanced preparedness actions to mitigate this risk. In addition to EAPs, inundation mapping associated with dam failures and incidents is used for hazard mitigation planning, for enhanced preparedness in support of the Collaborative Technical Assistance Program and will be needed to address the authorization of the Biggert-Waters Flood Insurance Reform Act of 2012. FEMA's Future of Flood Risk Data (FFRD) initiative when implemented will include a more comprehensive picture of the country's flood hazards and risk and will require inundation mapping to address the impact of dams. In 2013 FEMA published to Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (FEMA P-946). This document provided a comprehensive approach to flood risk modeling and mapping for dams and included a tiered approach to assist users select the appropriate model and input parameters for various products. What is needed for dam design is not the same level of detail as is needed for a planning study. An urgent need exists to update FEMA P-946 to reflect modern technologies and to address the study needs for the products of today. The dam is about to break for the need of more flood inundation mapping for dams and this presentation will show how an updated FEMA P-946 is an important document to meeting this urgent need.

Biography: Edward Beadenkopf is a Water Resources Engineer and since 2008 has served as a Technical Expert to the Federal Emergency Management Agency (FEMA) in support FEMA's role to manage the National Dam Safety Program. Ed was the primary author of FEMA P-946 'Guidelines for Standard Approaches to Inundation Mapping of Flood Risk Associated with Dam Incidents and Failures" and currently supports the Collaborative Technical Assistance Program scenario-based tabletop exercises for dams. Ed has a B.S. in Civil Engineering from the University of Maryland, College Park, MD. He is located in Alexandria Virginia and can be reached at edward.beadenkopf@atkinsrealis.com. Mobile: 703.622.1939

Range of Additional Levee Failure Probabilities Due to Climate Change
Kaveh Zomorodi, Ph.D., PE, CFM, Dewberry, kzomorodi@dewberry.com
Co-presenters: None

Abstract: Heavy rainfall events can lead to catastrophic impacts to large populations. Previously, Emergency Action Plans (EAPs) for critical infrastructure often relied on evolving flood conditions and signs of flood protection failure prior to notifying the population. Recent advances in our understanding of rainfall-runoff response and precipitation forecasts have improved flood forecasts and impact predictions. Applied Weather Associates is currently working with communities and regulators to develop enhanced EAPs and Risk Reduction Measures (RRMs). By evaluating rainfall-runoff results of prior storms, models can determine the likely response of rivers and streams, the potential threat to the public, and the potential loss of critical infrastructure. Through modeling the impacts of various return-frequency rainfall events, including various storm sizes and intensities, mitigation measures can be evaluated for effectiveness for multiple scenarios in advance of a catastrophic flood. Additionally, rather than simply preparing static "worst-case" mapping of conditions like a large storm coupled with a dam failure, water surface elevations and inundation mapping can be created with confidence limits for a forecasted event. The predictions can be improved in real-time as an event approaches the area of concern. This presentation will discuss how data needed to populate these models is largely available from free public sources and many of the models needed are free and approved by regulators. We will discuss simple approaches for combining weather prediction, the evaluation of prior events, the reaction of watersheds, and the best available topographic and structural data. Previously limitations associated with computing power, quality topographic data, the GIS location of structures and buildings, and information sharing through alerts and real-time mapping, have been addressed. Simplified rapid modeling approaches were inaccurate in urban environments due to our inability to model storage and hydraulic structures and this has also been addressed.

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 34 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.

Rapid and Simplified Flood Hazard Analysis and Mapping with the Latest Free Tools

Nicholas Agnoli, Applied Weather Associates, nagnoli@appliedweatherassociates.com
Co-presenter: Bill Kappel, billkappel@appliedweatherassociates.com

Abstract: Levees in areas with intensifying floods due to climate change may face additional risk of breaching and failure in the future. The purpose of this study was to provide a range of additional risks of levee failure for the next 50 years (levee useful life). Three example levees were analyzed with

current safety levels of "relatively safe" (probability of failure in the next 50 years less than 0.5); "relatively unsafe" (probability between 0.5 and 0.75); and "unsafe" (probability exceeding 0.75). The calculations started by evaluating the levee joint probabilities of failure using fragility curves with no climate change impacts. The calculations were then repeated using five different climate change discharge increase scenarios. The results indicated that for the relatively safe levee, the current joint recurrence interval of failure of 163 years will be reduced to 96-115 years. For the relatively unsafe levee, the current recurrence interval of failure of 71 years will be reduced to 49-56 years. For the unsafe levee, the current recurrence interval of failure of 34 will be reduced to 4-13 years. The range of increases in the levee probability of failure in the next 50 years for the relatively safe levee is from 29.8% to 54.7%. Despite the increase, the levee will remain relatively safe. The increase range is 11.7% to 25.9% for the relatively unsafe levee and 9% to 29.6% for the unsafe levee. Despite the additional risk of failure for the currently relatively unsafe levee, climate change would not move it to the unsafe category. However, if the levee is currently deemed unsafe, it will almost certainly face at least one failure in the next 50 years. Depending on the consequences of levee failures, levee enhancement projects could be cost-effective in areas where floods are expected to intensify in the future.

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 34 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.

A8: Mapping and the Federal Flood Risk Management Standard (FFRMS)
Track: Mapping

Paving the Way: Data Development for Federal Flood Risk Management Standard (FFRMS) Implementation
Andrew Martin, FEMA, andrew.martin@fema.dhs.gov
Co-presenters: Sarada Kalikivaya, sarada.kalikivaya@atkinsrealis.com; Garrett Shields; garrett.shields@wsp.com; and Michael Hanke, hankemj@cdmsmith.com

Abstract: From an increase in the frequency and severity of extreme precipitation events to rising sea levels, a changing climate has profound implications for the way that we examine flood risk. Through the establishment of the Federal Flood Risk Management Standard (FFRMS) under Executive Order 13690,

the federal government is taking steps to mandate that all federally funded actions (e.g., buildings and projects) consider both current and future flood risk. Incorporating FFRMS into existing agency processes will ensure that agencies expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain so that federally funded projects will last as long as intended. There are currently 3 approaches to implement FFRMS: Climate Informed Science Approach (CISA), Freeboard Value Approach (FVA) and 0.2% annual chance floodplain. While CISA approach is being finalized, FEMA has been focused on the FVA and 0.2% annual chance floodplain approaches and completed: • Methodology Study: Produced FFRMS products for select study areas, provided estimates for the level of effort, developed specifications, and provided recommendations for scaling FFRMS production nationally. • FEMA and their mapping partners are working towards an aggressive schedule to create data before June 2024 to develop FVA and 0.2% annual chance floodplain approach data for the entire nation. The presentation will briefly discuss the FFRMS approaches, Data development methodology and coverage of the data and highlight some of the technical processes, challenges and lessons learned. Presentation will also discuss all the partners involved across the federal landscape and how the FFRMS data will be shared for better utilization and implementation of the standard.

Biography: Andrew has over 20 years of experience in natural hazard identification, risk analysis, hazard mitigation, and disaster recovery. Andrew is a Program Specialist in FEMA HQ's Risk Management Directorate, primarily focusing on FFRMS data development and implementation, while also supporting the CTP program, leading the Flood Risk Products team, and serving as the Tribal Liaison for the program. Prior to his time at FEMA HQ, Andrew served as the Public Assistance Chief at the New York State Division of Homeland Security and Emergency Services. He led a team of over 175 staff assisting communities, the State, and non-profit organizations to recover from disasters by managing all aspects of the FEMA Public Assistance recovery grants process. Andrew also served as the Risk Analysis Branch Chief for FEMA Region II from 2016 to 2019. Andrew is committed to providing the highest level of service to communities and stakeholders and will strive to maintain existing and develop new robust working relationships with local, State, Tribal, and federal partners, non-profit organizations, and the private sector.

In the Zone: the unique considerations of FFRMS in the Western U.S.

Sarada Kalikivaya, PE, CFM, PMP, AtkinsRéalis, sarada.kalikivaya@atkinsrealis.com
Co-presenter: Wendy Shaw, wendy.shaw@fema.dhs.gov

Abstract: From an increase in the frequency and severity of extreme precipitation events to rising sea levels, a changing climate has profound implications for the way that we examine flood risk. Through the establishment of the Federal Flood Risk Management Standard (FFRMS) under Executive Order 13690, the federal government is taking steps to mandate that all federally funded actions (e.g., buildings and projects) consider both current and future flood risk. Incorporating FFRMS into existing agency processes will ensure that agencies expand management from the current base flood level to a higher vertical elevation and corresponding horizontal floodplain so that federally funded projects will last as long as intended. The Western U.S. is the largest region of the country, covering nearly half the land area of the contiguous United States. It is also the most geographically diverse, incorporating geographic regions such as the temperate rainforests of the Northwest, the highest mountain ranges (including the Rocky Mountains, the Sierra Nevada, and the Cascade Range), numerous glaciers, and the western edge of the Great Plains. It also contains the majority of the desert areas located in the United States. Given

this expansive and diverse geography it is no wonder developing FFRMS datasets is challenging and at the same time rewarding. There are currently 3 approaches to implement FFRMS: Climate Informed Science Approach (CISA), Freeboard Value Approach (FVA) and 0.2% annual chance floodplain. While CISA approach is being finalized, FEMA has been focused on the FVA and 0.2% annual chance floodplain approaches and completed: • Methodology Study: Produced FFRMS products for select study areas, provided estimates for the level of effort, developed specifications, and provided recommendations for scaling FFRMS production nationally. • FEMA and their mapping partners are working towards an aggressive schedule to create data before June 2024 to develop FVA and 0.2% annual chance floodplain approach data for the entire nation. The presentation will briefly discuss the FFRMS approaches, Data development methodology and coverage of the data and highlight some of the technical processes, challenges and lessons learned. Presentation will also discuss all the partners involved across the federal landscape and how the FFRMS data will be shared for better utilization and implementation of the standard.

Biography: Sarada Kalikivaya is a Project Director with Atkins North America working in the Dallas Office. She currently serves as the Principal in Charge of supporting the Louisiana Watershed Initiative Program. Also, she is currently involved in managing multiple Flood Risk studies and works with the FEMA HQ innovations team in developing, and implementing new technologies such as Future Flood Risk Databases, 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 states of Louisiana and Missouri.

Federal Flood Risk Management Standard: Step Away from That Desktop

Shane Putnam, Dewberry, sputnam@dewberry.com
Co-presenter: David Sutley, dsutley@dewberry.com

Abstract: The Federal Emergency Management Agency (FEMA) Federal Flood Risk Management Standard (FFRMS) aims to improve the resilience of communities and federal assets against flood hazards. This standard requires that federal buildings and federally funded projects consider flood elevations and flood hazard areas (i.e., floodplains) throughout project siting, design, and construction. To facilitate the implementation of this standard, FEMA is developing a suite of floodplains for the Nation that builds on existing effective flood hazard data. Floodplains will be calculated for tens-of-thousands of river miles across the country by dozens of engineers, across multiple consulting firms. Traditionally, floodplains would be generated using out-of-the-box desktop applications and progress would be tracked in a shared spreadsheet. However, desktop applications are not scalable, must be installed on every user's computer, and require costly licenses. While shared spreadsheets used by dozens of people simultaneously, result in inputs that make it hard to track project progress and obtain consistent and, therefore, useful metadata. This presentation will discuss an innovative and modern web application developed by the Strategic Alliance for Risk Reduction (STARR II) joint venture for FFRMS. STARR II developed this web application to solve common problems faced by many projects relying on traditional desktop software, including those described above. The presentation will highlight the motivation, adoption, challenges, and successes of this web application in developing floodplains for FFRMS. In addition, the overall utility of moving away from sharing documents, data, and tools via networked or cloud drives and toward an all-in-one custom system for managing projects will be discussed.

Biography: Shane is a hydrologist and full stack developer on the Computational Science and Informatics team at Dewberry, which is a member of the Strategic Alliance for Risk Reduction (STARR II) joint venture. He has worked on a variety of projects that involve flood risk analysis, flood forecasting, H&H modeling, national scale data refinement, and web application development for local, state, and federal partners. Shane studied mathematics, chemistry, and hydrology at SUNY Oneonta, before earning an MS in Environmental Science and a PhD in Environmental Engineering from Johns Hopkins University.

A9: Innovative Modeling to Quantify the Essential Benefits of Floodplains
Track: Modeling

Evaluating Sustainable River Management in the Atchafalaya Basin through Hydrodynamic/Ecologic Modeling

Timothy Nelson, PG, CFM, Moffatt & Nichol, tnelson3038@gmail.com
Co-presenters: None

Abstract: The Nature Conservancy (TNC) and U. S. Army Corps of Engineers (USACE) are partners in the Sustainable Rivers Program (SRP), a collaboration to incorporate environmental flows that restore and sustain ecosystems into USACE water management practices. TNC Louisiana and the USACE have partnered to explore applying the SRP framework to management of the Atchafalaya Basin (AB) and Floodway. At 895,000 acres, the AB is the nation's largest swamp wilderness, containing nationally significant expanses of bottomland hardwoods and forested wetlands. Moffatt & Nichol previously developed an Atchafalaya Basin Model (ABM) for the National Audubon Society as a planning tool for evaluation of restoration and management initiatives. The model encompasses the entire floodway and coastal basin and was calibrated to the 2011 flood. To support TNC and the SRP program, M&N has redeveloped the ABM as a high resolution, flexible mesh hydrodynamic model with updated topobathymetric sources and calibrated to the latest hydrologic monitoring data, including USGS discharge measurements along secondary channels. The updated ABM more accurately simulates the distribution of flows out of the Atchafalaya River into the surrounding floodplain through secondary channels and the regulation of backwater swamp inundation by vertical features (spoil banks, etc.). A Cypress/Tupelo Swamp Ecology Module was also developed to model the impacts of varying AB flows and inundation extents/durations on Cypress/Tupelo germination, survival, and regeneration. The ABM and coupled ecology module are together used to examine regeneration potential under current hydrologic conditions and will be used in future phases to characterize changes in suitability for fresh forested wetlands over time associated with different AB water management strategies. This presentation will provide an overview of current efforts to evaluate the potential to optimize water management within a heavily managed system to achieve ecological benefits while maintaining the navigation and flood risk reduction functionality of current operations.

Biography: Timothy Nelson, PG, CFM, has 9 years' experience in coastal engineering and environmental consulting which includes numerical modeling, resilience and hazard mitigation planning, program management, and design of coastal and hydraulic structures. He has expertise with applications of MIKE, Delft3D, SWAN, and Xbeach numerical models for analysis of sediment transport and morphology, water management, and risk assessment. Additionally, Timothy has experience with coastal planning efforts. He has extensive experience with resilience and hazard mitigation plan preparation and has supported

numerous efforts to identify coastal hazards, quantify potential losses, and evaluate potential risk reduction solutions. He has provided program management support for master planning efforts, complex risk reduction projects, and funding allocation programs. He has also extensive experience in pursuing grant opportunities and providing funding strategies for state, local, and private partners. Mr. Nelson received a Bachelor of Science in Geological Sciences from the University of North Carolina at Chapel Hill and a Master of Science in Earth and Environmental Sciences from the Coastal and Environmental Hydrodynamics Lab at the University of New Orleans.

Quantifying the Socioeconomic Impacts of a Flood Prone Urban Watershed in Pittsburgh, PA

Tom Batroney, PE, CFM, HDR, tom.batroney@hdrinc.com
Co-presenters: None

Abstract: To understand the prolonged negative effects of continued flash flooding of Saw Mill Run, a social and economic analysis of the main stream corridor was performed for the purposes of understanding the economic disinvestment and related social injustices to adjacent neighborhoods. The study was broken into two phases over a year and half: Phase I (completed in 2023): This phase included the development of a detailed two dimensional rain-on-grid watershed flood prediction model, a flood damage and socioeconomic assessment of the existing properties, and an economic green benefits screening assessment of the parcels corridor. Phase II (ongoing and due to be complete in early 2024): This phase consists of a more rigorous and in depth future economic evaluation of two site locations for potential nature based flood plain strategies. Strategies include detailed hydraulic modeling to determine flood reduction and water quality benefits along with an economic impact analysis to the local watershed and the surrounding area. This presentation will provide conference attendees with approaches for how to build an economic case for community driven nature based floodplain strategies using socioeconomic data and state of the art flood modeling software tools for a real world case study in a densely built urban watershed.

Biography: Tom is a registered Professional Engineer with over 15 years of engineering consulting experience in sewer, stormwater, and water resources planning and engineering design projects. He possesses hands-on working experience in several hydrologic and hydraulic modeling applications as well as using geographic information systems to facilitate modeling workflows. He has worked extensively on combined sewer, sanitary, and storm collection system models for numerous large and mid-sized cities in the Midwest and Northeastern portions of the United States. In addition to his modeling experience, he is well versed in statistically analyzing large data sets such as hydrologic weather data, flow data from open channel flow sensors, and processing billing data from water and sewer utilities.

LifeSim Evaluation of Emergency Preparedness and Life Loss at Rapid City, SD

Susannah Byrd, U.S. Army Corps of Engineers, susannah.e.byrd@usace.army.mil
Co-presenters: Thomas Gorman, Thomas.G.Gorman@usace.army.mil; Jennifer Gitt
Jennifer.L.Gitt@usace.army.mil and Nicole Walski, nicole.e.walski@usace.army.mil

Abstract: During the night of June 9-10, 1972, extremely heavy precipitation fell on the northeastern Black Hills of South Dakota, resulting in widespread, severe flash flooding. Devastating consequences occurred in the developed areas along Rapid Creek within Rapid City. The flooding resulted in the loss of

238 lives and 3,000 injuries, destroying 770 houses and 550 mobile homes, and damaging another 1,400 homes. Since 1972, Rapid City and Pennington County have implemented numerous structural and nonstructural mitigation measures to reduce flood risk along Rapid Creek. The most important was the creation of the Greenway, clearing the most hazardous area of the floodplain of all residential and most commercial buildings. In 2022, the USACE, Omaha District initiated a Floodplain Management Services interagency nonstructural project, in cooperation with the City, County, and the South Dakota Silver Jackets partner agencies. A range of flash flood events, including the 1972 flood hydrograph, were modeled with two-dimensional HEC-RAS hydraulic analyses. The HEC-RAS model provided depth and velocity maps to visualize impacts to the modern city. This is important as the City faces increasing Greenway development pressure and the population booms. Potential consequences were analyzed in the form of potential life loss by utilizing the HEC-RAS outputs and LifeSim. A consequence elicitation (Mileti, D.S. and Sorensen, J.H.) with the local emergency manager was conducted to better understand Rapid City's emergency action planning. The elicitation helped define LifeSim parameters with greater specificity and produced inputs unique to Rapid City. The LifeSim model results were presented with recommendations on their emergency action planning with the intent of reducing potential life loss due to flooding. This presentation will demonstrate the usefulness and application of LifeSim consequence analysis supported by HEC-RAS modeling to support risk-informed decision making and emergency action planning.

Biography: Susannah Byrd is a Senior Economist and Consequence Specialist with the U.S. Army Corps of Engineers (Omaha District). She has a bachelor's degree in economics from Marshall University. She has worked on life safety analyses, floodplain management, risk assessments, and planning studies for nearly a decade. She is a technical expert in LifeSim modeling, risk communication, and flooding consequence assessments. She has received the Civilian Service Achievement Medal and the Civilian Service Commendation Medal for her contributions to life safety assessments and planning studies.

Concurrent Session B

B1: Local and Private Funded Resilience Programs
Track: Mitigation

Fight the Flood, Lessons Learned from Miami Beach's Private Property Adaptation Program
Kelli Reddick, CFM, ICF, kelli.reddick@icf.com
Co-presenter: Noel Webber, City of Miami Beach, noelwebber@miamibeachfl.gov

Abstract: The City of Miami Beach has invested significantly in infrastructure improvements to combat the effects of climate change, including increased rainfall, rising groundwater and sea levels, tidal impacts, and increased storm surge. Miami Beach has been at the forefront in mitigating the impacts of sea level rise for both its public infrastructure and the properties of residents and businesses that call the city home. By investing in both public and private property and infrastructure, Miami Beach and its residents can live in and enjoy a more flood-resilient community. The City's latest tool in its climate adaptation toolbox is the launch of the Fight the Flood Private Property Adaptation (PPA) program, which provides grant funding for private property owners to assess and complete flood risk mitigation

projects. Commercial and residential property owners can apply for and receive up to $20,000 in funding to go towards a property risk assessment, in addition to the design and construction of resilient flood mitigation improvements. The improvements can include a variety of projects, such as floodproofing, home elevation, green infrastructure, and more. This innovative program is a vital component of Miami Beach's climate resilience planning efforts to work together with the community to cultivate holistic city-wide resilience. The City was also able to successfully leverage PPA dollars as match for two FEMA Flood Mitigation Assistance (FMA) home elevation projects. While home elevation is not yet prevalent in Miami Beach, this project will help serve as a pilot to increase awareness of the technical feasibility and effectiveness of home elevation as a flood mitigation option. This presentation will cover the City of Miami Beach's locally funded PPA program, including the process for engaging and selecting applicants that are eligible for local funds and competitive for federal grants offered through FEMA's FMA program. Presenters will discuss Miami Beach's comprehensive flood risk reduction strategy, the PPA program design process, as well as unique floodplain management challenges addressed such as incorporating federal flood risk management standards and historic preservation guidelines into the program. Participants will walk away with ideas to fund and design local property adaptation programs, and lessons learned to navigate federal grants and homeowner expectations.

Biography: Kelli Reddick brings 10 years of experience in the hazard mitigation and resilience planning field, specializing in the implementation of FEMA floodplain management and Hazard Mitigation Assistance programs. Kelli is passionate about helping communities and utilities implement critical resilience and hazard mitigation projects. Her technical and functional experience runs the gamut of the planning process, including performing vulnerability and consequence assessments, benefit-cost analysis, HAZUS analysis, investigating floodplain management policy and practices, conducting public outreach, strategizing solutions for implementation, and developing funding strategies for hazard mitigation and resilience projects to bring those solutions to life. She has led federal grant application development in Florida, Massachusetts, California, and Washington to identify over $300 million in eligible projects that address natural hazards, and managed grants to implement projects that range from property-based solutions to community flood protection projects.

Noel Webber serves as the Resilience Coordinator in the Environmental and Sustainability Department for the City of Miami Beach. Mr. Webber manages projects and programs related to adapting the City to the threats of sea level rise and climate change, including the Private Property Adaptation (PPA) program, the Sea Level Rise Vulnerability Assessment, and the City's Program for Public for Public Information related for the CRS. The PPA program is an innovative, ambitious program that provides grant funding to private property owners in Miami Beach to conduct flood mitigation projects on their properties. Mr. Webber also coordinates with local and regional organizations, such as Resilient 305 and the South Florida Climate Compact, to coordinate and contribute to major projects, including the Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study led by the U.S. Army Corps of Engineers. Mr. Webber received a bachelor of science in mechanical engineering and a master's in city and regional planning from The Georgia Institute of Technology.

The City of Garland has a Voluntary Buyout Program! How did they do that?
Ryan Mortensen, PE, CFM, Westwood Professional Services, ryan.mortensen@westwoodps.com

Co-presenters: Jake Fisher, P.E., CFM, City of Garland, JFisher@garlandtx.gov and Marla Waters, CTCM, CTCD, Texas Water Development Board, Marla.Waters@twdb.texas.gov

Abstract: The City of Garland established a flood-prone properties fund through their 2019 Bond Program. This fund was created to purchase frequently flooding properties located in the floodplain, restore those properties to their natural flood functions, and promote the health, safety, and welfare of the residents. However, the City needed a program and process to expend the funds in a fair, consistent, and indiscriminate basis for all property owners. This presentation will provide an overview of how the City established their Voluntary Flood-prone Property Buyout Program, including: leveraging FEMA FMA Grant Funding to stretch local funds, adopting a new ordinance (Nov. 2022), establishing guidelines for the program (Jan. 2023), and a review of the first application cycle. The guidelines create a process to:

• Establish Eligibility;

• Inform Potential Applicants;

• Apply for the Program;

• Evaluate and Prioritize Applications;

• Utilize Grant Funding;

• Select and Purchase Properties;

• Establish Permissible Uses of the Properties; and

• Demo and Maintain the Properties.

Biography: Ryan Mortensen is a Registered Professional Engineer who graduated from the University of Arkansas in 2004 with a Bachelor of Science Degree in Civil Engineering specializing in water resources. Mr. Mortensen has been a private consultant for twenty years. His current position is with Westwood Professional Services, Inc., out of their Dallas office where he is the Water Resources Service Lead. He specializes in stream restoration, drainage improvements, flood control, erosion control, master planning and capital improvement design projects. Jake Fisher is a Registered Professional Engineer who graduated from the University of Nebraska in 2011 with a Master of Science Degree in Civil Engineering, specializing in water resources / environmental. Mr. Fisher has over 10 years of experience working for municipalities as a consultant and employee. His current position is with the City of Garland as a Senior Civil Engineer where he also serves as the FEMA CRS Coordinator. His experience includes: private development & floodplain development permitting, technical reviewer for flood & drainage studies, H&H modeling & floodplain mapping, stormwater master planning, dam assessments, and capital improvement design. Marla Waters graduated from the University of Oregon in 2017 with a Bachelor Science Degree in Environmental Science. Ms. Waters has over 7 years of experience working for Federal and State agencies. Her current position is with Texas Water Development Board as a Grant Coordinator specializing the FEMA Flood Mitigation Assistant (FMA) Grant program for the state of Texas.

Promoting resilience for an uncertain climate future
Daniel Furman, FM Global, daniel.furman@fmglobal.com
Co-presenter: Charles E. Mahall, charles.mahall@fmapprovals.com

Abstract: The frequency and intensity of extreme precipitation events have increased, leading to record breaking flood and stormwater events year after year. Preparation for this future risk of more intense and less predictable weather patterns requires the tools, resources, and expertise to help businesses adapt to the changing climate. Join us as we discuss what property insurance leader FM Global is doing to help guide their clients through these history changing times. Learn about groundbreaking approaches to climate resilience including flood risk mitigation solutions; a suite of climate products to aid in risk identification; enhanced outreach to spread the message regarding FM Approved flood mitigation products; and a first-of-its-kind Resilience Credit for eligible policyholders to invest in climate risk resilience. We cannot stop these extreme flood events from happening, but we CAN move forward with adaptation so organizations can continue to provide for their customers, employees, and communities.

Biography: Daniel Furman is a Senior Staff Engineering Specialist in the Climate and Structural Resilience department for FM Global. He has a BS in Mechanical Engineering from Rutgers University, P.E. in Fire Protection and over 14 years of property loss prevention experience. In his current role he focusses on the development and maintenance of evaluation tools, mapping resources and technical guidance to support FM Global field engineers in their evaluation of climate related risks including, flood(coastal/riverine/stormwater), wildland fire, hurricane/tropical storm, and earthquake. He enjoys learning as much as he can about climate related perils and helping to develop solutions to mitigate exposure to property and business income for FM Global clients.

B2: State Floodplain Management Initiatives
Track: NFIP

Climate Resilient Floodplain Management Resources for Disadvantaged Communities in New York State
Brad Wenskoski, CFM, NYSDEC, brad.wenskoski@dec.ny.gov
Co-presenters: None

Abstract: Resources were developed to assist NYS communities, specifically Disadvantaged/Environmental Justice communities, incorporate climate change considerations into their floodplain management activities. The focus was on administrative procedure improvements which will allow those communities to meet or exceed FEMA minimum standards and leverage existing NYS programs for CRS eligibility. Resources developed include: - NYS Quick Guide - Revisions to the NYS NFIP Handbook for Local Government Officials - After the Flood: Post-flood guide for impacted residents - CRS crosswalk with guidance and an associated training module, and guidance on how the NYS Climate Smart Communities program could support NFIP and CRS program activities - Development of guidance materials to highlight existing funding programs disadvantaged or EJ communities could be used to support CRS and NFIP implementation

Biography: Brad Wenskoski is an Environmental Program Specialist with the New York State Department of Environmental Conservation (NYSDEC) in the Floodplain Management Section within the Bureau of Flood Protection and Dam Safety, and also serves as the Program Emergency Response Coordinator for

the NYSDEC Division of Water. Brad is an Association of Statewide Floodplain Management Certified Floodplain Manager, New York State Floodplain and Stormwater Managers Association Region 4 Director, and NYS Certified Code Enforcement Official. Brad graduated in 2008 with a Bachelor of Science degree in Environmental Science from the State University of Plattsburgh.

A Bluegrass Perspective: Moving Floodplain Management Forward in the Commonwealth

Alex VanPelt, CFM, Kentucky DOW, alex.vanpelt@ky.gov
Co-presenter: Kaycie Len Carter, kaycie.carter@ky.gov

Abstract: In Kentucky, the commonwealth has statewide floodplain management authority to manage its flood risk. While this statewide permitting authority has enabled the Commonwealth to permit developments in its floodplains, even in non-participating NFIP communities, the statewide requirements were similar to NFIP standards. Then in July 2022, a devastating flood event in eastern Kentucky highlighted the flaws in the existing program. In this presentation, Kentucky's NFIP staff will discuss the July 2022 event & its impacts on the communities, and how Kentucky is working to improve its floodplain management system from a focus on permitting alone to one of management. Improvements discussed include a series of higher standards proposals, post-disaster event management during recovery, and more.

Biography: Alex VanPelt is the Commonwealth of Kentucky's National Flood Insurance Program (NFIP) Coordinator at the Division of Water. His primary responsibilities include assisting communities in the commonwealth with managing their flood risk, administering state & local floodplain development requirements, ensuring compliance with NFIP regulations and standards, as well as providing technical assistance to communities regarding floodplain management. He also serves on the Kentucky State Hazard Mitigation Council and is the At-Large Representative for the Kentucky Association of Mitigation Managers (KAMM), ASFPM's KY chapter. Alex received his Master of Science degree in Geography and Environmental Resources from Southern Illinois University at Carbondale (SIUC) in 2013, a Bachelor's of Science in Forestry from SIUC in 2010. He has been with the Kentucky Division of Water since 2015.

Quirky Challenges of Floodplain Management in Arid Rural Idaho

Maureen O'Shea, ID Dept of Water Resources, maureen_oshea@yahoo.com
Co-presenters: None

Abstract: The Snake River is 1,078 miles long meandering across Idaho. While vast, the Snake River Basin is quite arid. Much of the area along the Snake River, within a few miles of its banks, is irrigated farmland. More than 95% of the Snake River is an A Zone without BFE. Idaho has 44 Counties with 41 Counties participating in the NFIP. Idaho has 199 Cities with 133 Cities participating in the NFIP. About 213 of the 243 Idaho communities eligible to join the NFIP have a population of <25,000. City & county elections occur every two years. Often half of the seated council/commissioners are new every two years. Thus, FPM education is an ongoing challenge. Not only does half the elected officials change out with biennial regularity; then every four years so does the City/County Clerk. In the 213 communities with a population of <25,000 the City/County Clerk often wears way too many hats. Functions of the Clerk's office often includes Alcohol Beverage Licensing, Alcohol Catering Permits, Annual City Budget, Building Permit Applications, City Elections, City Park Reservations, Dog Licensing, Payroll, Personnel/Human Resources, Planning & Zoning, Public Records Request, Urban Renewal, Water, Sewer, Sanitation Services, & so many other duties as assigned of which includes Floodplain

Development Permits. If someone only snow skis once a year… they will never become an Olympics contender. Thus, these small cities/counties can never be a master of FPM. They do less than one Floodplain Development Permit per quarter, & sometimes less than one a year. One city on the Snake River has a Clerk that has been there +13 years. She attended a few trainings & has adopted a new Flood Ordinance. She has issued three building permits in her tenure & none of the building permits were for structures in the SFHA.

Biography: Maureen O'Shea, AICP, CFM is a part-time Floodplain Specialist with Idaho Department of Water Resources. Maureen was the ID State NFIP Coordinator from November 2015 to January 2023. Prior to moving to Idaho Maureen worked for FEMA as a Substantial Damage Crew Leader/Floodplain Management Specialist deployed to Alabama, New York, Minnesota, Michigan, Texas, and South Carolina following natural disasters and the rebuilding efforts in the floodplain that follow. Working for North Carolina Emergency Management she was the NFIP Planner for Eastern/Coastal North Carolina. Maureen's Floodplain Administrator experience has been at both the County and Town levels. She has been the CRS Coordinator for Currituck County and the Town of Kitty Hawk. Maureen has practiced floodplain management in the planning profession since 2005. She has her CFM since 2007, and AICP since 2010. Maureen has a Bachelor of Landscape Architecture from the University of Nevada Las Vegas. Maureen lives in Canyon County, Idaho with three golden retrievers Murray, Orlagh, Poppy.

B3: Equity, Engagement, and Communications
Track: Risk Communication/Equity

Giving Power to the People! Rethinking Rural Alabama Discoveries

Jordan Hayes, PE, CFM, WSP, jordan.hayes@wsp.com
Co-presenter: Casie Pritchard, casie.pritchard@adeca.alabama.gov

Abstract: The Discovery process is intended to provide communities with an opportunity to communicate their needs and available data. The traditional approach to the Discovery process is not often conducive to early buy-in or open dialogue within rural communities, which face numerous challenges involving flood risk communication, enforcement and are often less capable of dedicating individual community stakeholders to flood risk management. In order to best engage with these communities and their stakeholders, The Alabama Office of Water Resources (OWR) has reimagined the standard approach to Discovery Engagement. Rural Communities often share the numerous emergency planning responsibilities across a more limited number of staff, resulting in stakeholders wearing many different hats for a given community. Furthermore, rural watersheds rarely have equitable meeting locations. To combat this shortcoming of the more standard approach, the D iscovery process has been reimagined to be more personalized to communities in the watershed. This process involves multiple methods of early engagement ranging from telephone interactions to an ultimate goal of personalized small meetings within the community. This method provides the community with an opportunity to see the data and digest the Discovery and RiskMAP processes on their timeline and in their community. This presentation will detail the needs for entirely broken out meetings surrounding the Discovery process and showcase a success story for engaging communities that were not enthusiastic during the BLE phases. The findings will be shown for multiple rural watersheds in Alabama and will explore the process

for choosing communities and leveraging available data at the Discovery phase. Additionally, the presentation will further provide a voice to those historically marginalized or underserved by showcasing something that works well- personal attention.

Biography: Jordan Hayes is a Senior hydrologist and project manager. He has been excitedly solving hydrologic engineering problems for 10 years. His work in Alabama includes numerous floodplain mapping projects, BLE projects, and now focuses on maximizing flood risk communication to those affected. He received his bachelor's and master's degrees from the University of Tennessee. In his spare time, you can catch him renovating his home and camping with his Wife and dog!

Hazard Mitigation in 70 languages

Jaleesa Tate, CFM, Tetra Tech, JALEESA.TATE@tetratech.com
Co-presenters: None

Abstract: Mitigation as an action that reduces the severity of an incident must begin with people understanding what risk they live with in their community. That can be a challenge for English speakers and a major barrier if English is a second or third language. Can someone translate wildfire into Poqomchi for me? The California Governor's Office of Emergency Services offered competitive hazard mitigation grants and the City of Concord use that grant to support its Language Access Analysis and Strategy. In Part One of the project, they needed determine the number of active languages in the community. In Part Two the project goal was to create a strategy that structured Concord OES so it can conduct long-term meaningful engagement with the whole community based on its understanding of language use. This presentation will explain how Concord championed the concept that language access is hazard mitigation, not an easy feat when most mitigation projects involve engineering. We will explore the challenge that comes with creating data. The U.S. Census provides data updates every ten years, but people keep migrating and immigrating between those data points. Qualitative and quantitative data analysis was the foundation to establish the need for outreach to multiple language communities. This presentation will provide overviews of on-the-ground research processes and how to present useable results. Once risk communication needs in multiple languages was established, there had to be changes to policy, plans, and programs, and a strategy to go with that. We will explore how a structure was created for OES to provide multiple opportunities for community members to participate in leadership, goal setting, and objectives for language access programming. Then how a go-to-them model of emergency management was utilized for whole community engagement. And finally, how we establish an evergreen approach so expanding language access is a taken-for-granted element of OES. Language access is a long-term, ongoing hazard mitigation project. Participants can walk away with a model for hazard mitigation programming that can be applied to local and regional emergency management programs.

Biography: JaLeesa Tate is experienced in the areas of hazard mitigation, floodplain management, and urban planning. She currently serves as a Senior Community Resilience Professional in Tetra Tech's TDR Division. Her hands-on experience in emergency management and urban planning has positioned her to be a leader for developing strategies and recommendations to build resilient communities.

JaLeesa is a recognized thought leader and has contributed to flood resilience initiatives with the Pew Charitable Trust and Urban Land Institute. She also provided national and statewide resilience guidance through her service as the mitigation committee co-chair for the Maryland Association of Floodplain and

Stormwater Managers and chair of the State Hazard Mitigation Officer (SHMO) subcommittee for the National Emergency Management Association. She contributed to FEMA's policy and program development, as a member of FEMA's External Stakeholders Working Group.

Prior to joining Tetra Tech, Inc., JaLeesa served as the SHMO and Hazard Mitigation Branch Manager for the Maryland Department of Emergency Management (MDEM). In this capacity she spearheaded the development of the State's Hazard Mitigation Program and secured and managed over $100M for Maryland to invest in resilience actives. Additional prior roles include serving as the City of Baltimore's Coastal Resources Planner and the Environmental Planner for Wicomico County – City of Salisbury Department of Planning and Community Development. In these roles she worked on local water quality improvement and environmental land use. JaLeesa holds a Bachelor of Science in geography and geosciences from Salisbury University and is a CFM. Insights into Historical Flood: Visualizing Data for Equity in Risk Communication.

Qi Ma, PE, CFM, AECOM, qi.ma@aecom.com
Co-presenters: None

Abstract: Flood events have long been a significant concern, inflicting extensive costs on both properties and lives. In this presentation, we will delve deeply into the historical flood data sourced from the NOAA Storm Events Database. Through the application of big data analytics and advanced data visualization techniques, we aim to comprehensively explore the temporal and spatial distribution of historical floods, trends in occurrence, and associated losses etc. By leveraging these insights, we seek to empower stakeholders with the knowledge necessary for informed decision-making, thereby providing a crucial resource for effective risk communication strategies. Given that the dataset encompasses geographic locations across the nation, it is essential to acknowledge and address potential biases and limitations inherent within it. We will highlight the importance of critically evaluating the data's scope and accuracy to ensure robust and reliable analyses. Furthermore, our presentation will underscore the significance of community engagement and outreach efforts in achieving equity within flood risk management and propose inclusive approaches to foster meaningful participation from all stakeholders, particularly those in underserved or vulnerable communities.

Biography: Qi Ma is a Water Resources Engineer at AECOM's Atlanta Office. He joined AECOM in 2019, and has been actively involved in FEMA Flood Risk MAP efforts, consistently providing valuable engineering support across various projects. He has conducted hydrologic and hydraulic (H&H) analysis for a significant number of streams and adeptly employed both 1D and 2D modeling methods to ensure accurate assessments and comprehensive evaluations. Moreover, Qi's commitment to refining his skills has prompted him to adopt data analytics and visualization capabilities, which he now applies within the field of floodplain management. He is a PE and a CFM.

B4: International Floodplain Management
Track: International Committee Sponsored

Floods from Down Under: Lessons Learned from the Australian Floodplain Management Conference
Del Schwalls, PE, CFM, Schwalls Consulting LLC, ds@schwallsconsulting.com
Co-presenters: None

Abstract: Flooding occurs everywhere in the world, and we can learn great lessons from our colleagues overseas. The 2023 Floodplain Management Australia Conference brought together a phenomenal group of local community officials and technical professionals from Australia, New Zealand, Asia, Europe, and North America. Throughout the week, the presentations and conversations reminded this speaker that the problems we face are the same, just measured in different units. This presentation will present the highlights from the conference and the 6 weeks spent in Australia and New Zealand, learning about their approach to floodplain management and flood risk communication, while showing some of the innovative ideas coming from our Aussie and Kiwi counterparts. In addition, the presentation will be accented by sites seen around these 2 amazing countries.

Biography: Del Schwalls is President of Schwalls Consulting LLC and an environmental engineer with 23 years of experience in floodplain management and water resources. He provides engineering and floodplain management solutions for local communities, state and federal agencies, and private entities. He specializes in conducting training around the country on the FEMA Elevation Certificate, supporting communities in improving their CRS and overall floodplain management programs, and tailoring local regulations to meet the community's specific needs and goals. Mr. Schwalls also serves as an expert legal witness on FEMA regulations and programs, and has been the H&H/Inland Flooding subject matter expert for the Florida Commission on Hurricane Loss Projection Methodology since 2015. His background includes watershed and stormwater management, independent technical reviews of FEMA Flood Risk projects and Flood Insurance Studies, HMA grants, and flood risk assessment, modeling, and mapping.

Mr. Schwalls has been on the Board of Directors for the Florida Floodplain Managers Association since 2008, including serving as Chair and Vice Chair, and served as Region 4 Director on the ASFPM Board from 2016-2022. He is a PE in FL, AL, GA, and SC, and earned his CFM in 2003.

Delivering major infrastructure on complex Australian floodplains – Lessons, challenges, and progress

Martin Boshoff, CpEng RPEQ (Australia), CEng (United Kingdom), AECOM, martin.boshoff@aecom.com
Co-presenters: None

Abstract: Floodplains in Australia have long been entwined with infrastructure development, often to the detriment of both. Consequently, contemporary Australia grapples with a legacy of ill-conceived projects in flood-prone areas, resulting in capital investments tied to unsustainable locations, aggravated by the effects of a changing climate. Any need for adjustments to infrastructure in flood-prone areas to cater for growing communities has become a contentious and politically charged issue. This ongoing development in flood-prone areas presents a challenging landscape where the necessity of major projects collides with the inherent vulnerability to flooding, posing a growing dilemma for floodplain managers. In a time when extreme climate events are increasingly common, public awareness and interest in infrastructure planning have surged. Communities are more inquisitive and informed about climate-related decisions and infrastructure planning than ever before. In addition, advancements in hydraulic modelling software and digital solutions have transformed flood risk assessments. These tools evaluate complex hydrological and hydraulic processes, allowing detailed assessments of changes in flooding behavior caused by developments, enabling regulators to impose complex quantitative flood compliance criteria on infrastructure projects. However, despite the abundance of data, the complexity of conveying flood risk remains, with many community members lacking proficiency in probability,

statistics, or flood model interpretation. In a parallel evolution, the way communities interact with information has transformed. Greater access to data, models, and information doesn't necessarily equate to deeper understanding or trust in information sources. As climate and environmental awareness grows, communities seek more comprehensive information, challenging professionals to go beyond presenting raw data. This paper, drawing from recent case studies, will navigate the intricate terrain of delivering infrastructure on Australian floodplains, with a particular emphasis on the author's firsthand experience in overseeing flood risk and meeting community expectations within the context of development in floodplains.

Biography: Martin Boshoff, an experienced floodplain management practitioner, has held various positions within AECOM's Water Business since joining the company in 2012. He recently assumed the role of International Water Resources Leader. In this capacity, Martin is responsible for driving AECOM's water resources growth in all geographies outside the Americas, including Europe, Africa, the Middle East, Asia, and Australia & New Zealand. His responsibilities encompass strategy formulation, growth initiatives, client engagement, and managing AECOM's brand presence in the water resources sector. With over 24 years of experience in civil and water resource engineering, Martin has worked across water, civil infrastructure, environmental, mining, and agricultural sectors, in both private and public roles spanning various countries, including Australia, Scotland, England, Saudi Arabia, Spain, and South Africa.

The 2023 Nova Kakhovka Dam Attack in Ukraine: Fathom case studies in Disaster Risk Reduction

Gavin Lewis, Fathom, g.lewis@fathom.global
Co-presenters: None

Abstract: On June 6th, 2023 The Nova Kakhovka Dam failed in Ukraine. "The dam, 30metres tall, 3.2 km long, holding a volume equal to the Great Salt Lake in the U.S. state of Utah, was built in 1956 on the Dnipro river as part of the Kakhovka hydroelectric power plant. It is not known how many people may have died as a result of the flooding." "Ukrainian officials estimated about 42,000 people were at risk from flooding, including some 25,000 in Russia-held parts on the right bank of the river. In total, c.80 communities were threatened by flooding." (Reuters). This event is not only an example of the "residual risk" associated with hydraulic infrastructure but also an example of the cascading effects of disasters. "The environmental and humanitarian consequences are already catastrophic. Tens of thousands of people have lost their homes. Thousands are stranded in 12 foot-deep flood zones. Millions have no potable water—Kherson, Mykolaiv, Dnipropetrovsk, and Zaporizhya oblasts relied on the dam and its reservoir for water, as did Crimea. At least 150metric tons of oil and countless volumes of chemicals have leaked out into the Dnieper River en route to the Black Sea. More will join it from flooded gas stations, factories, and sewage facilities." "These are tragedies of the purest form But these impacts aren't going to be suffered beyond the immediate geographical area. What will be felt abroad are the price hikes and supply crunches for agricultural products and industrial commodities." (Times, https://time.com/6285811/ukraine-kakhovka-dam-bombing-impact-essay/)... In this presentation we will explore the methodology behind the rapid response mapping Fathom provided for the UK Foreign, Commonwealth & Development Office to assess flooded areas downstream of Nova Kakhovka dam post event. We have rapidly deployed mapping for other major events worldwide and could potentially bring

in a partner to speak on, or contribute to, how we leverage the latest scientific developments in modeling, mapping and validation to uplift disaster risk reduction efforts.

Biography: Gavin is an engineer, and has a commercial background in spatial data and technology across a number of sectors particularly insurance, financial services, government and real estate. As Head of Engineering, Gavin is responsible for growing direct clients across the engineering sector and for developing the Fathom Partner network globally.

B5: Integrated Floodplain Management: Designs and Case Studies
Track: NBF

Floodplains By Design Accelerator: Scaling a Successful Model
Sarah Murdock, The Nature Conservancy, smurdock@tnc.org
Co-presenters: Bob Carey; bcarey@tnc.org

Abstract: Public funding and collaborative management programs that enable integrated floodplain management work resulting in multiple benefits is scarce. As communities and ecosystems face growing impacts from flooding, drought, water quality degradation, loss of public open space, biodiversity loss, declining freshwater recreational opportunities, and others, there is a growing need to address these challenges with public programs that promote collaborative, holistic floodplain management work resulting in multi-benefit outcomes. Floodplains by Design (FbD), a public-private partnership in Washington State, is an example of this type of program—implemented through a two-pronged approach that includes top-down public funding and bottom-up capacity building. It has brought together tribal and local governments with multi-sector stakeholders who collaborate locally on developing and implementing large scale floodplain plans and projects—and supports them through state funding and capacity building. The successes of the program are now well documented. We have extensively studied the enabling conditions that led to and continue to enable the success of this program.

In light of the success in Washington, The Nature Conservancy is leading a team of partners to develop a national Floodplains by Design Accelerator. The goal of the effort is to adapt and replicate the general approach of the Washington FbD program in other states. The vision is to greatly expand investments and capacities in integrated floodplain management by establishing collaborative governance structures, building local leadership capabilities to build the pipeline of multi-benefit projects needed for long-term community and ecosystem resilience, and creating multi-sector alliances to advocate for the investments needed to build a more resilient future.

At this session, we will share the success story of the Floodplain by Design program and what we have learned about the essential enabling conditions and key ingredients that led to its current and continued success. We will also share our ongoing work to enable and replicate integrated, multi-benefit floodplain management programs in other states and how you can help with this effort.

Biography: Ms. Sarah Murdock serves as the Senior Director of U.S. Land 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 20 years working at the Conservancy, Ms. Murdock has and

currently leads on policy development, advocacy, communications, and execution of projects that inform The Nature Conservancy's climate resilience, land and water policy work. She currently manages and leads the U.S. federal land and water policy team. 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 and currently serves on the Executive Board of the Trustees for that program. She is married, a mother to a son, loves all active and inactive outdoor activities, and resides in Scituate, MA.

Integrated Floodplain Management: A Multi-Benefit Solution for States

Eileen Shader, CFM, American Rivers, eshader@americanrivers.org
Co-presenters: None

Abstract: Integrated Floodplain Management (IFM) is a multi-disciplinary approach to managing floodplains that brings together multiple stakeholders, encourages agency collaboration, and seeks to achieve multiple floodplain benefits for people and nature. It is the most effective way to achieve the dual goals of floodplain management- reduction of flood losses and protect and restoration of natural and beneficial functions of floodplains. IFM seeks to move beyond siloed management that can result in unintended consequences like loss of habitat, inequitable flood protection, and unwise development in floodplains. States play a critical role in floodplain management as the intermediary between local communities and federal programs, and are charged with addressing complex water resources challenges. States that use integrated floodplain management strategies are able more effectively engage all floodplain stakeholders, access more diverse funding opportunities, and implement more projects that reduce flood risk, improve floodplain habitat, improve water quality, and increase resilience to climate change. American Rivers is working with partners including The Nature Conservancy and River Network to launch a campaign to advance IFM in more states across the nation by building committed leaders, refining programmatic frameworks that support IFM, providing technical support, and bringing together diverse stakeholders. This presentation will provide an overview of Integrated Floodplain Management and the multiple benefits that states and communities can realize using IFM strategies. We will discuss the enabling conditions necessary for effective IFM at a state level, provide examples of states leading the way on IFM, and lay out strategies for replicating IFM in other states.

Biography: Eileen Shader is Senior Director of Floodplain Restoration for American Rivers. Ms. Shader has worked in river protection and restoration advocacy for over 20 years and currently leads a national program working to increase the pace and scale of floodplain restoration across the United States. She leads American Rivers' floodplain and flooding policy and advocacy, coordinates a team of 20+ floodplain restoration practitioners, and advances campaigns to build institutional and workforce capacity to restore floodplains. Eileen coordinates the Natural Floodplain Functions Alliance, a community of practice of 2500+ floodplain restoration practitioners, and she is a leader in the Association of State Floodplain Managers, serving as Co-Chair of the Natural and Beneficial Functions Committee, and the Social Justice Task Force. Eileen holds a B.S. in environmental science from Elizabethtown College, a M.A. in Environmental and natural resource management from The George

Washington University, and is a Certified Floodplain Manager. She lives in Camp Hill, Pennsylvania, and is a watershed steward for her local creek, Conodoguinet Creek.

Resilient Riverscapes: The role of integrated floodplain management in the Colorado River Basin

Brian Murphy, River Network, bmurphy@rivernetwork.org
Co-presenters: None

Abstract: Streams and riverine landscapes, or "riverscapes," are composed of the river channel, connected floodplain, and biotic communities that make up the valley bottom and maintain the physical and biological processes vital to riverscapes and the associated ecosystem services. Rapid development within those riverscapes and a changing climate influence water and land use, degrade river health, and reduce the benefits of ecosystem services to communities. Across the West, communities are struggling with responding to those adverse conditions and evolutionary changes. An emerging tool in the resiliency toolbox is integrated riverscape management, or IRM, which aligns the management of water resources, land use changes, and hazards to improve benefits for communities equitably. IRM emphasizes three core objectives: (1) preserve and restore the capacities of rivers to withstand floods safely; (2) maintain and restore floodplains and wetlands to absorb high river levels; and (3) protect and regenerate the vegetation along the river corridor to slow water flow, filter pollutants, recharge the aquifer, and provide habitat. This presentation will describe a new IRM program in Colorado and summarize the tools that shift best practices away from top-down, reach-scale engineering towards catchment-scale planning, nature-based solutions, and corridor-wide management. The presentation will also discuss the piloting of IRM across Colorado, focusing on opportunities for strengthening implementation within the four interdependent sectors of emergency management and hazard mitigation planning, community and land use planning, land management, and water resources management.

Biography: Dr. Brian Murphy is an ecological and riverscape engineer and fluvial geomorphologist with a wide-ranging background in watershed planning, riverscape restoration, fluvial geomorphology, and floodplain management. He has worked in the water resources consulting field for 20 years, joining River Network in 2022 as the Healthy Rivers Program Manager in the Colorado River Basin (CRB). As part of the CRB team, he provides technical assistance to coalitions, local governments, and other organizations across the CRB. Brian leads River Network's integrated river management program that supports local leaders working to ensure their communities and rivers are healthy and resilient into the future. Partners look to him for help navigating technical hurdles, collaborating with federal, state, and local agencies, and promoting solutions that balance community resilience and resource conservation goals. Brian's PhD research focused on assessing urban stream processes and emerging management paradigms that integrate social-ecological values. He lives in Denver with his wife and three children.

B6: Post-Disaster Policies and Procedures
Track: Post Disaster

SI/SD Desk Reference (FEMA P-758): Spotlighting Upcoming Revisions and Additions
Molly Kaput, FEMA, molly.kaput@fema.dhs.gov
Co-presenters: Rebecca Quinn, rebecca@rcquinnconsulting.com

Abstract: Everyone agrees—administering the substantial improvement and substantial damage requirements is one of the most challenging parts of floodplain management. From its inception, the "50% rule" was intended to bring into compliance those buildings that were built before communities adopted floodplain management ordinances. Adding to the challenge are changes to flood hazards: BFEs are going up and SFHAs are getting wider. That means more buildings are located in SFHAs and are subject to regulation. This session highlights the most significant revisions and additions in the upcoming second edition of the SI/SD Desk Reference (FEMA P-758). It has been a mainstay resource for floodplain managers since it was published in 2010. To prepare the revision FEMA examined 13 years of notes, lessons learned, recommendations, and responses to the FEMA Building Science helpline. The review committee included FEMA staff, state NFIP coordinators, and local officials.

Biography: Molly Kaput has been the first Disaster Operations Coordinator with FEMA's Floodplain Management Division since 2022. She has been working with communities since 2012 to ensure compliance with the National Flood Insurance Program. Prior to FPMD, she worked for over four years in Region I in Boston supporting New England states and for five years in FEMA Region III in Philadelphia supporting mid-Atlantic states. She has completed multiple deployments in support of disaster recovery efforts with a specific focus on substantial damage operations and is currently serving as FEMA's Floodplain Management Division's Disaster Operations Committee Chair.

Planning for the Unexpected: Post-Disaster Lessons Learned in Florida
S. Marie Yarbrough, PE, AtkinsRealis, marie.yarbrough@atkinsrealis.com
Co-presenters: None

Abstract: Once a region enters the cone of uncertainty for a tropical storm or hurricane event, it becomes a wild ride for asset managers over the next few weeks, sometimes even months. The pre-disaster planning phase must begin well in advance of a named storm event with protocol developed for staff identification, equipment preparation, provision logistics, safety considerations, resource allocation including fuel, and a game plan to navigate the unknowns bound to occur. The Atlantic hurricane season may begin June 1st, but preparations must begin well in advance. Storm plans must be finalized in the spring with potential staff identified – the more the better! In late spring, a practice response is recommended for all to better understand their roles and responsibilities and test accessibility to cloud databases. Data collection applications must be developed and tested – there will likely be limited IT staff availability once a storm is on the horizon. Following the storm is where Ms. Yarbrough specializes sharing approaches and best practices from her post-disaster experience in Florida. She brings her experience working with State agencies through Hurricanes Idalia, Nicole, Ian, Michael, and Irma and a utility company through Tropical Storms Eta and Fred to help others better understand coordination, preparation, and what to expect post-disaster. Lessons learned from those experiences may help restore assets owned by both public and private entities and a sense of normalcy more efficiently. This presentation will focus on recommended actions for asset managers who are responsible for timely data collection and analysis needed to determine the status of their assets post-disaster. Even the most well-prepared Emergency Response planners will experience unexpected issues to be worked through and will build upon their lessons learned and best practices from past storm responses.

Biography: Marie Yarbrough is a senior coastal engineer at AtkinsRealis. She brings over 18 years of experience involving field operations and data collection, research and analysis, design, permitting, construction oversight, and program management support. Her general responsibilities include providing program management support services as part of a statewide engineering contract for the Florida Fish and Wildlife Conservation Commission, Boating and Waterways Section. Recent projects include response and recovery analysis and support services in response to Hurricanes Idalia, Nicole, Ian, Michael and Irma and Tropical Storms Eta and Fred.

Substantial Damage Estimator (SDE) 3.0: Best Practices

Molly Kaput, FEMA, molly.kaput@fema.dhs.gov
Co-presenters: Christina Groves, Advancing Resilience in Communities (ARC),
christina.groves@tetratech.com

Abstract: This presentation will cover best practices for using FEMA's Substantial Damage Estimator 3.0. Because communities are experiencing unprecedented natural disasters with significant impacts on structures, it is more important than ever to learn efficiencies for using SDE 3.0 during "blue skies" to support community requirements in addressing substantial damage. Whether it is flood, fire, tornado, or another type of incident, addressing substantial damage is a requirement of the National Flood Insurance Program (NFIP). All participating communities have adopted and are expected to enforce a flood damage prevention ordinance that meets or exceeds the NFIP minimum standards found in 44 CFR 60.3. Those standards include addressing substantial damage. Attend this session to learn best practices when using the SDE 3.0 tool to better prepare communities for post-disaster situations. The ideal time to build a strategy for working substantial damage assessments is before an incident occurs.

Biography: Molly Kaput has been the first Disaster Operations Coordinator with FEMA's Floodplain Management Division since 2022. She has been working with communities since 2012 to ensure compliance with the National Flood Insurance Program. Prior to FPMD, she worked for over four years in Region I in Boston supporting New England states and for five years in FEMA Region III in Philadelphia supporting mid-Atlantic states. She has completed multiple deployments in support of disaster recovery efforts with a specific focus on substantial damage operations and is currently serving as FEMA's Floodplain Management Division's Disaster Operations Committee Chair.

B7: MOFFATT & NICHOL SHOWCASE

B8: LIDAR and Vertical Data for Mapping
Track: Mapping

Beneath the Surface: Unveiling Hidden Depths of Flood Resilience with USGS 3DNTM
Tyson James, PE, CFM, AECOM, Tyson.James@aecom.com
Co-presenters: Amelia Vincent, AECOM, amelia.vincent@aecom.com

Abstract: Floodplain Managers can elevate their roles by harnessing the upcoming United States Geological Survey's (USGS) National Topography Model (3DNTM). Potential strategic collaboration with FEMA promises a substantial reduction in workload, a more profound comprehension of flood resilience, and will unlock new capabilities and emerging technologies. USGS 3DNTM aims to deliver a new era of water data with the next generation 3D national elevation dataset and a 3D elevation derived hydrography dataset at an unprecedented level of precision over the next decade. Not surprisingly, this 3DNTM endeavor was confirmed as the foremost use case in the USGS's Hydrography Requirements Benefits Study (HRBS) conducted in 2016, with several pilot projects already in progress. Currently, a substantial endeavor is necessary to address the dearth of elevation data available for both hydrologic and hydraulic modeling. 3DNTM could be streamlined directly in the hydraulic model neglecting the complex hydrologic calculations, hydraulic processes, and external software programs. Moreover, the 3DNTM opens the door to a higher quality and elevated understanding of flood resilience: accounting for seasonal changes, periods of drought, floodplain storage, force and momentum of water, hydro-geomorphology, and many other crucial factors. Emerging technologies such as a digital twin will illuminate these capabilities and facilitate better communication. This presentation will equip Floodplain Managers with the knowledge of benefits the 3DNTM program can provide in flood risk analysis, mitigation, emergency response, climate change, and promote safer communities.

Biography: Tyson, a graduate of Brigham Young University, started his career here in Salt Lake City, Utah with AECOM 8 years ago. He has enjoyed pioneering projects with AECOM, recently including: SCDNR's Flood IMPACT website, SCOR's identification & prioritization of mitigation projects, Southeast Hurricane Response Teams, and NC Blueprint. He has improved workflows by incorporating technology, automating tedious tasks, and improving user experience with friendly and more beautiful products. He specializes in the complex hydrology and hydraulics of the watersheds in South Carolina.

Get Your Geodetic Advice about New Vertical Datums

Christine Gallagher, NOAA's National Geodetic Survey, christine.gallagher@noaa.gov
Co-presenter: Jeff Jalbrzikowski, jeff.jalbrzikowski@noaa.gov

Abstract: Flood hazard identification and mapping relies upon vertically-referenced digital elevation models (DEMs) and hydrologic models that use consistent vertical datums to ensure correct alignment and risk assessment. Unfortunately, the propensity of various vertical datums and technological advances that allow for collecting huge geospatial datasets have created challenges in managing metadata and ensuring datums are aligned. A new pair of geodetic datums are set to be produced by NOAA's National Geodetic Survey (NGS) in the coming years. These datums will modernize the National Spatial Reference System (NSRS) by replacing the North American Datum of 1983 (NAD 83) and the North American Vertical Datum of 1988 (NAVD 88). This will impact all Federal geospatial programs, including the National Flood Insurance Program (NFIP) managed by FEMA. To help with this transition, NGS Regional Geodetic Advisors are positioned around the country to connect with everyone doing geospatial work in their regions. They partner with state, local and federal government agencies to build infrastructure and solve hard problems, including any that are facing the floodplain management community. This presentation will give a brief overview of the various types of vertical datums of the National Spatial Reference System (NSRS), targeted for the floodplain manager, GIS professional, and engineer. We will review NGS's ties to FEMA's NFIP, datum terminology, some technical history, datum transformations (aka 'conversions'). We will give a brief update on publicly available tools NGS is

developing, how we are coordinating with other federal agencies to implement this change, and ways it will enhance flood mapping activities. This presentation will also give a brief overview of the regional geodetic advisor program as well as shoreline mapping, emergency response aerial imagery and topographic-bathymetric lidar projects that are being completed by NOAA's National Geodetic Survey.

Biography: Christine Gallagher is Regional Geodetic Advisor Branch Chief at NOAA's National Geodetic Survey (NGS), and she manages 14 geodetic advisors that provide technical assistance and support directly to local and regional users. She previously led communications efforts at NGS and planned a series of Geospatial Summits about modernizing the National Spatial Reference System. She also previously coordinated NGS programs focused on using accurate elevation information for various applications including flood risk determination. She's had a number of professional opportunities that have taken her to the Environmental Protection Agency, National Park Service, Capitol Hill, and other offices throughout NOAA. Christine earned a Masters Degree in Engineering and Public Policy at the University of Maryland. She earned her bachelor's degree in engineering at the University of Pittsburgh, and she now resides outside Seattle, Washington.

USGS 3D Hydrography Program: A New Model for the Nation's Hydrography

Cynthia Rachol, US Geological Survey, crachol@usgs.gov
Co-presenters: None

Abstract: The United States Geological Survey (USGS) National Geospatial Program (NGP) provides foundational digital geospatial data representing the topography, natural landscape, and manmade environment of the U.S. and is in the process of establishing the 3D Hydrography Program (3DHP) to modernize the mapping of the Nation's inland waters. High-resolution lidar (light detection and ranging) elevation data that have been collected across much of the conterminous US (CONUS) through the 3D Elevation Program (3DEP) will be used as the source to derive a positionally accurate and detailed stream network. The USGS assessed the acquisition of elevation-derived hydrography data through several pilot projects in states including Alaska, Texas, Pennsylvania, and Oregon. This presentation will provide background information on USGS spatial data and programs, a status update of 3DHP data and how to access it, and a general overview of the USGS elevation-derived hydrography data specifications.

Biography: Cynthia Rachol is the USGS National Map Liaison for Michigan and Ohio. She transferred into the National Geospatial Program's User Engagement section in July 2021 after spending the previous 22 years working as a hydrologist in the USGS' Upper Midwest Water Science Center, where she held research interests in dam removal analysis, natural channel design evaluation, flood inundation modeling, and water quality monitoring in both urban and agricultural settings.

B9: Leveraging Modeling for Real-Time Flood Forecasts
Track: Modeling

San Joaquin River Hydraulic Model Development and Flood Forecast Evaluation in CA.

Chris Ferrari, PE CFM, GEI Consultants, cferrari@geiconsultants.com
Co-presenters: None

Abstract: GEI Consultants in coordination with the California Department of Water Resources has developed a one- and two-dimensional hydraulic model using HEC-RAS for the San Joaquin River system based on LiDAR and bathymetry collected in 2021 and 2022. The SJR system model includes approximately 1000 miles of study streams in the California central valley. The upstream boundary extends to seven major reservoirs (New Melones, Don Pedro, McClure, Eastman, Hensley, Millerton and Pine Flat), flows through several communities and agricultural areas and discharges downstream into the Delta near San Francisco, CA. The hydraulic model was calibrated to the 2017 and 2023 high flow events and was utilized for real-time 5-day flood forecasting to route the May through July reservoir flow releases to forecast water levels through the system. The flood forecasting was used to monitor water levels to protect residences, businesses and critical facilities (police, fire, hospitals, schools) protected by the levees. The hydraulic model is also being utilized to evaluate approximately 600 miles of levees to reduce risk to local communities, update levee freeboard, channel capacity and produce hypothetical levee failure mapping for emergency managers. This presentation will discuss the model development, terrain collection, and the following results: flow timing, channel capacity impacts due to subsidence (one foot per year) in sections of the San Joaquin River system, and flood forecasting for the May thru July 2023 reservoir flow releases throughout the San Joaquin River system.

Biography: Mr. Ferrari has 34 years of water resource project experience developing hydrologic and hydraulic one-, two- and three-dimensional Computational Fluid Dynamic (CFD) models to evaluate watersheds, riverine systems, stormwater systems, dams and spillways for floodplains, civil design and complex hydraulic structures. Mr. Ferrari clients have included several California local agencies, the State of California Department of Water Resources (CADWR), the United States Corps of Engineers Sacramento District (USACE) and the Federal Emergency Management Agency (FEMA).

A Crash Course in Accessing Streamflow Forecasts from the National Water Model

Jason Regina, NOAA | NWS | Office of Water Prediction, jason.regina@noaa.gov
Co-presenters: None

Abstract: The National Water Model (NWM), currently in version 3.0, is a fully-distributed continental-scale high-resolution hydrological model that generates hourly forecasts and retrospective simulations of volumetric streamflow at over 3 million stream reaches across the Continental United States, Alaska, Hawaii, and Puerto Rico. NWM output includes short range (18-48 hours), medium range (8.5-10 days) and long range (30 days) forecasts of streamflow, soil moisture, and total coastal water level in both deterministic and ensemble configurations. Forecasts are driven by precipitation from the National Weather Service Rapid Refresh (RAP), High Resolution Rapid Refresh (HRRR), Global Forecast System (GFS), and National Blend of Models (NBM) forecast products. Coastal wave heights for total water level forecasts include input from the Surge and Tide Operational Forecast System (STOFS) and Probabilistic Tropical Storm Surge (P-Surge) models. Simulation output includes hourly snapshots and daily retrospective analyses driven by Stage IV Multi-Radar/Multi-Sensor (MRMS) Quantitative Precipitation Estimates and a 40-year retrospective simulation driven by the Analysis of Record for Calibration (AORC). A 2023 community survey focused on understanding the NWM's current and potential role in community resilience planning found that municipal participants felt that the NWM had potential for use in flood risk, emergency management, and forecast-informed reservoir operations, but that most respondents (>60%) reported having no prior knowledge of the NWM or its forecast products. NWM output is available on multiple platforms including the National Oceanic and Atmospheric Administration Operational Model Archive and Distribution System (NOMADS), Google Cloud Platform,

Amazon Web Services, and Microsoft Azure. This presentation will introduce the various forecast configurations of the NWM and discuss how model output is stored in NetCDF and Zarr format on different platforms. We will also provide a high-level overview of open-source tools available to retrieve and analyze NWM output in Python and R.

Biography: Dr. Jason A. Regina is a research hydrologist and model developer working on model evaluations in the Interdisciplinary Science and Engineering Division in the Office of Water Prediction's National Water Center in Tuscaloosa, AL. He works primarily on evaluations of the National Water Model to support model development and forecast operations. Jason earned a B.S. in Civil Engineering at the University of Missouri-Kansas City, and a M.S. and Ph. D. in Civil Engineering at the University of Wyoming with an emphasis on water resources and numerical modeling. His research interests include hydrometric analysis, tropical hydrology, computational hydrology, forecast uncertainty, and the hydrological effects of land-use and land-cover change. More recently, Jason has become increasingly interested in science communication, especially differences in how practitioners and the public understand forecast uncertainty.

Modeling Compound Flooding in Real-Time

Frank McKinnie, Streamline Technologies, Inc., fmckinnie@icpr4.com
Co-presenters: None

Abstract: Compound flooding occurs when two or more flooding sources occur simultaneously such as storm surge and riverine flooding. This presentation describes an innovative approach to identify compound flooding impacts in real-time by nesting an inland flood forecasting system with a coastal surge and tide forecast system. Two case studies in coastal Florida are presented and include model development, the nesting scheme, system deployment, and an outward-facing dashboard that identifies flooding at the building and street level several days in advance. The dashboard is an easy-to-use tool that can be leveraged by emergency response teams to proactively prepare for, mitigate, and recover from major storm systems in coastal areas.

Biography: Mr. McKinnie has over 20 years of experience in the water resources field. He has been directly involved with numerous stormwater master plans and watershed studies throughout the State of Florida varying in size (up to 600 sq. mi.) and complexity (spanning 5 counties; multiple stakeholders with varying interests). His experience includes stormwater modeling (1-D and 2-D), hydraulic analysis of erosion and sedimentation countermeasures, floodplain analysis, water quality analysis, groundwater modeling, secondary drainage system analysis, level of service analysis, and GIS. He has extensive knowledge integrating stormwater infrastructure data with GIS applications for asset management as well as H&H model development.

Concurrent Session C

C1: Demonstrating Mitigation Project Effectiveness
Track: Mitigation

At the Intersection of Flood Mitigation and Wildfire Mitigation: Understanding the Crossroads
Daniel Bass, RA, CFM, FEMA, Building Science Branch, daniel.bass@fema.dhs.gov
Co-presenters: Stacy Franklin Wright, stacy.wright@atkinsrealis.com

Abstract: This presentation will introduce floodplain managers to the connections between flood mitigation and wildfire mitigation practices before and after a wildfire occurs. Most floodplain managers are aware of the risk of flooding after a wildfire occurs, but there are other considerations that need to be integrated into local land development policy and implementation to target multiple hazard risk. Recent FEMA Mitigation Assessment Team (MAT) investigations following the 2021 Marshall Fire in Colorado and the 2023 Maui fires identified the need for a multi-disciplinary approach that collectively addresses the impact of natural hazards on wildfire risk through effective land management and building techniques. While wildfires are a natural component of many ecosystems, the risk of more dangerous and intense fires has increased due to various land management practices (including fire exclusion and suppression policies), climate change, human error or arson, ecosystem-damaging insects and disease and invasive species such as cheat grass. Wildfire can ignite and spread in both undeveloped lands, such as open shrublands and grasslands, and in outdoor spaces of developed areas. In developed areas, outdoor spaces serve essential community roles for residents in the form of greenbelts, grazing areas, parks, and other recreational spaces. However, grasslands and outdoor spaces can become avenues where wildfire is able to burn rapidly and spread to residential areas. Natural and man-made drainages filled with dry vegetation are a common pathway for the rapid advancement of wildfire. If not properly maintained, drainages such as stream beds, natural channels and man-made drainage ditches can be overgrown with vegetation and become conduits for wildfire spread or sources of ember creation. This presentation will share MAT findings and help attendees understand how flood mitigation in open spaces and grasslands can exacerbate wildfire risk if not properly designed and maintained.

Biography: Dan Bass works in the Building Science Branch at FEMA Headquarters as the Building Science Disaster Support Program Manager. He is an Architect that practiced in the private sector for 25 years prior to joining FEMA. He studied Architecture and Structural engineering at the University of Tennessee, Knoxville. Mr. Bass was recruited by FEMA following Hurricane Katrina and worked extensively in the recovery efforts along the Gulf Coast as well as numerous other hurricane, flood, fire and tornado disasters around the US and US territories. Mr. Bass is a recognized expert in disaster resistant design and construction, FEMA Safe Rooms, flood and wind mitigation measures for structures and floodplain management. He has delivered numerous presentations, trainings and workshops to design professionals, community officials, and emergency managers and at national and international professional conferences. Mr. Bass is the Mitigation Assessment Team (MAT) Lead, including overseeing post-disaster investigations for the 2021 Marshall Fire in Colorado and the 2022 Maui Wildfires in Hawaii.

Recommended Improvements to Flood Resistant Design and Construction Requirements Based on Hurricane Ian
Manny Perotin, PE, PMP, CFM, CDM Smith, perotinma@cdmsmith.com
Co-presenters: None

Abstract: The Mitigation Assessment Team (MAT) is part of the FEMA Building Science Disaster Support (BSDS) Program and is managed by the Building Science Branch at Headquarters. Following a natural disaster, the team conducts field assessments and makes technical observations on the performance of

buildings subjected to the effects of the natural hazard event. The MAT's observations are used to recommend changes to building codes and standards, prepare recovery advisories, gather information to improve guidance and influence construction practices during repair, support the integration of hazard mitigation measures into the repair process, update guidance on best practices and hazard mitigation measures, provide technical assistance related to code and standards, and contribute to research efforts. Most recently, FEMA sent teams to Southwest Florida following Hurricane Ian in 2022. This presentation will provide a summary of observations, conclusions, and recommendations from the FEMA Hurricane Ian MAT Report with respect to building performance as well as illustrate the impact floodplain management had on reducing flood damage. The session will primarily focus on an analysis completed by the Hurricane Ian MAT of NFIP policy information across 12 areas of interest with varying flood sources and flood depths during Hurricane Ian. The analysis compares flood damage to single-family residential buildings based on year built, building size, foundation type, and other building characteristics. The analysis includes average flood damage based on actual claims which led to several conclusions and recommendations towards improving flood resistant design and construction requirements. The presentation will also highlight the effectiveness of common floodproofing measures observed by the Hurricane Ian MAT.

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.

Demonstrating the Value of Mitigation

Tammie Tucker, PE, CFM, AECOM, tammie.tucker@aecom.com
Co-presenter: Dr. Shane Parson, shane.parson@aecom.com

Abstract: The Federal government spends billions of dollars in natural hazard mitigation to increase the Nation's resilience. One method of demonstrating the effectiveness of these mitigation measures is through a loss avoidance study (LAS). A loss avoidance study demonstrates the cost savings of a mitigation measure by assessing the losses avoided during a particular event. This presentation will cover details and results of FEMA's Hurricane Ida Loss Avoidance Study, provided with approval by FEMA. This study assessed 645 mitigated structures across southeast Louisiana and estimates a return on investment for them during Ida. The structures assessed include a variety of mitigation types, funding sources, and include both residential and non-residential structures. Both flood and wind losses were considered. Louisiana has experienced a multitude of hurricane and flood disasters and have had several loss avoidance studies completed for some of these past events. This presented an opportunity to assess compound losses avoided for structures that are known to have been impacted by multiple events. Quantifying a compound return on investment demonstrates that the value of mitigation measures increases over their lifetime with each event they are exposed to. This study also considered a new viewpoint – losses avoided based solely on the adoption of higher building codes.

Biography: Tammie, PE, CFM has worked in floodplain management for 20 years. Her primary focus is riverine H&H analyses, natural hazard risk assessments, and environmental justice. Her career has been dedicated to helping the public prepare for, respond to, and mitigate the impacts of natural hazards.

Dr. Shane Parson, PE, CFM is the Climate Adaptation Lead within the AECOM Water business from the U.S. East Region. His expertise is finding solutions for clients' tough climate questions. His over 30 years of expertise includes everything from climate change to grants to losses avoided studies.

C2: 2+ Years Later – Understanding NFIP's Pricing Approach (Risk Rating 2.0)
Track: NFIP

The NFIP Insurance Rating Blackbox Myth (The premium calculation step by step)
Lloyd "Tony" Hake, FEMA, lloyd.hake@fema.dhs.gov
Co-presenter: James "Doug" Iannarelli

Abstract: Debunking the NFIP Insurance Rating Blackbox Myth. Understanding the rating variables that go into the calculation of NFIP Flood Insurance rates. A deep dive into the premium algorithm thatdepicts the flood perils, policy characteristics and rating factors.

Biography: Mr. Hake is the Director for the National Flood Insurance Program (NFIP) Transformation Efforts. These efforts include streamlining and simplifying the dleivery of the NFIP for stakeholders and policyholders. Tony has led numerous transformation activities in varioius capacities within FEMA and the previous FIMA organization. He has actively engaged with policyholders, Congress,OMB, other government agencies, State Insurance Commissioners, across FEMA headquarters, regional and field offices, and with other related industry groups, organizations and committees.

How Mitigation Activities can Impact NFIP Insurance Rating
Lloyd "Tony" Hake, FEMA, lloyd.hake@fema.dhs.gov
Co-presenter: John Hintermister, John.hintermister@fema.dhs.gov

Abstract: Understanding the mitigation activities and how they the NFIP Insurance Rate. Determining the premium discounts for mitigation activity under the current NFIP rating methodology.

Biography: Mr. Hake is the Director for the National Flood Insurance Program (NFIP) Transformation Efforts. These efforts include streamlining and simplifying the dleivery of the NFIP for stakeholders and policyholders. Tony has led numerous transformation activities in varioius capacities within FEMA and the previous FIMA organization. He has actively engaged with policyholders, Congress,OMB, other government agencies, State Insurance Commissioners, across FEMA headquarters, regional and field offices, and with other related industry groups, organizations and committees.

Risk Rating 2.0 – What Floodplain Managers Need to Know (in 30 minutes or less!)
Bruce Bender, Bender Consulting Services, Inc., babender@cox.net
Co-presenter: Ashley Cantrell-Tharp, ashley.tharp@weareflood.com

Abstract: FEMA's current NFIP pricing approach, Risk Rating 2.0 (RR 2.0), rolled out October 1, 2021, and

was fully implemented April 1, 2023. We have learned much about it during that time…and we continue to learn more about it each month! In addition, FEMA implemented several updates on April 1, 2024. As a result, floodplain managers and other local officials continue to receive questions from policyholders…as well as from insurance agents and others. This audience-interactive session will cover key RR 2.0 questions floodplain managers are dealing with (e.g., CRS and mitigation discounts, National Violation Tracker, mitigation savings estimator, map changes). It will also review some of the key April 2024 updates that floodplain managers should be aware of such as:

• Understanding crawlspace versus First Floor Height (FFH) when it comes to rating.

• Treating hanging floors/mid-level entries as a FFH but not a floor.

• Using Section H of the Elevation Certificate.

• Explaining why premium changes when different parts of the EC are completed. With so many questions out there today about RR 2.0, you won't want to miss this session.

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 still has a flood insurance policy!

C3: State and Federal Risk Communications Initiatives
Track: Risk Communication

We Know the Risk, We Know Our Audience, We Know Our Options – Now What?
Katelyn Noland, U.S. Army Corps of Engineers, katelyn.m.noland@usace.army.mil
Co-presenters: None

Abstract: The U.S. Army Corps of Engineers (USACE) Dam and Levee Safety Programs initiated a study in 2021 to better understand the state of risk communication and what was needed to improve it. This study included independently completed assessments of the organization and its structure, audiences for communication and their information seeking habits, and existing communication strategies that could be leveraged to improve USACE's approaches. The study is now complete and unearthed multiple lessons learned – including how communities relate to infrastructure, the untapped opportunity of leveraging non-traditional communication partners, the impact of absence in a community, and the result of unfocused and inconsistent messaging. While some findings feel like tried-and-true principles, the study also demonstrates why it becomes hard to consistently apply them over time. This presentation will explore these findings in more detail, and highlight challenges and opportunities and recommendations for what USACE and the greater flood risk management community can do now.

Biography: Katie is the Strategic Communication Specialist for the U.S. Army Corps of Engineers (USACE) Dam and Levee Safety and Section 408 Programs. In this role, Katie is responsible for leading the direction of communication and supports development of policy, resources, and training that support successful communication and engagement activities. Prior to this position, Katie was a Social Scientist, most recently with the USACE Levee Safety Center where she first got engaged in the Dam and Levee Safety Programs and identifying opportunities to tell the story of these structures and support internal staff in creating conversations about dams, levees, and flood risk management. Katie spent a majority of her USACE career to date working at the Institute for Water Resources (IWR), which is a forward-looking policy office part of USACE. While part of IWR, Katie supported a variety of mission areas with communication, writing, facilitation, policy, and program management support including flood risk management, emergency management, navigation, and other research related activities. Katie joined USACE in 2012 through the Pathways Program. She was a graduate student at George Mason University at the time pursuing a Master of Arts in English, Professional Writing and Rhetoric. Katie completed her degree in 2014, which included a thesis study where she examined risk communication within USACE and how organizational definitions of risk affect interactions with audiences and communication design. Katie completed her undergraduate study at Virginia Tech 2010 with a Bachelor of Arts in English, Creative Writing.

Using a Place-Based Approach to Flood Risk Communications: An Example from Southern Utah

Holly Strand, Utah Dept of Public Safety, hstrand@utah.gov
Co-presenters: Danae Olsen, danae.m.olsen@usace.army.mil and Mrs. Deborah Neddenriep, CFM, debbie@cwsd.org

Abstract: In 2023 the Utah Division of Emergency Management started the seven-to-ten year process to develop new floodplain maps for three watersheds in Southern Utah. The Greater Sevier Project covers 11,276 sq. mi. and cuts through seven southern Utah counties. In this presentation we summarize the unique physical and socioeconomic profile of the project area. Then we showcase specific communication products and initiatives developed with this profile in mind. Among these products is a video describing fans and showing how to identify high-risk fans in this region. Another product is an online flood risk atlas designed with input from stakeholders in the project area. All communication products feature a place-based design created specifically for the target communities. We use a combination of photographs, licensed images, and videos in a "National Geographic style" layout so that information is visually appealing to both technical and non-technical audiences. The cost for these multimedia digital communications is low since they are made primarily in-house, and many of the information blocks can be easily adapted to different communities. Objectives behind our place-based communication strategy are: 1) gaining community trust, 2) demonstrating the relevance of floodplain mapping in rural, arid lands, 3) and establishing partnerships for ongoing training and dialogs about how to increase rural community capacity for mitigating flood risk. Given current predictions for an increase in this region's monsoon flooding, locally targeted, long-term engagement in these rural communities is essential.

Biography: As a science communications specialist, Holly wrestles technical information into a form that is accessible to more general audiences. Working for the Utah Division of Emergency Management (Dept. of Public Safety), she creates content for and maintains the state's floodplain management

website, floodhazards.utah.gov. She juggles words, maps, video, images, sound, and graphics to help increase the flood risk knowledge of Utahns. Prior to this position, she worked twenty years for World Wildlife Fund and Utah State University running geographic prioritization workshops around the world and creating science communication products for the public, partners, and donors. Holly earned a bachelor's degree from Pomona College and has a master's degree in Geography at University of Colorado-Boulder where she first became involved in natural hazards research.

Building a Lasting Memory of Flood Risk with the Nevada Comprehensive High-Water Mark Campaign: a Federal, State and Local Partnership Story

Sarah Fichtner, NDWR, sfichtner@water.nv.gov
Co-presenters: None

Abstract: Working in flood mitigation, it is no secret that the public can be quick to forget about the last flood. This is especially true in the driest state in the country where tourists, new transplants and even some lifetime residents will tell you that Nevada does not flood. The Nevada Floods and Nevada Silver Jackets teams work to challenge this misconception by educating the public on floods of the past to help them prepare for floods in the future. This presentation will regale the collaborative effort between federal, state and local partners to create the Nevada comprehensive high-water mark project.

Biography: Sarah Fichtner is the Floodplain Mapping Coordinator with the Nevada Division of Water Resources. Working as a FEMA Cooperating Technical Partner for the state floodplain management program, Mrs. Fichtner acts as a liaison between federal, state, and local partner agencies in determining flood mapping needs throughout the state. Additionally, she works on flood risk outreach and education projects as part of the Nevada Flood Awareness Committee and deputy of the Nevada Silver Jackets team.

C4: Identifying Debris Flow Risk Through Modeling
Track: Arid Regions

Debris Flow Modeling: Insights and Applications

Dai Thomas, PhD, PE, Tetra Tech, dai.thomas@tetratech.com
Co-presenters: None

Abstract: Debris flows are a recurring natural hazard, particularly in steep mountain terrain prone to intense thunderstorm events. Debris flows pose a significant hazard to human life and infrastructure and cleanup is typically difficult and expensive. This presentation provides an overview of recent advancements in debris flow modeling, with a focus on their purpose, field investigations and recent modeling studies. Three Colorado debris flow examples will be discussed that are located in Aspen, Telluride and Ouray. These case studies will illustrate the practical application of debris flow models and will also show how they can be used for evaluating the impacts of wildfires on watershed runoff, peak flows, and debris flows, as well as to predict and mitigate hazards. The findings from the Colorado examples are applicable to other parts of the country and will provide a deeper understanding of debris flows and contribute to more effective hazard recognition and mitigation and enhance the overall resilience of our communities and landscapes.

Biography: Dr. Thomas is a Senior Hydraulic Engineer and Geomorphologist at Tetra Tech with over 25 years of experience. His primary area of expertise and interest is in integrating his dual specialties of water resources (hydraulic and sediment transport) and geomorphology to solve complex landscape, river and environmental problems, including river and bank stabilization, flood management, water allocation and mined lands remediation. He has considerable experience with the range of hydrologic, hydraulic and sediment-transport models, including extensive 1-, 2-, and 3D hydrodynamic modeling using industry standard software. He is proficient at carrying out geomorphic analyses, geomorphic mapping, and hazard assessments, as well as data collection including GPS topographic and bathymetric surveys. The field information is used in conjunction with hydrologic, hydraulic, and sediment-transport analyses to develop recommendations for a broad range of identified problems and to develop channel rehabilitation designs. He has designed and evaluated many channel and landscapes restoration projects, across a range of climatic zones from the arid areas of Arizona, the tropics of Australia and Papua New Guinea and the Boreal zone of Alaska.

FEMA Outreach Success Story: Debris Flow Modeling and Mapping in Ouray, Colorado

Eli Gruber, PE, PMP, CDM Smith, grubere@cdmsmith.com
Co-presenter: Marta Blanco Castano, marta.blancocastano@state.co.us

Abstract: The City of Ouray is located in southwest Colorado in Ouray County. The city sits directly on debris fans formed where Cascade Creek and Portland Creek drain onto the Uncompahgre River valley floor. The geologic processes that formed these fans are still active and present debris flow hazards to life, property, and public infrastructure. CDM Smith partnered with the Colorado Water Conservation Board (CWCB) to secure funding from FEMA's Mitigation Technical Assistance (MTA) program to develop debris flow hydraulic models, evaluate, and map potential incremental inundation extents caused by the frequency floods up to the 1-percent annual exceedance probability (100-year) debris flow event. This presentation summarizes the technical processes and results from this study and highlights the FEMA Risk Mapping Assessment and Planning (MAP) community outreach tools employed to identify the project, form a partnership with the community, and secure funding. The City of Ouray is located in southwest Colorado in Ouray County. The city sits directly on debris fans formed where Cascade Creek and Portland Creek drain onto the Uncompahgre River valley floor. The geologic processes that formed these fans are still active and present debris flow hazards to life, property, and public infrastructure. CDM Smith partnered with the Colorado Water Conservation Board (CWCB) to secure funding from FEMA's Mitigation Technical Assistance (MTA) program to develop debris flow hydraulic models, evaluate, and map potential incremental inundation extents caused by the frequency floods up to the 1-percent annual exceedance probability (100-year) debris flow event. This presentation summarizes the technical processes and results from this study and highlights the FEMA Risk Mapping Assessment and Planning (MAP) community outreach tools employed to identify the project, form a partnership with the community, and secure funding. The debris flow modeling was conducted using new HEC-RAS 2D debris flow simulations and results were processed and mapped using GIS. This study improves on older debris flow studies performed on these drainages by incorporating updated terrain data, hydraulic parameters, and hydrologic data along with improved software applications. In addition, this study captured the impact of incremental impacts from a spectrum of flood frequency events, and their associated bulking factors, rather than only looking at the 100-year event, which can be less impactful due to a lower bulking factor. The updated debris flow maps provide the community with important tools to evaluate planning decisions and potential mitigation actions within the City of Ouray. This presentation will

describe technical debris flow analysis methods and community outreach and engagement strategies, specifically how the FEMA Risk MAP process can be leveraged to identify and support communities with technical mitigation support. Additional ongoing projects through the MTA program will also be discussed.

Biography: Eli is a water resources engineer with CDM Smith where he focuses on hydrology and riverine hydraulics. He is a lifelong Coloradan and reckons that the San Juan mountains may be the most beautiful place on earth. He spends most of his free time exploring in the mountains or on a river. Marta has been with the Colorado Water Conservation Board (CWCB) for three and a half years. She assists with the flood mapping program management as well as the LiDAR acquisition/management program. She especially enjoys the community engagement and technical coordination aspects of the job. Marta specializes in GIS data management, analysis, and technology applications, and has worked with hazard mitigation planning as well. Marta holds a BA in Geography and Environmental Studies, and a MS in Geographic Information Science. She is also currently working on a civil engineering degree that hopefully will be completed in the next few years. In her spare time, Marta enjoys various outdoorsy activities such as skiing, hiking, biking, camping, and rock climbing.

Variations in Debris Flow Risk During Wildfire Recovery – FEMA R8 Flood After Fire

Thad Wasklewicz, Stantec, Thad.Wasklewicz@stantec.com
Co-presenters: None

Abstract: The likelihood of post-wildfire floods and debris flows can remain high for multiple years until vegetation recovers thereby reducing the runoff and stabilizing sediment. Therefore, it is critical to develop a framework to examine debris flow risks to infrastructure and communities in or adjacent to wildfires. We develop three phases of post-wildfire hydrologic recovery. The initial phase (0-3 years after the wildfire), transitional phase (estimated to be from 3-10 years after the wildfire) and later recovery phase (estimated to be >10 years after the wildfire) are considered in the risk analyses. We examine three fires in FEMA Region 8 at various points of post-wildfire hydrologic recovery and consider how the debris flow risk varies over the various phases. Debris flow risk at different receptors is determined under the conditions of the respective scenarios for each element at risk by multiplying hazard and consequence index values. Debris flow modeling is performed whereby varying return-interval rainfall conditions are simulated in the modeling for each of the locations. For the initial phase, known rainfall-events for debris flows occurring in some of the fires was an initial starting point for these fires and return intensities from published literature are used for fires were the remaining fire. Debris flow modeling is varied based on infiltration and rainfall intensity required for debris flow initiation in the later phases. Our findings show the risk profile increases significantly following the wildfire, but over time there is a potential for greater damage (despite the declining frequency of the event) as larger storms are required to produced debris flows. Risk at receptors (roads, houses, and occupants) in the various fires is unique with different receptors experience higher risks in different phases. Risk also varies depending on location of the receptor within a landscape or a debris flow fan.

Biography: Thad is an internationally recognized geoscientist and geomatics leader with extensive experience running collaborative projects. Thad is a Principal at Stantec Consulting Services, INC. based in our Fort Collins, CO office and possesses nearly three decades of geohazards and environmental change detection experience. He is a SME in debris flows, steep streams, and alluvial fans and applies high-resolution topography and 2D modeling to assess and manage environmental hazards. Their team

is dedicated to identifying and assessing potential geohazards with the goal of helping to develop resilient communities and infrastructure.

C5: Federal Floodplain Management and Equity
Track: Equity

It Takes a Village: How the whole-of-government can deliver environmental justice for all
Jessica Ludy, CFM, US Army Corps of Engineers - San Francisco, jessica.j.ludy@usace.army.mil
Co-presenters: Katherine Rowden, Katherine.L.Rowden@usace.army.mil and Julie Beagle, Julie.R.Beagle@usace.army.mil

Abstract: Today's flood and climate risks are unevenly distributed across the nation. This creates a patchwork landscape where many communities face disproportionate exposure to floods, toxic air, land, water, and soil, to extreme heat, and lack access to recreation. This uneven landscape was created over decades through a series of historical land, water, and voting policies and practices that were implemented without equity in mind. Research shows that today's environmental and flood outcomes continue to be unequal because modern land, water, and disaster policy and practice are built on the unequal legacy without first addressing it. Government resources are found to go to communities with resources already, and not to communities without resources. Solving these complex challenges requires "a village" and the good news is that solutions are possible. Community based organizations have been leading this change for decades, agencies are encouraging greater outreach and engagement with affected communities, and federal funding for infrastructure is at some of its highest levels. In addition, Executive Order 14096 (signed in April 2023) revitalized the federal family's commitment to environmental justice for all. It modernizes EO 12898 (passed 1994) and calls for a whole-of-government approach to dismantling barriers to environmental justice and building a world where all communities have access to a healthy and sustainable environment. What does "whole-of-government" look like in flood resilience? What barriers are being dismantled and what programs can enhance flood resilience and floodplain function and how can communities access them? This presentation will share some tangible ways that agencies are advancing environmental justice and can do so together. It will also demonstrate how flood-related technical assistance programs like Silver Jackes and Floodplain Management Services at the Corps of Engineers, or grants across the federal family can be combined and leveraged to achieve a healthy and sustainable environment for all communities.

Biography: Jessica Ludy is the Flood Risk and Environmental Justice Program Manager for the San Francisco District US Army Corps of Engineers. She is also on Detail with the Asst. Secretary of the Army-Civil Works office for Environmental Justice Policy. Jessica thinks she has years of experience in private and public sectors working on integrated flood risk management in communities across the U.S. She received her master's degree in Environmental Planning at UC Berkeley and spent 2 years in the Netherlands as a Fulbright Scholar researching the Multi-layered flood safety programs. Jessica is a co-chair of both the Flood Risk Communication Committee and Social Justice Task Force at the Association of State Floodplain Managers. When not geeking out about floods, Jessica enjoys competitive sailing, learning to garden, and laughing with her toddler, Lucia. Jessica acknowledges and pays respect to the

wisdom, vibrant cultures and survivorship of the thousands environmental justice leaders on whose work she builds today.

Equity Considerations for Floodplain Management: Analysis of Federal Efforts and Policy Implications

Ummekulsoom Lalani, MPP, PMP, AtkinsRéalis, ummekulsoom.lalani@atkinsrealis.com
Co-presenter: Grace Morris, Grace.Morris@atkinsrealis.com

Abstract: Floods are the most common, and among the most deadly, weather-related disasters in the United States. Low-income communities and people of color often shoulder a disproportionate share of the burden, and each flood event further exacerbates existing racial and social inequities. Resources for flood risk management are often inequitably distributed even though socially underserved populations experience the worst repercussions. The debilitating impacts of disasters on underserved communities have shifted discussions around how to prioritize equity and social justice considerations in floodplain management. Federal agencies such as the Federal Emergency Management Agency (FEMA), Environmental Protection Agency (EPA), Department of Energy (DOE) and Department of Housing and Urban Development (HUD) are reassessing current policies, programs, and practices to examine approaches that seek to alleviate inequities. Recent initiatives from state and local governments to address the needs of underserved communities have also informed the development of federal equity initiatives highlighting the importance of planning for floodplain management. Equity continues to be a key driver of national policy shifts with existing and new federal funding including incentives for communities to incorporate equity considerations in planning and decision making. This presentation will provide an overview of equity considerations for floodplain management by examining federal and state programs that incentivize equity and tools to illustrate how equity needs, national policy shifts, and informed decision-making are interconnected. It further makes the case for identifying how flood practitioners can be active change agents in contributing to these policy shifts to advance equity in their work. Floodplain management is influenced by cultural, social, and political factors and by incorporating these factors into decision-making and governance, practitioners can transition towards a more sustainable, resilient, and equitable paradigm shift.

Biography: Ummekulsoom Lalani has over 10 years of experience on social justice and equity, disaster management and resilience. As a project manager at AtkinsRéalis, Umme provides technical support to FEMA, including the FEMA Building Codes Strategy development and the White House's National Initiative to Advance Building Codes. She promotes equity considerations when addressing flood risk management and has experience managing projects focused on identifying equity solutions, support capacity building and cross-sector partnerships. In her previous role as research faculty at Johns Hopkins University, she provided analytic, technical, and strategic support to strengthen health systems and equity in Asia, Africa and the Middle East. Umme has a Master's in Public Policy (MPP) from the University of Cambridge and is a PMI certified PMP.

Great Expectations: NRCS Arkansas Program for Flood Resilience in Underserved Communities

Jeremy Rice, Freese and Nichols, jjr@freese.com
Co-presenter: Kale Farmer, Kale.Farmer@freese.com

Abstract: Our team is partnered with the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) and the Arkansas Black Mayors Association (ABMA) on fast-tracked studies to help underserved communities access almost $96 million in federal funding. These communities have experienced long-term persistent flooding, and this is the first of its kind NRCS program to increase flood resilience for underserved rural communities. Each community lies within a watershed, or land drainage area, with rivers and streams that eventually feed the Mississippi River or its tributaries. For each of the watershed, our team conducted a Preliminary Investigation and Findings Report (PIFR), a brief watershed study that uses existing data and field information. The report is the first step in the NRCS watershed planning process. If the PIFR assessment shows no insurmountable obstacles, the planning process can move forward to a more detailed watershed plan with recommendations for specific projects that eventually could be implemented. Based on the PIFR, fourteen watersheds were approved for development of NRCS watershed planning documents, our team is assisting with two of those watershed areas. The watershed planning process involves local community outreach, identification of problem areas, opportunities, and alternative selection. Utilizing Base Level Engineering (BLE) our team will perform hydrology and hydraulic analysis to identify problem areas within the watershed. Through community feedback our team will identify potential alternatives such as conservation practices, channel widening, flood proofing etc. Environmental assessments will be performed along with benefit cost analysis for the alternatives. Assuming the plans are approved by NCRS, the selected alternatives will be eligible for design and construction funding. This whole process is 100 percent federal funded with no local match require from these communities.

Biography: Jeremy Rice is located in the Freese and Nichols Tulsa, Oklahoma Office. He serves as group manager for a stormwater group that supports work in Arkansas and Oklahoma. He has over 16 years of experience in watershed planning studies. He is currently serving as the project manager for two NRCS watershed planning studies in Arkansas and leading the State Flood Plan for the State of Oklahoma.

C6: Stormwater Master Planning
Track: Stormwater

Analysis and Planning of Flood Relief Through a Constrained Urban Watershed

Kevin Chapman, PE, CFM, Hazen and Sawyer, kchapman@hazenandsawyer.com
Co-presenter: Connor Bottorff, cbottorff@hazenandsawyer.com

Abstract: The Cross Creek watershed in Fayetteville, NC, traverses assorted land uses across the City, including the downtown area, before discharging to the Cape Fear River. The watershed has a history of flooding concerns associated with larger hurricanes in recent years and more frequent thunderstorms. Flooding concerns are especially challenging in the downtown area, due in part to channel geometry associated with a historic mill pond. As part of a comprehensive city-wide stormwater master planning initiative, the City is studying the Cross Creek watershed to better understand flooding concerns and develop proposed solutions to provide drainage and flood relief, with a particular emphasis on alleviating flooding through the downtown area. A linked and dynamic modeling approach was essential to understand the storm dynamics through the watershed and effectively evaluate proposed solutions. Storm drainage infrastructure was evaluated using a 1D/2D Infoworks ICM model (secondary system),

connected with a 2D HEC-RAS model of Cross Creek and its main tributaries (primary system). Hydrograph timing was found to play a crucial role in evaluating flooding, as timing of peak discharges from drainage infrastructure and major tributaries were unique for each modeled storm event. Gauge adjusted radar rainfall was utilized to inform model development, compare model results to stream gauges in the watershed, and evaluate the impact of conceptual improvements under a range of storm events. Evaluated improvement concepts included restoration of a breached impoundment, tunnel diversion, floodplain buyouts, and channel improvements. These concepts were evaluated based on their cost, property acquisition needs, operations and maintenance requirements, flood reduction potential, and co-benefits. This presentation will demonstrate a practical example of how the latest development in precipitation analysis and 2D modeling can be utilized to evaluate flooding concerns within a complex urban watershed and develop comprehensive improvement concepts, including key considerations for similar efforts conducted by others.

Biography: Kevin Chapman works within Hazen and Sawyer's Water Resources Infrastructure team. For the past five years, he has led hydraulic and hydrologic modeling efforts on several projects to aid in floodplain/floodway analysis, stream restoration design, watershed master planning, and generation of dam breach EAP inundation maps. Kevin is a member of the Association of State Floodplain Managers (ASFPM) and is a certified floodplain manager (CFM).

Put Up the Pirogues Sooner: Planning for Stormwater Resilient Roadways

Christopher Matthew Johns, AICP, CFM, CSI, Rapides Area Planning Commission, matt@rapc.info
Co-presenters: None

Abstract: This presentation details our methodology for funding (utilizing one of the newer planning factors in federal transportation legislation) as well as our methodology for identifying and improving flood prone and flood vulnerable transportation infrastructure through the development of a Hydrologic and Hydraulic model. Furthermore, it will showcase a roadway level imagery tool that superimposes flood levels on the imagery – a very compelling public outreach tool. Attendees will learn how transportation dollars can be utilized for stormwater resilience planning – benefitting more than roadways. Attendees will also learn key methodologies in H&H model development including use of LiDAR and field survey data. Finally, attendees will learn about free, available tools for historical weather data and a street-level imagery tool that makes data "come to life" for stakeholders and the public.

Biography: Matt has 20 years of planning experience between the Rapides Area Planning Commission and the Louisiana DOTD. He is currently a Commissioner and the CEO of the Rapides Area Planning Commission, a member of the Louisiana Planning Council, and on the board of directors for the Louisiana Transportation Authority as well as the Louisiana Community Development Authority. Since 2019, Matt has served as a member or officer on four regional steering committees for the Louisiana Watershed Initiative. He also serves on the board of directors for the national Association of Metropolitan Planning Organizations and serves on multiple committees for the Transportation Research Board, a division of the National Academy of Sciences, Engineering, and Medicine. Since joining RAPC, Matt has led the expansion of the agency from 5 staff members to 27 - accompanied by an annual operating budget that grew from $250,000 to ~ $5 million per year. This was accomplished by offering technical assistance to surrounding jurisdictions, providing the expertise of RAPC's talented staff to assist almost any need. Matt has a bachelor's degree in Public Administration from Louisiana Christian University and obtained his AICP, CFM, and CSI professional certifications. Perhaps his greatest

accomplishment, Matt married WAY UP to a brilliant, super-model-caliber wife and has five children ranging in age from 16 years to 8 months old.

Beyond the Boom: Tackling Stormwater Challenges in Nashville
Adrian Ward, PE, CFM, Barge Design Solutions, adrian.ward@bargedesign.com
Co-presenters: Matt Tays, Metro Water Services Nashville, Tennessee, matt.tays@nashville.gov

Abstract: Nashville has seen explosive population growth between 2000 and the present. The influx of new residents, limited available land, and a desire to live near the City core has resulted in new types of developments that create more impervious area per acre. This reduces the capacity of the topography to infiltrate rainwater and leads to more runoff. The additional runoff has created flooding in areas which never previously had flooding and has worsened existing flood prone areas. In 2022, the City established a plan to prioritize stormwater drainage system improvement projects to address these issues. Metro Water Services (MWS) manages a stormwater service area of 514 square miles. The MWS stormwater service area includes over 75,000 culverts and pipes and 95,000 structures. The presentation will review the stages of MWS' master planning process, results of the pilot study, and the progress of the project through June 2024. We will present (1) a review of existing data, (2) key decisions made, (3) basin prioritization, (4) schema creation for data collection, and (5) condition assessment metrics. For the pilot study and subsequent study areas, we will present the (6) existing conditions hydraulic model, (7) alternatives development and evaluation process, and (8) final recommendations. Additionally, we will showcase project-specific tools created for data management and the development of ranking criteria that can provide unbiased project prioritization. The master plan project is important to MWS' ongoing efforts to protect their investments, respond to aging and undersized infrastructure, and prepare for the future growth of Nashville. This presentation will discuss the challenges involved in implementing a large, city-wide stormwater master planning effort as well as present some innovative tools and processes that can help mitigate these challenges. This presentation will convey success stories that can help other municipalities who are just starting their own stormwater master plan effort.

Biography: Adrian has been at Barge Design Solutions since 2006. He has a Bachelor of Science Degree from the Tennessee Technological University and a Master of Science degree from the University of Tennessee. He currently serves as a Senior Engineering Manager and Vice President. Adrian leads the firm's stormwater practice focusing on stormwater master planning, natural channel design and flood mitigation projects.

Matt is a senior project manager at Metro Water Services in Nashville, Tennessee. Matt currently oversees the stormwater capital improvements program and is the project manager for the MS4 master plan program. Outside of work, Matt enjoys vacationing with his family, small woodworking projects, and grilling outside.

C7: FORERUNNER SHOWCASE: Planning for the Future: Mobilizing Data and Technology for Floodplain Management

As floodplain management continues to adapt to future demands, communities nationwide are placing greater emphasis on the thoughtful collection and mobilization of data. Challenges like sea level rise,

increasingly impactful storm events, and evolving resident needs are just a few factors in this evolution. To meet these dynamic conditions, floodplain managers across the country are increasingly leveraging more sophisticated datasets, technology, and processes – but it can be hard to know where to start.

In this session, we'll deep dive into how local agencies are collecting, managing, and mobilizing information in their day-to-day work. Through presentations and a panel discussion, this session will surface practical insights into how a diverse set of communities use data to provide better service to residents, enhance preparedness, and contribute to overall resilience.

C8: Making Use of FEMA Resources for Mapping
Track: Mapping

Best Practices for Acquiring NFIP Data
Tim Spears, FEMA Contractor / Michael Baker International, Timothy.Spears@associates.fema.dhs.gov
Co-presenters: None

Abstract: Are you replacing an aging culvert or considering expansion of your town center? Having the right data is a foundational requirement for successful floodplain management, especially to lead the change necessary to mitigate flood hazards and reduce risk in your community. Acquiring National Flood Insurance Program (NFIP) data sets developed during its 50+ year history has sometimes been a cumbersome and time-consuming activity. While the development of the Mapping Information Platform (MIP) and modernization of the Map Service Center (MSC) within the Risk MAP program has greatly increased access to more recently created data, there is still uncertainty for many on how to acquire the historical records that continue to support the regulatory requirements. This presentation will provide you best practices for acquiring the technical and administrative data that enable you to make sound and informed decisions about managing risk in your community. We will take a detailed look at the Risk MAP program's FEMA Engineering Library Data Request processes. We will explore the types of data available, existing and future methods of making a request, and expectations on the research process and data delivery.

Biography: Tim Spears is the Manager of the FEMA Engineering Library. Leading a Michael Baker International team, and in partnership with IBM, he works together with FEMA to administer a key component of the Risk MAP Customer and Data Services (CDS) contract. The FEMA Engineering Library exists to archive and disseminate the technical and administrative data developed during the production of the NFIP's regulatory products. Historically, the library has served as the central repository for data developed from the start of the FIA in the 1970's till the modernization of NFIP data archival with the introduction of the Mapping Information Platform (MIP) in 2004. While MIP is now the repository for newly developed data, the 4,000 data requests received each year by the library shows its continued importance to private individuals and firms, local communities, and other NFIP stakeholders to acquire the technical data that supports the NFIP's mission. Mr. Spears has 23 years of experience within the FEMA Engineering Library as a contractor on the Risk MAP and Map Modernization contracts with expertise in the history of NFIP Flood Insurance Study (FIS), Letter of Map Amendment, and Letter of Map Revision production processes; research and verification of effective engineering analysis; archival

services; records retention; and data privacy. Mr. Spears received his Bachelor of Science in Environmental Science: Mapping and Data Management from the University of Maryland, College Park.

LOMR Considerations for the SOMA Process within a Physical Map Revision

Jamie Hughes, GISP, CDM Smith, hughesjn@cdmsmith.com
Co-presenters: None

Abstract: During the process of a physical map revision (PMR) effective Letters of Map Revision (LOMRs) are reviewed against the new study data and either incorporated, if the effective data remains the best data available, or superseded, if revised data is deemed to be superior. Preliminary, Revised Preliminary and Final flood study deliverables communicate the status of the effective LOMRs impacted by a PMR through the digital database, the Flood Insurance Study Report (FIS), and the mailed Summary of Map Actions (SOMA) Report. The SOMA report includes a complete reportage of each impacted Letter of Map Change (LOMC) and must be closely coordinated with the mapping production team. It is the responsibility of each mapping partner to produce a SOMA report that reflects correct and complete LOMR information. Especially since LOMRs are not revalidated at the study effective date like Letters of Map Amendment (LOMAs). This presentation will uncover some of the common pitfalls when determining LOMR status and review best practices to demonstrate the "why" of each status decision. We will discuss various conditions and considerations that mapping and SOMA producers must take into account to properly represent LOMRs within and adjacent to the PMR footprint during each regulatory milestone. We will also discuss the impacts that LOMRs have on LOMAs and how SOMA producers address those situations when categorizing LOMCs.

Biography: Jamie Hughes has been a GIS Specialist at CDM Smith for 15 years. She has been working on the COMPASS JV's SOMA production and quality review teams for 7 of those years. Jamie dedicates much of her efforts to ensuring that SOMA reports communicate correct information to communities, property owners and other stakeholders. At home, she dedicates much of her time to her husband and three children. She enjoys spending time with her family and baking bread.

Flood Risk Project Guide to the MIP

Christina Black, Stantec, christina.black@stantec.com
Co-presenters: Patrick Creager, CFM, GISP, Stantec, Patrick.Creager@Stantec.com

Abstract: FEMA's Mapping Information Platform (MIP) is an online portal which serves as a repository for historical and ongoing Flood Risk projects. This presentation will demonstrate how to navigate the system: explaining the differences between the drives, accessing historic data, submitting new tasks, and best practices. Once a Flood Risk project has been validated, files will become available for the public on the Mapping Service Center's (MSC) website - a platform available for the public to gain local flooding information about their community. This presentation will guide users how to organize data submittals for a smooth transition from the MIP to the MSC.

Biography: Christina Black is a Senior GIS Analyst with Stantec Consulting Services. In her eight years of experience, she has led multiple FEMA Flood RiskMAP projects for Strategic Alliance for Risk Reduction II (STARRII), a Professional Technical Services (PTS) and for the Cooperating Technical Partner (CTP) Kentucky Division of Water (DOW). Ms. Black specializes in floodplain management, DFIRM production, quality assurance and control, community outreach, and is a Post Preliminary Processing (PPP) lead for DOW.

C9: Coastal Modeling for Resiliency
Track: Modeling

Shishmaref's Ice Problem: How Coastal Modeling is Helping an Alaskan Community Plan for Climate Change

KC Kent, HDR, kc.kent@hdrinc.com
Co-presenters: None

Abstract: Shishmaref is a small community in northern Alaska located on a barrier island in the Chukchi Sea. Shishmaref is considered one of the most vulnerable communities in Alaska to erosion, wind, and wave action. Shorefast sea ice protects the community from erosion due to wind and wave action during the winter. However, due to climate change, the extent and length of time the sea ice protects the community is rapidly declining with the increased exposure time and accelerating coastal erosion rates. Climate change is also causing warming waters which are increasing storm intensity; and sea level rise which is contributing to inland flooding. The entire community including homes, archeologically important sites, and critical infrastructure such as the school, church, and the waste treatment plant is now vulnerable to more frequent erosion and flooding. To address these risks, the community is working with the State of Alaska's Department of Transportation and Public Facilities to model flood inundation, and storm surge. Extensive coastal numerical modeling has been performed on a variety of possible future sea level and storm scenarios to help the community understand the impacts future flooding and erosion will have. This information will be used to facilitate decisions such as prioritizing shoreline protection projects, and if they need to accelerate their expansion onto the mainland. This presentation will present and discuss the challenges the community of Shishmaref is facing in the wake of climate change and how using modeling technology can be used to identify flood hazards and risk to community infrastructure. Discussion will be focused on how coastal models were created using limited rural data resources, and how the results are helping the community plan for a resilient future.

Biography: KC Kent is the Alaska coastal resilience practice lead for HDR. Her experience is in sea level rise analysis and coastal inundation as it pertains to project planning, adaptation, and preparedness. She has written relative sea level rise impact documentation, conducted numerical modeling for inundation analysis, and assisted in coastal resilience planning for rural communities across Alaska.

Evolving Challenges for Securing Regional Resiliency along the "National Safety Valve"

Garland Pennison, PhD, PE, HDR Engineering, Inc., garland.pennison@hdrinc.com
Co-presenters: Eric Zgonina, eric.zgonina@hdrinc.com

Abstract: In 1925, George H. Maxwell, a California lawyer who helped pass the National Reclamation Act in 1902, proposed a system of spillways, floodways, and storage basins on the Mississippi River that he called "The Atchafalaya National Safety Valve". He challenged the illusion of safety the existing flood control levees provided and warned that additional protections were needed. His proposal along with many others were considered by the Mississippi River Commission (MRC) but no action was taken, and the status quo remained until the devastating 1927 Lower Mississippi River (LMR) flood. This catastrophic flood ended the MRC's reliance on levees for flood control as the order was given to "dynamite" the levee below New Orleans at Caernarvon. The expanding flood wave subsequently

breached Atchafalaya River levees causing catastrophic flooding in adjoining watersheds. The need for the Atchafalaya Floodway diversion and LMR gated diversions was no longer debatable. Almost 100-years later, the challenges and debates are increasing with regards to providing flood resiliency for an increasingly at-risk population and rapidly changing environment with a growing recognition that action is once again needed. HDR is developing the Louisiana Watershed Initiative (LWI) models for Louisiana DOTD in Region 5 (Atchafalaya, Teche, Vermilion, Mermentau Headwaters, and Mermentau HUC8 watersheds). HDR is engaged in complex modeling efforts with extensive coastal transition zones that have required coupling of coastal, estuarine, and riverine models for the critical drainage area of over 10,000 square miles. We will present a brief history and highlights of the stakeholder engagement and modeling efforts that led to 2023's newly formed "Acadiana Watershed District", the first regional watershed management district created in Louisiana. This initiative intends to promote understanding and encourage collective action among public and private sector partners to improve resilience for a critical regional and national flood risk management system.

Biography: Dr. Garland Pennison is an HDR Professional Associate and senior project engineer with over 44-years' experience in project planning, engineering, and management. He has diverse experience in large civil, water resources, environmental, coastal, 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, COPRI, LES, WEF, ASBPA, IISE, SAME, LFMA, and ASFPM.

The Future is Here: Developing a Combined Flood Risk Model for Wilmington, DE

Sarah Dickert, PE, WSP, sarah.dickert@wsp.com
Co-presenters: Jospeh Faries, PE, CFM, Joseph.Faries@delaware.gov and Seth Meisler, seth.meisler@wsp.com

Abstract: The City of Wilmington is a socially vulnerable community where flooding impacts low-income areas of the city, including the east side, which experienced severe flooding during Hurricane Ida, and the Southbridge neighborhood, which experiences nuisance flooding along with tidal/fluvial flooding from the Christina River. WSP and Delaware's Department of Natural Resources and Environmental Control (DNREC) is developing a graduated, climate-informed, 1D/2D linked flood risk models to support flood awareness and mitigation in the city. The model is being developed through combining the City's Long Term Control Plan (LTCP) 1D PCSWMM Model, FEMA's Effective Brandywine River 1D HEC-RAS model, and FEMA's Future of Flood Risk Data (FFRD) for the tidal sections of the Delaware and Christina Rivers in PCSWMM with a new 2D domain to that will generate floodplain mapping for a range of combined scenarios. The final model is intended to provide the city with a tool that provides useful data for future hazard mitigation grant applications, identify areas currently at risk for pluvial flooding, and identify areas at future risk of pluvial flooding or worsening flood risk due to climate change. This presentation will expose attendees to how the model was developed and how it will be utilized to develop the coastal, riverine, pluvial, and composite flood risk maps under current, Mid-Century, and Late-Century conditions for the City. These maps will serve as a resource for City floodplain management and hazard mitigation, so that the best available flood risk and social vulnerability data can be utilized to identify and prioritize locations for mitigation measures.

Biography: Sarah Dickert is a registered Professional Engineer working with an experienced team of water resources professionals who have been working directly with communities across the United States to help them identify sustainable stormwater management designs that mitigate the impact of climate change. This include developing urban stormwater models that are used to support the decision-making process and evaluate the proposed design performance under future climate conditions.

Concurrent Session D

D1: FEMA Hazard Mitigation Assistance Programs
Track: Mitigation

Best Practices for Application Development - Observations from the FY23 BRIC and FMA Application Cycles
Eric Kenney, PE, PMP, CFM, CDM Smith, kenneyed@cdmsmith.com
Co-presenters: James Hinds, hindsJW@cdmsmith.com and Manny Perotin, perotinMA@cdmsmith.com

Abstract: The priorities for the Fiscal Year (FY) 2023 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. With the continued evolution of BRIC and FMA – including the availability of BCA technical assistance to certain communities and the establishment of a narrative cost effectiveness approach for projects under $1,000,000 – understanding and navigating these improvements will help communities and Applicants develop and submit projects that meet the technical and cost effectiveness requirements of the program. This presentation will present 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 are applicable to the Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) programs as well.

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 eight years has led the contractor support for the National Technical Review (NTR) of non-disaster grants supporting the review of over 2,500 applications across the FMA, PDM and BRIC programs.

Simplifying the BCA: An Overview of Recent BCA Updates
Zain Dadabhoy, FEMA, zain.s.dadabhoy@fema.dhs.gov
Co-presenters: None

Abstract: The requirement to demonstrate cost-effectiveness using a benefit-cost analysis (BCA) is one of the larger barriers for state, local, tribal, and territorial (SLTTs) applying to FEMA Hazard Mitigation Assistance (HMA) grant programs. Although this burden applies to all SLTTs, it is greatest for disadvantaged subapplicants or for unconventional project types, such as many applications of nature-based solutions. As part of ongoing efforts to simplify the process for BCA to reduce burdens on local governments applying for HMA funding, FEMA has introduced several key policy and toolkit changes over the last few years. These changes seek to reduce the level of effort required to develop a BCA, particularly for disadvantaged and underserved communities, as well as better capture benefits associated with projects that are mitigating against climate change and incorporating nature-based solutions. Updates to be discussed in this presentation include: expanding the use and applicability of social benefits to all projects; allowing ecosystem services benefits as the primary benefit category; decreasing the discount rate to 3% for BRIC and FMA programs; updating pre-calculated benefits for many project types, updating the seismic module, and allowing a cost-effectiveness narrative for projects with a total cost less than $1,000,000 for BRIC and FMA programs. For each of these topics, examples will be provided showing how these changes help lower the burden for BCA. This presentation will educate participants on the justification and nature of key FEMA BCA policy changes, so that participants better understand how to leverage these changes to their advantage when preparing a BCA. For each of the key policy updates, the presentation will discuss the nature of the change and how to utilize the efficiencies.

Biography:

Flood Mitigation Assistance Swift Current: National Rollout

Brandon Sweezea, FEMA, brandon.sweezea@fema.dhs.gov
Co-presenters: Shandi Teltschik (Shandi.Teltschik@fema.dhs.gov)

Abstract: • Federal Emergency Management Agency's (FEMA) Flood Mitigation Assistance (FMA) grant program is making waves with a national rollout of the Fiscal Year 2023 FMA Swift Current Notice of Funding Opportunity. The purpose of FMA Swift Current is to reduce or eliminate the flood risk to NFIP-participating communities and repetitive flood damage to structures and buildings insured by the NFIP following a flood-related disaster event, and to enhance community flood resilience within NFIP-participating communities. It does so by providing funding for mitigation opportunities immediately after a flood disaster event with the aim of delivering speedy mitigation outcomes. This presentation will provide attendees with an understanding of the FMA Swift Current opportunity, detail the key differences between FMA and FMA Swift Current, and the status of the FMA Swift Current national rollout.

Biography: Brandon Sweezea has been with FEMA for 12 years working both in the Region 10 field offices and at headquarters. Currently he is the Flood Mitigation Assistance (FMA) Section Chief for FEMA Headquarters in Washington, DC where he works within the Non-Disaster Implementation Branch of Hazard Mitigation improving grant program delivery for projects that reduce flood risk to repetitively flooded building & communities nationwide. Previously, he was a project lead in FEMA Region 10 where he was in charge of managing disaster mitigation projects designed to improve community resiliency for State & Tribal communities in Washington and Oregon. While with FEMA he also deployed for

Superstorm Sandy acting as the External Affairs Officer for the Manhattan Borough. Prior to coming to FEMA in 2011, Brandon was a Community Planner for Island County in Washington state where he reviewed land-use development permits, coordinated projects with internal and external partners, and developed Comprehensive Plan elements. His educational background includes a Bachelor's in Political Science and a Master's in Business Administration focusing on emerging technologies from the University of Washington. He holds a Project Management Professional (PMP), LEED Green Associate, Federal Grants Administration certifications, and is also an Eagle Scout.

D2: Floodplain Management Regulations
Track: NFIP

Compare and Contrast Federal (FFRMS) and NJ Floodplain Standards,
Anton Detz, CFM, T&M Associates, AGetz@tandmassociates.com
Co-presenters: J. Andrew Martin, CFM, andrew.martin@fema.dhs.gov

Abstract: FEMA is placing a significant level of focus and effort on the Federal Flood Risk Management Standard (FFRMS) in 2024. FFRMS is a federal policy mandating increases in future flooding be accounted for in federal construction projects. The State of New Jersey has long had more stringent floodplain development standards as compared to the minimum FEMA National Flood Insurance Program (NFIP) standards, including the recent adoption of NJ Inland Flood Protection Rules (IFPR- July 2023). The NJ IFPR amendments include raising the NJ design flood elevation (DFE) by several feet above FEMA's current 1% annual chance flood elevation. Given the FFRMS approach of mapping an additional 1-foot, 2-feet and 3-feet to the riverine FEMA 1% annual chance flood elevations, this presentation will compare the differences and/or similarities between NJ State standards and the Federal FFRMS standards.

Biography: Mr. Getz is a floodplain management professional with over 17 years of experience supporting FEMA's floodplain mapping program. He has extensive experience in data development, regulatory production, flood risk products, and community engagement for riverine and coastal communities and watersheds throughout the country. He has reviewed dozens of counties of FFRMS deliverables. He has also developed and regularly delivers an in-person floodplain management training course focused on NFIP rules and New Jersey higher standard regulations, on behalf of the New Jersey Department of Environmental Protection (NJDEP), a FEMA Cooperating Technical Partner.

The Future of Flood Resilient Housing: Implementing the Federal Flood Risk Management Standard
Lauren Hayes Knutson, HUD, lauren.e.hayes@hud.gov
Co-presenters: Dan Herrera, Daniel.J.Herrera@hud.gov

Abstract: In May 2021, E.O. 14030 Climate-Related Financial Risk reinstated E.O. 13690 requiring federal agencies to review and update, as needed, their policies, regulations, and procedures to account for the reinstated Federal Flood Risk Management Standard (FFRMS). Accordingly, the Department of Housing and Urban Development (HUD) has undergone the rulemaking process to revise its 24 CFR Part 55 regulations: Floodplain Management and Protection of Wetlands. The FFRMS rule applies to most

projects receiving HUD assistance, financing, or insurance. The rule broadens the regulatory floodplain to include the "FFRMS floodplain" with a preference for implementation of the Climate Informed Science Approach (CISA). The FFRMS floodplain expands the floodplain of concern (currently the 100-year floodplain) both vertically (based on projections of increased flood height) and horizontally (to reflect the vertical increase depending on the topography of a site). This rule requires that newly constructed or substantially improved structures be elevated to the FFRMS floodplain elevation. This rule expands the areas in which these requirements apply and updates instructions on completing the 8-Step Process to foster better analysis and improve overall climate resilience in HUD-assisted projects. This presentation will provide an overview of HUD's revisions to Part 55 and the Minimum Property Standards as well as existing implementation guidance. This presentation will also address potential implementation challenges, including compliance under jointly funded projects, and describe how HUD stakeholders can comply with the new FFRMS rule to implement flood resilience across HUD programs.

Biography: Lauren Hayes Knutson is the Director of the Environmental Planning Division (EPD) in HUD's Office of Environment and Energy (OEE). She oversees a team of subject matter experts to develop policy, criteria, and guidelines for environmental review processes. EPD is also responsible for developing innovative methods for environmental planning and assessment and providing technical assistance to HUD program offices and constituents. Prior to her role as EPD Director, Lauren served as HUD's subject matter expert for floodplain and wetland management, as well as the Environmental Clearance Officer for all Community Planning and Development (CPD) programs, including CDBG, HOME, CDBG-Disaster Recovery, Housing Trust Fund, and homeless programs. Lauren holds a Bachelor of Arts Degree in Sociology and Community Relations from Michigan State University and a Master of Public Affairs Degree with a focus on Environmenal Policy and Natural Resource Management from Indiana University.

Is it an Attached Garage or an Enclosure? The definitive resource you have always wanted.
Becca Fricke-Croft, AtkinsRealis, Becca.Croft@atkinsrealis.com
Co-presenters: Scott Cofoid, CFM, SCofoid@verisk.com

Abstract: When completing and reviewing FEMA Elevation Certificates, surveyors and floodplain managers have struggled for decades to distinguish between enclosures and attached garages. The EC instructions say that "attached" is "self-explanatory" but we know better. What if there's living space above the garage? What about breezeways or a common roof? It's just not that clear! At least it wasn't until now. Look no further! We have the answer! (Well, sort of... if kind of depends.) Working in partnership with FEMA Building Science, Floodplain Management, and Insurance Branches, the CRS team has put together an illustrated guide to help EC users make the call. In this session, we'll review the new "Attached Garage or Enclosure?" fact sheet and step through the distinguishing building features for both.

Biography: Becca Fricke-Croft is a Senior Project Manager for AtkinsRéalis and the Floodplain Management Training Lead for STARR II. As a former elected official and local floodplain manager, she possesses a unique perspective of the communication and training needs of local community officials, engineers, and surveyors. Ms. Fricke provides online and in person training on a number of topics related to the National Flood Insurance Program, with a special emphasis on the floodplain development review process, building inspections, and Elevation Certificates. In 2021, Becca sold her house and truck

and everything in them and bought a motorhome, which she now lives in full time. She travels the country taking photos of random buildings for her EC training classes.

D3: Using Data in Risk Communications
Track: Risk Communication

Data, Data Everywhere, But Not a Map to Link: Understanding Flood Risk Information Ecosystems through a Year of Conversations
Peter Herrick, Federal Emergency Management Agency
Co-presenters: Laura Duff, laura.e.duff@fema.dhs.gov

Abstract: As part of its mission to help people before, during, and after disasters, FEMA provides flood hazard and risk information to help guide mitigation actions. But we realize we're not the only source of information – and that there's informational gaps in the information that does exist. To this end, FEMA conducted a year-long assessment of the flood hazard and risk information landscape to better understand what data and information currently exists and how it is being used by our partners. This presentation will capture our findings and insights from a year of conversations with our partners – and share how this information will be used to shape the Future of Flood Risk Data.

Biography: Peter Herrick serves as the Communications Strategy Branch Chief in the Risk Management Directorate. He joined FEMA in 2010 and has worked in External Affairs, Response Planning, and National Preparedness prior to joining the Risk Management Directorate in 2017. In his current role he is responsible for communicating risk to the Whole Community, driving risk reduction across the country, and empowering partners and stakeholders to understand, communicate, and reduce natural hazard risk. Peter oversees two sections, one leading customer experience (CX) which strives to improve interaction with RMD processes and products and simultaneously increase the impact of the Directorate's activities, the other leading the other leading communications, the customer contact center, and partnerships. He has led development of toolkits, multimedia products, and other resources to educate and empower communities to understand and reduce their natural hazard risk. Peter hails from New England and now resides in Washington, DC with his rescue dog, Dillon. He holds a bachelor's degree in Political Science from Norwich University.

Recipe for Disaster (Mitigation): Using Open-Source Data to Understand Local Flood Risks
Gregg Bowser, PhD, Booz Allen Hamilton, bowser_gregg@bah.com
Co-presenters: None

Abstract: In recent years, many Federal agencies have made increasing amounts of their data available to the public. However, despite the availability and quality of these datasets, it can be hard to figure out how best to utilize them. This is especially true for local floodplain managers. Strapped for time and resources, it can be a struggle to make sense of these data, and to translate them into meaningful insights that they can use to understand and address their flood risks. However, with only a small up-front time commitment and a few simple GIS procedures, any community can stand up a GIS model of their community that will help them better understand the dimensions of their flood risks. This presentation aims to provide an overview of and applications for a series of freely available Federal

datasets that can help local floodplain managers tell the story of flood risk for their community. These data include building footprint data, equity metrics, NFIP insurance data, and disaster mitigation data. We present these data from basic plug-and-play options to data that requires just a bit of analytics expertise to unlock their potential. Armed with this information, any local jurisdiction can gain useful insights into the dimensions of flooding within their community, and the potential impacts that come with those risks.

Biography: Gregg Bowser, Ph.D. is a Lead Scientist at Booz Allen Hamilton, specializing in data science and data visualization. During his time with Booz Allen, Dr. Bowser has supported the Federal Emergency Management Agency mission by providing insights and analysis for FEMA's Floodplain Management Division, National Exercise Division, and its Federal Exercise Branch. Previously, Dr. Bowser supported efforts by the National Preparedness Assessment Division (NPAD) to improve preparedness assessments and to better measure community capability in the face of hazards. Dr. Bowser has also worked extensively with state and local emergency managers in his career, supporting the development of infrastructure risk analyses and broader risk analyses for over a dozen state and local jurisdictions.

New Tools for Visualizing, Communicating, and Assessing Sea Level and Coastal Flood Risk

Dan Rizza, Climate Central, drizza@climatecentral.org
Co-presenters: Glen Denny, Climate Central, gdenny@climatecentral.org

Abstract: Floodplain managers need tools to quickly and easily assess the risks posed by sea level rise and coastal flooding and communicate those risks to the public, government officials, and others. For the past decade, Climate Central has provided publicly available online tools, maps, reports, and visualizations, grounded in peer-reviewed research and informed by the needs of coastal stakeholders. These resources have been shared by the news media tens of thousands of times, used by millions of people, and featured at the UN climate conference. This presentation will demo Climate Central's latest tools for analyzing and communicating sea level rise and coastal flood risk and provide examples of how floodplain managers have used our existing tools and can utilize these new resources moving forward. We will focus on two initiatives in particular:

In June, Climate Central will launch the Edge of America Tour—utilizing our FloodVision® technology (https://go.climatecentral.org/floodvision), which provides photorealistic visualizations of potential future flooding and precise entry-floor elevation measurements for buildings and structures. As we drive the FloodVision® vehicle through coastal communities from Maine to Texas on this tour, we will be scanning the streets to collect data and visuals. These resources can be used for enhancing community engagement, improving public safety, informing disaster management strategies, optimizing resource allocation, and supporting resilience planning and other critical efforts. We will also demo our latest sea level rise and coastal flood risk web tools that equip coastal stakeholders with localized maps, statistics, and graphics for resilience efforts.

Biography: Dan Rizza leads the Program on Sea Level Rise at Climate Central, directing a team dedicated to equipping coastal stakeholders with the tools, information, and products necessary to understand, communicate, visualize, and respond to sea level rise and coastal flooding, while also underscoring the importance of mitigating its drivers. The team continually refines their approach based on stakeholder feedback. Previously, Dan worked at the Climate Policy Center where he managed sea level rise mapping initiatives and advised Congressional Committees on sea level rise and climate hearings. He was a

member of the team contracted by the Department of Energy to advise and support the start-up of the Advanced Research Projects Agency-Energy (ARPA-E). He earned his Master's degree from Georgetown University's Graduate School of Foreign Service and his BA from Colby College.

D4: Innovations in Flood Warning Systems
Track: Warning Systems

Live Modeling for Real Time Stormwater Management
Ryan Brown, PE, Autodesk, ryan.brown@autodesk.com
Co-presenters: None

Abstract: For year, stormwater engineers and utility planning teams have used hydraulic and hydrologic (H&H) models to adjust and plan for long term changes to the system. Often, when an H&H model is completed, the model is left without updates for long periods making it more irrelevant over time. Utilities and engineers have the opportunity to utilize these one-time use models to support ongoing planning and real-time system management by connecting with SCADA telemetry, rainfall forecasts, and real-time controls (RTC). While this concept is relatively new to stormwater management, successful implementations of these systems have been deployed around the US and other parts of the world. Key challenges that arise from managing a real-time modeling system include model management, maintaining data integrity, and verifying data is accurate according to true field conditions. These challenges will be acknowledged throughout the presentation and will highlight through case studies ways that these challenges can be mitigated. Through these case studies, I will also describe how these systems can be developed using models, sensors, and radar data that is typically already a part of or easily available most utilities, and see how the system can be used to do more with less and better manage floods, protect human life, and manage assets. Attendees of this session will be able to understand the multiple benefits of real time stormwater management, understand and mitigate challenges associated with it, and break down the seemingly overwhelming complexity into easy-to-understand concepts.

Biography: Ryan has over twelve years of experience in the water, wastewater, and stormwater industry. He has focused on hydraulic modeling for design, analysis, and other digital applications of water, wastewater, and stormwater-related data systems for much of that time. His expertise also extends to FEMA floodplain compliance and transportation hydraulics design. Ryan Holds a BS in Biosystems Engineering from Clemson University and an MS in Biological and Agricultural Engineering from NC State University. He is a registered professional engineer in the state of North Carolina.

Racing the Runoff: Applications of Using Near-Realtime Rainfall Rasters for Predictive Flood Forecasting
Neal Banerjee, PE, CFM, LJB, Inc., nbanerjee@ljbinc.com
Co-presenter: Sidar Gul, sgul@espassociates.com

Abstract: The increased access and affordability of gage and low-cost sensor technology have greatly improved the ability to obtain near real-time flood stage and risk information. While having this information is extremely valuable for understanding the "now" during an event and for post-storm evaluations and recovery, it has limited application providing forecast/predictive flood information that

is even more valuable to responders in trying to reduce impacts from an event. Most flood forecasts are based on rainfall forecasts. However, rainfall forecasts are often more general, subject to change, and/or can deviate significant from actual rainfall, thus limiting their usefulness. With the increasing accuracy and accessibility of near real-time spatially/temporary-distributed rainfall data (served as raster datasets), coupled with advancements in modeling (e.g. HEC-RAS 2D) and computing power, the ability to forecast flooding from actual rainfall is becoming a reality. This approach, which is essentially a race to model runoff and map flooding from rainfall before it makes its way through the drainage network, can produce a much more reliable forecast. This presentation will inform attendees on the general workflow of this innovative approach, show real-world examples of its application for several pilot areas, and then provide recommendations and qualifiers to where this approach is most appropriate.

Biography: Neal is the Water Resources/Civil Practice Lead for LJB and is located in Charlotte, NC. He has nearly 30 years of experience in water resources/civil engineering supporting a wide variety of projects and clients. His experience includes FEMA/CTP flood insurance study updates, municipal master plans and drainage projects, flood mitigation planning, stream restoration, and data collection and GIS/database development for variety of projects. Banerjee holds a master's degree in Civil Engineering from the University of North Carolina-Charlotte, and bachelor's degrees in Civil Engineering and Anthropology from the University of Illinois. Neal has specialized expertise in working on flood event warning, response, and recovery efforts.

Urgent flood response in Dearborn: A pilot on technology and public engagement

Brandon Wong, Hyfi, brandon@hyfi.io
Co-presenters: None

Abstract: In response to the significant floods that have struck the City of Dearborn over the past decade, city stakeholders recently embarked on a pilot sponsored by the State of Michigan to enhance urgent flood response and better protect critical facilities across the city. First, local authorities ranked locations of interest – notably flood-prone emergency routes, basins tied to sewer outfalls, and bridges that serve as essential links into the city. Real-time monitoring and notifications were then launched to help crews track localized flooding ahead of emergency calls. In July 2023, a massive log jam significantly raised river levels, prompting a swift and targeted response to begin clearing the debris. Weeks later, a downpour exceeding a 200-year storm struck the region. Officials quickly rerouted traffic away from flooded roadways, ensuring driver safety and minimizing travel disruptions. Moving forward, this growing repository of historical data paired with dynamic flood maps and photographic evidence promises to help first responders prepare for similarly extreme events in the future. These events also helped fine-tune rainfall-runoff models and enable a new generation of predictive capabilities using emerging tools like machine learning. Community participation was prioritized to ensure tools were built towards ensuring effective communications during emergency flooding situations, and to also establish the foundation for long-term engagement going forward. This presentation will help inform future endeavors in localized flood response and mitigation, offering a blueprint for similarly-sized communities facing similar challenges. The lessons learned from this pilot in Dearborn, MI, are poised to exemplify a promising model for urban flood management where the integration of modern technologies with local authorities and public feedback helps to accelerate flood response and strengthen community engagement across the region and beyond.

D5: Completed Projects Showcasing Floodplain Function Restoration
Track: NBF

Floods, Fish, and Fun! How levee setback projects successfully achieve multiple goals

Jennifer Zung, PE, CFM, Harmony Design & Engineering, jen.zung@harmonydesigninc.com
Co-presenter: Dan Fricke, dfricke@jeo.com

Abstract: This presentation will demonstrate how a levee setback project in Pocatello, Idaho, will achieve multiple goals by restoring stream ecology and connecting people with the river while still providing flood protection. This session will delve into the intricacies involved in the process of levee setbacks, shedding light on the complexities to anticipate and strategies to overcome them. Drawing from this project located along the Portneuf River in Centennial Park, we will explore the multifaceted nature of levee setback projects, highlighting the technical, environmental, and regulatory challenges that often arise. This session will also emphasize the crucial role collaboration between municipalities, federal agencies, non-profit organizations, and the community plays in successfully executing levee setback projects. Join us as we navigate the intricate path towards effective flood risk reduction, environmental stewardship, and community building.

Biography: Jennifer Zung has a M.S. in Hydrologic Science and Engineering from Colorado State University and a B.S. in Civil Engineering from the Missouri University of Science and Technology. She has more than 29 years of experience working in the civil engineering field and is a Certified Floodplain Manager and a Professional Engineer. Ms. Zung is the founding Principal of Harmony Design & Engineering, a planning and engineering company in Driggs, Idaho, and Jackson, Wyoming, that is working to increase the positive environmental impact of our built environment to create thriving communities. She also served for two years as a Peace Corps Volunteer in the Philippines, working to improve wastewater treatment facilities around Dumaguete City. She lives in Alta, Wyoming, with her husband and business partner, their son, and one crazy cat.

Modeling Floodplain Resilience: Innovations in Fish Passage Restoration and Infrastructure Design in Washington's Aquatic Ecosystems

Brad Hartman, PE, P.Eng, CFM, Jacobs, bradley.hartman@jacobs.com
Co-presenters: None

Abstract: From 1854 to 1974, treaties signed and clarified between the US Government and the Native American Indian tribes in the Pacific Northwest, have allowed equity access to fish-bearing streams and rivers. Since the early 1990's, the Washington Department of Transportation and partners such as the Washington Department of Fish & Wildlife, have developed fish passage inventories and permitting/design guidance for over 7,000 miles of WSDOT highway, which include nearly 4,000 fish-bearing stream crossings which include 2,000 culverts. Due to a 2013 legal injunction, the State of

Washington is required to improve over 1,000 crossings which function as fish barriers, preventing the upstream migration and spawning of Salmon due to scour, drops, small openings, low flow depths, high velocity, etc. To help facilitate fish passage, these roadway crossings are being converted to larger box culverts, three-sided culverts, and bridges. In conjunction with their hydraulics and bridge design manuals, WSDOT developed a robust multi-disciplinary process to help design each new crossing, from preliminary through to final design stages. Multiple sciences and disciplines were required to meet program goals and included practitioners and subject matter experts in hydraulics/hydrology, engineering, biology, geology, environmental, stream restoration, geotechnical, and geomorphological fields. The WSDOT process includes 2D modeling and scour analyses using SRH-2D, design resilience by using flow projected to occur nearly 60 years into the future, and a Flood Risk Assessment which identifies and communicates any issues of meeting FEMA requirements, including impacts that may require a change in design or a CLOMR. This presentation will focus on fish, floodplains, and the future by introducing WSDOT's industry leading fish passage design efforts, highlight the extraordinary progress in rehabilitating Washington's aquatic ecosystems, and delve into the techniques that underpin this restoration. Included will be real-world examples and photographs of design/construction elements including Large Woody Material, demonstrating how nature and engineering can harmoniously coexist. An added focus will be placed on principles and best practices of 2D hydraulic modeling and scour as it pertains to resiliency to infrastructure and the ecosystem.

Biography: Mr. Hartman completed his BS and MS engineering degrees at Brigham Young University in 2001, is a Certified Floodplain Manager, and is a registered professional engineer in several US states and Canadian provinces. Most of his 22 years of experience has been with flood control, floodplain management, hydrology/hydraulics, stream design and river scour, and drainage for highway/bridge, airport, and rail clients. Mr. Hartman started work after school in 2001, joining CH2M Hill in Salt Lake City 16 years ago, which was eventually merged with Jacobs Solutions Inc. Personally, Brad's hobbies include cycling, camping, shooting sports, SCUBA diving, and travel.

Colorado River Aquatic Habitat and Agricultural Land Restoration

Peggy Bailey, Tetra Tech, peggy.bailey@tetratech.com
Co-presenters: None

Abstract: Irrigators of Lands in the Vicinity of Kremmling (ILVK) consist of 12 ranches and BLM land spanning 12 miles of the Colorado River and 1.5 miles of the Blue River near Kremmling, Colorado. These ranches are one of the most intact agricultural areas remaining in Colorado providing habitat connectivity to thousands of acres of public land and riverine systems. However, trans-mountain diversions from the Colorado headwaters to the east slope have significantly impacted these rivers by lowering flows and water levels to the point where ditch diversions and pumping operations are impeded, stream banks are degrading, and water temperatures are increasing. Seepage from irrigation ditches located along the channel banks has created instabilities resulting in the loss of irrigation ditches, fencing, productive agricultural lands, and an overly wide river channel. The net result has impacted agricultural operations and the health of the aquatic habitat and species that reside within this riverine system. The ILVK ranching families and BLM have partnered with Trout Unlimited, with support from local, State, and Federal agencies, water providers, and conservation groups, to implement riverine improvements as part of the Colorado River Headwaters Project. Serving as a lead designer, and working closely with the ILVK, Tetra Tech has completed designs or is in the process of designing improvements for 14 sites on 6 properties plus 7 BLM sites. To date, improvements on 11 sites have been constructed.

In total, these improvements will provide a near-contiguous restoration effort of the ILVK lands. The designs are simple and innovative solutions that address the functional requirements for agriculture operations, enhance aquatic habitat, and stabilize stream banks. This presentation includes a review of the technical assessments and restoration designs. We will present pre- and post-construction photos and review the monitoring protocol established for each of these sites.

Biography: Peggy Bailey is a Water Resources Engineer with Tetra Tech and a registered Professional Engineer in the State of Colorado. She has over 30 years of experience specializing in water resources and aquatic restoration throughout the arid southwest regions of the U.S. including numerous aquatic habitat enhancement projects for endangered and native fish species on the Colorado River and the Green River in Utah. Peggy has extensive experience in the resilient design and stabilization of heavily impacted rivers from both human disturbance, such as mining and highly diverted riverine systems, to systems with extensive flood and debris flow damage. These projects include the Blue River in Breckenridge previously disturbed from dredge boat mining; the Little Thompson River in the front range of Colorado disturbed from the record-setting 2013 floods; and twelve miles of channel bank stabilization along agricultural lands and the Colorado River where transbasin diversions have significantly impacted both agricultural operations and the fishery habitat. In addition to her work with Tetra Tech Peggy is Vice-President of the Blue River Water Group, a non-profit in Summit County, Colorado currently restoring several rivers in the Blue River watershed. Peggy is also a member of the Colorado River Basin Round Table as the Summit County Representative working to solve a wide range of water-related issues. Peggy lives and works in Dillon, Colorado.

D6: Climate Change Modeling and Tools
Track: Climate Change

Who Benefits? Using FloodAdapt to Support Equitable Flood Risk Management
Sarah Wright, Deltares, sarah.wright@deltares.nl
Co-presenters: Frederique de Groen, frederique.degroen@deltares.nl and Keren Bolter, keren.bolter@deltares-usa.us

Abstract: Many tools enable visualization of climate risks, but there is a need for a tool to evaluate meaningful scenarios that resonate with stakeholders – such as a recent or historically important event – and explore how different adaptation options can reduce flood impacts, particularly for socially-vulnerable residents. FloodAdapt is a free, open-source tool co-developed with the Department of Homeland Security Science and Technology Directorate that empowers communities to evaluate how flooding, impacts, and risk will change (and for whom) under future conditions, and to test the effectiveness of adaptation options in meeting community objectives. Two innovative open-source models enable fast, accurate calculations. The physics-based compound flood model SFINCS is coupled with the impact model Delft-FIAT to quantify flood depths and damages to buildings and roads. The FloodAdapt user interface opens the door to non-modelers to interact with flood and impact models and define compound flood events, future conditions, and adaptation strategies. There are options to calculate return period flood maps and expected annual damages for a benefit cost analysis (BCA). FloodAdapt includes an equity approach accounting for income disparities, enabling both traditional

BCA and equity-weighted BCA. In addition to spatial visualization of floods and impacts, FloodAdapt also automatically generates infographics and infometrics, integrating social vulnerability data to quantify how benefits and risk are distributed among residents in the community. This presentation will show how FloodAdapt users can answer questions like "What if Hurricane Ian's track had shifted to the north or south?", or "Will a floodwall benefit the socially vulnerable?" Demonstrations will highlight FloodAdapt's utility for equitable flood risk management and how attendees can explore applications for their community.

Biography: Sarah Wright is a researcher at the applied research institute Deltares, with experience in water management and climate adaptation. Holding a BS in Environmental Science and Mathematics from the University of North Carolina at Chapel Hill and an MSc in International Land & Water Management from Wageningen University, Sarah specializes in adaptive planning under climate and socio-economic changes. She focuses on decision support tools which translate scientific knowledge into accessible, actionable and contextualized information for adaptation practitioners. Sarah works on the development and application of FloodAdapt - an open-source, rapid, physics-based decision support system for flood adaptation planning developed by Deltares and funded by the Department of Homeland Security Science and Technology Directorate.

Towards a Realistic assessment of Compound Flood Risk in a Changing Climate

Somayeh Mohammadi, Michael Baker International, Somayeh.Mohammadi@mbakerintl.com
Co-presenters: None

Abstract: Compound flooding is the most expensive natural disaster in the United States, primarily affecting coastal areas. These types of flood events are caused by the simultaneous occurrence of multiple flood mechanisms. Recently, the effects of climate change have increased the risk of compound floods in coastal areas. Michael Baker International has developed an innovative approach to compound flood risk analysis that not only acknowledges but also adapts to the climatic shifts. This study has employed two-sided conditional sampling to analyze compound flood risk along the Louisiana coast. The involved flood mechanisms include precipitation and storm surge. Non-stationarity in precipitation and storm surge data, caused by the future climate conditions, has been incorporated into the analysis. To achieve a more realistic assessment of compound flood risk, the study has distinguished between tropical and non-tropical events while conducting an extreme value analysis. Furthermore, this study has investigated how the return period of catastrophic historical compound flood events could change by considering future climate conditions. The research unveils a startling reality: Climate change is not only hastening flood recurrence intervals, but also escalating their severity. In the not-too-distant future, compounding impacts of sea level rise with surge and precipitation will result in present day extreme events to occur with increasing frequency. A detailed assessment of these compounding impacts is critical towards efficient and effective planning efforts to protect life and infrastructure. Michael Baker's scalable compound flood risk analysis is a powerful tool for proactive planning, capable of shielding coastlines from the accelerating impacts of climate change. We believe that our shared future relies on understanding and mitigating these risks today. This study calculates compound flood return periods by taking into account future climate conditions. This output can serve as a more realistic assessment of flood risk for the design of flood protection measures.

Biography: Somayeh Mohammadi is a technical specialist at MBI, where she works on projects related to flood hazard modeling and prediction. She earned her PhD from the University of Maryland in the

field of Disaster Resilience, with a particular focus on compound flood hazard assessment. She possesses diverse experience in risk analysis, community resilience, disaster management, probabilistic data analysis, and the application of machine learning methods in flood prediction. Additionally, she has a strong interest in tackling real-world challenges associated with building flood-resilient communities while taking into account the potential impacts of future climate changes.

Future Flood: Modeling changing flood risk with dynamically downscaled climate data

Jordan Branham, Argonne National Laboratory, jbranham@anl.gov
Co-presenter: Quentin Cummings. quentin.cummings@fema.dhs.gov

Abstract: On July 10th and 11th, 2023, the state of Vermont experienced catastrophic flash and riverine flooding, causing widespread damage on par with that wrought by Hurricane Irene in 2011. The floods were driven by prolonged torrential rains and led to landslides, road and bridge washouts, severe damage to properties, and several fatalities. This rain-induced event, unprecedented in Vermont's history, hints at a future in which such anomalous events become more common under climate change. Pluvial floods are a major threat to property, infrastructure, and people, and their impacts are expected to grow under the combined influence of increasing urbanization, growing strains on stormwater infrastructure, and climate change-driven extreme rainfall events. Equitable access to high-quality climate projections is an important precursor to informed planning for future climate extremes. In this presentation, we explore recent additions to the Climate Risk and Resilience Portal (ClimRR), including inland (pluvial) flooding and coastal flooding projections. Flood data are developed using dynamically downscaled climate projections from three global climate models, which drive a hydrologic model at 200-meter resolution. Data depict historical and mid-century flood projections of flood depths for a range of return periods, from the 1-in-2-year event (50% annual exceedance probability) to the 1-in-50-year event (2% annual exceedance probability). We present insights at the HUC-12 level, highlighting those watersheds that project to have significant increases in both flood extent and flood severity. This information can help emergency and floodplain managers, planners, and other decision makers consider shifting risk environments and target policies and investments to mitigate flood exposure.

Biography: Dr. Jordan Branham is a Senior Climate Risk & Resilience Analyst with the Center for Climate Resilience and Decision Science, part of the Decision and Infrastructure Sciences Division at Argonne National Laboratory. He is a trained urban planner, specializing in urban spatial analytics, risk assessment, and the development of resilience and adaptation strategies. His work spans a range of sponsors, including DOE, FEMA, EDA, and energy utilities. Some of his recent projects include supporting the release and ongoing development of the Climate Risk and Resilience Portal (ClimRR); evaluating climate risks and adaptation strategies for energy utilities; and developing a climate adaptation planning guide for emergency managers. Dr. Branham received his PhD in City and Regional Planning from the University of North Carolina at Chapel Hill, where he studied the impacts of coastal resilience policies and the development of environmental markets. He has a Master's from the University of Illinois at Urbana-Champaign and a BA from Washington University in St. Louis.

D7: Technological Innovations in Floodplain Management
Track: Tech & Tools

Digital Twins for Emergency and Floodplain Management
Darcy Watts, Guidehouse, dwatts@guidehousefederal.com
Co-presenter: Marlana Zink, Guidehouse, mzink@guidehousefederal.com and Jack Olcott, Guidehouse, jolcott@guidehousefederal.com

Abstract: Digital twins are virtual models designed to represent an object or system within the physical world. They rely on near real-time data from sensors to provide an accurate depiction of the current state of the physical entity represented. While digital twins are an emerging technology, many floodplain managers have actively worked with simple digital twins for years, in the form of flood maps connected to water gauges and other sensors to examine current flood levels for a location. However, the true power of digital twins is unlocked when combined with machine learning (ML) predictive modeling, to enable not only current situational understanding but also "what if" simulations and scenario planning.

Aside from their popular usage in flood sensing and mapping, digital twins have many other use cases that can improve flood and emergency management planning, execution, and post-disaster responses to drive optimal outcomes for communities. For example, digital twins can be used to create virtual reality (VR) training environments for emergency managers or first responders, providing a lower-stakes environment where personnel can learn and refine critical disaster response skills. They can additionally be used to perform tests or run scenarios that cannot feasibly be performed in real life, such as evacuation simulations to determine optimal routes, a topic that this presentation will investigate further.

This presentation will introduce ASFPM attendees to the concept of digital twins, describe applied use cases in the emergency and floodplain management domains, and showcase a prototype digital twin that enables emergency and floodplain managers to simulate evacuation procedures for a community. The prototype will enable users to run "what if" scenarios considering various factors such as population, road sizes and closures, phased evacuation approaches, and weather conditions, to identify optimal evacuation routes that may be codified within community emergency management plans and evacuation instructions.

Biography: Ariana KWW DiMeo is Branch Chief for Data Analytics for the National Flood Insurance Program. Her over 17-years of public service span the U.S. government, including committees in the House and Senate, Federal District Court, and multiple Cabinet-level departments and agencies. Ariana's commendations include Presidential Management Fellow, Partnership for Public Service Excellence in Government Senior Fellow, Graduate School USA Senior Leader, National Intelligence University subject-matter and community leadership certificates, and the Intelligence Integration Unit Citation. She is a Board Trustee at The Langley School, an independent grade school in McLean, VA, where she serves on the Audit and Risk Management, Governance, and Facilities Committees. Ariana earned her B.A. in government and religion, summa cum laude, Phi Beta Kappa, Presidential Medal, from Sweet Briar College. She earned her A.M. in political ethics and biblical law from the University of Chicago Divinity School, and her business certificates from Yale University School of Management and the London School of Economics and Political Science. Ariana earned her J.D., Order of Barristers, from Tulane University Law School, and her L.L.M. in dispute resolution from Pepperdine University Caruso School of Law. She lives in Annandale, VA, with her husband, daughter, parents, and mother-in-law. Patrick Heck, CSM, is a Director at Guidehouse. 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.

Roadmap to Resilience: Scaling Site Specific Modeling for more Realistic Watershed-Wide Planning

Curtis Smith, PE, CFM, Stantec, curtis.smith@stantec.com
Co-presenters: None

Abstract: Over the past five years, Federal and State level grant funding for resilience projects has significantly increased (BRIC, Infrastructure Investment and Jobs Act, etc.). Prioritizing where those investment dollars are best spent can be a challenge due to the high sensitivity of the benefit /cost models to the expected flooding depth. Typically, regional scale flood hazard analysis data is used to determine the feasibility of a project, with more detailed modeling to follow to confirm benefit/cost information. However, the complexities of hydrologic and hydraulic processes often mean that accuracy is sacrificed when assessing regional scale flood risk assessments. If the ultimate benefit cost ratio determined from the detailed project specific model is drastically different than the initial regional model, it calls in to question whether the initial prioritization of projects was successful. In this presentation we will demonstrate how machine learning can be coupled with local site-specific modeling to produce detailed hazard information at a watershed-scale. This ultimately allows site specific information like stormwater capacity, detailed terrain information, infiltration data, and future conditions to increase confidence in regional feasibility level cost-benefit analyses. We will provide comparisons of the following data for several sites to examine how this new process can benefit resiliency planning: 1. FEMA flood hazard information 2. Regional scale hazard modeling 3. Detailed, project specific modeling 4. Machine learning predictions (Flood Predictor) 5. Observed data Planning directors, as well as development and community infrastructure managers will learn how machine learning can be coupled with existing site specific hydraulic modeling efforts to rapidly scale detailed results to other areas throughout the watershed that are lacking good hazard information. Financial administrators can use this information to better invest in projects with greater confidence acknowledging this proactive and adaptive process has strengthened the success curve and ROI to the community.

Biography: Curtis is a Professional Engineer who serves as a team lead and technical expert for several clients in the flood risk industry including FEMA. His projects are focused on leveraging data and statistics to identify flood prone areas throughout the country and promote efficient solutions in floodplain management.

Semantic Segmentation for Flood Mapping: Prioritizing areas of Flood Risk Assessment with Computer Vision

Arslaan Khalid, Michael Baker International, arslaan.khalid@mbakerintl.com
Co-presenter: Jeane Camelo, Jeane.Camelo@mbakerintl.com

Abstract: Effective flood risk assessment is critical for disaster preparedness and response. This presentation explores the application of semantic segmentation for tracking land cover and infrastructure changes through satellite imagery analysis to prioritize areas for detailed flood risk assessment using Facebook's Segment Anything Model (SAM). SAM produces high quality object masks

which are further categorized into water bodies, roads, buildings, and vegetation. Through advanced computer vision techniques, we showcase how semantic segmentation enables the identification and differentiation of crucial features in both new and historical satellite imageries, while enabling to track changes in land use and infrastructure over time. Case studies along the coast of Mississippi illustrate the utility of semantic segmentation in identifying areas of prioritization with substantial change in landcover and an uptick in urbanization. This presentation underscores the significance of image analysis and its role in strengthening flood risk assessment methodologies, offering insights that can inform decision-making processes for disaster management agencies.

Biography: Dr. Arslaan Khalid currently holds the position of Senior Coastal Engineer at a Michael Baker International. He brings with him a wealth of knowledge and experience in the fields of coastal and riverine flood risk assessment, geospatial flood mapping, cutting-edge risk estimation methods, and the development of real-time flood forecasting systems. Dr. Khalid's technical proficiency encompasses 2D hydrodynamic and wave modeling, utilizing software such as ADCIRC, Delft3D, SWAN, and WAVEWATCHIII. Moreover, he possesses advanced programming skills tailored for big-data analysis. His expertise extends to parallel processing, cloud computing, and sophisticated data visualization techniques. Dr. Khalid has effectively applied these competencies to address complex challenges in various water resources projects, both in research and industry settings.

D8: Mapping and Communicating Flood Risk to the Public
Track: Mapping

Nebraska Real-time Flood Forecasting: A web application for visualizing imminent flooding
Stefan Schaepe, PE, CFM, Nebraska Department of Natural Resources, stefan.schaepe@nebraska.gov
Co-presenters: None

Abstract: The massive flooding that devastated Nebraska in 2019 highlighted the need for a more proactive approach to inform risk-based decisions regarding imminent flooding. The Nebraska Department of Natural Resources (NeDNR) along with the Nebraska Emergency Management Agency received grant funding to produce a comprehensive web map with pre-calculated inundation boundaries at half-foot stage intervals for stream gages across the state. The Nebraska Real-time Flood Forecasting (NeRFF) site was fully launched in September of 2023, with inundation boundaries for 46 sites, covering 54 communities. HDR was brought on to handle the flood modeling effort. Two-dimensional HEC-RAS models were created for all 46 sites. This massive modeling effort included over 500 river miles, 415 hydraulic structures and nearly 1,500 model plans. The NeRFF site is a custom web mapping application that allows users to view flood inundation boundaries in their area based on current and potential flood stages. Along with the inundation data, other features such as levees, dams, weather radar, critical infrastructure, and more are available on the site to provide locals with a one-stop-shop for flood related information. In this presentation, Stefan Schaepe, NeDNR's project manager, will discuss: the NeRFF objectives, project approach, and a demonstration of the NeRFF site. Floodplain administrators, emergency managers, community officials, and citizens alike will find this new visualization of flood risk to be crucial in the event of imminent flooding, as well as for mitigation and disaster planning.

Biography: Stefan Schaepe is an engineer and project manager with the Nebraska Department of Natural Resources, where he has 9 years of experience in floodplain modeling and mapping. Stefan conducts basic and enhanced hydrologic and hydraulic analyses for mapping, reviews and approves base flood elevation determinations, prepares floodplain reports, and develops guidelines and procedures for mapping work. Stefan also reviews engineering work developed during FEMA mapping projects and performs Technical Reviews submitted by local jurisdictions. Stefan is a graduate of the University of Nebraska-Lincoln, with B.S. Civil Engineering (2013) and M.S. Civil Engineering (2015) degrees. He is a Certified Floodplain Manager and a Registered Professional Engineer in the state of Nebraska.

Predicting Flooding in Our Vulnerable Communities

Katherine Osborne, CFM, Stantec, katherine.osborne@stantec.com
Co-presenters: Carey Johnson, Director, Division of Water carey.johnson@ky.gov

Abstract: The mountainous area of Eastern Kentucky is uniquely vulnerable to flash flooding. With steep slopes and narrow valleys cut by streams, much of the population is exposed to flood risk. In July 2022, Eastern Kentucky experienced historic and deadly flooding caused by intense rain resulting in the loss of 45 lives and severe infrastructure damage. Kentucky Division of Water, in partnership with Stantec, developed a pilot project to enhance flood warning, mitigation, and resilience efforts by delivering a portal communicating flash flood inundation, depth, and probability mapping for one of the most vulnerable communities in Kentucky, Letcher County. Letcher County is a disadvantaged community with a poverty rate 150% higher than the national average. This pilot was supported by Flood Predictor, a proprietary product developed by Stantec, which applies machine learning flood-risk technology while leveraging FEMA's Risk MAP data to deliver rapid results in near real-time. This presentation will detail the innovative methodology used to develop the modeling and mapping and share how this portal has successfully communicated flood risk, supported flood warning, and overall resilience within Eastern Kentucky.

Biography: Katherine is a senior associate with more than 14 years of experience in flood engineering studies with a focus on Federal Emergency Management Agency (FEMA) RiskMAP project management, flood risk assessment, community outreach and training, and disaster resilience. Katherine's emphasis is integrating the latest digital solutions to assist with real-time response, mitigation, resilience, climate solutions, and emergency/disaster response, primarily serving Cooperating Technical Partner (CTPs) and municipalities. She has served as Stantec's Deputy Program Manager for Kentucky Division of Water for 10 years. She believes it takes empathy, foresight, and an analytic mind to excel in risk management and resiliency planning.

Helping Local Floodplain Managers Evolve in an ever-changing Flood Risk World

Maria Cox Lamm, South Carolina Department of Natural Resources, coxm@dnr.sc.gov
Co-presenters: Jennifer Housman, jennifer.housman@aecom.com

Abstract: This presentation will discuss several State education and outreach initiatives including utilizing the South Carolina Flood IMPACT (Inundation and Mapping for Action) website to find innovative methods to convey risk to local floodplain managers and the public. SC Flood IMPACT is a state-owned website with the ability to house and display preliminary, effective, and non-regulatory products to assist local and state governmental agencies and their communities. In 2021, South Carolina was the first state in Region IV to publish the results from a 2D study on an effective map. To address

challenges with understanding and utilizing 2D mapping products, the State has created a Mitigation Planning Tool feature on IMPACT to provide an easy and user-friendly method to view non-regulatory products such as water surface elevation and depth grids. Our goal is to provide innovative tools and training to help local floodplain managers with bridging the gap between previously supplied data (traditional 1D format) with newer output data (2D format). The State is also deploying education and outreach initiatives tailored to all floodplain managers with additional emphasis on underserved communities. These communities face many challenges ranging from financial to judicial capacity to logistical issues. To combat this need, the State has developed interactive activities including STEM education activities for middle school students to convey flood risk. SCDNR is proposing a Mobile Outreach Unit that will bring information to the areas of the state that need it the most. This unit would allow SCDNR to "drop in" anywhere in a community and set up a meeting or training whether it be inside or outside. This will address many barriers that these communities are faced with daily. The unit will help build floodplain management knowledge and ultimately increase the understanding of a community's Flood Risk.

Biography: Maria Cox Lamm is a Certified Floodplain Manager and serves as the program manager of the Flood Mitigation Program in the South Carolina Department of Natural Resources. The Flood Mitigation Program contains the Floodplain Management State Coordinating Office, Floodplain Mapping and the Flood Mitigation Assistance Grant program. She is responsible for the administration, coordination, and direction of all aspects of the Flood Mitigation Program. She has been with the agency since July 2004. Maria has over 22 years of experience in the field of floodplain management. Prior to joining the South Carolina Department of Natural Resources, she was employed by Wake County, NC. She worked in the Environmental Services Division; Erosion, Flood and Stormwater Section for just shy of 6 years. Maria graduated from North Carolina State University with a Bachelor of Science in Natural Resources in 1998. Maria served as Chair of the Association of State Floodplain Managers from May 2017 to May 2019.

D9: 2D Modeling & Changing Standards
Track: Modeling

Updates and Advancements in 2-Dimensional Modeling Processes: FEMA's 2D IPT
Laura Algeo, PE, FEMA HQ, laura.algeo@fema.dhs.gov
Co-presenters: David Rosa, David.rosa@fema.dhs.gov; Geoff Uhlemann, geoff.uhlemann@mbakerintl.com; and Andrew Bonner, Andrew.bonner@aecom.com

Abstract: In June 2022, FEMA expanded the 2D Floodway IPT to find solutions to various questions and issues associated more generally with 2D modeling as a whole. This 2D IPT is focusing on the use of 2D meshes for flood modeling and how to ensure our products can be consistent between 1D and 2D modeling techniques. As our roles in supporting resilient communisis change over time, so does the delivery of our program, the IPT is also investigating potential changes in what and how we deliver flood hazard data to be successful in the future. The IPT consists of over 100 members across the public and private sectors. Members formed subgroups to focus on finding solutions related to flood products, maps, hydrology, hydraulics, regulatory requirements, and model setup. This presentation will review

the 2D IPT, the progress made to-date with updating Guidance and Standards and discuss the current status of testing numerous modeling and mapping scenarios including floodway and recommendations for the path forward.

Biography: Laura Algeo is a Program Specialist with the Federal Emergency Management Agency (FEMA) Headquarters working in the Engineering Management Branch of FIMA'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.

Navigating Complex 2D Floodways in Urban Environments: A Case Study

Matt Chaney, PE, CFM, AECOM, matt.chaney@aecom.com
Co-presenters: None

Abstract: When floodwaters breach the confines of the main channel and weave through shallow, divergent paths in urban settings, 2D floodway computation becomes a formidable challenge. Join us on a journey through the Gould Wash case study in Washington County, Utah, as we present a novel solution to this complex issue, offering valuable insights for engineers and floodplain managers alike. In the realm of 2D modeling, it is a common scenario for flow to exceed the main channel's capacity, leading to the emergence of split flows in overbank areas. These overbank floodwaters are often shallow and meandering, particularly in fully developed regions. When a significant portion of the flow is breaking out of the channel into these overbanks, it can necessitate that the floodway also be computed along the overbank split flow paths. This can present significant challenges for local floodplain administrators, especially when the overbanks are completely developed. During the Washington County, Utah Risk MAP study, initially it appeared as though floodways would be required along the shallow, diverging split flow paths through the fully developed city in addition to the floodway along the main channel. Our team developed an alternate FEMA HQ-approved approach to compute the floodway in the main channel and avoid floodways through the fully developed split flow paths, providing a more useful and manageable solution for the community. In this presentation, attendees will gain insights into when and how this approach can be effectively applied, making their floodway computations in similar scenarios more appropriate and more useful.

Biography: Matt Chaney is a Water Resources Engineer with 10 years of experience on a wide variety of hydrologic and hydraulic modeling projects including bridge scour analysis, dam breach modeling, and floodplain mapping for the FEMA Risk MAP program. He has been heavily involved in developing cutting-edge modeling techniques including 2D Base Level Engineering, Probabilistic Flood Risk Assessment, and 2D Floodways.

Order of Operations: Case Study of Rainfall-Runoff Modeling Paired with Hydraulic Data

Seungho Song, CDM Smith, songs@cdmsmith.com
Co-presenters: None

Abstract: A typical Task Order proposes project schedules in which hydrologic analysis completion is prior to hydraulic analysis initiation. Also, the Task Order often does not allow/authorize hydraulic analysis charges/invoices until hydrologic analysis task completion. Especially for rainfall-runoff hydrologic analysis using HEC-HMS, appropriate channel routing requires data from the final stage of HEC-RAS modeling throughout the hydrologic system schematics. Also, field survey data may not be available for channel routing with HEC-RAS model setup when the rainfall-runoff hydrologic modeling is completed. Using the Saco Watershed hydrology case study, this presentation will discuss significant differences in reach routing data given different stages of HEC-RAS model refinement. From this case study, to demonstrate the significant impact on such hydrologic analysis, the results in HEC-HMS will be compared for the following routing scenarios: • Initial HEC-RAS model • HEC-RAS model after the major control structures are added • HEC-RAS model after incorporated field survey data including channels thalweg and roadway crossing structures If the HEC-RAS hydraulic modeling is completed after the HEC-HMS hydrologic analysis, channel routing data with all surveyed data incorporated hydraulic model condition should be re-iterated for reliable results in HEC-HMS hydrologic modeling. These efforts including calibration will delay project completion schedule and create a budgeting issue. Therefore, audiences will realize which order of operations in rainfall-runoff hydrologic and hydraulic (H&H) modeling would be proper for project productivity and effectiveness. The message of this presentation to all owners of H&H analyses, Project Managers, Task Order Managers is to encourage requesting H&H analyses with rainfall-runoff analysis to be paired with the HEC-RAS modeling results.

Biography: Seungho Song is a senior water resources engineer with 37 plus years of experience including technical director and project manager roles in storm water master planning, flood insurance studies, flood mitigation, watershed management, BMP design, stream restoration, and hydrologic and hydraulic (H&H) computer modeling. Seungho has extensive experience conducting H&H modeling and performing QA/QC roles in support of Flood Insurance Studies throughout the Regions I, II, III, IV, V, VI, and VIII. Seungho Song is currently serving as a Subject Matter Expert (SME) in Hydraulic Modeling and Dam for FEMA Map Information eXchange (FMIX) for Compass.

Concurrent Session E

E1: State Mitigation Initiatives
Track: Mitigation

Building a Firm Foundation: Increasing Resilience through Oklahoma's First State Flood Plan

Yohanes Sugeng, PE, CFM, Oklahoma Water Resources Board, Yohanes.Sugeng@owrb.ok.gov
Co-presenters: Brandon Claborn, bclaborn@meshekengr.com and Jeremy Rice, jjr@freese.com

Abstract: In May of 2020, on the heels of historic flooding in 2019, Oklahoma's governor signed into law Senate Bill 1269, which directed the development of the state's first Flood Plan. The purpose is to develop a comprehensive list of flood mitigation projects and strategies, provide improved resource

management between jurisdictions, and increase the state's community and public awareness. Initially unfunded, approximately $1.3 million in funding was secured through a combination of HMGP, BRIC and CDBG-DR sources. Since initial scoping, there has been extensive collaboration with hazard mitigation and infrastructure agencies and the public. So far, 190 flood mitigation projects have been identified totaling approximately $462 million in needs. Ten strategic recommendations have been crafted to guide the legislature on flood control planning and project construction. The Plan identifies areas of flood risk statewide on a watershed basis by examining existing available data including FEMA Base Level Engineering, hydraulic & hydrology studies, flood insurance claims, and damage assessments. A digital dashboard has been created showing potential flood "hotspots" developed from the data review and allows the public to pinpoint areas of flood concern in their communities and make better management decisions. This presentation will begin by describing the legislative action, purpose, and funding of Oklahoma's first ever state Flood Plan and then transition through the efforts that have been put forth towards engagement, data collection and analysis, and the creation of flood plan products such as an Executive Report and public Interactive Dashboard. This presentation will motivate conferencegoers to initiate or expand on their own statewide flood planning. Community mitigation needs expand beyond mapping, risk identification, and buy-outs. We aim to further reduce flood risk by identifying flood mitigation needs, funding sources, and raising awareness of actions to improve resource and emergency management.

Biography: Yohanes Sugeng serves as the OWRB's Engineering and Planning Division Chief. He oversees Oklahoma's Dam Safety Program, which ensures the safety of more than 4,700 dams across the state, and Oklahoma's Floodplain Management Program, which includes coordinating the participation of more than 400 Oklahoma communities in the National Flood Insurance Program (NFIP). The Engineering and Planning Division also coordinates updates and implementation of the Oklahoma Comprehensive Water Plan and Oklahoma Flood Plan, and provides technical support for water and wastewater infrastructure improvement projects funded through the OWRB's financial assistance programs. Yohanes has Master of Science degree in Civil Engineering and Construction Administration from the University of Oklahoma.

Utah's Mitigation Direct Technical Assistance Program

Kathy Holder, CFM, MBA, Utah Division of Emergency Management, kcholder@utah.gov
Co-presenters: None

Abstract: Utah has started a new program to bring greater equity to mitigation and HMA projects for Utah communities, and tribes. Non-financial Direct Technical Assistance can provide holistic hazard mitigation planning and project support at the earliest stages to Utah communities, and tribes requesting assistance. This helps communities to reduce disaster damage, build community resilience, and obtain and sustain successful mitigation. DTA is for communities with a desire to increase their capacity and capability to conduct mitigation activities, increase resilience to natural hazards, need help identifying projects that will reduce risk, or need support developing or submitting a BRIC/HMGP application. This is a service for communities that do not have the resources to do the work for themselves.

Biography: Kathy Holder is Utah's State Hazard Mitigation Officer, as well as the Mitigation Section Manager for the Utah Division of Emergency Management. She leads Utah's Post Wildfire Mitigation Team and Utah's State Hazard Mitigation Team. Kathy is currently serving on the Biden Harris National

Wildland Fire Mitigation Commission. She served as the State Floodplain Manager/National Flood Insurance Coordinator for the State of Utah before her current position. She is a Certified Floodplain Manager with 15 years of experience in Emergency Management. Kathy has worked on several presidentially declared disasters in recovery and held the position of the Deputy State Coordinating Officer for Public Assistance for two of Utah's most recent presidentially declared disasters. Kathy has held a position on the board of the Utah Floodplain and Stormwater Management Association (UFSMA) for the past 7 years. She holds degrees in Masters of Business Administration, Bachelors of Public Administration, and General Science. She has taught at the University level for over 11 years. Kathy engages in educating Utah communities, government agencies, private non profits, and citizens on regulations, permitting, building codes, mitigation.

North Carolina Flood Resiliency Blueprint

Marc Recktenwald, Division of Mitigation Services Department of Environmental Quality, Marc.Recktenwald@deq.nc.gov
Co-presenters: John Dorman, AECOM, john.dorman@aecom.com

Abstract: The Blueprint is a new statewide initiative that forms the backbone of the state's flood planning process to increase community resilience to flooding. An online-decision support tool and associated planning strategies address flooding for communities across NC's seventeen river basins. The Blueprint is a first-of-its-kind program in NC and represents the largest statewide flood mitigation investment in state history. When completed, the Blueprint will lead to an actionable set of projects and funding strategies that the State can implement to reduce flooding, mitigate the impacts of flooding when it does occur, and recover more quickly afterward. By making impacts from mitigation strategies clear, the Blueprint helps decision makers from the State level to individual communities make more informed choices when dealing with flooding. The Blueprint is funded through a $20 million allocation to the Department of Environmental Quality's Division of Mitigation Services from the NC General Assembly. Blueprint will accomplish several key goals: • Develop community and basin-specific risk management processes to identify and address flooding for NC communities. • Develop an online decision support tool which seamlessly guides state, county, municipal, and other jurisdictions to identify and select flood mitigation strategies responsibly, systematically, equitably, and transparently. • Establish a repeatable, statewide methodology for identifying, prioritizing, and selecting flood mitigation strategies for future implementation. The Blueprint benefits from the input and advice of over 150 subject matter experts who serve on 6 Technical Advisory Groups. TAG members include representatives from a diverse set of backgrounds. This presentation will inspire resiliency advocates to collaborate on innovative and sustainable approaches to flood resiliency in their communities. By showcasing this effort, we hope to provide an opportunity for other communities to leverage our journey and benefit from our lessons learned to reach their resiliency goals and empower involvement among a much wider net of diverse stakeholders.

Biography: Marc has over 25 years of experience developing and improving watershed protection and improvement programs. He led the development of NC State's Phase I Stormwater Program. He spent 10 years helping to develop and implement the Division of Mitigation Services. He then went on to lead the City of Charlotte's Surface Water Quality and Environmental permitting program. In 2022, he came back to DMS as director, in no small part to help develop the State's Natural Infrastructure Flood Mitigation Program and the North Carolina's first Statewide Flood Resiliency Blueprint. He holds a B.S. in

Natural Resources from NC State's College of Physical and Mathematical Sciences, and a MPA concentrating in regional sustainability, from Clemson University.

E2: Spotlight on Repetitive Loss Properties
Track: NFIP

Losing Ground: An Update on Severe Repetitive Loss Properties

Anna Weber, Natural Resources Defense Council, aweber@nrdc.org
Co-presenters: None

Abstract: Since the creation of the National Flood Insurance Program, nearly 45,000 properties have been categorized as "severe repetitive loss" (SRL) after sustaining multiple, damaging floods. Despite recent increases in mitigation funding, the number of SRL properties continues to rise, and mitigation rates continue to fall behind relative to the increasing flood risk faced by many communities. In fact, the number of mitigated SRL properties is less than the number that have dropped out of the NFIP without seeing any action to reduce their risk. If current programs and policies cannot keep up with the existing mitigation needs of the most flood-prone properties, what does that mean for the future? And what does that mean for the communities that are being left behind? This presentation will examine the locations, characteristics, and mitigation trends of SRL properties across the United States using NRDC's updated, interactive "Losing Ground" data visualization tool. The newly relaunched tool now contains data through December 2022 and highlights trends in post-FIRM SRL properties and those outside the special flood hazard area. The presentation will cover changes in SRL data in the past five years, examine the demographics of communities that have large numbers of non-mitigated SRL properties, and discuss the equity implications for hazard mitigation policy.

Biography: Anna Weber is a Senior Policy Analyst on NRDC's climate adaptation team. Her work seeks to incorporate the current and future effects of flooding, sea level rise, and other climate-driven hazards into local, state, and national decision-making and to ensure that adaptation policies benefit those on the front lines of climate change. Prior to joining NRDC in 2018, she spent ten years at the Cadmus Group, where she supported U.S. Environmental Protection Agency contracts related to water infrastructure and environmental health. She holds a bachelor's degree in the geosciences from Williams College and a master's of public health from the George Washington University. She is based in NRDC's Washington, D.C., office.

Repetitive Loss Properties: Property Characteristics, Community Demographics and Mitigation Strategies

Noreen Clancy, RAND Corporation, clancy@rand.org
Co-presenter: Lloyd Dixon

Abstract: The increased frequency and severity of flooding in the United States is likely to increase the number of properties that experience multiple flood losses. However, only limited information is readily available on the characteristics of such properties despite being a significant driver of the claim costs of the Federal Emergency Management Agency (FEMA)'s National Flood Insurance Program (NFIP). Data are available on the location of properties that have repeatedly flooded, for example, but information

was not previously readily available on the cause of loss (coastal flooding or riverine flooding), structure type, the distribution of losses (multiple small losses or fewer large losses), losses relative to structure and property value, and attractive mitigation strategies for different types of properties. This presentation will present findings from a study that RAND did for FEMA. The study examines properties with multiple losses insured by the NFIP and the communities in which they are located to help inform decisions related to floodplain management, flood insurance, and mitigation efforts. This presentation will provide information that should help the NFIP (1) better understand the specific challenges faced by these properties and the communities in which they are located, including consideration of equity issues, and (2) develop more-targeted mitigation programs and risk transfer strategies.

Biography: Noreen Clancy is a senior policy researcher and a professor at the Pardee RAND Graduate School. Her research has focused on resilience to natural disasters and post-disaster funding. Her work includes issues related to flooding and flood insurance and the equitable distribution of pre- and post-disaster funding. In her current work, she is helping FEMA think about how best to incorporate issues of risk and equity into its largest mitigation grant program for communities (Building Resilient Infrastructure and Communities). In her previous work she has studied flood insurance take up, the move to risk-based pricing and developed policy options for flood insurance affordability programs. She was also Co-Principal Investigator of a grant in the Gulf of Mexico examining the community resilience attributes following the 2010 Deepwater Horizon oil spill. Before coming to RAND Ms. Clancy worked at the National Oceanic and Atmospheric Administration and the President's Council on Environmental Quality. Ms. Clancy earned a M.Sc. degree in Environmental Science and Policy from The Johns Hopkins University.

Privacy Act vs. Public Access to FEMA Repetitive Flood Loss Claims Information

David Conrad, Association of State Floodplain Managers, david@floods.org
Co-presenters: None

Abstract: This presentation will review and discuss the current conundrum over public release of NFIP repetitive loss claims information versus protecting owners' privacy rights. It will present arguments for and against making FEMA's historic repetitive loss information available to communities and the public, including for community flood hazard mitigation planning needs and for appropriate real estate market disclosure. For many years, it has been increasingly difficult for community and State floodplain managers to obtain up-to-date records from FEMA of repetitive flood insurance claims and payments which would help identify where there may be elevated flooding risks and where flood risk reduction investments can be focused for public safety and risk management. Despite billions having already been spent on flood risk mitigation, the numbers of and costs of repetitive loss properties continue to grow substantially across the nation, and this trend shows little likelihood of seriously abating. Are flood histories of NFIP insured flood prone buildings a legitimate subject of Privacy Act protections? What policies could be adopted to maintain any legitimate privacy protections, while at the same time providing the risk management identification the public needs, and particularly for these high-risk properties, to help target risk mitigation investments where they can reduce public and private costs of repeated flooding? With increasing flooding costs from more intensive storms, watershed development and accompanying runoff, and rising sea levels, repetitive loss information for many stakeholders is becoming increasingly critical to making wise community development decisions. The presentation will explore the best options to get beyond today's stalemate over withholding repetitive loss information from reasonably timely and available public use.

Biography: Since March 2017 David has served as Water Resources Policy Advisor to the Association of State Floodplain Managers (ASFPM) in Washington DC, advising and representing ASFPM on a wide variety of policy and legislative issues, including the National Flood Insurance Program, Stafford Act Disaster Assistance, and flood-related programs of the U.S. Army Corps of Engineers. ASFPM is the nation's leading organization of flood risk management professionals. For more than forty years, David has served as an analyst and advocate for federal and state policies and practices supporting wise water resources management. He served previously for 23 years as the National Wildlife Federation's Senior Water Resources Policy specialist, and has written extensively on flood and floodplain management policy, including serving as Project Manager and a principal author of the National Wildlife Federation's landmark Higher Ground report in 1998, which brought national attention to problems with "repetitive flood losses" and highlighted new "non-structural" programs, such as voluntary buyouts and building elevations, to mitigate and reduce flood-related risks. David received a Bachelor of Arts in Environmental Sciences from the University of Virginia in 1974, and resides in with his wife, Paula Dinerstein, in Chevy Chase, MD. David is also a Certified Floodplain Manager.

E3: State Risk Communication Initiatives
Track: Risk Communication

Resilience Accelerator for Local Governments
Shannon McLachlan, FEMA, shannon.mclachlan@fema.dhs.gov
Co-presenter: Dana Kochnower, dana.kochnower@ogilvy.com

Abstract: FEMA Region 2's Resilience Accelerator builds the capacity of communities to respond to increasing risks. The program uses proven strategies to help communities identify, prioritize and ultimately achieve their resilience goals. It convenes community leaders with FEMA staff, state agency decision makers, local resilience professionals, private sector partners, and other experts. The Accelerator supports communities in:

• Understanding climate change realities and vulnerabilities relevant to their local area.
• Refining and communicating their resilience goals to the public and funders.
• Developing strategies and critical projects.
• Finding paths for funding.
• Building and maintaining partnerships.
• Integrating resilience into daily operations. The Accelerator led to strong impacts for the Region 2 communities that took part. For instance, the city of Lambertville:
• Formed a resilience committee that now meets each month to discuss Hurricane Ida recovery and ongoing resilience concerns. The committee has secured grants and launched public art projects.
• Offered to host ongoing peer-learning meetings with accelerator cohort. Somerset County:
• Created a working group on countywide stormwater management options.
• Is exploring a stormwater utility.
• Received expert advice on policy alternatives. In this presentation, the Resilience Accelerator facilitators will walk attendees through the Resilience Accelerator, and explain how the program was carried out across multiple sessions and topics, including:

• Helping participants work on storytelling about their resilience goals.

• Listening to participants talk about the climate risks in their community.

• Learning how to identify champions and form resilience teams.

• Developing action plans and figuring out where to find multiple funding streams for planning and projects. Participants will gain an understanding of how to conduct this training with other communities and help them work through their resilience goals from any starting point.

Biography: Shannon McLachlan, regional coordinator for FEMA's Community Assistance Recovery Support Function in Region 2, has served as a community and recovery planner for disasters in New York, New Jersey, Puerto Rico, USVI, Louisiana, Minnesota, and Hawaii. Working at the intersection of government programs and local recovery needs, she has established novel mechanisms for partnerships with agencies including NOAA, EPA, HUD and other organizations, through which the federal government has delivered sustainability advisement, recovery design seminars, a land use planning guide, peer exchanges, and other tailored recovery support tools. She is a contributor to Green Readiness, Response, and Recovery: a Collaborative Synthesis (USDA, 2019) and was a YMCA volunteer of the year for her work at a NYC special medical needs shelter after Hurricane Sandy.

Minnesota's Newer Tools and Outreach Ideas

Ceil Strauss, CFM, MnDNR, ceil.strauss@state.mn.us
Co-presenter: Garry Bennett, garry.bennett@state.mn.us

Abstract: Minnesota launched enhancements to the relatively new Lake & Flood Elevations Online (LFEO) viewer in late 2021. Local officials, professionals in the field and the public now have easy access to A Zone modeling cross sections (most a step up from Base Level Engineering) without GIS. FEMA hazard zones, cross sections and BFE lines are also present, along with "unmodernized" flood zone layers for paper map counites, two-foot contours, parcel boundaries, and state public waters. A flexible print option, measuring tools and a latitude/longitude tool make the viewer a new favorite for many in the state. In addition to learning about LFEO, DNR's model download site and a series of monthly LGU forums on floodplain and related topics that began in early 2023 will be discussed. In the forums the emphasis is on sharing new ideas and best practices, while encouraging discussion and questions by including a mix of related shorter presentations by local officials in addition to floodplain staff, other DNR staff, and representatives from other agencies and organizations.

Biography: Ceil Strauss is the Minnesota State Floodplain Manager. Ceil has been in the Floodplain Program at Minnesota DNR since 2002, and in the State Floodplain Manager role since 2007. She has worked with the Minnesota DNR an additional 14 years, mainly as an Area (or Field) Hydrologist in the western Twin Cities area. She is past Chair of the national Association of State Floodplain Managers (ASFPM).

The Virginia Flood Risk Information System (VFRIS): Enhanced Flood Risk Data for All Virginians

Sidney Huffman, Virginia DCR, sidhuffman1@gmail.com
Co-presenters: None

Abstract: This presentation offers a review of the new, enhanced Virginia Flood Risk Information System (VFRIS; https://consapps.dcr.virginia.gov/VFRIS/). VFRIS empowers individuals and communities to reduce flood risk by providing easy access to their flood risk information. DCR has redesigned VFRIS to

offer a more user-friendly interface, functionality upgrades, new data sets, 3D visualizations, HAZUS potential damage estimates, and improved data access. The presentation describes the development process, new tool features, and new data available to all users. The current version of VFRIS is popular and widely used, but over time system challenges have emerged. One challenge is that users have varying degrees of technical expertise, as well as varying uses for the information that they retrieve from VFRIS. The system redesign offers a simplified user interface directed at first time users or users with limited technical expertise. Advanced features for expert users, however, remain readily available. A new flood tool sidebar rapidly retrieves and displays extensive data regarding the location and community of interest. An expanded data set includes a suite of building-level flood risk layers, damage estimates for individual structures based on flood depth, critical infrastructure, social vulnerability layers, stream gage and weather overlays, flood profiles, and inundation data. Data layers have also been selected to maximize Community Rating System (CRS) credit for communities that incorporate VFRIS into their communications strategy. Data display has been optimized for faster rendering. Finally, a 3D graphical interface allows users to view flood impacts on a variety of structure types. This presentation highlights the benefits of the new VFRIS design-- benefits that make VFRIS a one-stop shop for flood risk data in Virginia. Finally, Virginia's experience and lessons learned in developing this redesign will help other states working to improve their own flood risk data tools.

Biography: Sidney Huffman is a Floodplain Program Planner with the Virginia Department of Conservation and Recreation. She supports agency efforts to ensure that state and local floodplain needs are met under FEMA's National Flood Insurance Program (NFIP) and the Cooperating Technical Partners (CTP) Program. Ms. Huffman performs regulatory reviews and floodplain assessments, assists local governments, citizens and stakeholders, and delivers relevant training, technical assistance, outreach, and education awareness messaging across the Commonwealth. Her efforts also include resiliency planning, flood hazard mitigation planning and, as necessary, flood disaster response and recovery efforts. Ms. Huffman is a water resources professional with experience in managing stormwater, wastewater, site remediation, and stream assessment projects. She holds a master's degree in Biological Systems Engineering (Watershed Science and Engineering) from Virginia Tech and is registered as a professional engineer (Civil/Environmental) in Virginia.

E4: Mitigating Alluvial Fan Flood Risks
Track: Arid Regions/Mitigation

Communicating Alluvial Fan Hazards, Challenges and Potential Solutions
Jamie Huff, CFM, Utah Division of Emergency Management, jhuff@utah.gov
Co-presenters: Matt Buddie, FEMA Region VIII Mitigation, FFRMS Coordinator, Matthew.Buddie@fema.dhs.gov

Abstract: According to the to the 2020 US Census, Utah has the highest growth rate in the nation. This 18.4% growth (since 2010) brings more development pressure. As valleys and low-lying areas are being "built out," new construction is often shifted to adjacent, higher elevations. Unfortunately, some of these higher grounds are at higher risk from flash flooding and debris flows. In particular, the sediment-filled areas surrounding around the mouth of un-channelized canyon drainages. The deposited

sediments create alluvial fan formations. Many of Utah's alluvial fans could produce flooding with high-velocity flows, active processes of erosion, sediment transport and deposition; and unpredictable flow paths. As the flood mapping program progresses from a binary to a probabilistic risk identification, we believe this non-riverine flood hazard should be incorporated as a flood risk factor. The Utah Division of Emergency Management recently completed a project to identify and map many of the active alluvial fan landforms within the state to help communities better understand where they are located and their potential hazard. In this session we will discuss how these alluvial fan data and associated tools are being used to explore flood risk in Utah communities. We will describe the mechanics of the state-wide alluvial fan study as well as how the data is being used at community Discovery Meetings. Additionally, we will discuss the challenges when implementing building codes and floodplain management requirements in these zones. Lastly, we will present potential mitigation solutions identified in a new Alluvial Fan Flood Risk Reduction Guide developed for Utah.

Biography: Jamie Huff has over 20 years of experience working with the National Flood Insurance Program (NFIP) and flood mapping programs. She been the Risk MAP (Floodplain Mapping) Program Manager for the Utah Division of Emergency Management since 2015 where she coordinates with Federal, State, Tribal and local community partners related to flood risk identification. She is responsible for managing state-wide flood risk and floodplain mapping activities, providing flood risk data, training and outreach, and technical assistance that assists in identifying, assessing, communicating, and mitigating flood hazard risks within Utah. Previous to DEM, Jamie severed in several positions at FEMA Region 10 from December 2002 to September 2015 that included work in the Floodplain Management and Insurance Branch. Jamie received her Bachelor of Science degree in Geography from the University of Utah in 2002. She is a member of the Association of State Floodplain Managers (ASFPM) the Utah Floodplain and Stormwater Managers Association (UFSMA), and the Utah Emergency Managers Association (UEMA).

Flood Risk Mitigation Challenges on Alluvial Fans in a Rural County

Deborah Neddenriep, CFM, Carson Water Subconservancy District, debbie@cwsd.org
Co-presenters: Mike Kellogg, PG, CFM, GISP, mike@jefuller.com

Abstract: Mrs. Neddenriep will discuss the CTP and County Perspectives, while Mr. Kellogg will discuss the technical challenges. As a CTP, Carson Water Subconservancy District (CWSD) has served as project manager / outreach coordinator for multiple Area Drainage Master Plan (ADMP) studies in Lyon County, Nevada. As a regional watershed planning agency, CWSD handles the paperwork so Lyon County can focus on planning and technical review. These ADMP focus areas have moderate to high social vulnerability rating. With a limited tax base, the county does not have the capacity to build resilience, but together we can identify risk and build solutions that could qualify for construction grants. Lyon County's mitigation challenges start with limited bandwidth for staff and lack of money for a county engineer and/or floodplain manager. CWSD works with Lyon County to acquire technical data to identify hazards in alluvial fan zones. The county adopts these ADMPs into their county hazard mitigation plan and uses this information to inform their planning decisions and increase resilience one culvert at a time. The county also uses and shares the data from the ADMPs in negotiations with developers to ensure new infrastructure mitigates impacts to existing and new residents. The long-term goal is to apply for funding to install projects that reduce flood damage or require drainage infrastructure with new developments. The technical elements to the ADMPs have proven to be just as challenging as the fiscal and administrative challenges faced by Lyon County officials. Many communities have developed

within areas of active alluvial landform fan flood risk. Alluvial fan landforms pose unique risks from riverine environments, and assessing these risks requires expertise in geomorphology, hydrologic and hydraulic modeling, and engineering. This presentation will highlight Lyon County's experience with addressing these flood risks using a suite of approaches and alternatives.

Biography: Deborah Neddenriep adores nature and the Carson River Watershed. She was inspired to attend college after her children grew up and she learned about the various aspects of water resources at Carson Water Subconservancy District (CWSD). She quickly realized working in water and with water people is a delight. Deborah earned her B.S.B.A. degree in business marketing management in 2016. Prior to her work at CWSD, Deborah enjoyed a rewarding career as a stay-at-home wife & mom, women's ministry leader, homeschooler, and community volunteer. Deborah transferred her knowledge, abilities, and unique perspective to develop her career as a water resource specialist and certified floodplain manager. Deborah's floodplain management work focuses on grant management of FEMA Cooperating Technical Partner (CTP) grants from cradle to grave. As a native Nevadan, she is passionate about building resilience in her community and state. Deborah revels in the outdoors and relishes opportunities to ride her mountain bike, hike all over her watershed, swim in area lakes and rivers, or explore the Nevada wilderness with her husband, Chris, and yellow Labrador Golden Poppy. Her children are so old they are now her siblings and she is training her three granddaughters as future water resource professionals.

Scenic/Littlefield, AZ Alluvial Fan Analyses; Assessing Active Fan Hazards to Inform Downstream Mapping

Geoff Brownell, Kimley-Horn and Associates, Inc., geoff.brownell@kimley-horn.com
Co-presenter: Katherine Fish, CFM, Fishk@mohave.gov

Abstract: The Scenic/Littlefield Floodplain Redilneation Project was a CTP funded study with Mohave County, AZ to map new and revise existing approximate A Zones. Through the course of the study, potential active alluvial fan complexes were identified upstream of the mapping area. The project team modified the analysis approach to accurately compensate for flow path uncertainty associated with active fan flood hazards within the bounds of FEMA's alluvial fan flooding guidance. The analyses included complex two-dimensional H&H modeling, geomorphic assessments, and field verification. This presentation will detail a simplified approach to appropriately and accurately define active fan flooding and flow path uncertainty upstream of approximate A Zone mapping. The approach leveraged available data and existing conditions modeling results, coupled with a streamlined virtual levee analysis, to fit within the original scope and budget as defined by the Mapping Activity Statement.

Biography: Geoff Brownell is a senior project manager at Kimley-Horn with twenty-five years of experience in mitigation planning and project design. Geoff has a Bachelor of Science in Geological Engineering from New Mexico State University. Geoff's focus is on applying two-dimensional modeling results to more accurately define and mitigate flood hazards in the arid west.

E5: Analytics with NFIP and DHS Datasets
Track: Data

Promoting a Culture of Open Government: Recent Updates to the OpenFEMA Initiative

Matthew Matsuyama, FEMA, matthew.matsuyama@fema.dhs.gov
Co-presenters: Patrick Heck, pheck@guidehousefederal.com and Megan Robinson, mrobinson@guidehousefederal.com

Abstract: The National Flood Insurance Program (NFIP) maintains a commitment to data transparency, accessibility, and collaboration which is pivotal in achieving resilience in the face of an increasing frequency of flooding events. This presentation will provide an overview of recent updates to the OpenFEMA initiative, which provides users with an Application Programming Interface (API) to connect to and pull real NFIP policy and claims data transactions, all while protecting policyholder personally identifiable information (PII). Version 2 of the OpenFEMA policies and claims data sets includes dozens of new fields, increasing the transparency of the NFIP and allowing for the public to easily access data for their research. We will showcase the enhancements and also include a demo using a programming language for how to access and pull the data.

Biography: Matthew Matsuyama is a Statistician for the Federal Insurance Directorate at FEMA. He joined the agency in 2019 and performs data analytics related to the NFIP, including reports to Congress, other federal agencies, news media, researchers, academia, and the public. He also played a role in establishing FEMA's new data sharing posture with regards to NFIP policyholder data through privacy agreements as well as the OpenFEMA initiative and FloodSmart. In addition to his duties related to the NFIP he has also worked as a Geospatial and Technical Specialist for the National Response Coordination Center (NRCC) and has deployed for tropical cyclone-related disasters as well as the COVID-19 pandemic. Matthew earned his B.A. in international affairs from UC San Diego in 2013 and an M.A. in international affairs with a regional focus on Japan from the UC San Diego School of Global Politics and Strategy in 2018. Matthew is among the 28th class of Mansfield Fellows and will be detailed to Japan for one year on behalf of FEMA to learn more about emergency management and the flood insurance market there. He lives in Orange County, CA.

An Exploration of NFIP Claims Data to Validate FFRD Damage Functions

Doug Bausch, CEG, PG, NiyamIT, dbausch@niyamit.com
Co-presenters: Christina Christina, christina.lindemer@fema.dhs.gov; Adam J. Reeder, reederaj@cdmsmith.com; and Lauren Schmied, lauren.schmied@fema.dhs.gov

Abstract: To support Future of Flood Risk Data (FFRD) and provide credible estimates of flood risk throughout the nation, FEMA has been working to develop a suite of damage functions providing loss estimates for coastal and inland flooding. FEMA's engineers and actuaries have provided access to detailed insurance claims data for recent flood events to validate and calibrate damage functions for the NFIP. These data are privacy protected from the public and in the past inconsistently reported. Preliminary results indicate reasonable agreement, allow for targeted refinement, and can enable an estimation of uncertainty for losses, improving the fidelity and confidence in existing damage function libraries. This effort evaluated over half a million claims across seven past hurricane events and two major inland riverine events from 2012 (Sandy) through 2022 (Ian), enabling evaluation of both coastal and freshwater damage functions. Post 2016 events contain more comprehensive attribution in the data collected by adjusters. Advancements in GIS tools and event hazard data availability are combined with improvements in the quality and completeness of the claims data attribution. This enables FEMA to better access and leverage claims for loss estimations. Site specific claims data information enabled a

detailed evaluation of claims, excluding claims with incomplete information. Data, such as NFIP adjuster codes were leveraged, since when these individualized adjuster codes were submitted with the claim, evaluations showed that the quality of the data were improved as validated by external sources. The completeness rates of the codes and the critical interior and exterior water depth measurement in the claims attribution have improved significantly over time, resulting in the ability to use the majority of claims data reported since 2016. Using these data, initial assessments show promise in calibrating freshwater damage functions and allowed for refinement of coastal damage functions.

Biography: Doug Bausch provides Subject Matter Expertise support for FEMA's Hazus Program, which provides standardized methods for estimating loss from earthquakes, floods, tsunamis and hurricanes. Doug helps ensure the development of risk assessment methods for the Hazus Program are aligned with the latest state-of-the-art methods and data. Mr. Bausch has more than 25 years of experience assisting states and communities, across the U.S. and abroad, in developing sound risk and vulnerability assessments to support all-hazard response, mitigation, recovery, and preparedness planning. He was recognized as one of FEMA's foremost Subject Matter Experts in risk analytics and loss modeling and was a leader of the FEMA Modeling Taskforce that directly supported the National Response Coordination Center (NRCC) for FEMA Level 1 events by providing rapid risk analytics in support of situational awareness and the delivery of disaster programs.

Powerful and FREE DHS Geospatial Infrastructure Data For Your State or Community

Daniel Horner, Michael Baker International, daniel.horner@mbakerintl.com
Co-presenter: None

Abstract: Are you looking for reliable and up-to-date geospatial data on critical infrastructure and hazards for your state or community? Do you want to access and use this data for free, without any restrictions or limitations? If so, you should check out the DHS HIFLD data portal, a valuable resource for emergency management, resilience, and research. HIFLD (pronounced "High-Field") stands for Homeland Infrastructure Foundation Level Data. It is a collection of nearly 500 geospatial datasets maintained by the Department of Homeland Security (DHS). These datasets cover various aspects of infrastructure and hazards, such as utilities, facilities, schools, hospitals, water sources, fire stations, and more. You can also find data on multiple hazard types, such as floods, earthquakes, wildfires, and hurricanes. The HIFLD data portal is a public-facing website that allows anyone to access and use the HIFLD data for free. You can download the data to your machine, open it in a quick and easy viewer, or access it via web data service. You can also request access to additional data points through the HIFLD Secure Portal if you are supporting emergency management for states. This presentation will show you how to make the most of the HIFLD data portal for your state or community's needs. It will cover the following topics: • How to access and explore the HIFLD data portal, and how to find the data that you need. • How to integrate the HIFLD data with your own data or project to discover new insights and opportunities for floodplain management and risk mitigation. • How to get help from the HIFLD support team and provide feedback to improve the quality and usefulness of the data. • Successful example projects that have used HIFLD data to map and analyze flood risks and mitigation options in a changing climate By attending this presentation, you will gain a better understanding of the benefits and potential of using HIFLD data for your state or community's floodplain management and risk mitigation goals. You will also learn practical tips and tricks on how to use the HIFLD data portal effectively and efficiently.

Biography: Dan is an enthusiastic member of the flood community and has been in the industry for 18 years working in geospatial solutioning, IT systems design, business architecture, and project and program management. He rejoined Michael Baker in 2023 and is enjoying working with the broader floodplain management and mitigation planning communities. When he isn't staring at or yelling at his laptop, Dan is usually crafting something out of wood, plastic filament, or in the kitchen, and is an avid kayaker, skier, backpacker, bass player, and hot sauce maker.

E6: State Post-Disaster Best Practices
Track: Post Disaster

Implementing Post-Disaster Floodplain 406 Mitigation – A Case Study of Hurricane Ian

Jamelyn Trucks, CFM, PMP, CGM, AtkinsRealis, jamelyn.trucks@atkinsrealis.com
Co-presenters: Eric Arnold, Eric.Arnold@atkinsrealis.com and Zach Bell, Zachary.Bell@em.myflorida.com

Abstract: Abstract: Hurricane Ian devastated south Florida in September 2023 and all parties partnered to support prioritizing 406 mitigation implementation understanding how important mitigation is during PA process for more immediate path for resiliency for infrastructure in lieu of waiting for HMGP. Case study of implementation during Ian. Coordination and effort of the state leaning forward with the development of the scope of work and supplementing the role of FEMA. Floodplain Management and impacts of higher standards and FFRMS. States can help bridge the gap between the FEMA policy and being able to implement mitigation at the local level. Many communities are receptive to mitigation but are not sure how to approach or develop ideas for implementing mitigation. This process requires that a general concept or scope be developed prior to obligation and long before projects are in the design phase. FDEM has helped with these challenges by providing TA to communities so that they can take advantage of the 406 opportunities that are often under-utilized and leave millions on the table in potential grant funding.

Biography: Jamelyn Austin Trucks, CFM, PMP, CGM has 28 years of experience in program management, mitigation, disaster resilience, planning, and project/business development. Her experience includes overseeing management of large stakeholder engagements, financial analysis, budget development, contract negotiations, training, database testing, federal grant administration, and policy development and implementation. Her 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 and developing improved methodologies.

Texas Water Development Board High Water Mark Project

Hope Morgan, NCPLS, GISP, CFM, AECOM, hope.morgan@aecom.com
Co-presenters: None

Abstract: High water marks (HWM/s) are an immensely valuable set of data that is created event based and is used to validate models showing flooding for the event, used to create DEMS for said event, and is then sometimes only used for that event. The USGS has mechanisms to collect and store data if there is a declared event. Data is often collected at a much smaller scale for specific rivers and streams or is

collected for State emergences that are not pushed to the national level. TWDB has put together a strategy for collecting, analyzing, storing and sharing HWM information past the time of an event and coordinating the collection with interested partners. Through a process of interviews with state, local, federal, academic, and nonprofit partners TWDB has put together a strategy for maintaining and storing HWM data at a state level leveraging work from many entities and providing a win/win option for data collectors, data users, and data viewers. Through data coordination the TWDB has reviewed existing HWM data currently available to coordinate with others that have a vested interest in the process and put together options for how and where data could be shared with all interested parties. That information has the potential to be used for a multitude of other projects such as vetting existing models, building out potential areas of concern, and comparing to upcoming buildouts to ensure water will not be a concern in the future. TWDB would like to share what they have learned in the interviews from partners and data review.

Biography: Hope is currently the Technical Excellence Lead for the Geospatial Domain as well as the Geospatial Delivery Service Manager for Flood Solutions East with AECOM. Her responsibilities include Floodplain Mapping Survey, Floodplain mapping productions, Terrain creation, and CNMS. Hope Morgan has worked in remote sensing/GIS for 25 years. Hope is the Director of the Professional Practice Division of ASPRS.

Constructing Creative Applications To Maximize Public Assistance & Individual Assistance Opportunities

Max Johnson, State of Utah - Division of Emergency Management, maxrjohnson@utah.gov
Co-presenters: None

Abstract: By thinking outside the box, the State of Utah, Division of Emergency Management, was able to successfully obtain funding opportunities from multiple sources for two weather-related events that occurred during 2023. Although there are standard and well-known benchmarks for meeting the minimum requirements for many funding opportunities, the State was able to creatively obtain support from multiple entities for the 2023 flooding events when from the surface, benchmarks appeared to be below minimum standards. Event summaries and an overview of the preliminary damage assessments, PDA best practices, and next steps for both events, will also be explored. This presentation will provide examples of how to contemplate, prepare and write disaster arguments that, by thinking beyond and outside of application norms, reasonable arguments can be made that make sense even when traditional benchmarks are not met.

Biography: Max serves as the Recovery Section Manager for the State of Utah, Division of Emergency Management, overseeing the Public Assistance and Individual Assistance programs, while supporting other DEM sections, several related state agencies and numerous other community recovery programs. He also prepares and supports communities maintain and enhance their ability to conduct preliminary damage assessments and understand PA and IA grant rules and regulations. He previously served as the State's Individual Assistance Officer and Recovery Program Manager. Max has over twenty years of experience in the planning field in a variety of ancillary roles including management, transportation, long-range and current planning duties with a focus toward resilience and implementation, current planning duties and responsibilities, hillside and rural development, and supporting local EOCs. He holds his Professional Certification from the American Institute of Certified Planners (AICP). Max has a Masters of Public Administration from Southern Utah University, with an emphasis in State and Local

Government, and a Bachelor degree in Urban Planning from the University of Utah. Max served as the Professional Development and Ethics Officer for the APAs Utah Chapter for many years, including Chair of the Wasatch Front Regional Council's Technical Advisory Committee. He has written several articles for the "Utah Planner," a monthly newsletter published by the Utah Chapter of the American Planning Association, and has served on numerous committees from a variety of communities.

E7: FEMA/Corps National Levee Safety Program Session
Trackers: Dams & Levees

Levee Management Guide: A New Resource for Levee Owner/Operators

Melissa Mullen, PE, U.S. Army Corps of Engineers, melissa.k.mullen@usace.army.mil
Co-presenters: None

Abstract: During the first phase of stakeholder engagement for the National Levee Safety Program, feedback on the National Levee Safety Guidelines identified a need to consolidate practical information for levee owner/operators in one location and, in some circumstances, provide additional detail on procedures and methodologies as well as supplemental resources to support the safe operation and maintenance of levees. The Levee Management Guide is being developed, with stakeholder input, as a supplement to the National Levee Safety Guidelines to consolidate the information needed by anyone who has a responsibility for some or all aspects of the operations, maintenance, and management decisions on levees. The Levee Management Guide will assist users with understanding and carrying out responsibilities for operating and maintaining a levee from the time it is constructed through its useful life. The content in the Levee Management Guide can also help users develop specific products, such as operations and maintenance manuals and emergency action plans, to document and communicate information specific to an individual levee. This interactive session will begin with progress made on development of the new Levee Management Guide and transition to an audience feedback session. Key questions will focus on content within the new Guide as well as feedback on additional resources being developed to supplement the Guide. These resources include templates for operations and maintenance and emergency action plans, an inspection checklist, floodfight techniques document and a USACE/FEMA Programs Guide.

Biography: Ms. Mullen has over 30 years of geotechnical engineering and levee safety experience. She began her career by working for 2 years with a private sector environmental engineering firm in the San Francisco area. Beginning in 1995, she worked for 4 years as a geotechnical consulting engineer in Memphis where her experience included deep foundation design and design and construction of soil embankments for a variety of purposes, including water retention. Ms. Mullen was hired by the U.S. Army Corps of Engineers Memphis District in 1999 with duties focused on the design, maintenance, inspection, and flood fighting of levees and other flood risk reduction structures. In 2009, she became the first Memphis District Levee Safety Program Manager. She oversaw execution of the USACE Levee Safety Program policies and procedures for over 50 levee systems. In 2013 Ms. Mullen became the Mississippi Valley Division Levee Safety Program Manager where she oversaw Levee Safety Program execution for all USACE portfolio levees within the Mississippi River Valley. She participated on development and implementation teams for the Levee Inspection Prospect Course, and for the USACE

Levee Risk Communication Workshops. Currently she is serving in a developmental assignment with the USACE Levee Safety Center, supporting development of the National Levee Safety Guidelines and revisions to USACE's Rehabilitation Program policy. Ms. Mullen earned a Master of Science Degree in Civil Engineering in 1995 and a Master's Certificate in Risk Management in 2015. She is a registered professional engineer in the State of Tennessee.

National Levee Safety Program: Where Have We Been and Where are We Going?

Michael Bachand, PE, U.S. Army Corps of Engineers, michael.l.bachand@usace.army.mil
Co-presenters: None

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, public awareness of flood risk remains low, and approaches to levee management vary. To help address those challenges, the U.S. Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) are co-leading the National Levee Safety Program – a program intended to support a more consistent approach to levee management in the U.S. with the goal of reducing impacts from flooding and improving community resiliency in areas behind levees. Since the program launch in December 2021, those who are responsible for, have an interest in, and are affected by levees and flood risk management activities have played a key role in providing input into development of the program. This session will include an update on key components of the National Levee Safety Program to include preliminary stakeholder feedback received on the draft National Levee Safety Guidelines, rollout of the redesigned National Levee Database, and status of the State, Tribal, and Regional District levee safety program efforts. An overview of the next steps of the National Levee Safety Program will also be provided.

Biography: Mr. Mike Bachand is currently serving as a Technical Manager within the U.S. Army Corps of Engineers' Levee Safety Center supporting development of the National Levee Safety Program. Prior to this assignment, Mike spent almost 10 years in the New England District serving in various roles including Chief of the Geotechnical/Water Resources Branch responsible for overseeing dam and levee safety program managers and as the Levee Safety Program Manager where he was responsible for overseeing administration of USACE's Levee Safety Program polices for over 60 levee systems in New England. Mike also completed an assignment as the Deputy Chief of Engineering and Construction Division at the Norfolk District as part of the Executive Leadership Development Program. During this assignment, he spent a considerable amount of time in construction working on the Arlington National Cemetery expansion. Prior to joining the U.S. Army Corps of Engineers, Mike spent 13 years working in private industry for CDM Smith where he served as a geotechnical engineer at the staff, project and principal level working on multiple national and international projects focusing on levees, floodwalls, impoundments (coal ash and aluminum tailings), dredging, sediment disposal areas, landfills, water/wastewater treatment plants, and pump stations for public, private, and federal sector clients.

E8: Regional Mapping Initiatives
Track: Mapping

Bridging the Data Gap for Disadvantaged Communities: BLE-to-FIRM

Diane Howe, CFM, FEMA Region 6, diane.howe@fema.dhs.gov
Co-presenters: Dave Rubinstein, david.rubenstein@aecom.com and Sean O'Melveny,
sean.omelveny@aecom.com

Abstract: Imagine trying to regulate development in your community without any flood maps, or only paper maps for some areas. FEMA Region 6 has almost 200 counties that are still working with only paper maps, or no maps at all. Some of these areas may have maps that are 40-50 years old with no models behind the data. There are over 58,000 approximate stream miles and just over 2,800 detailed miles in our 5 states. Many of these counties fit FEMA's criteria for investing in disadvantaged communities; they are rural with low populations, overburdened and underserved. FEMA Region 6 begin investing in high resolution LiDAR and developing Base Level Engineering (BLE) almost 10 years ago to help us assess and identify risk in these areas. As our inventory of BLE became robust enough to provide new BLE flood hazard data to these counties with paper or no maps, we began moving forward with providing new digital FIRMs to these rural, disadvantaged communities and achieve our Regional Goal of reducing our paper map inventory. In 2022 and 2023 FEMA began leveraging the BLE data to modernize a selection of counties across Texas and Oklahoma. This presentation on our "BLE-to-FIRM" projects will address the challenges and experiences we encountered as our teams worked with these communities to create modern, digital FIRMs, including: stakeholder acceptance of the data, meeting locations, communication needs, new tools, data accessibility, 1D and 2D data, NFIP Non-participation, and refining the BLE for detailed studies.

Biography: Diane Howe is a Certified Floodplain Manager currently serving as the Risk MAP Lead for FEMA Region 6 in Denton, TX. Her current projects include Base Level Engineering, Regional update coordination with other Federal Partners to digital mapping platforms, Risk MAP Provider coordination, grant management and mapping project outreach, communications, and procurement. She has over 35 years of experience in program design and management, outreach design and implementation, public speaking, fundraising, grant writing and volunteer coordination.

Paper Inventory Reduction: Leveraging Base Level Engineering

Sean O'Melveny, CFM, AECOM, sean.omelveny@aecom.com
Co-presenters: Diane Howe, diane.howe@fema.dhs.gov and Dave Rubenstein,
dave.rubenstein@aecom.com

Abstract: FEMA Region 6 Paper Inventory Reduction Project (PIR) FEMA Region 6 has almost 200 counties that are still paper maps or non-modernized Flood Insurance Rate Maps (FIRMs). This accounts to over 58,000 approximate stream miles and over 2,800 detailed stream miles. FEMA Region 6 is invested in reducing this paper inventory over the next few years.   Many of the remaining counties are rural with very low populations and rate very high on the social vulnerability index. Of these non-modernized counties, many of them are not mapped at a county level but only at a community level. Many of them don't even have all of the communities in the county mapped. To address the large paper inventory that still remains FEMA Region 6 has invested significantly in Base Level Engineering (BLE). BLE data identifies new areas of risk and refines existing special flood hazard areas as shown on the paper FIRMs. In 2022 and 2023 FEMA began pilot projects to leverage the existing BLE data to modernize several counties in Region 6.   This presentation will address the challenges and tools used to leverage BLE Data to creating modern digital FIRMs to meet the Region's Goal of reducing paper

inventory: including local stakeholder acceptance, data accessibility, using 1D and 2D BLE data and enhancing BLE data for detailed studies. Presenters: Diane Howe, FEMA Region 6 Risk Map Lead; Dave Rubenstein, COMPASS Region 6 Production Manager; Sean O'Melveny, COMPASS Region 6 Preliminary Production Lead.

Biography: Sean O'Melveny (CFM), is a GIS Manager at AECOM. He is a graduate of the University of Wyoming (BS) and Stephen F. Austin University (MSF) He has 16 years of experience in the NFIP across FEMA Regions 6 and 8 and 9, primarily focused on outreach, preliminary mapping and post preliminary processes for FEMA. Sean currently resides in Utah in the shadows of the Wasatch Mountains with a great view of the Salt Lake. Prior to coming to Utah, he lived in Albuquerque, NM where he was active in the New Mexico Floodplain Managers Association. Sean enjoys bird watching, cuddling rabbits and reading in his spare time.

Introducing the CNMS Unmapped Inventory Baseline and Tracking FEMA Region 6 Success
Susan Morris, CFM , AECOM, susan.morris@aecom.com
Co-presenters: Michael Johnson, AECOM, michael.johnson@aecom.com

Abstract: As part of the Risk MAP Program Multi-Year Plan, FEMA plans to address the approximately 1.3 million miles of unmapped waterways in the nation. To provide a credible and consistent way of baselining, forecasting, and reporting progress toward addressing these unmapped miles, a new Unmapped Inventory Baseline System of Record has been developed within FEMA's Coordinated Needs Management Strategy (CNMS). The new unmapped baseline feature class within FEMA's CNMS includes a fixed denominator of stream miles that is classified into different Product Categories (Regulatory vs. Non-Regulatory) and a series of Study Categories including: No Planned Investment, Planned Investment, In Progress, Modeled (Data Available), Mapped (Preliminary), and Mapped (LFD). As unmapped miles progress through each phase of a new flood study, these categories within CNMS are updated and then reported at the National and Regional level on a quarterly basis. FEMA Region 6 has already made significant progress in addressing the unmapped inventory primarily through the implementation of Base Level Engineering (BLE) projects throughout the region since FY2015. The data generated by 2D BLE is providing new floodplain studies for communities with no previous floodplain data. A large portion of BLE projects in Region 6 are being performed by the state CTP TWDB which plans to have statewide 2D BLE available by 2024. This presentation will explain the framework for the CNMS Unmapped Baseline System of Record, how it tracks and measures FEMA's progress in addressing the remaining 1.3 million unmapped miles nationwide, and will highlight the success of FEMA Region 6 in addressing their unmapped inventory through development of 2D BLE coverage.

Biography: Susan Morris, CFM, is a GIS Specialist at AECOM with 10 years of experience working with floodplain management. She is Technical Lead and Deputy Control Account Manager for the Compass PTS Coordinated Needs Management Strategy Program (CNMS) for FEMA Zone 2. She specializes in database management and past projects include developing data and content for new NOAA Environmental Sensitivity Index (ESI) maps in New England after Hurricane Sandy.

E9: Utilizing Changing Rainfall Data in Modeling
Track: Modeling

NOAA's Climate Informed Precipitation-Frequency Atlas of the United States

Sandra Pavlovic, NOAA/NWS/Office of Water Prediction, NOAA's Climate Informed Precipitation-Frequency Atlas of the United States, sandra.pavlovic@noaa.gov
Co-presenters: None

Abstract: With funding from the Bipartisan Infrastructure Law, NOAA has initiated the update and revision of precipitation frequency estimates for the entire nation and, for the first time, will develop a dataset that incorporates future climate projections. Once completed, this update will be known as NOAA Atlas 15. This high-quality and authoritative precipitation frequency standard, with comprehensive spatial coverage across the United States and its affiliated territories, will equip civil engineers and other design professionals with the necessary information to design the nation's infrastructure while accounting for a changing climate. NOAA Atlas 15 will be presented in two volumes. Volume 1 estimates will be derived using historical observations and will account for observed historical temporal trends in extreme precipitation. Volume 2 will incorporate future climate models in the form of adjustment factors, allowing for the adjustment of Volume 1 estimates to accommodate anticipated future trends. The project is expected to last four years, concluding with the release of final, peer-reviewed estimates for the contiguous U.S. in 2026 and for areas outside the contiguous U.S. and affiliated territories in 2027. An initial pilot study over Montana will serve as a minimum viable product for NOAA Atlas 15, and will be published through new web dissemination pages. The pilot study will present opportunities to collect public feedback on the science underlying the development of estimates and the web dissemination strategy. It is scheduled to be published in 2024 and will provide early insight into the Atlas 15 dataset, enabling civil engineers and practitioners to plan accordingly. This presentation will provide detailed information on the pilot study's development, including insights into the development of the regional nonstationary frequency analysis approach and evaluation of extreme precipitation information extracted from climate models intended for Volume 2 development. Additionally, it will discuss challenges, assumptions, and solutions essential in the dataset's development process.

Biography: Sandra Pavlovic is a professional water resources engineer with 15 years of experience in civil and environmental engineering, both in the public and private sectors. At present, she holds a position at the National Weather Service (N.W.S.) as the technical lead of the Hydrometeorological Design Study Center, responsible for revising and releasing the NOAA Atlas 14 volumes. Sandra Pavlovic holds B.S. and M.S. degrees in civil engineering from the University of Maryland at College Park and an M.B.A. from the Pennsylvania State University.

No NOAA Atlas 14, No Problem – Appling Stochastic Storm Transposition for Wyoming BLE in FEMA Region 8

David Sutley, PE, Dewberry, dsutley@dewberry.com
Co-presenters: None

Abstract: To overcome the lack of traditional NOAA Atlas 14, gridded precipitation frequency data available in Wyoming, probabilistic methods were used to develop the hydrology required for 2D base level engineering (BLE) using stochastic storm transposition (SST) techniques currently under development by USACE and consistent with the Future of Flood Risk Data. SST-based rainfall frequency analysis is a technique for reconstructing the long-term climatology of extreme rainfall of a watershed using "space-for-time substitution," nested within a probabilistic framework. These techniques involve

the development of a catalogue of storms created using gridded quantitative precipitation estimates (QPE) from the Analysis of Record for Calibration (AORC) dataset, which is developed by the National Weather Service. Gridded storms are then used to simulate events in HEC-HMS using a Monte Carlo simulation approach resulting in a suite of thousands of possible runoff scenarios. The approach is building a synthetic annual maximum series for each hydrologic element by pulling samples from a Poisson distribution to determine the number of storms per synthetic year; randomly sampling a storm and x-y offset from uniform distribution for each storm, combining that transposed storm with initial baseflow sampled from a gamma distribution; and temporally sampling snow water equivalent and temperature from a uniform distribution. For each synthetic year, the max discharge across each transposed storm is then computed and added to the maximum annual series for each model component. The results of the suite of HEC-HMS runs are statistically analyzed to develop peak volume and shape parameters representing each flood frequency scoped by the project suitable for forcing the 2D HEC-RAS hydraulic models. This BLE project and future BLE projects leveraging SST have the potential to serve as the foundation for producing the probabilistic flood hazard data across the country needed for FFRD.

Biography: David Sutley is a resilience expert with more than 15 years' experience in flood risk management working for four federal agencies, including the Federal Emergency Management Agency (FEMA), National Weather Service, Bureau of Reclamation, and U.S. Army Corps of Engineers (USACE). He joined Dewberry's Resilience Solutions Group in September of 2019 and has been supporting the advancement of unique flood risk management solutions. David grew up along the Gulf Coast and lived through many significant flood events. That exposure instilled a passion and desire to learn more about how flooding works, so he pursed and completed Bachelor's and Master's degrees from the University of Alabama in Civil Engineering focusing on open-channel hydraulics, hydrology and statistics. Flood risk communication is currently David's professional passion, and he is always interested in discovering new ways to improve the way a complicated subject can be presented in a way that tells a better story. Outside of work he enjoys water sports and camping in the summer with his family and snowboarding in the Colorado mountains.

Westside Creeks - San Antonio's Step Toward FFRD

Daniel Perry, San Antonio River Authority, PE, CFM, dperry@sariverauthority.org
Co-presenters: Andrew Swynenberg, PE, CFM, Freese and Nichols, Inc., Andrew.Swynenberg@freese.com

Abstract: This presentation will highlight the key components of the San Antonio River Authority (SARA)'s Future of Flood Risk Data (FFRD) pilot study in the Westside Creeks urban watershed, a cultural and business hub near downtown San Antonio, Texas. This FEMA-funded study builds on a long history of SARA-sponsored flood risk studies and flood mitigation efforts, including the 1954 San Antonio Channel Improvements Project and the upcoming Westside Creeks Ecosystem Restoration project – both partnerships with the US Army Corps of Engineers. The pilot study is supporting FEMA's FFRD initiative by 1) developing an efficient approach to adapt and enhance legacy flood risk models and 2) demonstrating the potential impact of future climate on flood-prone areas through 20-, 40-, and 60-year rainfall projections. In alignment with FEMA's FFRD vision, the enhanced 2D rain-on-mesh models will provide a modern foundation for a more comprehensive, graduated assessment of pluvial and fluvial flood risk.

Biography: Daniel Perry serves as an Ecological Engineer at the San Antonio River Authority, where he also takes on the role of project manager for the Westside Creeks FFRD project. His primary responsibilities revolve around hydrologic and hydraulic modeling, Risk MAP development, and flood mitigation analysis. Daniel holds a Bachelor of Science in Environmental Science and a Master's in Civil Engineering from the University of Texas at San Antonio. With 8 years of experience in the Environmental Science and Water Resources fields, working in both the private and public sectors throughout his career.

Concurrent Session F

F1: Mitigation Research and Policy
Track: Mitigation

Coastal Community Management of Acquired Hazard-Impacted Property

Annika Tomson, Association of State Floodplain Managers / Coastal States Organization, atomson@coastalstates.org
Co-presenters: None

Abstract: This presentation will share results of an assessment of technical resource needs for coastal communities to plan for and manage private property acquired due to coastal hazard exposure. For this subset of coastal properties across the United States, climate change impacts (sea level rise, intensifying precipitation patterns, Great Lakes water level fluctuations, and higher erosion rates) will make some land uninhabitable, or occupants will opt to relocate to escape intensifying risk exposure. In some cases, including where dry land is converted to tidelands or is permanently inundated, those properties transition from private ownership to public stewardship. Communities live with this land that is left behind as people relocate, raising both a need and an opportunity for self-determination in the kind of future coastal communities want to build for themselves. This project was undertaken to determine and address community technical resource needs for this growing issue. The project team conducted a review of the existing technical resources and tools available to communities. Additionally, the team interviewed municipalities that have acquired and managed hazard-impacted property across a variety of hazards (riverine flooding, lava inundation, coastal inundation and erosion). The team identified gaps in the existing literature as well as best practices and lessons learned from interviewee communities. This session will present technical resources that were developed in response to the gaps assessment and local practitioner experiences and expertise. These include a technical resources library, case studies of interviewee communities, a Q&A workflow, and a 100 year hypothetical community visualization. Attendees will come away from this session with an understanding of both the challenges and opportunities for coastal communities in managing previously private coastal property as well as the technical resources available to support their planning and management work.

Biography: Annika Tomson is a NOAA Digital Coast Fellow with the Coastal States Organization and the Association of State Floodplain Managers. Their work focuses on coastal community adaptation to climate change, specifically the planning for and management of previously private coastal property that

has become public due to coastal hazards. Annika has a M.S. in Environment and Sustainability, Environmental Policy and Planning from the University of Michigan where they researched Great Lakes municipal response to 2019 high water levels. They have a B.A. in Anthropology from Cornell University.

Home Elevations & Acquisitions: To Lift or Move, that is the Question.

Mary Baker, JEO Consulting Group, Inc., mbaker@jeo.com
Co-presenters: None

Abstract: Thousands of homes reside in the special flood hazard area (SFHA) especially in non-coastal states. Many homeowners can't afford to move or do not want to relocate their home outside of the SFHA. Housing stock is in short supply in every state, but especially in communities that have a heightened flood risk. Many states do not allow rebuilding efforts in the SFHA, especially in a mapped floodway. So, for homeowners the decision to mitigate their home or move or relocate their residence might not be up to them. There are options that can be explored. From elevating the home, to filling in a subgrade floor, to moving utilities out of a basement to the first floor above the BFE. Each parcel has unique risk and therefore each parcel will have unique options to mitigating that risk. Beyond the knowledge of the flooding hazard, there are also mental and emotional strains that are seldom addressed when we talk to citizens about mitigating their personal risk to hazards This presentation will address not just the science of non-structural mitigation for residences but will explore the social aspects of mitigation projects that address risk at the most local level. Local floodplain administrators, emergency managers, and local community leaders will all weigh in on how these tough decision-making processes could be improved. The presentation will be delivered as a documentary, including on-site field trips, pictures, and interviews of key stakeholders in the local mitigation process. Support from State and Federal partners is crucial in administering a homeowner focused mitigation program that seeks to protect citizens while honoring and respecting their emotional tie to their home and property. We can help people mitigate their flooding risk, if we are nimble in our programs and open to finding the best long-term solution for each homeowner pursuing risk mitigation.

Biography: Mary Baker is the Resiliency Strategist at JEO Consulting Group, where she assists team members of all disciplines with incorporating mitigation and adaptation measures in planning efforts and project execution for our customers. Mary is the client manager for the Planning & Engagement Team, assisting with client relations and business plan opportunities for this innovative group of professionals. Mary also assists the company's Environmental Sciences group as an envoy to clients and coordination of possible mitigation banking opportunities. Prior to joining the private sector, Mary worked for the State of Nebraska for over 12 years, seven of which were at the Nebraska Emergency Management Agency. During her tenure with the state, Mary served her last five years as the Hazard Mitigation Officer, where she managed the FEMA Hazard Mitigation Assistance Planning and Grant Programs. Under her leadership the state mitigation staff executed over $37 million dollars in HMA grants and maintained all of the local regional mitigation plans for the state. Since joining JEO Mary has taken on numerous roles, including the role of project manager, working with numerous communities to provide some non-structural solutions to the myriad of flood damages sustained to homes across the Midwest. These projects include home elevations, utility relocations, acquisitions, and relocation of complete communities. Her passion for helping the small rural communities become safer and more resilient is evident in her dedication in pursuing multiple grant fund opportunities that align with the local jurisdiction's goals and objectives. Mary also serves as co-chair of her firm's Women Support

Group, assisting women in the architecture and engineering industry overcome barriers and achieve their career goals.

Multi-Scale Flood Loss Prediction Model Developed from Experimentally Derived Material Damage

Anna Katya Opel, Louisiana Tech University, ako013@latech.edu
Co-presenter: Elizabeth Matthews, PhD, EI, A.M.ASCE, ematt@latech.edu

Abstract: Current practice of flood loss prediction presents limitations in accurately predicting building flood losses at multiple scales. While whole-building estimates can more accurately predict high-level losses (i.e., large groups of buildings), a significant analysis error is revealed with small-scale (i.e., individual, or small groups of buildings) investigation. The novel approach of collecting experimental flood data to support damage estimation has provided evidence that current damage models can and do under or overestimate loss. This research is developing a model that can produce monetary assessments of loss following a flood event. The framework of the model is based on a component-level damage database composed of data collected from experimental analysis. Structures with standard residential construction materials were built and incrementally flooded for short periods of time. The materials were assessed to determine the level of damage inflicted by the simulated flood events and cataloged based on material restorability. The restorability was determined through indicators such as moisture intrusion, corrosion, and mold contamination. The framework for the flood loss prediction model will be designed to incorporate damage uncertainty and be capable of analysis at multiple scales (i.e., individual buildings to large building groups). The building value, flood data (e.g., height of floodwater and type of water), and other parameters will also need to be input so that all the factors necessary for estimating flood loss are included. This model will also incorporate additional loss costs such as labor and restoration costs. The overall goal would be for the model to be accessible to anyone, whether it be inspectors, city planners, researchers, government officials, or homeowners. This presentation will outline and review the experimental process, the experimentally derived catalog of depth-damage curves, the framework for the flood loss prediction model, and its validity against other damage assessment models.

Biography: Anna "Katya" Opel, EI, S.M.ASCE is a graduate research assistant at Louisiana Tech University. After receiving her undergraduate degree from Louisiana Tech in Civil Engineering, she began her graduate studies in the Spring of 2020. She completed her Master of Science in Engineering degree in the Spring of 2022 and is now currently working on a Ph.D. in Materials and Infrastructure Systems. She has had brief work experience through internships in the power transmission and city planning fields. Her research interests include natural hazard mitigation practices, flood risk analysis, and resilient construction.

F2: CRS Success – Local Lessons Learned
Track: NFIP

Afraid of Taking on a CRS Program for Public Information? PPI / Floodplain Management Plan Made Easy

Ashley Gordon, CFM, Dewberry, agordon@Dewberry.com
Co-presenters: Christopher Williams, CFM, City of Newport News, williamscm1@nnva.gov

Abstract: The City of Newport News, located in the coastal Hampton Roads region of Virginia, experiences flooding impacts caused by heavy rainfall, storm surge, and tidal flooding. These flooding challenges will continue to worsen with ongoing climate change impacts of sea level rise and more frequent and intense rainfall. The City is actively working to address these challenges through a master planning effort to develop three individual but interdependent plans: a Stormwater Master Plan, Floodplain Management Plan, and Climate Change and Resilience Master Plan. The City is coordinating with a consultant team led by GKY to develop these master plans with funding through the Virginia Community Flood Preparedness Fund. As part of the floodplain management planning effort, led by Dewberry, the City is working to characterize current flood risk, develop recommendations to improve floodplain management practices in the City, reduce damages from flooding, and improve the City's ranking from a Class 7 in the Community Rating System (CRS). This presentation will focus on the process of establishing and engaging two interdisciplinary committees to support the development of the Floodplain Management Plan (FMP) and a Program for Public Information (PPI), both creditable through the CRS. These Committees included City staff, regional staff, and public stakeholders. Over the course of five months, these Committees worked through complementary monthly meetings to identify priority areas, goals, and strategies to mitigate and communicate flood risk. While the FMP and PPI processes may seem onerous for CRS communities, undertaking these efforts in tandem helped streamline planning efforts and coordinate stakeholder engagement. Highlights from the resulting FMP and PPI will be shared along with lessons learned to support other communities interested in developing or updating their plans.

Biography: Ashley Gordon, CFM, is a resilience planner with Dewberry, specializing in coastal climate change resilience and floodplain management. She supports comprehensive resilience planning efforts, including flooding vulnerability assessments, policy analysis, and community engagement primarily at the local and state level. Prior to joining Dewberry, Ashley spent four years in regional government at the Hampton Roads Planning District Commission where she provided technical assistance to localities for flooding and sea level rise planning. Ashley obtained her master's degree in Environmental Management with a coastal focus from Duke University and a Bachelor of Science from Miami University (Ohio), where she majored in Zoology and Environmental Science.

CRS Class 3, The Little Guys Can Also Do It!

David Stroud, CFM, WSP USA Environment & Infrastructure, Inc. (WSP), david.stroud@wsp.com
Co-presenters: None

Abstract: This presentation will describe the process that two small communities (by small community this refers to both population and number of staff) followed to lower their CRS classifications to 3. Additionally, this presentation will build upon the FEMA Fact Sheet "Small Communities in the CRS" and what other factors small communities should consider for a successful CRS program. This presentation will focus on the journey of two small Class 3 CRS communities of Culter Bay, FL and Folly Beach, SC. Each community is distinctly different but the goal to advance in the CRS program is the same. The attendees will understand how limited staff can undertake some of the CRS program's more complex documentation requirements and how other small communities can do the same. This presentation will show how each community approached their CRS Cycle Verification Visit and what activities helped

them reach a classification 3. This presentation will demonstrate that relying on a county can pay huge dividends. Additionally, as a small community understanding how to navigate the CRS, prerequisites to cross, and what documentation alternatives can be provided are all important concepts that will be addressed. Cutler Bay and Folly Beach did not go into their Cycle Verification Visits with the expectation of receiving a Class 3, but both are looking to lower their classifications even as the CRS will be changing in the future.

Biography: David Stroud, CFM has over 30 years of both CRS and Hazard Mitigation Planning experience. David work for ISO and the CRS program for 18 years. At WSP, Mr. Stroud leads a planning, resilience and hazard mitigation team which works with CRS communities in all aspects of the program, assists communities and states with developing resilience, floodplain management and hazard mitigation plans. Mr. Stroud has a Bachelor and Master's degree in Urban and Regional Planning from Ball State University.

What is it Like After You Join the CRS?

Emir Williams, City of San Diego, ewilliams@sandiego.gov
Co-presenters: None

Abstract: Since joining the National Flood Insurance Program's (NFIP) Community Rating System (CRS) at a Class 7 rating, maintaining compliance and following through on promises made at the verification stage are critical next steps for the City of San Diego. The City team is tasked with a long list of activities to be completed annually. The Floodplain Management Team must keep impeccable records to prove completion of these activities for future audits by the Federal Emergency Management Agency's CRS team. The activities listed below are being tracked by the City for future audits and the annual recertification process. Elevation Certificates: The Floodplain Management Team put together a diverse team of professional staff to help review Elevation Certificates for a high degree of accuracy and completeness. Additional city-wide training was provided to staff members responsible for reviewing developmental applications. Public Outreach and Education: The City's planned outreach entailed education to several focused groups for both internal and external clients. Presentations of an overview of the Floodplain Management responsibilities were provided to various City departments, the developmental community, and the consulting industry. Educational letters and brochures were sent out to targeted stakeholders within mapped floodplains. The City also rolled out general outreach regarding floodplain awareness to the public using the City of San Diego's "Think Blue" social media accounts via Instagram and Facebook. Website Development: Additional general outreach included revamping the City's Floodplain Management website. Information about the NFIP, flood maps, levee locations, developmental requirements, contact information, and more was provided to the public. Repetitive Loss Property Notifications: Annual notification letters were sent out to repetitive loss property owners to remind them that their structures remain at risk. These letters also provided options on how to protect structures, information about available financial assistance, and flood insurance fact sheets. This presentation will cover the steps that the City of San Diego is taking to maintain its Class 7 rating and how it is setting the program up for success for generations to come.

Biography: Emir Williams is a Certified Floodplain Manager who has been working with the City of San Diego for almost 10 years. He supports the Floodplain Administrator in regulating the Special Flood Hazard Areas. In his time at the City, he has worked with FEMA to keep the City in compliance with the NFIP and maintain a Community Rating System score of 7, giving the citizens of San Diego a 15%

reduction in flood insurance premiums. He also works with the US Army Corp of Engineers to certify and maintain San Diego's levee systems. Outside of the City, Emir is a lecturer at San Diego State University, teaching students the highway systems in California and Caltrans' crucial role.

F3: Not Your Uncle's Flood Risk Communication
Track: Risk Communication

Unlocking Risk Communication: The New Basics of Risk Communication for Floodplain Managers
Ronda Nowak, Michael Baker International, ronda.nowak@mbakerintl.com
Co-presenters: None

Abstract: You can unlock a door by trying every key, or you can study the lock and decide which key will be most likely to work. In risk communication we have been using a different approach—trying to change the lock to fit the key we choose. Recent research has been pointing us in a different direction, away from trying to complete and correct the information people have about their risk, toward a model for co-creating knowledge about risk with them. This session will look at that research and at practical ways that it can be applied to reduce flood risk in communities. Attendees will leave with hands-on principles that can be used in their work, whether they are working one-on-one with community members, or creating materials for a broad audience

Biography: Ronda is 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 emergency preparedness program.

Gamify Your Flood Risk: How Games Can Engage Your Community and Drive Mitigation
Gary Merrick, Master Exercise Practitioner, Booz Allen Hamilton, merrick_gary@bah.com
Co-presenters: None

Abstract: A floodplain manager's role is to help a community understand, take ownership, and act to mitigate flood risk. However, it is difficult to communicate flood risk in a way that leads to full understanding and inspires action. Games can be a powerful way to teach, persuade, or raise awareness about flood risk to drive action. A game can help community members visualize how to take certain steps before a flood event to identify opportunities to mitigate. Games serve as a collaborative venue to build consensus with emergency managers, planners, building code officials, and other stakeholders. Finally, games provide a mechanism for stakeholders to experience first-hand how disaster scenarios may impact different community members. Through this session, attendees will learn about a new game called Lifeline. Developed for the Federal Emergency Management Agency (FEMA) Response Directorate, Lifeline, takes place in the simulated location of Springfield and allows player/local officials to respond to a variety of possible scenarios that communities can face such as hurricanes, tornadoes,

earthquakes, and wildfires. Through the game, players are able to engage in discussions about the results and outcomes of the scenario and highlight lessons learned and best practices for addressing pre- and post-disaster mitigation. By attending this session, local officials can learn novel ways to leverage games like Lifeline to increase understanding of flood risk to drive mitigation action.

Biography: Mr. Merrick, a Lead Associate at Booz Allen Hamilton, is certified as a Master Exercise Practitioner and uses games in concert with other exercise types to create an engaging experience for exercise participants. Mr. Merrick collaborates closely with wargaming experts to apply traditional wargaming techniques and mechanics to emergency management. Mr. Merrick has over thirty years of experience including active duty in the U.S. Coast Guard and the U.S. Army with extensive experience in Emergency Management and Maritime Safety and Security operations/planning.

AI-Empowered Risk Communication and Public Engagement

Skye King, Ogilvy, skye.king@ogilvy.com
Co-presenters: None

Abstract: This session will explore the transformative potential of artificial intelligence (AI) in risk communication and community engagement. We'll use real-world examples and case studies that showcase the opportunities, limitations, and ethical considerations of leveraging AI to address critical issues such as flood risks and disaster preparedness. In this engaging session, attendees will: - Explore various types of AI technologies and their applications in community engagement and civic initiatives. - Examine the successes, challenges, and ethical implications faced in implementing AI tools for risk communication and public engagement through case studies. -Gain a deeper understanding of how to effectively evaluate and integrate AI tools into your own risk communication and community engagement efforts—while considering potential biases and ethical concerns. By attending this session, participants will be equipped with the knowledge and insights needed to harness the power of AI for enhancing risk communication and fostering stronger community engagement around natural hazards. Additionally, they will learn how to navigate the ethical landscape surrounding AI implementation, ensuring responsible and equitable use of these powerful tools.

Biography: Skye King brings more than 20 years of experience in business strategy & communications working at the intersection of health, technology, & the environment. Her expertise is in effectively applying behavior science, emotional intelligence, & storytelling to build relationships, communicate risk, and engage audiences. Skye has appeared on The Today Show to discuss her work in cultural diplomacy, has conducted numerous workshops, and has published more than 100 articles on AI technologies, bias, emotional intelligence, risk communications, and other topics. She has also spoken at numerous events on applying behavior science, building personal & organizational resilience, promoting DEI & cultural diplomacy, & improving global public health. She completed an executive program focused on AI and Business Strategy at the MIT Sloan School of Management and CSAIL—their Computer Science and Artificial Intelligence Lab. Skye is also part of the Mozilla Foundation's Ecosystemic AI Community of Practice—a working group focused on examining the environmental sustainability and social justice aspects of AI systems. In her spare time, she is an artist and avid user of VR and AI technologies, as well as serving on the Programming Board for StartOut, a non-profit supporting LGBTQ entrepreneurs and founders.

F4: Challenges and Benefits of Watershed Management Initiatives
Track: Watershed Management

Cohort Trainings on Integrated Watershed Management: Outcomes, Lessons Learned, and Next Steps
Ian Grosfelt, National Association of Wetland Managers, ian@nawm.org
Co-presenters: Marla Stelk, marla@nawm.org and Genevieve Moran, jenna@floods.org

Abstract: Better communication and increased collaboration between state, Tribal, local, and federal clean water and hazard mitigation programs can result in increased resiliency and improved environmental, social, and economic outcomes as a result of more integrated planning processes. The National Association of Wetland Managers and the Association of State Floodplain Managers are conducting a series of workshops using a national cohort training model focused on the intersection and integration of water quality and hazard mitigation planning and implementation. In September 2023, the first cohort workshop was held in Cincinnati, Ohio and was attended by clean water and hazard mitigation professionals representing 4 states and 6 municipalities. Over a two-day schedule of presentations, roundtable discussions, and synthesis exercises, participants built cross-sector collaborative relationships between levels of government and identified opportunities to integrate water resource protection and hazard mitigation planning and implementation in their work. Participants also learned about green infrastructure and nature-based projects with the potential to deliver functional co-benefits to both programs and toured Cincinnati's Lick Run Greenway as a live case study. This presentation will share lessons learned from the first cohort workshop, including participants' updates on outcomes as discussed during ongoing quarterly cohort check-in calls. We will also introduce a website resource guide on integrated watershed management and discuss plans and timetables for future workshops and webinars.

Biography: None

Applying watershed-based planning to create community resilience in Jacksonville, FL
Guillermo Simon, PE, CFM, Halff, gsimon@halff.com
Co-presenters: Dylan Ford, dylan@groundworkjacksonville.org; Cavel Williamson, cwilliamson@halff.com, and Sam Sarkar, PE, ssarkar@halff.com

Abstract: Sitting on the St. Johns River north bank, Jacksonville's urban core is characterized not only by its walkable historic communities and the downtown business district, but also by its lack of connectivity, green spaces, and healthy waterways. As part of the Emerald Trail, Groundwork Jacksonville contracted Halff to develop a watershed resilience plan for Hogans and McCoys creeks — the two watersheds covering these communities. The project consists of an ecologically based, community-driven watershed restoration and management plan aimed at reducing localized flooding, improving water quality, creating resilience, and improving access to recreation. The first phase of the project consists of intensive data collection through community outreach, which include neighborhood walks and public events. The second phase includes computer modeling to assess current conditions and evaluate potential solutions to reduce flooding on a street-by-street basis (through HEC-RAS) and water quality (through EPA SWMM). The third phase consists of an iterative process to discuss potential solutions and benefits with watershed communities, before developing the plan. The watershed plan is part of the Emerald Trail — a 30-mile system of trails and linear parks that will connect historic

communities, schools, colleges, parks, and businesses severed through years of discriminatory investment practices. The watershed plan will provide the roadmap to implement green infrastructure and other solutions that will strengthen communities. The presentation will show the challenges and benefits of engaging with the communities where they live. It will also include the approach and results of watershed wide modeling of pluvial flooding and water quality. Finally, the presentation will discuss alternatives preferred by communities. We hope this plan will become a model that the City can apply to every watershed and help meet its water quality goals.

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. Guillermo's experience includes engineering analyses, modeling, and design, often leading multidisciplinary production teams. Guillermo has a keen interest in serving local environmental and resiliency causes through volunteer roles and mentoring of young staff. Guillermo serves as Halff's Director of Water Resources in Florida.

Charting a Course for Resiliency - Management of the Salt Creek Floodplain

Carter Hubbard, Olsson, chubbard@olsson.com
Co-presenters: None

Abstract: Salt Creek is the ultimate receiving stream for runoff from the City of Lincoln and more than $1.5 billion of buildings and infrastructure are included in the Salt Creek floodplain. The City of Lincoln and the Lower Platte South Natural Resources District (LPSNRD) have addressed flood control and floodplain management in a variety of ways in the Salt Creek watershed over the last century. It is important to understand the history of the watershed and how flooding has been addressed in the past. It is also important to look at how national floodplain best management practices (BMPs) and state-of-the-art climate science may effectively be used to address watershed resiliency in the future. The primary focus of the Salt Creek Floodplain Resiliency Study is to illuminate how existing non-structural and structural floodplain management measures can be strengthened to further reduce flooding impacts to existing infrastructure, local businesses, residences, and future developments and to enhance the floodplain resiliency of Salt Creek. For this study, the city and LPSNRD, with their consultant team of Olsson and Michael Baker, determined a public education plan would be beneficial to improve public awareness about floodplain management and resiliency. To develop a dynamic education plan, a diverse stakeholder group was assembled to help guide the education process. The study examines the following eight subject areas: 1. National floodplain BMPs 2. Floodplain BMPs from communities across the country 3. Lincoln's current floodplain management practices 4. A review of floodplain studies involving Salt Creek 5. A rigorous climate evaluation of past, current, and future conditions 6. Potential flood resiliency measures and recommendations 7. A review of potential funding sources 8. Recommendations This presentation will provide a review of the study and a discussion of flood reduction actions the City of Lincoln and LPSNRD have completed and intend to take.

Biography: Carter has more than 25 years of experience in water resources engineering. Carter has worked on a wide variety of flood control and stormwater projects in more than twenty states. Carter is an expert in hydrologic and hydraulic modeling. Carter's passion is working collaboratively on multi-disciplinary projects, using creativity and ingenuity to develop solutions to complex problems. Carter was the inaugural chair of the Nebraska Floodplain and Stormwater Managers Association and has

served as an adjunct lecturer for the Senior Design and Professional Practice and Management classes at the University of Nebraska.

F5: Mapping and Assessing Risk with an Equity Lens
Track: Equity

Flood vulnerability: Incorporating household-level susceptibilities and capacities for equitable flood risk assessment

Haley Selsor, University of Georgia, hks47033@uga.edu
Co-presenters: Brian Bledsoe, bbledsoe@uga.edu

Abstract: Flood risk assessments are evolving to include social vulnerability along with the physical exposure from floods. However, social vulnerability is used to assess impacts from a variety of hazards using the same broad set of socio-demographic characteristics despite social vulnerability being highly context dependent to the specific hazard and location. We divide social vulnerability into the components of susceptibility and capacity to provide further specificity and develop a framework that depicts how these components impact vulnerability over time with the different stages of a flood. We will apply this framework in Athens-Clarke County, Georgia to assess household level flood risk by measuring household susceptibilities normalized by household capacities. Susceptibility includes measures of flood exposure and corresponding impacts to transportation and critical infrastructure. With this approach, cross-scale interactions are represented in the consideration of how disruptions to larger infrastructure systems can impede household level experience and recovery from a flood. Furthermore, capacity includes measures of resources available to households, risk perceptions, and additional psycho-social characteristics, like cognitive biases, that impact behavior in response to flood exposure. This methodological approach will use flood inundation data to assess household level exposure and determine affected critical infrastructure along with data collected from resident surveys and interviews to measure household capacities. The flood risk assessment will be compared to a flood risk assessment using the CDC's SoVI to determine differences in their predictions of the high risk areas. This approach can reveal areas of high risk from high susceptibilities and diminished capacities often due to historical marginalization and disinvestment to lead to more equitable flood risk management.

Biography: Haley Selsor is a PhD Candidate in the College of Engineering at the University of Georgia. Her work is centered on flood risk equity and integrating the social impacts of floods with the physical. The historical influence of societal and institutional structures have led to a complex social landscape in which flood hazards occur. Haley is of the mind that by understanding the impacts of these larger influences, we can begin to meaningfully incorporate social impacts of floods in order to quantify and address equity of engineered interventions. Her other research interests include community engagement and nature-based infrastructure, and how these can be used to create more equitable and resilient communities.

Tailoring Risk MAP support to lower-resourced communities: A pilot to empower communities to utilize their new flood hazard information and increase resiliency

Madi Pluss, FEMA Region 8, madeleine.pluss@fema.dhs.gov

Co-presenters: Thuy Patton, hongthuy.patton@fema.dhs.gov and Katie Gronsky, kgronsky@dewberry.com

Abstract: There are a variety of equity-related challenges in Risk MAP. Risk products are often complex and hard to effectively utilize for lower-resourced communities. Current practices do not always develop capacity, foster data ownership, or enable mitigation action at the community level. The team recognizes that there is no "one-size fits all" approach to the mapping process, and it is important that we tailor our outreach and engagement strategy to ensure all communities are represented and have a voice in the process. To address some of these challenges, the mapping team and STARR II have recently launched the second phase of an equity pilot project. Last year, in Phase I, FEMA Region 8 and STARR II worked to identify the locations of disadvantaged populations across Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming; focusing on understanding historical trends in how resources are being shared and utilized. Phase II will look beyond the quantitative data to explore qualitatively what types of Risk MAP activities are being conducted in under-resourced areas, determine useful elements, and gather recommendations to tailor approaches based on needs. The team designed a series of questions to better understand each community's specific equity considerations beyond what is shown on certain indices (SVI, CJEST), providing a clearer picture of how lower-resourced communities are interacting with their community officials and the new data. With the findings from this effort, Region 8 will highlight opportunities to empower communities to utilize their new flood hazard information and increase resiliency. During this session, we will discuss the kinds of questions we are asking to better understand community needs and insights from those conversations. We will share learnings on each pilot community's needs and recommendations in ways that gives the audience ideas around how to better understand the communities they serve.

Biography: Madi Pluss is a Management and Program Specialist in FEMA Region 8's Mitigation Division. Passionate about studying relationship trends between the natural and built environment, Madi aims to utilize high quality flood risk data to empower communities, promote implementable mitigation action, and ultimately increase resilience. Recognizing the disproportionate impacts from natural disasters, Madi has advocated for disadvantaged communities in several studies that overlays high hazard risk with community capacity. In her role as RiskMAP Program Manager, Madi partners with State and local officials to find innovative ways to raise awareness of mitigation and adaptation to at-risk communities. Prior to her time at FEMA, Madi helped write Hazard Mitigation Plan updates for local governments in Colorado and Wyoming. Madi obtained a degree in Environmental Science and Geology, and a GIS Certificate from University of Colorado at Denver and a Master of Urban and Regional Planning from the University of Oregon.

Exploratory Analysis of Flood Conditions and Associated Adverse Impacts on Water Systems Serving Disadvantaged Communities in Iowa, Kansas, Missouri, and Nebraska

Andy Sharma, PhD, Wichita State University, andy.sharma@wichita.edu
Co-presenter: Amanda Sharma, CFM, Wichita State Univ., Environmental Finance Center, asharma@wichita.edu

Abstract: According to the updated NOAA climate models for 2023 and the Climate Explorer Toolkit (v3.1), the possibility of intense rainstorms will be greater this coming year for the midwestern U.S. and may increase as much as 5% from 2035-2064. When heavy precipitation (rain or snow) cannot be adequately managed by a water system, flooding may occur and, in some cases, the excess water may

carry contaminants. Should county and state water systems not have the capacity to manage this excess flow, then the total environment will experience a reduced quality of life. In this presentation, we provide an exploratory analysis of such a condition for four midwestern states: Iowa, Kansas, Missouri, and Nebraska. In addition to the possibility of increased occurrences of heavy rainstorms, we selected these states because they offer a unique opportunity to proactively address the impact of insufficient system capacity resulting from multi-factor conditions, particularly for areas which consist of disadvantaged populations expected to age in place.   Results of this analysis are intended to assist states and communities increase resilience to flooding hazards. We also hope our presentation will encourage local communities to leverage grants (e.g., Bipartisan Infrastructure Law) to assist with public water systems in disadvantaged communities.

Biography: Andy Sharma is an Associate Professor of Health Policy at Wichita State University. His research interests include applied demography, applied economics, healthcare management, quantitative methods, and spatial statistics. Dr. Sharma was granted a PhD in Public Policy with a minor in Sociology from the University of North Carolina at Chapel Hill, where he was a funded fellowship trainee at the Carolina Population Center with grants from NICHD and NIA. He is co-author of A Brave New World of Healthcare Revisited with Colorado governor Richard D. Lamm. Dr. Sharma has also authored peer reviewed articles in Annals of GIS, Applied Geography, The Gerontologist, The Journals of Gerontology, Planning Theory and Practice, Population Research and Policy Review, and Women's Health Issues. He is currently working on a project which examines the impact of heat-related events on the health of older adults throughout the lower Midwest.

Amanda Sharma brings experience across diverse sectors, encompassing government, federal contracting, academia, and nonprofit organizations. Her expertise lies in the domains of resilience planning, emergency management, natural resource management, land-use planning, and district revitalization. Amanda supports the Environmental Finance Center (EFC) of Wichita State University and is a Program Integration Lead supporting the FEMA Risk MAP CDS contract. She is passionate about community resilience and communicating risks associated with hazards through the utilization of technology and analytics. Amanda has held various positions at the U.S. Federal Emergency Management Agency (FEMA). During her tenure at FEMA, Amanda led a program evaluation effort for the National Hazard Mitigation Planning Program and supported FEMA's Environmental Protection and Historical Preservation Directorate as a Unified Federal Review Advisor. She has been deployed to multiple Federally Declared Disasters, undertaking roles such as Environmental and Historic Preservation Manager, Hazard Mitigation Deputy Branch Chief, Floodplain Management and Insurance Group Supervisor, and as a Mitigation Liaison embedded on a Place-based Recovery Team. In addition to her Federal experience, Amanda has garnered local government experience as a County Planner and as an Executive Director for a local MainStreet Project. Amanda is a Certified Floodplain Manager and holds an Executive Master of Business Administration (MBA) and a Master of Resource Law Studies (MRLS) from the University of Denver.

F6: Nature Based Solutions and Stormwater Management
Track: Stormwater

New York City Cloudburst Stormwater Management Network

Anastasia Yankopoulos, New York City Emergency Management, ayankopoulos@oem.nyc.gov
Co-presenter: Benjamin Goldberg, New York City Emergency Management, bgoldberg@oem.nyc.gov

Abstract: New York City (NYC) has been encountering unprecedented flooding events. In 2021, Hurricane Henri poured 1.94 inches of rain per hour over the city, and only two weeks later, Hurricane Ida dropped 3.15 inches per hour. In 2023, Post-Tropical Cyclone Ophelia flooded multiple inland neighborhoods, with a peak rainfall rate of 2.75 inches per hour. These "cloudburst" events, defined as sudden heavy downpours within a short period of time, are compounded by the City's low capacity combined sewer system. Overflow is common during intense rainfall, flooding streets, buildings, and critical infrastructure and polluting local waterways. Cloudburst events will increase in frequency and intensity as a direct result of climate change, and to combat their impacts on flood-prone communities, cost-effective risk reduction mitigation efforts are needed. In 2015, the City's Department of Environmental Protection (DEP) partnered with the City of Copenhagen to share knowledge on innovative cloudburst management strategies. DEP has since developed a Cloudburst Program, designing a scalable network of stormwater management projects to make flood-prone communities more resilient to extreme rainfall events exacerbated by climate change. These projects leverage a combination of green and grey infrastructure and nature-based solutions to absorb, store, and transfer stormwater to minimize flooding. In partnership with the DEP and New York City Housing Authority, the City is piloting several projects at affordable housing complexes and in high-risk inland communities. Three existing cloudburst projects will receive funding through the FEMA Building Resilient Infrastructure and Communities (BRIC) grant, with two more projects slated for submission to the 2023 BRIC cycle. This presentation will explain how innovative cloudburst projects in densely built urban environments can be developed with cost-effective methodologies that focus on risk reduction and avoided damages to further resiliency and overall mitigation throughout the city.

Biography: Anastasia Yankopoulos is a Mitigation & Resiliency Program Manager at New York City Emergency Management. She works with New York City agencies on securing federal funding to develop and implement mitigation projects that increase protection and resiliency to infrastructure and communities throughout the city. Anastasia also teaches environmental policy courses for the University of Maryland Global Campus, and consults for local water quality nonprofit, The Coalition to Save Hempstead Harbor. She holds a masters degree in Sustainability Studies from Hofstra University.

Assessing Green Stormwater Infrastructure for Stormwater Management in the Phoenix, Arizona Area

Valerie Swick, PH, CFM, U.S. Bureau of Reclamation, vswick@usbr.gov
Co-presenters: None

Abstract: Reclamation's Hassayampa River Study, Assessing Low Impact Development for Stormwater Management looks at the theoretical use of green stormwater infrastructure (GSI) and low impact development (LID) to manage stormwater in the City of Buckeye, Arizona. GSI and LID features are nature-based solutions used to manage and treat stormwater alone or in conjunction with conventional stormwater management practices. GSI/LID mimic natural processes to reduce stormwater runoff and sediment transport and infiltrate stormwater close to it source. Small scale GSI/LID projects have been shown to reduce flood risk while increasing infiltration. Few studies have been conducted to quantify the benefits produced by GSI. This study uses stormwater modeling to compare natural conditions to

the theoretical use of GSI for stormwater management. An area in the west valley of Phoenix, in Buckeye, Arizona is used for the surface water modeling. The Flood Control District of Maricopa County (FCDMC) originally modeled natural conditions and a proposed conventional stormwater infrastructure (CSI) stormwater management alternative using the Army Corps of Engineers HEC-1 model. The FCDMC natural conditions model was updated with more detailed mapping and a 2-dimentional model. The results of the FCDMC CSI modeling is used to help calibrate our natural condition models. Two scenarios are modeled for the GSI and CSI alternatives consisting of the regional watershed and a hypothetical development. The regional watershed modeling is conducted by the USGS using the KINEROS model to estimate stormwater flows under natural conditions and with theoretical gabion basket installations used as the GSI features. Hypothetical developments using GSI and CSI are developed and modeled using EPA's PCSWMM by the Bureau of Reclamation's Denver Technical Service Center. This presentation will provide the results of the modeling efforts for the GSI and CSI regional watershed and hypothetical development to assess the effectiveness of using GSI for stormwater management.

Biography: Valerie Swick received her B.S. in Watershed Management from the University of Arizona. She worked for the Flood Control District of Maricopa County, in Phoenix Arizona as a hydrologist and project manager planning large regional drainage master studies. Valerie was involved with the Arizona Floodplain Management Association as a Regional Representative, Treasurer, and an active member in the Technical Committee since 1987. She was also involved in ASFPM where she was a Chapter Director for six years and active in many of the committees including Arid Regions, Higher Education, and the Climate Change Task Force. Valerie has been a CFM since 2001. In 2018, after 31 years with Maricopa County, Valerie retired and began working for the Bureau of Reclamation as a Water Resources Planner in the Lower Colorado Basin Region at the Phoenix Area Office where she works on a variety of water projects including water supply, climate change effects, and green stormwater infrastructure.

The Phoenix Valley's Next Frontier of LID Applications through retrofitting

Zachary Schmidt, Kimley-Horn, zachary.schmidt@kimley-horn.com
Co-presenters: geoff.brownell@kimley-horn.com

Abstract: This presentation will focus the quantitative portion of LID/GSI applications. LID/GSI applications have long been looked at more in a qualitative way. A recent retrofit project was completed at the Flood Control District of Maricopa County (FCDMC) that included the design (under construction) of numerous applications. As part of the design, substantial rainfall-runoff modelling was completed to quantify the impacts of the applications on site runoff and water budgets for various storm events including continuous/annual storm events. The project is under construction with the goal of monitoring the results and ultimately incorporating lessons learned into future policies with the greater Phoenix area.

Biography: Zach has been a civil engineer focusing on surface water for over 17 years in the Phoenix metropolitan area. He focuses on the planning and design of flood control infrastructure. He has been a part of the Arizona Floodplain Managers Association for almost his entire career.

F7: State Climate Change Initiatives
Track: Climate Change

New York State's Community Risk and Resiliency Act - Approaches for Future Riverine Flood Risk Planning

Kelli Higgins-Roche, PE, CFM, NYS Department of Environmental Conservation, kelli.higgins-roche@dec.ny.gov
Co-presenters: Wylie Minot, PE, CFM, Dewberry, wminot@dewberry.com

Abstract: The New York State (NYS) Community Risk and Resiliency Act (CRRA) requires applicants for specified State permits and funding programs demonstrate they have considered future physical climate risk including sea-level rise, storm surge, and flooding. To support CRRA implementation, the NYS Department of Environmental Conservation (NYSDEC) published the New York State Flood Risk Management Guidance for Implementation of CRRA (SFRMG), which envisions using "guideline elevations" to map a future risk-informed flood hazard area. The NYS Office of General Services (NYSOGS) and NYSDEC worked with Dewberry to (1) pilot analytical approaches to map future risk-informed flood hazard areas based on the recommended guideline elevations and (2) provide observations and recommendations on how to achieve a defensible and scalable approach for implementing CRRA in inland areas. The first phase of the project focused on evaluating approaches to develop future flood risk mapping in riverine areas of the State. As a part of the first phase of the project, gaps were identified in climate-informed riverine design discharge recommendations. During the second phase of the project, the team developed watershed models to simulate the change in hydrology under several future conditions scenarios to evaluate the impact of increased rainfall across the Upper Chesapeake watershed within NYS. This presentation will discuss the evaluation of potential floodplain designations, including flow multipliers and base flood elevation plus freeboard solutions, and how the future conditions hydrology estimates may be used to expand the availability of this guidance throughout inland New York.

Biography: Kelli Higgins-Roche is a Licensed Professional Engineer, and a Certified Floodplain Manager with over 18 years of experience in floodplain management and flood protection at the New York State Department of Environmental Conservation. She is the NYS National Flood Insurance Program Coordinator, managing both the floodplain management and mapping grant activities at the state level. Kelli currently serves on the ASFPM Board of Directors, representing New Jersey, New York, Puerto Rico, and the Virgin Islands as the Region 2 Director. Kelli received a master's degree in civil engineering from Texas A&M University and a bachelor's degree in biological sciences from Cornell University. Stu Geiger is an interdisciplinary water resources scientist and project manager with a long record of leading integrated teams of engineers, geographers, and planners in the development of federal, state, and local flood risk identification and assessment projects. Stu has extensive experience with the National Flood Insurance Program and manages Risk MAP projects in New York and Montana. He is also a key contributor to the Commonwealth of Virginia's Coastal Resilience Master Plan. Stu received his master's degree in water resources and geography from the University of Wyoming and his bachelor's in geography from the University of Mary Washington.

MnDOT's Road to (Hydraulic) Resiliency: An Overview of Past, Present & Future Initiatives

Rachel Pichelmann, PE, CFM, Minnesota Department of Transportation, rachel.pichelmann@state.mn.us
Co-presenters: None

Abstract: The flood vulnerability of MnDOT's bridges, culverts, storm sewers, BMPs and roadways is expected to increase as climate change leads to larger and more intense rainfall events. MnDOT

maintains approximately 39,000 culverts, nearly 5,000 bridges, and more than 11,000 miles of roadway statewide. Most of the existing infrastructure was designed based on historical rainfall or flood data, which was considered the best available information during design, but assumes stationarity. However, in recent years, MnDOT has explored new routes for considering nonstationarity in project identification and design.   With substantial investments in infrastructure occurring in Minnesota right now, MnDOT is committed to continuous improvement of hydraulic design processes. This includes conducting vulnerability assessments that consider current flood risk and the potential future flood risk throughout the service life of the infrastructure. MnDOT has also been developing new hydraulic design guidance to consider nonstationarity, improving flood documentation to aid in project development, and collaborating with experts across the department and in other agencies and organizations to improve the hydraulic resiliency of its assets. In this presentation, MnDOT's Hydraulic Resiliency Engineer will provide an overview of past, present, and future initiatives that are focused on improving the hydraulic resiliency of MnDOT's assets.

Biography: Rachel serves as the Hydraulic Resiliency Engineer for the Minnesota Department of Transportation. In this role, she is responsible for leading efforts to improve the flood resilience of MnDOT's infrastructure by developing design guidance, participating in research projects, providing expertise for flood mitigation projects, and conducting internal and external collaboration to share knowledge. Prior to joining MnDOT in February 2023, Rachel worked in private consulting for more than 13 years. She is a Professional Engineer in MN, IA, IN, and SD, and is a Certified Floodplain Manager.

Can we Talk About Climate Change? Addressing FEMA CAP and Mitigation Planning Requirements

Rhonda Murphy, CFM, H2O Partners, Inc., rmurphy@h2opartnersusa.com
Co-presenters: Lisa Jennings, lisa.jennings@fema.dhs.gov

Abstract: This session will address the new FEMA requirements for addressing climate change in the FEMA CAP Program as well as in Hazard Mitigation Planning. • States must address climate change in their statement of work this year for the CAP Program with the goal of implementing climate change activities by 2026. This session will discuss what state partners are currently engaged in to meet this requirement, challenges that may hinder progress, and activities or actions being discussed or proposed for implementation. • Local and state mitigation plans must address climate change in all plans submitted to FEMA after April 2023. Navigating these new requirements during a politically charged time can be challenging for state and local jurisdictions. Ideas, sample language, and best practices from an approved state and local plan will be presented along with resources for climate change information. This presentation will assist communities with meeting the new 2023 requirements for addressing climate change in local and state mitigation plans as well as requirements under the CAS-SSSE program.

Biography: Ms. Murphy brings over 23 years of experience working as a mitigation planner and grants analyst. She has extensive Hazard Mitigation Planning experience, both as a plan reviewer under the FEMA CAMPR contract as well as a lead and contributing author for more than 75 local and regional plans. Ms. Murphy was the lead author on the State of Texas mitigation plan update, which incorporated the new 2023 FEMA plan requirements. Ms. Murphy also has wide-ranging knowledge in FEMA HMA grant programs, floodplain management and the National Flood Insurance Program (NFIP), including Increased Cost of Compliance (ICC).

F8: Streamlining Techniques of Mapping Processes
Track: Mapping

Using Model Builder for 2D BLE in Louisiana
Bradley Binder, CFM, CDM Smith, binderbj@cdmsmith.com
Co-presenter: Losha Schreifels, schreifelsar@cdmsmith.com

Abstract: Model builder is a visual programming language found in ArcGIS Pro and ArcMap that allows a spatial analysis workflow to be simplified by creating and modifying geoprocessing tools. A model uses the outputs of one process as the inputs of another, and can be chained together to create powerful, multi-step functions. Using model builder to automate a workflow can help save time on repetitive tasks and reduce manual inputs. This presentation will explain what Model Builder is, show the basics of how to build one's own model, as well as highlight the beneficial uses found in using Model Builder to help make building a 2D BLE Dataset more efficient. A 2D BLE dataset includes the creation of WSEL and Depth Grids for 10%, 1% and 0.2% flooding events, as well as the respective Flood Hazard Area polygons for each event. Creating one of these rasters takes several steps which must be run sequentially to create a finalized raster. Before Model Builder was introduced to the workflow, tools were individually being ran, waited on to finish, and then the next tool ran. This made the process inefficient, as the multiple rasters required for 2D BLE had to each be ran through multiple tools which required setting up parameters each time. Once Model Builder was fully incorporated into the workflow the raster generation process could be fully automated, requiring input only at the beginning of the chain of commands, before receiving a finalized raster upon completion.

Biography: Bradley Binder is a GIS Specialist for CDM Smith. He graduated in 2018 with a Bachelor of Arts in Geographic Information Sciences from the University of Oklahoma. He has been with CDM Smith since May 2019. While at CDM Smith, he has been involved in many phases of the floodplain management workflow including 2D BLE, floodplain mapping, and Preliminary and Final Mapping issuances.

Tips, Tricks and Best Practices for CNMS Linework Replacement - Strategies to Reduce Efforts While Fostering Data Integrity.
Tripp Spear, GISP, WSP, tripp.spear@wsp.com
Co-presenters: Jarod Skrivanek, jarod.skrivanek@wsp.com

Abstract: The Coordinated Needs Management Strategy (CNMS) "is a FEMA initiative to update the way FEMA organizes, stores, and analyzes flood hazard mapping needs information for communities.", and is the sole source for tracking FEMA's NVUE percentage metric (the portion of flood studies which currently meet or exceed FEMA's minimum quality standards). The CNMS database is a combined repository of geospatial and attribute information detailing the geographic extents of existing flood hazard analyses and the methods by which they were studied, tracking ongoing studies and documenting areas of future study needs. At the QR3 (Preliminary Issuance) phase of a FEMA flood risk study, existing CNMS stream centerlines within the S_Studies_Ln feature class must be replaced by higher quality profile baseline linework from the project's Preliminary FIRM database. This process

involves transferring all existing CNMS attributes into new centerline geometry, while maintaining existing splits at study limits. This often proves to be one of the most challenging and time-consuming CNMS tasks for production teams during the entire project lifecycle. While no "Easy Button" has been created for this process, there are strategies to help minimize effort and foster data integrity. This presentation will showcase tips, tricks and best practices for manually transferring attributes into the 160+ unique fields within CNMS's S_Studies_Ln feature class, including updates needed for the new schema. By utilizing basic functionalities within ArcGIS, the task of transferring existing CNMS attribution to new higher quality profile baseline linework can be streamlined, saving project teams (and QC reviewers) time, budget, and headaches.

Biography: Mr. Spear, GISP is a Technical Professional III – GIS Analyst with WSP USA Environment & Infrastructure Inc. in the Topeka, KS office. He has a background in FEMA's Coordinated Needs Management Strategy (CNMS) and NFIP program. He specializes in CNMS processes and procedures, quality control and database management.

Tips and Tricks to Simplify and Automate Creating Flood Profiles Using RASPLOT
Jeremy McClung, CDM Smith Inc., mcclungjj@cdmsmith.com
Co-presenters: None

Abstract: One key element of a Flood Insurance Study (FIS) is the flood profile. The creation of the flood profile using FEMA's RASPLOT program can be unexpectedly complex and riddled with frustrating errors. The RASPLOT user guide is a helpful introduction to the program, but most technical functions are left for the user to learn through painstaking trial and error. When trying to coordinate between Microsoft Access, Excel and RASPLOT without official guidance to reference, users are left to train themselves, eating valuable budget and leading to frequent profile mistakes. However, there are some tips and tricks only learned through experience that can simplify the process and alleviate common errors. This presentation will highlight frequent flood profile mistakes, shortcomings in the RASPLOT program and simple methods to address these issues. First, we will discuss ways to automate the generation of cross section stationing, backwater elevations and confluence notes using excel. Then we will explore common user errors of RASPLOT database editing and how to easily prevent them. Finally, the presentation will cover the most helpful tools inside the RASPLOT CAD (.dxf) editor that will significantly expedite the final profile touches.

Biography: Mr. McClung is a GIS Specialist with CDM Smith out of the Denver, Colorado office with five years of geospatial experience. Half of this time has been spent working on Risk MAP and other floodplain mapping projects with CDM Smith. He has experience with all stages of Flood Insurance Study project development, including hydraulic and floodplain mapping, draft DFIRM, profile and FIS report generation. Additionally, he has taken part in several interdisciplinary GIS projects, including post-fire hydrogeologic modeling, future flooding and sea level rise resiliency analyses and a reservoir water reallocation feasibility study. Prior to CDM Smith, Mr. McClung worked in environmental consulting, helping to develop geospatial models for company sustainability initiatives and with the National Park Service, modeling changes in alpine air pollution in U.S. national parks using GIS.

F9: Solutions to Complex Watershed Modeling
Track: Modeling

A well-balanced RAS diet in Watershed Modeling

Brandon Gonzalez, PE, AtkinsRealis, Brandon.Gonzalez@atkinsrealis.com
Co-presenter: Sarada Kalikivaya, Sarada.Kalikivaya@atkinsrealis.com

Abstract: Large scale watershed modeling is the future of obtaining resilient watershed management practices, fully evaluating flooding impacts, and planning for future mitigation. The question everyone wants to know is, what is the best way to model large watersheds while maintaining practicality by balancing robust models and technical limitations? What if we told you in RAS there is a way to create a model that utilizes various approaches for a single watershed to maximize methodology applicability. This entails creating a model that utilizes 1D unsteady reaches, 2D areas at 1D junction locations, 2D Direct Inflow, and 2D Rain-on-Grid approaches all within a single model geometry for a HUC8 level watershed. Join us as we discuss how to identify the various approaches, the process to combine a model in such a way, the benefits to watershed modeling, and future capabilities to build upon with this approach. The technical methods applied within this approach combines various complex modeling abilities by implementing realistic baseflow conditions, rapid initial condition calibration, and the ability to leverage hydrologic modeling to be fully robust for any scenario. With large scale watershed modeling, control and flexibility of the model is paramount for calibration, evaluating upstream and downstream watershed impacts, and allows for design storm implementation with realistic flooding response. This approach provides all of these benefits and then some in one spot.

Biography: Brandon Gonzalez has 5 years of experience with water resources engineering analysis. This experience includes hydrologic and hydraulic analyses of watersheds, open channel hydraulics, FEMA RiskMap development, river restoration, and dam breach analysis. Brandon specializes in 2D hydraulic modeling with an emphasis in complex modeling scenarios.

Edwards AFB 2-D H&H Analyses and Floodplain Delineation

Brian Schalk, PE, CFM, Wilson & Company, brian.schalk@wilsonco.com
Co-presenter: Peng Zhang, peng.zhang@wilsonco.com

Abstract: The Edwards AFB 2-D H&H Analyses and Floodplain Delineation project was conducted to assess and revise the floodplain located along the west and south boundaries of Edwards AFB. The contributing area is approximately 1,600 square miles. HEC-RAS 2D was selected for the H&H modeling because its adaptive mesh size is ideal for large watersheds and its recent improvements on rainfall-runoff simulations makes it suitable for the H&H modeling. Creative approaches have been developed to address challenges encountered throughout the project. This presentation will cover some challenges and solutions including: (1) terrain built from different sources and how to keep track of terrain modifications/updates; (2) culvert/bridge and their approximation in the terrain modification; (3) gridded rainfall data created from NOAA data and the site specific AN/FMQ-19 meteorological station; (4) depth-area-reduction factor for this project; (5) land use, soil, and infiltration modeling for the watershed; (6) transmission loss is critical, how it is modeled and how it is calibrated using NWS MRMS data and USGS Landsat satellite images; and (7) how the results from this project vary from previous studies.

Biography: Brian Schalk is a civil engineer that has been focusing on stormwater management since 2001. He is a Senior PM with Wilson & Company, working on a wide variety of projects, such as: Area/Watershed Drainage Master Studies/Plans (ADMS/P); flood hazard response planning; regional drainage facility design; and decentralized stormwater management planning. For the past 15 years, the majority of his projects have included the application of 2-dimensional H&H analyses for flood hazard assessment. Mr. Schalk is the current Chair of the Nature-Based Stormwater Management Committee under the Arizona Floodplain Management Association.

Town of Camp Verde Area Drainage Master Study

Corbin Bendel, Wilson & Company, Inc., Engineers & Architects,
Co-presenter: corbin.bendel@wilsonco.com

Abstract: Named after the lush greenery and the 18 miles of river which splits the town in half, the Town of Camp Verde is a 45 square mile chunk of land that experiences frequent flooding from the Verde River and its tributaries - Oak Creek, Beaver Creek, and West Clear Creek. The Area Drainage Master Study quantifies drainage conditions across the Town using FLO-2D (2-dimenstional) modeling software to assess flood hazards and to prioritize future drainage projects. However, this is a quite a challenge when the contributing watershed area to the town exceeds 4,500 square miles. HEC-HMS hydrology was developed based on USGS stream gages and previous FEMA Flood Insurance Studies to determine FLO-2D inflow hydrographs at select points along the contributing tributaries to cut down on the 2-dimensional model area and reduce computational runtime. The 2-diimesional model area covers approximately 200 square miles, with grid cells ranging from 20'x20' to 40'x40'. Detailed topography, planimetric data, and aerial imagery were used to determine hydraulic parameters for the modeling effort. This presentation will discuss how the complex 2-dimensional model was developed and how results were utilized to identify problem areas and determine the priority of future drainage projects. Not only is the Town of Camp Verde a small town in a giant watershed, but the Town also has limited funds to address major flooding issues. Modeling results were used to strengthen grant proposals for locations that experience severe flooding and that pose significant risks to resident safety.

Biography: Corbin Bendel is a Hydrologic & Hydraulic (H&H) Engineer-in-Training with Wilson & Company, Inc., specializing in 2-dimensional H&H modeling and GIS. Corbin has played a critical role in a wide range of projects – including planning studies, design projects, and FEMA studies. To date, he has developed over 200 square miles of detailed 2-dimensional models, using both FLO-2D and HEC-RAS 2D. Corbin utilizes GIS and custom script automation to simplify project workflow. Corbin is involved with the Arizona Floodplain Management Association (AFMA), Environmental and Water Resources Institute (EWRI), and the American Society of Civil Engineers' (ASCE) Younger Member Forum (YMF).

Concurrent Session G

G1: Know the Code: Building Codes and Mitigation
Track: Mitigation -1

Strengthening Building Codes Against Future Flooding

Katie Ringland, PE, CFM, AECOM, katie.ringland@aecom.com

Co-presenters: Rebecca C. Quinn, CFM, RCQuinn Consulting, Inc., rebecca@rcquinnconsulting.com and Joy Duperault, CFM, MA Dept. of Conservation & Recreation, joy.duperault@mass.gov

Abstract: The mandatory Massachusetts State Building Code (MSBC) is based on the model International Codes and state-specific amendments adopted by the Commonwealth's Board of Building Regulations and Standards (BBRS). As part of an ongoing effort to increase resilience, the Commonwealth assessed the MSBC for needs and options to improve floodplain management standards that will increase the resilience of new buildings, considering the best available statewide climate change projections. Massachusetts also evaluated local floodplain management options that communities can adopt which complement the MSBC and in turn would result in safer, stronger, and more resilient buildings. Due to climate change, natural hazards have increased in intensity, frequency, and duration. By 2070, coastal flooding alone is projected to cause over $52 million in damage annually to state-owned coastal properties, a 550% increase from 2023. Nationwide, communities that have adopted and enforced hazard-resistant codes have avoided billions in losses from natural hazards. FEMA has acknowledged the importance of enhanced building codes, including advancing adoption and enforcement of hazard-resistant building codes and standards in its Building Code Strategy. This presentation will discuss the ongoing effort to enhance building codes and floodplain management standards, while incorporating the best available climate change projections. The discussion will touch on potential options found to enhance building codes and community floodplain management options, the public engagement activities performed during the project, and lessons learned.

Biography: Katie Ringland has 20 years of experience working with water resources and floodplain management. Katie joined AECOM in August of 2022 and serves as the project manager for several CTP and floodplain management projects. Prior to working for AECOM, she worked for the Nebraska Department of Natural Resources for 12 years, seven years of which were as the Chief of the Floodplain Management Section. Her experience at NeDNR included managing FEMA's CTP program, State NFIP Coordination, and Flood Mitigation Assistance grant.

First of Its Kind National Sustainable Infrastructure Community Standard Issued

Karen Kabbes, PE, CFM, Kabbes Engineering Inc, kckabbes@kabbesengineering.com
Co-presenters: None

Abstract: Issued in October 2023, is the first-of-its-kind standard entitled, Standard Practice for Sustainable Infrastructure. It provides guidance for infrastructure owners, including federal, state of local governments, to develop and implement sustainable and resilient infrastructure solutions. The standard is a non-mandatory, performance-based consensus standard designed for all horizontal (non-building) civil infrastructure ranging from transportation projects, to water and flood control/stormwater systems, and the energy grid. Published by ASCE as Standard 73-23, it provides a performance standard that can be referenced worldwide by policymakers, infrastructure owners, and practitioners to promote mitigation and adaptation toward short and long term environmental and climate threats, including greenhouse gases. The standard provides guidance for building equitably and addressing the specific needs of communities that they serve. One of the major innovations in the standard is the life cycle cost analysis requirement. No longer will users be able to limit their analysis to initial investment costs. Building the right project in addition to building the project right is an underlying goal of the standard, based in part on the Institute for Sustainable Infrastructure's Envision sustainable infrastructure rating system. The proposed standard is arranged in eight chapters, including

Leadership, Quality of Life, Resources Allocation, Natural World, Climate (GHG Emissions), Resiliency, and Life Cycle Cost Analysis. The standard is relatively short and includes fewer than 30 outcomes in total. The Institute for Sustainable Infrastructure, owner of the Envision rating system, participated in the development of the standard.

Biography: Karen C. Kabbes is president of KEI, a water resources and environmental engineering firm with offices in Illinois and North Carolina. A former State of IL floodplain manager, she was the lead author of the Chicago metropolitan area floodway rules and oversaw the FEMA's Community Assistance Program for the Chicago region consisting of over 270 communities. Ms. Kabbes was the first Chief Stormwater Engineer for Lake County IL Stormwater Management Commission, responsible for the initial development of a county-wide floodplain and stormwater ordinance and technical reference manual for 52 communities in a rapidly urbanizing area. A member of both the IL and NC state associations, she has served as a Chapter Representative on the ASFPM Board, in addition to having held positions as co-chair of ASFPM's Mapping and Engineering Committee and Multiple-Objective Management Committee, ASFPM Technical Conference Chair and as a founding member and past chair of the IL ASFPM Chapter. She was the 2014 President of ASCE's 23,000 member Environmental and Water Resources Institute and was elected to ASCE's national board in 2023. She served on the steering group that developed ASCE Standard 73-23:Standard Practice for Sustainable Infrastructure. A registered professional engineer in Illinois and North Carolina, Ms. Kabbes, is a Certified Floodplain Manager, Board Certified Water Resources Engineers. Ms. Kabbes has a B.S. in Civil Engineering from University of Illinois in Champaign-Urbana and a M.A.S. in Public Policy Analysis from the University of Illinois in Chicago.

Focus on the Basics – Flood Venting
Zach Faulkner, Floodproofing.com, zfaulkner@floodproofing.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, as well as how they can effectively prevent major damage to buildings due to flooding. The presentation will touch on the key requirements highlighted in FEMA Technical Bulletin 1 pertaining to engineered flood vent features, placement and flood coverage.

Biography: Zach Faulkner is the VP of Sales for Smart Vent Products and Floodproofing.com. He is a Certified Floodplain Manager and has extensive knowledge on FEMA and building code flood regulations and can assist with commercial and residential floodproofing designs. With a background of 300+ presentations promoting for the company, Zach has instructed architects, code officials, surveyors, builders, and homeowners on best practices for flood mitigation. His main role is to assist the outside sales team with hitting their sales goals and contribute to the overall growth of the company.

G2: Floodplain Management Compliance
Track: NFIP

Floodplain Audit App - Moving Compliance into the Next Millennium
Michelle Staff, CFM, FEMA, michelle.staff@fema.dhs.gov

Co-presenters: Alicia Silverio, CFM, Ohio State NFIP Coordinator, ODNR Columbus OH, Alicia.Silverio@dnr.ohio.gov

Abstract: Are you annoyed of writing down potential violation addresses in compliance audits? Or trying to figure out which property your photos belong to with the written data you collected? The purpose of the floodplain field tour is to gather site-specific information on development and to document potential floodplain management problems to assist in the review of the community's permits. The Ohio Department of Natural Resources (ODNR) created a new mobile application that is based on (ESRI's ArcGIS Field Maps) that makes the floodplain tour much more efficient while collecting the data needed to document compliance. Over the past year, ODNR has been using the application for compliance audit field tours and extended the use of the application to FEMA R5 staff. We will demonstrate the application, the data it is collecting and the final outputs for compliance follow up activities.

Biography: Michelle Staff joined FEMA Region 5 in 2020 as a Supervisory Floodplain Management Specialist and works out of the Chicago office. She promotes community participation in the NFIP, provides technical assistance and training for community leaders and other stakeholders on the requirements of the NFIP and benefits of sound floodplain management. Previously, Michelle worked for the Wisconsin Department of Natural Resources (WDNR) as the State NFIP Coordinator and prior to working for the WDNR, she worked 20 years in county government in the administration and enforcement of zoning, floodplain, land division, sanitation, and subdivision ordinances. She has a Bachelor of Science degree in Geography/Geology from the University of Wisconsin-Whitewater and Master of Public Administration (MPA) from University of Wisconsin-Oshkosh. She is a Certified Floodplain Manager through the National Association of Floodplain Managers.

Ins and Outs of the Redesigned NFIP Compliance Audit Program

Sarah Owen, FEMA, Sarah.Owen@fema.dhs.gov
Co-presenters: None

Abstract: Over 22,500 communities participate in the National Flood Insurance Program (NFIP), each with unique challenges, flood risks, and opportunities to strengthen their floodplain management program health. FEMA must apply an appropriate level of review based on the specific needs of NFIP communities to streamline the compliance health assessment of every community. The redesigned NFIP Compliance Audit Program has been designed to diagnose, triage, and prescribe remedial actions more efficiently and effectively. FEMA's compliance audit tools help power the new audit process, arming FEMA and local communities with actionable information to improve local community floodplain management program health. This presentation will walk attendees through the details of the NFIP Compliance Audit Program process and compliance audit tools. Local floodplain administrators will gain an increased understanding of the tools and insights they will provide every community when the future audit process launches nationwide.

Biography: Ms. Sarah Owen works at FEMA Headquarters as an NFIP specialist and regional liaison who acts as a resource for regional regulatory support and national policy making. She led 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 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, 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 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.

State of Illinois-owned Properties and the NFIP: A journey towards compliance
Stephen Altman, Illinois Department of Natural Resources, steve.altman@illinois.gov
Co-presenters: Erin Conley, erin.c.conley@illinois.gov

Abstract: Since 2006, the State of Illinois has utilized Executive Order 2006-05 –"Construction Activities in Special Hazard Areas" to indicate that the State of Illinois has land use authority supporting administration of a floodplain management program for State of Illinois Property. In 2019, FEMA Region V requested documentation from the State of Illinois to demonstrate that the State was managing its property in compliance with NFIP requirements. In 2022, after review of the submitted documentation, FEMA Region V provided the State of Illinois with an assessment and summary of findings that the State needed to strengthen its management of State-owned property. This presentation will discuss activities the State of Illinois has undertaken in to ensure the State of Illinois maintains its status as a participating community in the National Flood Insurance Program.

Biography: Steve currently serves as Manager of OWR's Division of Resource Management which includes Downstate Regulatory Programs, Northeastern Illinois Regulatory Programs, Dam Safety Program, Lake Michigan Programs, and Statewide Programs. The Division is responsible for all permitting authority under OWR, Illinois' participation in the FEMA's National Flood Insurance Program, and the State of Illinois-Funded Flood Mitigation Buyout program. Steve holds a Bachelor's Degree in Civil Engineering from Bradley University and is a licensed professional engineer in the States of Illinois, Nevada, and Texas, and is a Certified Floodplain Manager.

G3: Risk Communication How-to
Track: Risk Communication

Clear as Mud: crafting plain language messages to increase flood awareness
Matt Lyttle, PMP, Guidehouse, mlyttle@guidehousefederal.com
Co-presenters: None

Abstract: According to FEMA's National Household Survey (2022 NHS), people who perceive that they are at risk to a hazard are more than twice as likely to intend to prepare. However, the outreach and marketing efforts of emergency managers across the country seem to have little effect on people taking action. In fact, the 2022 NHS shows a drop in virtually all preparedness actions compared to the year previous. What are we missing here? Perhaps the disconnect is in the flood awareness message itself. This session will examine three popular flood awareness messages used by emergency managers. In real time, the presenter and audience will evaluate each message for its simplicity, clarity, and ease of understanding. The group will adapt the messages to improve them in each of these categories in a workshop-like environment. The resulting messages developed by attendees will serve as plain-language alternatives to those commonly used today. The session will serve as an instructive review of typical flood awareness messaging and offer participants insights that they can bring home to their communities. As a result, attendees will have the ability to craft more plain-language messages in the future and reverse the trend of declining preparedness action in their communities.

Biography: Matt Lyttle is a Director in the Defense and Security Segment at Guidehouse. He supports federal clients in transforming disaster programs to improve equity in service delivery. Before joining Guidehouse, he was U.S. Senate Homeland Security and Government Affairs Committee (HSGAC) staff, where he developed legislation on disaster resilience and emergency management. Matt has also held several positions within the U.S. Federal Emergency Management Agency (FEMA), including as the Acting Deputy Director of Individual and Community Preparedness. Matt has deployed to respond to multiple federally declared disasters, including Hurricanes Sandy, Harvey and Maria. Matt is a Returned Peace Corps Volunteer, serving in Nicaragua and witnessing long-term effects of insufficient hazard mitigation throughout his service. He continues to build resilience in Latin America by introducing community preparedness initiatives in Bolivia, Chile, Honduras, and Mexico. He is a Security Fellow in the Truman National Security Project focusing on the intersection of climate change and national security. Matt lives in Fairfax County, Virginia.

A Primer on Public-Facing Data Visualization

Sean McCarthy, Booz Allen Hamilton, mccarthy_sean2@bah.com
Co-presenters: None

Abstract: Recent events such as the flooding in Montpelier, Vermont's state capitol, and devastating rain from Hurricane Otis's intensification to a Category 5 in less than 24 hours indicate the importance of having mitigation efforts and an informed community for reducing flood damages. With models predicting a 26% increase in flood risk by 2050 and average annualized flood losses standing at $32 billion, knowing how to communicate flood risks and solutions is increasingly essential for local mitigation and safety efforts. However, turning flood data into a relevant, understandable, and accessible graphic is not only about having the right information, but also about how that information is being communicated, where that information is being displayed, and knowing the graphic's audience. Communicating flood-risk data has the added challenge of complex geographic and risk data, which are confusing and stressful subjects for public audiences. This presentation offers a primer in creating public-facing graphics that effectively communicate the risks of flooding. The focus of this presentation will be the dos and don'ts of graph and map making through a range of topics from selecting graphs and using the right language to asking questions for understanding an audience. For example: When is a good time for a pie chart? The answer is never, unless it is to show how much a pie has been eaten. And

what does a 17-year-old need to know about flood risk and is the information easily accessible for them? How is the answer different or similar for a 39-year-old, a renter, or a single parent?

Biography: Sean McCarthy is a Senior Consultant at Booz Allen Hamilton, supporting the data visualization and analytics needs of FEMA's Floodplain Management Division. Previously, Sean worked on converting climate risks into financial impacts for The Climate Service, an S&P Global company, and researched climate trends as an AmeriCorps member serving the American Red Cross in Greater New York. He holds a Master of Environmental Management degree in Environmental Economics and Policy from Duke University and a Bachelor of Science degree in Global Development from Cornell University.

Be (havioral Science) the Change: Using Applied Behavioral Science to Better Communicate Risk and Support Behavior Change

Griffin Smith, Resilience Action Partners, griffin.smith@ogilvy.com
Co-presenters: Peter Herrick, FEMA, peter.herrickjr@fema.dhs.gov and Yifei Gao, Resilience Action Partners, yifei.gao@ogilvy.com

Abstract: You've heard about behavioral science, but how can you actually use it to solve the resilience challenges you face in your work? Beyond being a buzzword, behavioral science can help convey risk information, change behavior, and more. This training will briefly introduce behavioral science but focus on immediately applicable, tangible tools and skills. Throughout its regional and headquarters' projects, FEMA applies these tools to deliver greater, more lasting impact. The training will explore both the EAST framework, a tool for changing behavior by making products and processes Easy, Attractive, Social as well as behavioral principles for conveying risk. The presentation will highlight examples that showcase how FEMA brought these tools to bear on a variety of resilience challenges. Attendees will also receive worksheets as leave-behind tools to use in the future. The worksheets will include an overview of the major behavioral principles related to resilience and a guide with prompts for understanding diverse audiences. This presentation will: 1. Teach trainees to better convey risk information through behavioral science. They will learn about key principles relevant to risk communication and practice applying them. 2. Tie directly into broader customer-centricity changes FEMA is looking to drive. Better conveying risk information to and engaging with audiences allow FEMA to support customer-centric ways of work.

Biography: Griffin Smith directs the behavioral science team on the FEMA CERC contract. He supports FEMA engage with and communicate risk to communities across the country to build resilience for climate-caused natural hazards. Before joining Resilience Action Partners, Griffin worked for ideas42, a behavioral science, social impact consultancy. At ideas42, Griffin led teams focused on issues including climate adaptation and mitigation, public transportation, renewable energy, and government training. Prior to that, Griffin worked as a policy advisor at MIT where he developed climate mitigation policies in Malaysia. While at MIT, Griffin also created and taught courses on negotiation and impact assessment. Griffin spent a summer in Utah as an MIT fellow piloting methods of discussing climate change with rural communities. Griffin has experience as non-profit negotiation and mediation consultant and helped stakeholders reach consensus decisions on a range of policy issues. Griffin holds a masters from MIT and a BA from Grinnell College.

G4: Modeling Flood Risk in Arid Regions
Track: Arid Regions/Modeling

Green and Ampt Infilration in the West: Applications and a Little Theory

Nathanael Vaughan, PE, JE Fuller Hydrology & Geomorphology, Inc., nate@jefuller.com
Co-presenters: Elizabeth Rockwell, Elizabeth.Rockwell@Maricopa.Gov

Abstract: Have you ever had questions about infiltration methods, but been too afraid to ask? This presentation provides an introduction to the fundamentals of Green and Ampt infiltration, examples of regulatory implementation in several jurisdictions, how it's used in several popular modeling platforms, and applications of use in the western US. The Green and Ampt infiltration methodology has historically been applied based upon soil texture class (sand, loam, silty loam, etc.) from reference tables. Broader use of the Green and Ampt infiltration methodology has been hindered by a lack of readily available, localized reference datasets as well as popularized usage of alternatives such as the NRCS Curve Number methodology. Modern methodologies and datasets have allowed for development of improved texture class relationships and project-specific, spatially variable parameter assignment. Implementation methods and guidelines for applying the methodology are provided to assist technical professionals and regulatory agencies in implementing the methodology to facilitate flood hazard identification and mitigation. Both statewide and local implementations are reviewed. With improvements in technology and increasing sophistication of lumped parameter and 2-dimensional modeling platforms, the physically-based Green and Ampt methodology can be incorporated more easily over a broader geographical range than has been previously available. While the Green and Ampt infiltration methodology is incorporated into multiple popular hydrologic and hydraulic modeling packages, not all implementations of Green and Ampt infiltration are the same. Examples of implementation of the values, methodologies, and models discussed are included. Discussion elements include rainfall abstraction, parameter sensitivity/calibration, and routing losses. This presentation will show the audience the fundamental theory of the Green and Ampt methodology, educate on the availability of data for other jurisdictions, the significance of various input parameters, and how the methodology is applied in different regions and models.

Biography: A registered professional engineer in Alaska, Arizona, California, and Utah, Nate has worked throughout the western United States over the past 18 years. Since starting his professional career in Arizona, Nate has enjoyed working on and managing a wide range of projects including large scale flood mitigation design, dam inundation, manual development, geomorphology studies, and sediment transport analysis, among others. Technical analysis, automation, and communicating flood risk and results are some of Nate's favorite parts of working in flood mitigation and hazard identification. Nate graduated from the University of Alaska Fairbanks with BS and MS degrees in Civil Engineering while working on several research projects for the Alaska Department of Transportation and Public Facilities. When he's not working, Nate can be found telling corny jokes while hiking and enjoying the outdoors with his family.

The Silvies River Basin- Balancing Flood Mitigation With Groundwater Regeneration

Benjamin Cary, PE, CFM, Kleinschmidt Group, ben.cary@kleinschmidtgroup.com
Co-presenters: Cheyenne Kinn, Kleinschmidt Group, cheyenne.kinn@kleinschmidtgroup.com

Abstract: This presentation will provide a summary of the Silvies River Flood Mitigation Analysis completed by Kleinschmidt associates on behalf of Harney County in southeastern Oregon. Harney county and its residents have been negatively impacted by changing climate in the form of severe spring flooding, known as spring freshets, as well as rapidly decreasing groundwater levels resulting from irrigation practices and loss of surface recharge. Harney County contracted Kleinschmidt Associates to model the existing Silvies River basin and its current flood exposure, and to use this model to identify potential candidate projects that would reduce flooding during large spring freshet events, while also promoting additional groundwater recharge. Additional extension of this model through the remaining downstream portion of the Silvies River further provides a tool for Harney County to evaluation flow distribution in the basin moving forward. Identified candidate projects included hard infrastructure, water management, wet meadow, and other more "wild" solutions....

Biography: Ben Cary is a hydraulic engineer and H&H section manager for Kleinschmidt Associates who works out of his home office located just north of Portland, Oregon. Ben graduated from Gonzaga University with a BS in Civil engineering in 2015 and has since worked as a consultant focusing on water resources projects. Along with being a P.E. and CFM, Ben teaches hydraulic modeling (HEC-RAS) classes to professionals all over the US and internationally. He also co-hosts a YouTube video podcast "Full Momentum" with Chris Goodell which focuses on all things HEC-RAS. In his spare time Ben is fully hooked on Pickleball and enjoys spending time with his son who just turned 1 in May.

Zion National Park: Post-Flash Flood Modeling and Mitigation

Rachel Mares, WSP, rachel.mares@wsp.com
Co-presenters: John Loranger, john.loranger@wsp.com

Abstract: Zion National Park's breathtaking landscape that attracts thousands of visitors annually also brings with it the dangers of flash flooding and debris flows. With exponential increases in annual visitors to the park over the last 5 years, many improvements are planned for the park which need to hold up to this inevitable risk. In June of 2021, a flash flood caused significant damage to facilities and property near the park's South Entrance. Following this event, the National Park Service hired WSP to conduct a hydrologic and hydraulic analysis, including a key two-dimensional (2D) sediment transport piece, to recommend drainage improvements and provide feedback on current Park development plans. This presentation will include an overview of the flood event and damages, the Park's immediate actions, the analysis methods including the HEC-RAS 2D Sediment Transport software feature, challenges faced, and the resulting improvement recommendations.

Biography: Rachel manages the Surface Water Practice Area in WSP's Salt Lake City, Utah office. She has over 8 years of experience as a professional water resources engineer. Rachel's areas of expertise include watershed and urban stormwater hydrology and hydraulics (H&H) analyses, primarily related to flood risk management and mitigation. Rachel enjoys taking in the beautiful Utah landscapes on skis or trail running shoes with her husband and two dogs.

G5: Natural and Beneficial Functions and Coastal Environments
Track: NBF

Resilience, Redundancy, and Recreation - Construction of a Mile Long Living Shoreline in front of a Federal Levee
Michelle Gonzales, CFM, Jefferson Parish Government, MGonzales@jeffparish.net
Co-presenters: None

Abstract: Jefferson Parish, Louisiana, contains abundant (albeit diminishing) natural habitat critically important to our ecosystem, economy, culture, and safety. The Parish is experiencing the second-highest rate of land loss in coastal Louisiana due to the effects of sea level rise, subsidence, hurricanes, storm surges, disconnection of the Mississippi River from coastal marshes, oil and gas activity, and other human impacts. We recognized a need to design and build a project that elevated our protection against storm surge, created and/or restored native habitat, and provided recreational benefits to the community. This presentation will cover the development and implementation of a living shoreline and marsh creation project designed to rebuild a previously existing natural first line of defense against flooding due to storm surge and rising sea levels, and to support the restoration of the water quality and ecological functions of Lake Pontchartrain. Special emphasis will be placed on the regulatory challenges associated with constructing in front of a federal levee and within the critical habitat of an endangered species; the economics of the project; and the biological and recreational benefits.

Biography:

Getting More Benefits and Equity from Integrated Solutions. Go Nature-Positive!
Luce Bassetti, PhD, ENV SP, GISP, WEDG, Jacobs, luce.bassetti@jacobs.com
Co-presenters: Paul Robinson, paul.robinson@jacobs.com and Paul Hargreaves, paul.hargreaves@jacobs.com

Abstract: We need developments and communities to be more inclusive, nature-positive, and yet still able to thrive economically. In the coastal environment, a new understanding is emerging that can guide more synergistic and regenerative relationships between efforts to protect coastal community assets and their supporting natural processes. Further inland, flood and stormwater management solutions can achieve significant environmental and social benefits that can enhance communities beyond simple dollar terms. How do we achieve a balance between designs for traditional hard engineered structures and armoring, and conserving or restoring ecological systems and their myriad benefits? Flood and Coastal risk reduction typically can be achieved through multiple approaches which can be made with a combination of nonstructural, structural and natural or nature-based measures. The type of reduction measures depend upon many factors including the project objectives, reliability, space, cost. A hybrid solution can also evolve to a natural solution with the use of natural material. These solutions can even be "nature positive", restoring ecosystems and contributing to biodiversity improvements. To better adapt and evolve to our changing world, natural systems can serve as a driver for innovation in flood and coastal protection in two ways: • Bio-utilization – the use of living systems as protective/stabilizing structure (i.e. mangroves, tidal marsh, living shorelines, etc.) • Biomimicry – examining natural forms, structure, processes that can be mimicked in engineering and architectural design This presentation will define Bio-utilization and Biomimicry solutions for coastal protection and flood management contexts, identify their benefits, provide examples of how these have been applied to projects in the US and UK, and finally outline research trends with implications for the future.

Biography: Dr. Bassetti is the Americas Coastal Resilience Director for Jacobs. Luce has 19 years in the management and technical study of regional and international maritime projects related to port and coastal engineering and climate/vulnerability impact assessments. Luce started her career as a numerical modeler and has focused on coastal resilience, climate change, and sustainable development for the past 10 years to undertake global challenges. She aims to understand the social and economic sides of projects in different regions, the impacts on communities, and applicable climate change policies. In 2022, Luce was elected as the new Climate Change Champion for the PIANC EnviCOm Commission.

Using a large-scale marsh habitat restoration project to reduce flood insurance premiums on Dauphin Island, Alabama

Meg Goecker, Moffatt & Nichol, mgoecker@moffattnichol.com
Co-presenters: Renee Collini; rcollini@thewaterinstitute.org

Abstract: Dauphin Island, Alabama, as a part of the northern Gulf of Mexico barrier island system, provides protection to a large portion of the state's coastal resources and approximately one-third of Mississippi Sound. The island has experienced historical beach and back-barrier marsh erosion driven by climatic and anthropogenic events which threaten the ecological services and protection provided by Dauphin Island. Graveline Bay, on the back-barrier side of Dauphin Island, has experienced approximately 75 acres of marsh erosion over the last 170 years. The National Fish and Wildlife Foundation Gulf Environmental Benefit Fund funded the construction of the Graveline Bay Marsh Restoration Project to remedy harm to injured natural resources from the Deepwater Horizon oil spill. Completed in the spring of 2023, the project restored approximately 60 acres of back-barrier marsh habitat through the design and construction of marsh mounds, maximizing the linear footage of highly productive marsh edge habitat. Additionally, nearby homeowners have experienced secondary benefits from the sheltered wave climate during high water level events. This reduction in flood risk is being studied by The Water Institute's Gulf Center for Equitable Climate Resilience to understand how the change in flood risk impacts actuarial risk rating with the goal to inform FEMA's Risk Rating 2.0 for the residents around this Bay. This pilot project scope includes engineering analysis on changes in total water levels; engaging residents to assess type and frequency of flood insurance; education on FEMA's new Risk Rating 2.0 and the goals of the project; assessment of risk reduction; and generation of content for each homeowner with change in flood frequencies and corresponding reduction in actuarial risk; supporting residents to share results with insurance agencies; and tracking of road blocks to see if this project lowers premiums.

Biography: Meg Goecker has 20 years of project management, environmental assessment, and restoration planning experience. Her previous experience includes serving as a marine habitat restoration specialist for the NOAA Restoration Center where she had oversight of contractor performance on coastal and marine restoration/research projects in Mississippi, Alabama, and the Florida panhandle. She has been a lead planner across a diverse range of projects from watershed planning in Mississippi and Alabama to marine planning and monitoring plan development in Australia and the Gulf of Mexico. As a project manager and senior scientist, she has supported municipalities, Non-Governmental Organizations (NGOs), and state/federal agencies in restoration project development, grant writing, restoration planning, and environmental assessments for projects related to the Deepwater Horizon oil spill. She has advanced planning through design and into implementation

for numerous large-scale coastal habitat restoration projects including oyster reefs, seagrasses, marsh, and living shorelines projects across the Gulf Coast. These experiences are underpinned by a strong background in marine ecological research, including collecting, organizing, evaluating, and reporting on data from coastal and marine ecological ecosystems.

G6: Risk Assessments for Mitigation
Track: Mitigation -2

Elevate Your Risk Assessment with BLE
Shanene Thomas, FEMA Region 6, shanene.thomas@fema.dhs.gov
Co-presenters: Rosemary Bolich, bolichrr@cdmsmith.com

Abstract: Hazard mitigation plans are a critical component of building resilient communities. This presentation will discuss how to apply Base Level Engineering (BLE) data in creation of a hazard mitigation plan, specifically in the risk assessment portion of the plan. FEMA Region 6 has strategically invested in BLE data with the goal of developing BLE for the whole region. Traditionally, this data has been underutilized in hazard mitigation planning. However, BLE data can be of great value when working on risk assessments, especially for smaller communities and communities that have older floodplain mapping. BLE enhances effective zone A data and, in that, provides data availability where it may not otherwise exist. This presentation aims to give attendees an understanding of the role that BLE data can play in the development of hazard mitigation plans, both for risk assessments and in other applications such as the Community Rating System. The presentation will include a demonstration of the FEMA Region 6 Base Flood Elevation Viewer, a widely used source of BLE data for Region 6.

Biography: Shanene is a Hazard Mitigation Planner at FEMA Region 6, with over 18 years of emergency management experience in both federal and state government. She reviews local, state, and tribal mitigation plans; provides technical assistance for all hazards planning efforts (primarily in Oklahoma and New Mexico); instructs EMI courses; and is involved in multiple efforts to improve emergency management across the various disciplines. Shanene is also the Tribal Liaison for the Mitigation Division assisting as the primary point of contact for Tribes regarding all aspects of mitigation including mitigation grants, the National Flood Insurance Program (NFIP), and Risk Mapping, Assessment, and Planning (Risk MAP) efforts to assist in building capabilities for the Region's 68 tribes.

Flood Impact Assessments to Serve Vulnerable Alaskan Communities
Nora Nieminski, PhD, Alaska Division of Geological & Geophysical Surveys, nora.nieminski@alaska.gov
Co-presenters: None

Abstract: Nearly 150 communities in Alaska are threatened by frequent flooding related to increased storm activity, erosion, and permafrost degradation. Although local and statewide flood mitigation decisions require a defined understanding of flood risk, this risk has not been adequately determined for many Alaskan communities due to a lack of baseline data, historical storm records, and/or assessment of flood impacts. The State of Alaska's Division of Geological & Geophysical Surveys (DGGS) Coastal Hazards Program aims to enhance decision making support for coastal geohazard response and resource management by providing Alaskans with sound scientific investigations of coastal processes and

documented storm impacts. The DGGS is refining flood risk assessment by including community-specific insights and local knowledge of historical storm impacts and flood heights in addition to flood impact categories, which are critical for enhancing resilience. Flood impact categories are defined using National Weather Service terminology and are based on the elevation of critical infrastructure within each community. Flood impact assessment products include written reports and maps that better communicate results within communities, which are frequently underserved and have high Alaska Native populations, and to agency and other stakeholders. Refining flood risk assessment in Alaska's unique and extreme environment is aimed to help guide mitigation strategies and ensure the resilience of Alaska's coastal communities in the face of changing climate.

Biography: Dr. Nora Nieminski recently joined the State of Alaska Division of Geological Surveys to manage the Coastal Hazards Program. Nora earned her Ph.D. in Geological & Environmental Sciences from Stanford University where she completed her dissertation research on deep-water sedimentary rocks in Namibia and New Zealand. She then did a postdoc with the Monterey Bay Aquarium Research Institute where she worked on sediment transport patterns and modern deep-water systems such as the Monterey submarine canyon. Before moving to Alaska, Nora worked on sedimentary systems and earthquake hazards along the Cascadia subduction margin as a Research Geologist at the USGS Pacific Coastal & Marine Science Center.

Upcoming Updates to the National Risk Index - Inland Flood Hazard with FEMA Risk Rating 2.0 Data

Casey Zuzak, FEMA, casey.zuzak@fema.dhs.gov
Co-presenters: Emiliano Gonzalez-Santin**,** FEMA, emiliano.gonzalezsantin@fema.dhs.gov; Annie Sheehan, anne.sheehan@fema.dhs.gov; and Benjamin Roberts, broberts@absgroup.org

Abstract: Adaptation projects are typically evaluated using benefit cost analyses, which often overlook the needs of disadvantaged communities by undercounting the baseline risks and potential benefits of proposed solutions. Risk quantification often relies on federal methodologies that do not adequately consider the local context of flood risk. By integrating new methodologies into various levels of risk quantification, decision-makers can better understand the potential impacts of flooding and develop more equitable and effective strategies for risk reduction and resilience building. For example, the development of standard federal DDFs, such as those found in HAZUS, is opaque at best. Our new approach allows for the development of DDFs tailored to specific regional specifications, resulting in greater transparency and improved accuracy. By considering local building typologies, these updated functions provide a more realistic estimation of potential flood impacts. In addition, the methodology for annualizing risk consistently undercounts the changing nature of flood events over time. With climate change, today's 1% storm may be tomorrow's annual event. We suggest an approach for annualizing risk that uses interpolated future exceedance probabilities of present-day flood events to yield significant differences in expected annual damages. This methodology provides a more comprehensive understanding of the potential impacts. We also recognize the importance of considering social equity in flood risk assessments. By integrating a social equity weighting factor based on the marginal utility of a dollar, damages are weighted to reflect the ability of residents to pay. This presentation will highlight these three key innovative methods for improving the quantification of flood risk, with a particular emphasis on addressing the needs of socially disadvantaged communities by using

transparent DDFs, integrating changing flood probabilities into annualizing risk, and weighting risk by local ability to pay.

Biography: Casey Zuzak, GISP is a Senior Risk Analyst for Hazus and Natural Hazards Risk Assessment Program (NHRAP) in the Risk Management Directorate at the Federal Emergency Management Agency (FEMA) and Lead for the National Risk Index. The NHRAP provides natural hazard risk assessment data, tools, and analyses to support FEMA strategic goals in the development of risk communication. Casey has worked for FEMA since 2011 and has a M.S. in Geography from the University of South Carolina.

G7: Planning and Design for Structural Flood/Floodplain Protection
Track: Dams & Levees

Best Practices for a Large-Scale Levee System Survey Data Collection Program
Matthew Redington, PE, HDR, matthew.redington@hdrinc.com
Co-presenters: None

Abstract: The AECOM-HDR Joint Venture contracted with the Galveston District of the US Army Corps of Engineers in 2019 to begin levee design services for the Sabine to Galveston, Coastal Storm Risk Management and Ecosystem Restoration project. The planned design included improvements to extensive portions of a 44-mile levee system along the Brazos River, the Old River, Oyster Creek, and DOW barge canal waterways which flow to the adjacent Gulf of Mexico. The location and facilities protected by this system include the Township of Freeport, United States Strategic Petroleum Reserve, petrochemical processing facilities for DOW Chemical and Phillips66, a port (Port Freeport), commercial areas, and residential areas. The highly complex nature of the project created the need for a large data collection program to support design. A well-planned data collection effort, careful execution, and robust quality reviews are an essential part of achieving success for a large-scale project. The data collection task order was a $15.3M effort to acquire data on geotechnical conditions, utilities, easements and right of way, planimetrics, photogrammetry, supplemental topographic survey, and bathymetry. Geotechnical and utility data collection were particularly challenging given the diversity of geotechnical conditions, dense industrial areas, and the large number of potential utility conflicts. This presentation introduces the Freeport Levee project, summarizes how this complex data collection program was executed, and explains the quality system that was implemented to review data as it was collected and confirm that the data collected was suitable for subsequent design efforts. This presentation includes ideas on how data collection programs should be completed and summarizes best practices through our experiences on the Freeport project related to documentation, assessing completeness of data sets, quality management, data management practices, and field safety.

Biography: Matt has 26 years of experience as a civil engineer and is a senior business class leader for HDR's civil works program. He also serves as the lead for HDR's civil design practice group. His specialty is design of flood protection systems including levees, floodwalls, dams, and hydraulic structures. Matt is based out of HDR's Minneapolis, MN office. He obtained a Bachelor of Science in Civil Engineering from Iowa State University and an MBA from the University of Nebraska.

Illuminating Levee Outreach: Boosting Flood Risk Reduction in Disadvantaged Communities

Caroline Jones, PE, CFM, Freese and Nichols, caroline.jones@freese.com
Co-presenters: John Wethington, john.wethington@fema.dhs.gov and Ken Hinterlong, ken.hinterlong@fema.dhs.gov

Abstract: With the rise of boat traffic in the 1920's, Cairo, Illinois, was once an ideal location for a port city. Since then, the population has declined significantly, and the city is now considered an economically disadvantaged community. With 25% of the continental United States draining to this location, Cairo is completely surrounded by levees at the confluence of the Mississippi and Ohio Rivers at the southern tip of Illinois. As part of an ongoing flood map update, FEMA is working with stakeholders to identify the 1% annual chance flood hazard in areas impacted by levees. This includes helping the City of Cairo understand what information is required to maintain accreditation of their levee on a FEMA map. This involves a concerted effort from State and Federal partners comprised of representatives from FEMA, USACE, and key Illinois state agencies. This team developed an outreach plan to present consistent messages and options to the local stakeholders in the levee-impacted areas, helping them to understand their flood risk and the process to pursue levee accreditation. Like Cairo, the City of Golconda, Illinois, is an economically disadvantaged community surrounded by levees and needs to increase their flood risk awareness. The City of Golconda has a USACE-constructed levee system on three sides but does not have an NFIP flood map that reflects the city's flood hazard. FEMA Region 5, FEMA's support contractors, and the Illinois State Water Survey are working with the local stakeholders to educate them and the community on the NFIP and levee accreditation process. These two case studies in FEMA Region 5 will highlight the successes of working together with local stakeholders to increase flood risk knowledge in levee-impacted areas.

Biography: Caroline Jones was born and raised in North Dallas. She earned her bachelor's degree in Biosystems Engineering from Oklahoma State University in 2015, and subsequently started her career that summer in Oklahoma City. In January of 2020, she moved back to Dallas. As the quote goes, "You can take the girl out of Texas but not the Texas out of the girl." Caroline's career has focused on stormwater management including bridge hydraulics, roadway drainage design, FEMA floodplain studies, and community engagement. In 2022, she started working with FEMA Region 5 as part of the Regional Service Center, specializing in levees and stakeholder outreach. Caroline currently works for Freese and Nichols in the Dallas office and is a registered Professional Engineer and a Certified Floodplain Manager in Texas and Oklahoma.

Breaking Up The Banks: Willamette River Bank Protection Consequence Assessment

JD McLandrich, AECOM, jd.mclandrich@aecom.com
Co-presenters: Yacoub Raheem, yacoub.raheem@aecom.com

Abstract: The U.S. Army Corps of Engineers (USACE) Northwestern Division, Portland District (CENWP), has the responsibility of administering the Willamette River Bank Protection (WRBP) Program, which consists of 193 federally constructed structures, or revetments, constructed under the 1936, 1938, and 1950 Flood Control Acts (FCAs) for reducing erosion potential on the Willamette River and tributaries. A previous study developed an estimate of the channel migration zone by combining the FEMA 0.2 percent annual chance (500-year) flood extents with datasets for historic flood extents and historic channel locations. This approximate channel migration zone was split into 45 revetment reaches, grouping together revetments based on location, type, and topography, and those that appear to work

together, where if one were to fail, others might fail as well. This study developed a consequence assessment methodology for ranking the 45 revetment reaches based on likelihood of loss of life and damage to critical infrastructure if revetments were to fail. Population near revetments were estimated using the FEMA Hazus database. Critical infrastructure included government institutions (e.g., airports, fire stations, medical centers, schools, and post offices), bridges, oil and natural gas pipelines, railroads, commercial/industrial/agricultural buildings, and transmission lines. The goal of the consequence assessment was to prioritize repairs to the revetments and identify sites that have the potential to be repaired using bioengineering methods.

Biography: JD McLandrich has been a GIS specialist with AECOM for 17 years. He graduated from the University of Kentucky with a degree in geography. He first became interested in geography when he was a kid and spent many road trips flipping through the road atlas. JD enjoys playing handball and mountain biking.

G8: Mapping and 2D Modeling
Track: Mapping

Floodways in 2D – How much of an increase does one foot of surcharge cause
Richard Gleason, P.E., CFM, Kasraie Consulting, gleason@kasraieconsulting.com
Co-presenters: Alan Lulloff, alan@floods.org

Abstract: Floodways in 2D – How much of an increase does one foot of surcharge cause The Federal Emergency Management Agency allows floodways to be developed with a one-foot surcharge. This surcharge is the amount of increased flooding allowed when mapping the floodway. The amount of area in which development can occur is increased by narrowing the width of the natural floodway. On average this decreases the width of the natural floodway by 50 percent. Two dimensional engineering models provide more information than historic one-dimensional models. One-dimensional engineering models focus on conveyance. Two-dimensional models also assess the impact of loss of storage and provide information on velocity in addition to flood elevations. Floodway surcharge is not added to the Base Flood Elevation. It is a future condition that will increase flooding above the BFE and cause flood waters to extend beyond the FEMA designated Flood Hazard Area. This project evaluated a set of case studies to determine the amount of increase that occurs when one foot of surcharge in the floodway spreads out beyond the floodway and how much additional land area is inundated in the annual once percent annual chance event. This presentation will present information on how floodways are mapped, discuss how to evaluate floodways mapped with 2 dimensional modeling related to federal standards, and provide information on the impacts of one-foot of floodway surcharge.

Biography: Rich Gleason, PE, CFM Rich is a Senior Engineer with Kasraie Consulting (KC), and he has 24 years of professional civil engineering experience, including 12 years with KC. During his career, Rich has worked on hundreds of innovative 1D and 2D hydrology & hydraulics (H&H) modeling projects, flood control design, floodplain management, FEMA Letters of Map Change , peer review studies, drainage deficiency analysis, computer numerical modeling, storm drain atlas mapping, stormwater quality, and Geographic Information System (GIS). Most recently, Rich has conducted special 2D Floodway Analysis for ASFPM, and has provided quick response Post-Fire H&H engineering modeling and flood hazard and

risk mapping services to several municipalities in response to the Thomas Fire and the Woolsey Fires in Southern California. Kasraie Consulting is a Ventura County, California-based civil engineering/hydrology consulting firm. It has been in business for 21 years, providing conceptual drainage design, hydrology, hydraulics, floodplain management, engineering plan checking, analysis, GIS mapping, and Lidar topography services to local municipalities, public agencies, private development, and the engineering community.

Problems integrating provided 2D BLE data with effective flood maps; Case Study

Monica Urisko, AtkinsRéalis, Monica.Urisko@atkinsrealis.com
Co-presenters: None

Abstract: Problems integrating provided 2D BLE data with effective flood maps; Case Study In this case study, a 2-dimentional model for the Yellow River watershed has been built for the client. This model was calibrated using flows from the Yellow River and not from its tributaries. As a result, the 2-dimensional base level engineering (BLE) will not tie in properly with the existing effective zone A and AE flood maps. There are locations where the 100yr BLE floodplain is more than 0.5 feet above the zone AE water surface elevation (WSE). The BLE model ties in well where it meets the main line of the river, but not well on the AE sections of the tributaries. Approximately 40% of the 1586 points sampled exceed a 0.5-foot threshold with many exceeding by 3 feet or more. Results also show higher peak flows in the tributaries of the BLE models. Similar results are observed when the BLE is compared to the available gage data. The simplest solution for these issues would be to remap the watershed and calibrate the model at the tributary level. This would also be the costliest solution. To help salvage the client's investment in the original 2-dimentional maps, alternate integration techniques were investigated. This presentation will summarize the technical issues noted in the Yellow River project for mapping of the 2-dimentional BLE study data provided. The presentation will then discuss a series of options considered and a final course of action selected which is far more cost efficient that simply remapping the watershed.

Biography:

Federal Flood Risk Management Standard 2D Freeboard Value Analysis Mapping Approach

Cody Garcia, CDM Smith/Compass, codygcia@gmail.com
Co-presenters: None

Abstract: The Compass 2D Freeboard Value Analysis (FVA) methodology uses the computational mesh found within HEC-RAS models and FLO-2D models. The computational mesh was leveraged to map the FVA raster outputs by adding 1-ft, 2-ft, and 3-ft elevation gain to each value in the computational mesh. The FVA was interpolated from the computational mesh by creating triangulated irregular networks that were converted to water surface elevation grids. By using NFHL effective 2D models, the end user has an option for efficiently leveraging NFHL effective data for FVA raster production. Compass 2D riverine processes and tools will provide FFRMS end users an efficient option for producing FVA rasters for the plus 1-ft, plus 2-ft, and plus 3-ft FVA scenarios by using HEC-RAS and FLO-2D models. This presentation will showcase how GIS automation was leveraged to produce FVA rasters for the FFRMS plus 1-ft, plus 2-ft, and plus 3-ft FVA scenarios, as well as highlight some of the challenges encountered.

Biography: For the past five years, Cody has served as a GIS specialist supporting the FEMA RiskMAP project with Compass PTS JV and CDM Smith. Cody has leveraged Geospatial Information and Technology to help decision makers advance community resilience to natural disasters and reduce threat to life and property. Cody specializes in python tool production, 2-Dimensional floodplain mapping, cartography, web application development, and enterprise GIS development. Cody graduated from North Carolina State University in Spring of 2022 as a Master in Geospatial Information Science and Technology. Cody is a spatial thinker who is exited to be apart of new and emerging geospatial technologies.

G9: AI, Tools & Planning for Large Scale Modeling Efficiency
Track: Modeling

Floodplain Studies as Elephants: A Method for Partitioning a 485-mile Long Study Reach

Doug Brugger, PE, CFM, Montana Department of Natural Resources and Conservation, douglas.brugger@mt.gov
Co-presenters: Russ Anderson, russell.anderson@mbakerintl.com

Abstract: The old adage - Question: How do you eat an elephant? Answer: One bite at a time – is applicable for tackling large, complicated flood risk studies. This was the approach utilized by Montana Department of Natural Resources and Conservation with support from Michael Baker, Intl. to update flood risk information along a 485-mile reach of the Milk River in northern Montana. The Milk River is a very low gradient river with a broad, complicated floodplain containing multiple split flows, several levee protected communities, areas that include floodways, and several locations where ice jamming represents potential flood risk. Longer periods of gaged flow data and advanced statistical hydrologic methods along with technological advances in topographic data collection and two-dimensional (2D) hydraulic modeling give us the tools to provide current, reliable, and highly detailed large-scale flood risk information for the communities along the Milk River corridor. However, just as critical as providing technically robust information is providing the information in a way that is readily usable to the communities and stakeholders in the study area – the models should have reasonable sizes and run times for use in future permits and map revisions. To this end, the 485-mile study reach (elephant) was divided into 23 different model domains (bit-sized pieces), with each domain delineated based on several factors such as ease of tie-in and matching county boundaries. This approach to planning and scoping large, complicated study areas is applicable across a wide range of study areas and study types, and this presentation will explore some of the advantages and lessons learned from this project-in-progress. Preliminary results will be utilized to demonstrate how the scoping/planning steps were implemented.

Biography: Doug Brugger is the State Floodplain Engineer for Montana's Department of Natural Resources and Conservation. Under FEMA's Risk MAP program, he and his team are managing updates to over 9,000 riverine miles of Montana's regulatory floodplain mapping. Doug grew up in Montana and studied Water Resources Engineering at the University of Wisconsin in Madison.

Leveraging AI-Assisted Scripting for HEC-RAS and HEC-HMS Automation

William (Bill) Katzenmeyer, PE, CFM, C. H. Fenstermaker and Associates, billk@fenstermaker.com
Co-presenters: None

Abstract: An exploration of the development of HEC-Commander tools With the release of ChatGPT's GPT-4, there has been intense interest on how to successfully leverage these tools in practice, with varying success. A successful use case has been emerged, leveraging AI tools for creation of scripts in Python to automate HEC-RAS and HEC-HMS modeling workflows. Utilizing AI tools, Fenstermaker successfully developed and open-sourced tools for Region 4 of the Louisiana Watershed Initiative, accompanied by a white paper detailing useful findings. The white paper "HEC-Commander: Command Line is All You Need" will be summarized along with a review of the tools successfully utilized in AI-assisted development such as GPT-4, GPT-4 Advanced Data Analysis, Microsoft Copilot, and Cursor. Several best practices and prompt examples will be presented that can be leveraged by water resources professionals without coding experience to generate working scripts with AI. Developing with an AI-centric design philosophy significantly increased the accessibility of python-based tools to users without coding experience. Several successful strategies will be shared, including a code-forward approach, context window driven modularity and linearity, and avoiding package publishing and automatic setup of environment dependencies, all of which are suitable for simple to medium complexity scripts. The result are scripts tailored to allow third-party editing via AI tools. Prompting examples, from structuring zero-shot prompts to Tree of Thought and Chain of Thought prompting strategies will be reviewed. Additionally, examples of leveraging the Advanced Data Analysis tool to directly manipulate data in its local environment as well as specific prompts utilized in the development of the HEC-Commander tools will be explored. The presentation will conclude with a brief discussion of the HEC-RAS parallelization, efficiency, and benchmarking examples for local and cloud compute platforms.

Biography: William (Bill) Katzenmeyer, P.E., C.F.M., serves as the Senior Water Resources Technical Lead at C.H. Fenstermaker and Associates, LLC, working remotely in the New Orleans Office, he brings over 15 years of experience spanning from physical and numerical hydraulic modeling to heavy civil design and FEMA grant management. Bill is currently Senior Water Resources Technical Lead at Fenstermaker for Region 4 of the Louisiana Watershed Initiative, spearheading the adoption of innovative AI tools tailored to address the unique challenges posted by to the Watershed Initiative's objectives and deadlines. Bill holds an active role in the American Society of Civil Engineers (ASCE) Coast Ocean Ports and Rivers Institute (COPRI) on both the Waterways and Ports and Harbors Committees as well as the Sea Level Change Task Subcommittee. Bill is spearheading an initiative to establish a new subcommittee to further explore how AI chat tools can accelerate development of practical tools for engineers.

Using Closing Teams to Improve Project Delivery: How to keep your project from slowing down

Reuben Cozmyer, AECOM, reuben.cozmyer@aecom.com
Co-presenters: Hayden Edwards, Hayden.Edwards@aecom.com and Katie Ringland, Katie.Ringland@aecom.com

Abstract: With the continued push for nationwide flood risk mapping, the ability to develop quality Zone A mapping that is both quick and cost effective is more important than ever. Appropriately sized teams are important to develop the models swiftly, and large teams often drag down budgets as the project slows down and nears completion. This abstract will describe how a "closing team" can lead portions of

a flood hazard project—all without additional software or hardware! The smaller, more agile closing team can help you bring the models to the finish line much more efficiently than the full complement of engineers that were required to kick the project off successfully. Using a strategy to dynamically size the modeling team allowed AECOM to make the rapid progress that the client required, and scaling back the team as the work progressed meant that communities were able to see their flood hazard as quickly and economically as possible.

Biography: Reuben is an engineering manager in AECOM's Kansas City office with over a decade of experience in watershed studies of various sizes. He was involved in the production of a best-practices document for performing watershed-level hydraulic studies using the 2-D features of HEC-RAS 5 and 6 as well as FEMA's development and implementation of probabilistic flood risk analysis. He has been a part of FEMA flood studies ranging from state-wide Base Level Engineering (BLE) coverage to Zone AE model development, covering all aspects of a study from scoping to delivery. His technical skills include hydrologic and hydraulic analyses to determine flood risk using Bulletin 17C stream gage analyses, regression equations, HEC-HMS, HEC-RAS, and XP-SWMM. Reuben received both his MS and BS in Civil Engineering from the University of Kansas.

G10: FEMA Floodplain Management - Training Roundup
Track: NFIP

Erin Cobb, FEMA Floodplain Management Division, Erin.Cobb@fema.dhs.gov
Co-presenters: Michael Gumpert, FEMA Floodplain Management Division,
Michael.Gumpert@fema.dhs.gov

Abstract: As FEMA continues to transform the NFIP, the training needs and interests of Floodplain Administrators, State and local officials, whole community partners and other NFIP stakeholders is also growing and changing. Come learn about all the new training initiatives and products available and coming soon from FEMA's Floodplain Management Division (FPMD), and how you can influence the future of floodplain management training and professional development! Participants will preview new courses, new tools, and updated publications all designed to build knowledge, experience and capabilities for effective State and local floodplain management programs. This session will highlight the National FPA Training Needs Assessment, updates to the FEMA 480 policy & guidance manual/desk reference, a new FPA Community Connection Portal, new and updated web-based and classroom courses, and more.

Biography: Ms. Erin Cobb is a National Training Coordinator within the Floodplain Management Division of the Federal Emergency Management Agency (FEMA) Headquarters office. For nearly 20 years, Ms. Cobb has served in a variety of capacities supporting administration of the National Flood Insurance Program at national, regional, state and local levels. She began her career as a floodplain mapping contractor for FEMA Region 7 before accepting a position in the Mitigation Division of FEMA Region 6 in Texas. In 2011, she transferred to FEMA Headquarters, where she led various aspects of FEMA's floodplain mapping and floodplain management program operations, including clarifying regulations and developing program policy and guidance. In 2018, Ms. Cobb returned to FEMA Region 7 as a Floodplain Management Specialist, then served for 3 years as Chief of the Region 7 Floodplain

Management and Insurance Branch before rejoining her colleagues at FEMA HQ in June 2023. An educator at heart, Ms. Cobb especially enjoys speaking at conferences and conducting floodplain management trainings and workshops and looks forward to supporting our State, Local, Tribal and Territorial partners and other FPM stakeholders to build resilient communities through sound floodplain management and mitigation.

Concurrent Session H

H1: Mitigation Planning
Track: Mitigation

Changing the Trajectory – Advancing Texas Flood Planning Initiatives
Cindy Engelhardt, PE, CFM, Halff, cengelhardt@halff.com
Co-presenters: Reem Zoun, PE, CFM, Texas Water Development Board, reem.zoun@twdb.texas.gov

Abstract: This presentation offers a thorough exploration of Texas State Flood Planning, tracing its journey from inception through the ongoing execution of its inaugural planning cycle. We also navigate through upcoming planning phases, spotlighting the plan amendment process that bridges planning cycles, discussing future adjustments in flood planning rules and cycles, and demonstrating the effective execution of risk reduction projects with the aid of diverse funding sources. Attendees will be empowered with a deeper understanding of the Texas flood planning process. This, in turn, will fortify their engagement, facilitate the successful implementation of flood risk reduction projects, and ultimately enhance community resilience. By advancing state flood planning initiatives, we can proactively alter the trajectory of future flood risk, fostering a more secure and resilient future.

Biography: Cindy Engelhardt is a civil engineer with a focus on water resources. In her 18 years at Halff, she has been involved in numerous floodplain management, flood planning and design projects throughout Texas. Cindy offers years of positive working relationships with FEMA, other federal agencies, state agencies, regional entities, local communities, and Cooperating Technical Partners. Her unique experience with multiple funding programs allows her to guide clients effectively. Through active participation in professional organizations such as the Texas Floodplain Manager Association, Texas Section ASCE, ACEC, and the Austin Branch of the ASCE EWRI, she has fostered trust with local, state, and federal agencies.

Meeting Those Dam Requirements – Lessons on Meeting HHPD Criteria in Hazard Mitigation Plans
Tony Subbio, CEM, CFM, PMP, Tetra Tech, tony.subbio@tetratech.com
Co-presenter: Gabriel A. Reed, MBA, BSBA, West Virginia Emergency Management Division, gabriel.a.reed@wv.gov

Abstract: Dam failures can be sudden onset events with people having little time to evacuate or protect their property. Therefore, reducing the risk of a dam failure has been a priority for communities across

the country. However, the cost of dam safety projects has been a major deterrent to getting these projects implemented. Since 2019, the Federal Emergency Management Agency (FEMA) has provided funding through the Rehabilitation of High Hazard Potential Dams Grant Program (HHPD) to protect lives and property downstream of high-hazard dams. Eligible activities under HHPD include conducting studies to determine risks associated with the dams, development emergency plans, engineering studies, repair and rehabilitation, dam removal, and others. The HHPD includes requirements for mitigation planning that must occur for a project to be eligible. This planning includes working with dam owners and operators and other stakeholders, assessing the risk from dam failure and to the dams from other hazards, and identifying goals and actions to reduce vulnerability. Because this planning largely mirrors the planning conducted by a jurisdiction in developing its HMP under the Disaster Mitigation Act of 2000, it makes sense for a jurisdiction's HMP to also meet the HHPD planning requirements. This presentation will describe how meeting the mitigation planning requirements of the HHPD can be integrated into an HMP update. The presentation will also review examples of best practices from local (county) and state HMPs that met HHPD requirements.

Biography: Tony Subbio is a community resilience consultant with over 20 years of experience helping municipalities, counties, regions, and states enhance their emergency management, hazard mitigation, and/or floodplain management programs. He has led dozens of county hazard mitigation plan updates across Pennsylvania and New York State and the 2023 State HMP Update for West Virginia; 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 hazard mitigation, floodplain management, and emergency preparedness topics at local, state, and national training sessions and conferences, and is a Certified Floodplain Manager and Certified Emergency Manager.

NRI applications in Hazard Mitigation Planning: Practitioner Case Studies

Jeff Brislawn, WSP Environment & Infrastructure Inc., jeff.brislawn@wsp.com
Co-presenters: Brian Neff , Brian.neff@wsp.com

Abstract: FEMA's National Risk Index (NRI) data and interactive website are just coming into broad use and are showing potential to provide a powerful and much needed link between hazard science and practice. The NRI models risk for every county in the United States using a consistent methodology for 18 natural hazards, including flood, drought, severe weather and more. These results can be downloaded and directly integrated into hazard state and regional hazard mitigation plans risk assessments, providing the ability to do comparative analysis and understand large-scale risk trends. Besides being readily available, one of the benefits of NRI in state hazard mitigation plan updates is the ability to analyze comparative flood risk using a consistent methodology, including rural areas that often do not have flood maps. Another benefit is the ability to readily access social vulnerability data and resiliency indices. This presentation will provide an overview of how the NRI can be leveraged for planning, based on case studies including state hazard mitigation plans for Utah, South Dakota, and New Mexico, in addition to a large-scale regional planning effort in Montana. The NRI proved useful in most cases, though some aspects have been limiting in these contexts. Strengths and limitations are discussed, in addition to a comparative analysis of various social vulnerability indices. The presentation concludes with opportunities for enhancement to further leverage this budding resource.

Biography: Jeff Brislawn is a hazard mitigation and emergency management consultant with WSP USA Environment & Infrastructure Solutions, Inc. and has over 30 years of related experience for state and local governments. Jeff has been the project manager on more than 65 local and state hazard mitigation planning projects, including the Utah State Hazard Mitigation Plan in 2023-2024, and been a contributor to numerous others. Jeff's background includes 12 years of public sector experience including work for the Colorado Office of Emergency Management and FEMA. Jeff has assisted numerous state, local, and federal clients with hazard risk assessment and related resiliency planning including multi-hazard mitigation plans, drought mitigation and response plans, dam failure evacuation plans, and local emergency operations plans. Jeff has an M.S. in Geology from Colorado State University and a B.S. in Geology from Ohio University and is a Certified Floodplain Manager.

H2: No Adverse Impact Floodplain Management
Track: NFIP -1

Land Use Strategies for Managing Flood Risk: No Adverse Impact Floodplain Stewardship
Janet Thigpen, CFM, Southern Tier Central Regional Planning & Development Board, jthigpen@chemungcountyny.gov
Co-presenter: Terri L Turner, AICP, CFM, HALOStrategicPlanningLLC@gmail.com

Abstract: The No Adverse Impact (NAI) approach to flood risk management and floodplain stewardship provides local planners and floodplain professionals with an approach to floodplain administration that is beneficial, legally defensible, palatable, and understandable to the community as a whole. It is based on the principle that the actions of one property owner should not be allowed to adversely affect the rights or property of other members of the community. This holistic approach to flood-risk management encompasses a variety of strategies and tools, which can be used to integrate NAI principles into local land use management programs. These NAI approaches help communities fulfill their responsibilities for promoting health, safety and public welfare and protecting property within their communities. This presentation will provide a better understanding of the No Adverse Impact approach to floodplain stewardship, inspire integration of NAI into local land use management programs, and provide concrete examples of how communities have incorporated NAI principles into their communities' programs.

Biography: Janet Thigpen, CFM serves as Co-Chair of the ASFPM No Adverse Impact Committee and contributed content to the No Adverse Impact Legal Guide for Flood Risk Management (ASFPM, June 2023). Ms. Thigpen serves as the regional Flood Mitigation Specialist at Southern Tier Central Regional Planning and Development Board. She has implemented a regional Flood Assistance Program since 1996, providing the three-county Southern Tier Central Region of New York State (Steuben, Chemung, and Schuyler Counties) with technical and planning assistance for diverse flood risk reduction activities. Ms. Thigpen holds a Bachelor of Arts Degree in Geology from Carleton College and a Master of Science Degree in Geology (Geophysics) from Cornell University. She received the Louthain Award for Distinguished Service from ASFPM in 2018.

Avoiding Legal Pitfalls When Implementing No Adverse Impact Floodplain Stewardship Regulations

Jerry Murphy, JD, AICP, CFM, University of Florida, murphyge@ufl.edu
Co-presenters: Thomas Ruppert, Esquire, tkruppert@wm.edu; Terri L Turner, AICP, CFM, HALOStrategicPlanningLLC@gmail.com; and Janet Thigpen, CFM, jthigpen@chemungcountyny.gov

Abstract: The ASFPM No Adverse Impact (NAI) Legal Guide for Flood Risk Management (aka NAI Legal Guide) is a tool for local planners, floodplain stewards, floodplain professionals, and their legal representatives to better navigate the law surrounding flood risk management and floodplain stewardship. The legal research for developing the Guide led to identification of strategies that communities can use to craft more robust flood risk management programs without subjecting themselves to increased legal risks. For example, a regulation is much less likely to be held as a taking of property rights if it is clear that the basis of the regulation is to prevent serious harm and injury to the community or its citizens. The requirements should be clearly related to the community's responsibility for promoting public safety and ensuring property protection. And community actions must be fair. This presentation will focus on these and other recommendations for integrating No Adverse Impact (NAI) principles into local regulations in a way that avoids successful legal action against the community. This presentation will provide communities with guidance for developing local land use plans and regulations that enhance flood resilience in a manner that is legally sound and can be successfully defended in court. Additional details about the legal cases from which these recommendations were derived can be found in the NAI Legal Guide.

Biography: Jerry Murphy, J.D., AICP, CFM is a principal investigator and author of the No Adverse Impact Legal Guide for Flood Risk Management (ASFPM, June 2023). Mr. Murphy is a State Specialized Program Agent for the Program for Resource Efficient Communities at the University of Florida. 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, and community resilience/sustainability. He currently works with local governments and regional planning councils 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 other challenges facing local governments in the 21st Century.

Legal Precedents Supporting Local Implementation of No Adverse Impact Floodplain Stewardship Programs

Thomas Ruppert, William & Mary, tkruppert@wm.edu
Co-presenters: Jerry Murphy, JD, AICP, CFM, murphyge@ufl.edu

Abstract: Courts have broadly and consistently upheld performance-oriented floodplain regulations, including those exceeding minimum National Flood Insurance Program (NFIP) standards for floodplain development. However, communities remain concerned that more proactive flood risk management programs will make them vulnerable to legal challenges. Based on the extensive legal research that resulted in the ASFPM NAI Legal Guide for Flood Risk Management (aka NAI Legal Guide), this presentation explodes the myth that pro-active floodplain stewardship that protects people and property automatically increases the likelihood of infringing on private property rights. Instead, this presentation discusses how local government liability related to flooding and floodplains more often comes in the form of liability for negligence, nuisance, trespass, or other civil liabilities—and how careful application of NAI principles can actually decrease these types of potential liabilities. We delve into what is a "taking" of private property and what case law teaches us about successfully defending against

takings lawsuits. This presentation will introduce the most significant content of the NAI Legal Guide, focusing on frequently asked questions from previous NAI Legal Guide presentations. Participants will recognize that the Guide is a valuable resource for additional in-depth information for floodplain managers and local officials to understand and avoid these and similar legal hazards, as well as being a valuable resource for attorneys preparing a legal defense of flood risk management or floodplain stewardship actions.

Biography: Thomas Ruppert, Esquire is a principal investigator and author of the No Adverse Impact Legal Guide for Flood Risk Management (ASFPM, June 2023). Mr. Ruppert serves as Director of the Virginia Coastal Resilience Collaborative (VCRC), an initiative of William & Mary that builds upon the foundation established by the Virginia Coastal Policy Clinic, which operated out of William & Mary's law school. The VCRC continues the work and partnerships of the Virginia Coastal Policy Clinic and seeks to expand the network of resilience collaborators in Virginia. The VCRC will engage with others to develop physical- and social-science translations that inform policy analyses for decisionmakers tasked with making the Commonwealth and its communities more resilient.

H3: Risk Communication Tips for Floodplain Administrators
Track: Risk Communication

Communicating Flood Risk
Rhonda Montgomery, CFM, FEMA, rhonda.montgomery@fema.dhs.gov
Co-presenters: None

Abstract: The Office of the Flood Insurance Advocate (OFIA) serves as a resource to assist policyholders and property owners who face challenges navigating the National Flood Insurance Program (NFIP). In this presentation, OFIA will share the findings of its Fiscal Year 2022 Report: Insights and Recommendations, which focuses on opportunities for advancing and enhancing NFIP communications and improving several NFIP processes. Through this presentation, the OFIA will also seek an understanding of what floodplain managers need from the NFIP in order to best support the NFIP customer. In addition to OFIA proposing recommendations to FEMA program offices throughout the year to improve the NFIP customer experience, OFIA's Fiscal Year 2022 Report discusses opportunities and provides recommendations to better communicate flood risk. NFIP customers come to the OFIA frustrated by the inability of their insurer or insurance agent to explain how flood insurance premiums are determined. Customers are confused when policy declarations, quotes, and renewal notices lack adequate information to help them understand how the price of their flood insurance policy is calculated and how discounts are applied. They would benefit from more risk information such as the type of flood hazards in the area, the frequency of flooding, historic claims in the area, and other information to help them understand the risk conveyed by their flood insurance premium. There is also an opportunity to increase communications to help policyholders avoid policy lapses. This presentation will discuss the increasing issue of policy lapses and highlight the need for more communications in this space as well as the role of floodplain managers and other local officials.

Biography: Rhonda Montgomery is the Director of FEMA's Office of the Flood Insurance Advocate and has been in this position since October 2021. Prior to this role, she served for five years as the Deputy

Flood Insurance Advocate. Previously, Ms. Montgomery was detailed 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.

What's flood got to do with it?: A new course for local elected officials, taught by their own FPA

Yi Chan, CFM, AtkinsRéalis, yi.chan@atkinsrealis.com
Co-presenters: Michael Gumpert, FEMA, michael.gumpert@fema.dhs.gov; Michelle Gilbert, AtkinsRéalis, Michelle.Gilbert@atkinsrealis.com; and Linda Langston, Langston Strategies Group, Lindarenelangston@gmail.com

Abstract: Local officials play a critical role in making their communities safer and more resistant to disasters. Floodplain administrators need support and buy-in from their local elected officials to effectively implement their NFIP responsibilities. To increase the perceived value of floodplain management and encourage local officials to improve their NFIP programs, FEMA developed a new training course with Bloomsburie LLC and AtkinsRéalis: The Importance of Floodplain Management for Local Elected Officials. The course can be delivered in a flexible, modularized, manner to suit an audience's needs and time constraints. It is designed to be delivered either by a single local Floodplain Administrator, or with a second guest instructor that brings relevant stories and perspectives to the participants – such as a former or current elected official with floodplain management experience or the State NFIP Coordinator. This presentation will provide participants with an overview of the course development process, introduce the course elements and modules of this new FEMA course, and describe options for use by local Floodplain Administrators and other subject matter experts.

Biography: Yi Ling Chan, CFM, has 8 years of experience in floodplain management, local community support, and flood resilience GIS research. Prior to working at AtkinsRéalis, she served as the Texas State NFIP Coordinator, providing technical assistance and training, flood disaster response support, and state and regional flood planning efforts. She was recognized as the 2022 NFIP State Coordinator – Best Innovation Award winner for her initiatives in Texas.

Hello? Anyone There? Take a Simple Approach to Engage a Disinterested Public

Anthony Stacy, Booz Allen Hamilton, Stacy_Anthony@bah.com
Co-presenters: None

Abstract: A floodplain administrator is often their community's chief coordinator, regulator, educator, and planner. Sometimes overlooked, however, is the very important role of "chief communicator" a floodplain administrator may also take on. This other duty as assigned is a big job! As many floodplain managers can attest, the National Flood Insurance Program (NFIP) is not inherently catchy or easy to understand.   This presentation will show floodplain managers communications strategies to turn even the most complex topics into engaging content by walking through how to: • Really listen to learn what your community cares about.   • Distribute information that breaks down the complexities of floodplain management compliance into straight-forward sentences that reach every community member. • Move beyond the traditional fact sheet and create short-form videos that don't require the skills of a Hollywood director or production crew. You only need your phone and a catchy message to help your

community take notice.   • Learn how to run easy "message testing" on social media • Transform your local social media channels into a hub of information that your community turns to for digestible and timely content.

Biography: Anthony Stacy is a Communications and Outreach Specialist with Booz Allen Hamilton. Anthony has over 25 years of experience leading communications and outreach efforts for multiple federal agencies, including the Federal Emergency Management Agency, the Department of Energy and the Department of Homeland Security. His areas of expertise include communications planning, messaging, branding and community engagement. Anthony previously served as a Chief of Staff for Booz Allen Hamilton and The Nature Conservancy and led a program at Syracuse University that evaluated and graded 125 state and local governments on their management capacity. He also worked for a nonprofit organization in Bucharest, Romania teaching young professionals about campaigns and outreach and was Assistant Director of Communications for the Speaker of the Ohio House of Representatives. Anthony serves on the Executive Committee and is the Governance Chair of the C&O Canal Trust Board of Directors. The C&O Canal Trust is the official nonprofit of the C&O Canal National Historical Park. He received his Master of Public Administration from The Maxwell School of Syracuse University.

H4: Local Floodplain Management Programs
Track: NFIP -2

A Proactive Approach to Floodplain Management using 2D BLE Models

Albert Schmidt, CFM, City of Sioux Falls, Aschmidt@siouxfalls.org
Co-presenters: Greg Thompson PE, CFM, gthompson@houstoeng.com

Abstract: As of 2022, the City of Sioux Falls' population is approximately 209,000 and has experienced a sustained average growth of 1.7% per year over the past 5 years, with much of the development taking place in unmapped floodplain areas. Through a 2D Base Level Engineering (BLE) modeling effort, the City took a proactive approach to managing the unmapped floodplain by adopting a floodplain ordinance that regulates development within areas that are not currently floodplain, but will become floodplain in the future. This opportunity balances the City's floodplain management goals to reduce flood risk to new and future properties, while allowing developers to continue to support the economic demands of this ever-growing community. This hydraulic modeling and mapping effort involves a joint City- and developer-funded solution that will put the final modeling and mapping details into one central location for consideration by FEMA. It bridges the gap between a modeled and known flood risk and the effective floodplain maps. This presentation will highlight an overview of the floodplain management considerations, processes, required inputs, and anticipated Letter of Map Revision (LOMR) closure process. Presenters will step through unique development examples, including City projects, showing how the process successfully reduced future flood risk by requiring structures to be built above future Base Flood Elevations (BFEs), ensuring no-rise to the BFEs, and requiring compensatory storage for fill placed in the floodplain. This presentation will also provide insights that other communities can emulate for proactive floodplain management.

Biography: Albert Schmidt, CFM, works as an Urban Planner and the CRS Coordinator for the City of Sioux Falls, overseeing a group of three other staff that conduct floodplain reviews as secondary job duties. In his non-floodplain roles, he works on city-initiated annexations, neighborhood agreements, and traffic modeling. He has worked in Urban Planning/Floodplain since 2008, working for the City of Sioux Falls for over 11 years. He earned his bachelor's degree in Political Science and Economics and master's degree in Public Administration from the University of South Dakota in Vermillion, South Dakota. Greg Thompson, PE, CFM, works as a principal and senior civil engineer for Houston Engineering, Inc. in Fargo, ND. He manages numerous water resources surface water modeling efforts to complement the company's project designs across the Upper Midwest. Greg is a local consulting engineer project manager specializing in flood mitigation and related 1D and 2D hydraulic floodplain modeling. He has worked for Houston Engineering, Inc. for over 20 years after receiving his bachelor's degree in civil engineering from North Dakota State University in Fargo, North Dakota. Specific to this presentation, Greg has supported the City of Sioux Falls manage development within their floodplain ordinance.

You've Adopted Higher Standards Now What?

Kristin Owen, AICP, CFM, Henrico County, OWE042@henrico.us
Co-presenters: Celinda Adair, CFM, celinda.adair@atkinsrealis.com

Abstract: You've convinced your leadership that adopting higher standards will lead to safer, stronger, more resilient communities. You've navigated the adoption process and embedded higher standards into your floodplain ordinance. Now your work is done, right? Unfortunately, not. Designing local permitting systems to successfully implement higher standards can be challenging. But we've developed strategies that achieve success in several ways. We'll walk you through Henrico County, Virginia's approach to implementing their floodplain management program that effectively applies and enforces the higher standards they adopted in 2021. We'll cover the benefits of public facing resources, internal standard operating procedures, and engaging directly with the development community. This presentation will tell Henrico County's story and share guidance, tips, and resources to help communities navigate what comes after higher standards are adopted.

Biography: Kristin Owen is the Floodplain & Dam Safety Manager for Henrico County, Virginia and the current president of the Virginia Floodplain Management Association. Kristin has extensive state and local government experience in floodplain management and land use planning. Prior to joining Henrico County, Kristin worked for the Commonwealth of Virginia as the Acting NFIP Coordinator, State CRS Coordinator, and co-chair of the Virginia Silver Jackets team. While in this role, she assisted Governor Northam's Office with developing and implementing two executive orders aimed to reduce flood risk and increase Virginia's resiliency to natural hazards. She also partnered with Virginia Tech to create and teach a graduate-level course on local floodplain management, which earned her FEMA's 2019 Best Innovation/Project Award. Before joining the Commonwealth of Virginia, Kristin was the Planning and Floodplain Administrator for Teton County, Idaho. Kristin received a Bachelor of Science in Biology from West Virginia University, and a Master of Urban and Regional Planning, a Master of Natural Resources, and Graduate Certificates in Watershed Management and Geospatial Information Technology from Virginia Tech. She is an AICP professional planner and a Certified Floodplain Manager.

How can a small rural communities use BLE data?

Ferrin Affleck, AtkinsRéalis USA, Inc., ferrin.affleck@atkinsglobal.com
Co-presenter: Vikram Shrivastava, vikram.shrivastava@atkinsrealis.com

Abstract: As FEMA and state CTPs in western states complete 2D BLE analyses and mapping, such data is being shared with small and rural communities. For officials from such communities, the jump from paper based Map Modernization FIRM panels to use of BLE data portals or GIS on personal computers is significant. To aid community officials in utilizing BLE data (best available data) for their day to day needs, the presenters will walk through scenarios of tasks that Floodplain Administrators (FPAs), Town/City Engineers, Permitting Officials etc. do that rely on data such as that present in BLE datasets. This is not a presentation on what BLE is nor how is BLE data made. This is a presentation geared to equipping community officials in accessing and using BLE data for floodplain management and permitting along with answering questions from their stakeholders. A link will be provided at the end of the presentation to download short "how to" videos on common FPA tasks.

Biography: Ferrin has over 19 years of experience in water resources engineering. His focus has been on hydrologic and hydraulic modeling, levee analyses, flood hazard mapping, and quality control of large projects. He has extensive experience in analyses and mapping for FEMA flood insurance studies. Ferrin manages delivery of the PTS program for AtkinsRéalis mentoring project managers and technical leads for successful project execution. Ferrin is a Project Director with AtkinsRéalis. He obtained his bachelor's in civil engineering from the University of Nevada – Las Vegas.

H5: Case Studies in Equity
Track: Equity

Mitigation in Action Strike Team – The Next Iteration in Equity

CindyWirz, FEMA Region 6, cynthia.wirz@fema.dhs.gov
Co-presenters: Mary Witucki, mary.witucki@fema.dhs.gov and Michael Ku, michael.ku@fema.dhs.gov

Abstract: The Mitigation in Action Strike Team (MAST), introduced after Hurricane Ida in Louisiana in 2022, is a simple idea. Create a program, coordinating with the State, to educate underserved communities on Mitigation Programs. While successful in Louisiana, and currently in draft status as a National Strategy, the MAST is not "one size fits all" but rather a strategy to be modified to meet cultural, capacity and capability needs of the mitigation audience. This presentation walks the participants through two different iterations of the MAST, how it works with a variety of audiences and natural disasters. First, MAST is introduced in New Mexico, communities experienced life altering wildfires and extreme flooding. What New Mexicans lacked in capacity was made up by their ferocity of spirit. For the MAST to be successful, Community Education and Outreach Specialists (CEO), partnering with the Mitigation Advisor, prioritized the content, and presented it to appropriate audiences. These "bite size" presentations allowed the community leaders time to digest and understand how the Mitigation Programs work as well as how to access these programs to create more resilient communities. Second, Tribes and Alaska Native communities in Region 10 each have their own culture, community leadership, and governance structures as sovereign nations. Many communities face unique challenges due to remote location and extreme weather. Based on these cultural differences and in

cooperation with community partners, CEO Specialists designed their MAST offerings to meet the needs of their audiences. MAST is an opportunity for FEMA Regions, States, Tribes, and Territories to collaborate, build on, and improve resiliency by providing education to communities at their respective levels. MAST encourages community leaders to take advantage of Mitigation programs, while at the same time provides a point of contact in the FEMA Region to help them navigate complex issues and programs.

Biography: Cindy Wirz has been with FEMA since 2005 and serving as a Community Education and Outreach (CEO) Specialist with the Mitigation Division since 2009. She continues to innovate when it comes to spreading the mitigation message of repairing/rebuilding now leads to a more resilient future by reducing losses caused by disaster. Additionally, she briefs new employees across Region 6 on the value and importance of mitigation both before and after a disaster, as well as in their everyday lives. Creating state specific web pages through Adobe Connect, Ms. Wirz, has supported her fellow CEO staff in other Regions to do the same. She also initiated the Mitigation Helpline, 833-FEMA-4-US or 833-336-2487, and has invited other Regions and disasters to use the number to provide survivors another option for reaching mitigation specialists after a disaster. Ms. Wirz served as the national CEO Program Manager, detailed to FEMA Headquarters, and during that time she was able to advance the Mitigation in Action Strike Team (MAST) Strategy. Working with other CEO Specialists to provide a comprehensive strategy that is scalable, and sections may be prioritized to meet the needs of an audience.

Mobile Homes in Deep Waters: Strategies for Decreasing Flood Risk to Affordable Housing

Kristin Smith, PhD, Headwaters Economics, kris@headwaterseconomics.org
Co-presenters: None

Abstract: Mobile and manufactured homes are a critical source of affordable housing for 22 million people throughout the United States. These homes are 40% more likely to be located in areas with high flood risk when compared to other housing types, but they are systematically overlooked in floodplain management, emergency planning, and mitigation efforts. Moreover, mobile home park residents often have overlapping layers of social vulnerabilities that make them less able to effectively prepare for, respond to, or recover from a flood. Given these factors, mobile home parks are a key concern for floodplain managers and government officials. Drawing upon national research conducted by Headwaters Economics and a multi-year, collaborative project with a mobile home park in rural eastern Montana, this session will provide an overview of the underlying drivers of vulnerability among mobile home park residents. It will then outline policy and programmatic barriers that prevent local governments from implementing solutions, including benefit-cost calculations that de-prioritize lower-property value neighborhoods and programs that fail to account for the complexity of neighborhoods with split ownership. The presentation will end with an overview of strategies that local and state governments are using to overcome these barriers. This presentation will help floodplain managers, government officials, and other stakeholders understand the range of challenges and opportunities facing flood mitigation projects that involve mobile home parks. It will outline the diverse strategies that local and state governments have implemented to preserve affordable housing and ensure mobile home park residents' needs are being met in flood resilience efforts.

Biography: Kristin K. Smith, Ph.D. is the lead researcher and policy analyst for the FloodWise Community Assistance program at Headwaters Economics, an independent research and community development nonprofit. Kristin is passionate about working on the ground with local government staff and elected

officials, state and federal agency personnel, engineers, and other technical experts to help communities reduce flood risk. Her research centers on empowering rural communities, including connecting the threads of local government capacity, economic wellbeing, and disaster resilience.

Supporting Equitable Community Engagement Through Place-Based Initiatives
Adam Lucas, Guidehouse, alucas@guidehousefederal.com
Co-presenters: Alyxandra Colgan, acolgan@guidehousefederal.com and Natalie Ridout, nridout@guidehousefederal.com

Abstract: Place-based initiatives have become an important focus for agencies across the federal government following the passage of the Bipartisan Infrastructure Law (BIL) in November of 2021. This strategic approach to community engagement and support provides tailored solutions to meet the unique needs of a place. For many communities, place-based initiatives acknowledge generations of discrimination and disinvestment and create solutions unique to the environment, history, culture, and people. This tailored approach to supporting communities presents an unprecedented opportunity to expand equity in historically marginalized communities and offer unique solutions that better meet community needs. This session will offer perspectives from across federal, state, and local government on challenges, lessons learned, and best practices in place-based initiatives. To successfully implement place-based strategies, all levels of government will need to coordinate to develop tailored solutions that support communities and meet their needs.

Biography: Adam Lucas is a Director in the Defense & Security Segment at Guidehouse, global consultancy that solves important problems and builds trust in society. Adam oversees strategic communications and engagement at FEMA for Resilience and Office of External Affairs that focuses on driving equitable outcomes. His work spans the areas of strategy and transformation, customer experience, change management, program and project management, human capital, and agile technology development. Adam brings more than 15 years of total experience working in the private and local, State, and Federal sectors.

H6: Local Post-Disaster Lessons Learned
Track: Post Disaster

Lessons from Hurricane Idalia: Improving Data Collection, Tools, and Processes
Liz Russell, Forerunner, liz@withforerunner.com
Co-presenters: Steven Elliot, Georgetown County, SC, selliot@gtcounty.org) and Matthew Millwood, Georgetown County, SC, mmillwood@gtcounty.org

Abstract: In the aftermath of large scale storm events, accurate and timely damage assessments are crucial for driving recovery but can be challenging to complete quickly. This can be true for compounding reasons: impacted areas might be difficult to access, it can be difficult to mobilize a team quickly enough to preempt rebuilding, and not all communities have access to adequate resources to document damages efficiently in the field. On top of that, residents seeking information about their options might not know where to go for help. Increasingly, communities are turning to technology and digital tools to meet the needs of residents and stakeholders after storm events. In this presentation,

we'll explore challenges and solutions to post-disaster data collection and communication through a case study examining Georgetown County, SC's response to Hurricane Idalia. In particular, we'll share how the community partnered with Forerunner to ensure that residents had resources to better understand their flood risk pre-storm, as well as how they utilized the software's Preliminary Damage Assessment (PDA) tool post-storm. We'll discuss key learnings from their in-field usage and how feedback from the community worked to improve Forerunner's software for all communities.

Biography: Liz Russell is a dedicated professional with 12 years of experience in the NFIP, and emergency and disaster management. Throughout her career, Liz has worked with many community and state officials, providing program support, education, and training on the NFIP, CRS, floodplain management, disaster recovery and grants management. To date, she has helped states and communities manage over $2.65 billion in FEMA funding. At Forerunner, Liz serves as the Director of Customer Success, responsible for ensuring all of our customers get the best possible experience with our product.

From Flooded Island to Flood Mitigation Success Story: Fremont's Partnership with USACE

Derek Schriner, PE, U.S. Army Corps of Engineers, derek.schriner@usace.army.mil
Co-presenters: Rachel Williams, CFM, rachel.c.williams@usace.army.mil

Abstract: With more than $19 million in damages from record flooding and levee overtopping in 2019, the City of Fremont, Nebraska became an island, cut off from surrounding communities. Prior to and immediately following the event, a multi-project partnership with the U.S. Army Corps of Engineers (USACE) was developed to support the mitigation and planning efforts to build the flood resiliency of Fremont. Fremont and other local partners combined to complete a Section 205 Study with USACE and two projects with Nebraska Silver Jackets (NESJ). The Section 205 Study was already underway during the 2019 flood event. Its purpose was to evaluate flood risk management solutions that are beneficial to the public, technically feasible, economically viable, and environmentally acceptable. After multiple conceptual levee alignments were evaluated using a 2D hydraulic model, results concluded a levee was not economically viable. The study moved forward with a nonstructural alternative implementing dry floodproofing, wet floodproofing, and structure elevating for buildings within the 4% AEP inundation, to protect against the 1% AEP flood level plus 1 foot. The first NESJ project updated the 2D hydraulic model to simulate 1% AEP ice-affected flooding and concurrent levee breaches reflective of the 2019 conditions. The hydraulic model results supported a LifeSim analysis on potential life safety risks due to flooding. These modeling efforts were followed by a second NESJ project that developed an Emergency Action Plan (EAP) and facilitated a tabletop exercise to evaluate the EAP. Over sixty people from pertinent agencies attended the tabletop exercise. This presentation will highlight the integrated nature of the flood risk management approach taken by Fremont by reviewing multiple past and ongoing projects. Each project has improved the City's flood risk management capabilities throughout the flood risk management cycle of Response, Recovery, Mitigation, and Planning.

Biography: Derek Schriner, P.E. has worked with the U.S. Army Corps of Engineers, Omaha District since 2021. He has a Bachelor of Science in Civil Engineering (2016) from the University of Nebraska and Master of Science in Civil and Environmental Engineering (2018) from the University of Utah. Derek is a hydraulic engineer in the Flood Risk and Floodplain Management section but is currently serving in a temporary role with the Dam Safety Section at the Omaha District and serves as the Silver Jackets Coordinator for Nebraska. Recent project work includes dam safety program management, dam breach

modeling, rain-on-grid 2D modeling, emergency action plan development, and tabletop exercise planning.

Spanish Fork River Emergency Management Response

Travis Warren, Spanish Fork City, twarren@spanishfork.org
Co-presenters: Cameron Jenkins, cjenkins@bowencollins.com

Abstract: 2023 had a record amount of snow. This presentation will discuss the efforts by Spanish Fork City to prepare for the record snowpack runoff and emergency measures taken when a major waterline washed out. BC&A worked with the City to develop bank stabilization measures, stream alteration permits, and emergency repairs. This presentation will discuss the record snowpack, multiple bank stabilization projects, public outreach, and emergency repairs.

Biography: Travis is the City Surveyor for Spanish Fork City. Among his duties as the City Surveyor, he is responsible for the floodplain administration as well as managing the GIS division. He graduated from Utah Valley University with a BS in Geomatics and is a Professional Land Surveyor. Travis has been with Spanish Fork City for 10 years and enjoys working on the day-to-day utility planning & mapping and project management.

H7: Local Climate Change Initiatives
Track: Climate Change

Why Won't the Flood Stay in the Floodplain?

Josha Crowley, PE, CFM, D.WRE, PMP, STARR II, josha.crowley@atkinsrealis.com
Co-presenter: Wendy Shaw, FEMA Region 10, wendy.shaw@fema.dhs.gov

Abstract: Jökulhlaups, or glacial lake outburst flooding, had never occurred on the Mendenhall River in Juneau, Alaska before 2011. Climate change has accelerated glacial retreat in Alaska and jökulhlaups have become an annual occurrence in Juneau. The recent event in August 2023 was the highest flood of record. This flood caused significant damage including channel erosion, with trees and buildings being swept into the river. Climate change is accelerating the frequency of such events, but they remain difficult to predict. The FEMA Special Flood Hazard Area (SFHA) is based on a statistical assessment of the historic record and was originally intended to set flood insurance rates. As weather patterns change, we find more and more areas where history is not a good indicator of the risk. FEMA has two recent initiatives that will offer a more comprehensive risk assessment that will be able to incorporate future conditions, expected changes, and more severe events than the 1% annual chance. Zone X has too often been interpreted as "outside the floodplain" and it is important to recognize that there is still risk in these areas. The Future of Flood Risk Data (FFRD) will give a more comprehensive picture of the flood risk and shift from a binary to a graduated risk analysis. Federal Flood Risk Management Standard (FFRMS) will allow climate informed science to be part of the risk analysis. FFRMS will also employ a freeboard value approach to determine the areas next at risk beyond the SFHA limits. Both efforts are intended to support the building of a more resilient future.

Biography: Josha Crowley is a water resources engineer and the Regional Service Center (RSC) Lead with STARR II for FEMA Region 10. Mr. Crowley is a Registered Professional Engineer in Washington, Oregon, California, and Texas. Mr. Crowley is a graduate of the University of California at Berkeley and has over 25 years of experience with floodplain analysis, mapping, and outreach. Wendy Shaw is the Risk Analysis Branch Chief at FEMA Region 10 where she applies over 25 years of experience to oversee watershed analysis, hydrologic and hydraulic modeling, and risk communication to RiskMAP flood studies in Alaska, Oregon, Idaho, and Washington. She also leads the Earthquake, Dam Safety, Building Science, and Planning Programs in the Branch. Wendy is a Registered Professional Engineer in the State of Washington and holds a Bachelor of Civil Engineering from Youngstown State University and an Engineering Leadership Certificate from the University of Washington.

Advancing Pre-Disaster Resilient Norfolk Through Coastal Storm Risk Management

Kyle Spencer, City of Norfolk, kyle.spencer@norfolk.gov
Co-presenters: Phetmano Phannavong, phetmano.phannavong@aecom.com

Abstract: The City of Norfolk is increasingly at risk of flooding and damage from coastal storms. Norfolk has one of the highest rates of relative sea level rise among Atlantic coastal communities. The Coastal Storm Risk Management (CSRM) Project will reduce the city's risk from coastal flooding and damage from nor'easters, hurricanes, and other significant storm events. Norfolk is focusing on building resilience before disasters occur. Identified as one of the nine focus areas in the North Atlantic Coast Comprehensive Study by the U.S. Army Corps of Engineers (USACE), the $2.6 billon Norfolk CSRM Project is a decade-long collaboration between USACE and the City of Norfolk to address coastal flood risk and building resilience. The Project features storm surge barriers, nearly 8 miles of floodwalls, nearly 1 mile of levees, 11 tide gates, and 10 pump stations, along with a series of nonstructural projects including home elevations, basement fills, and commercial floodproofing. Much more than just a floodwall project, the Project is rooted in social and environmental equity, bringing multiple federal, state, and local agencies together with an integrated approach benefitting the entire city and prioritizing layers of defense for the most socially vulnerable areas. The City of Norfolk is investing substantial local funding to help expedite the Project implementation. This presentation will showcase resilience in practice where all levels of government are investing funding to address the most challenging climate change impacts on local economies, infrastructure, and communities. We will highlight lessons learned from adapting USACE authorities, policies, and guidance for non-federal sponsors to implement different project elements; engagement with property owners in understanding the project benefits and participating in the voluntary nonstructural program; and complex design and construction of storm surge protection systems while incorporating natural and nature-based features to preserve both the function and aesthetic of the coastlines.

Biography: Kyle Spencer is Chief Resilience Officer at the City of Norfolk, Virginia. He is responsible for implementing the City's Resilience Strategy by managing complex water management, environmental, urban planning, and smart cities projects. He regularly collaborates with regional partners on resilience innovations to support research projects with universities and develops business solutions in the resilience sector by turning Norfolk into a coastal community laboratory. His work in resilience has been featured in the Wall Street Journal, Washington Post, on NPR's Market Place, and the Weather Channel.

Underwater Assets: Lessons Learned From the District of Columbia's Climate Change Simulation

Katrina Tavanlar, Booz Allen Hamilton, Tavanlar_Katrina@bah.com
Co-presenters: None

Abstract: The growing frequency and severity of climate events are impacting real estate and the built environment in profound ways. "Underwater Assets: Washington DC & Climate Change" brought together Georgetown University, the District of Columbia, the Federal government, and a broad range of private sector partners to evaluate the infrastructure impacts, economic costs, and political risk associated with changing climate conditions. The group focused on the neighborhoods surrounding Washington Union Station, which demonstrated elevated flood risk in a range of scenarios. The simulation was developed by the Georgetown Steers Center in partnership with Booz Allen Hamilton, Gallagher Re, and the US Naval War College, using KatRisk modeling technology to forecast both climate scenarios and asset impacts. The simulation provided insights into how each industry would respond to a climate event in Washington, D.C., and how businesses and investors can both prepare for damages and assess their own climate risk across the region. Some of the key findings include: • Adverse income and value impacts from growing climate risk are inevitable. Investors should expect risks, including any or all of reduced revenues, increased expenses, and required capital expenditures. • As climate events become more frequent and expensive, well-capitalized private investors will be exposed. In the recovery phase of a climate event, governments are likely to allocate scarce funds to socially vulnerable constituents and owners with few other financial resources. • The city will look to private investors for support. New programs are needed to address climate issues, although achieving meaningful results from private or public-private action is difficult. These challenges, which may limit holistic solutions, will create opportunities for private investments as a result. To learn more: https://bit.ly/3pmj6Gq

Biography: Ms. Katrina Tavanlar is Senior Associate at Booz Allen Hamilton with more than 25 years of experience leading and providing organizational development and mission support in the areas of Resilience, Climate, and Infrastructure. Over the last decade, Ms. Tavanlar provided strategic advice to the Federal Emergency Management Agency's (FEMA) leadership in the areas of Floodplain Management, Hazard Mitigation, and Resilience. She has been instrumental in helping enhance and transform FEMA's floodplain management programs especially in the areas of National Flood Insurance Program compliance, technical assistance, and post-disaster support. Ms. Tavanlar is an award-winning outreach and community engagement professional having received the highest honors from the Public Relations Society of America, the Association of Marketing and Communications Professionals, and the American Marketing Association. Ms. Tavanlar received a B.A. in Environmental Science from University of California Berkeley and a M.C.P in Environmental Policy and Planning from the Massachusetts Institute of Technology.

H8: State and Local Mapping Initiatives
Track: Mapping

Back to the future: mapping future condition flood hazard across Texas
Reem Zoun, PE, CFM, Texas Water Development Board, reem.zoun@twdb.texas.gov
Co-presenters: Dr Natalie Lord, n.lord@fathom.global; Gavin Lewis, g.lewis@fathom.global; and Saul Nuccitelli, Saul.Nuccitelli@twdb.texas.gov

Abstract: In 2021 the Texas Water Development Board (TWDB) completed a first-of-its-kind project to develop a comprehensive cursory floodplain layer for Texas. The innovative project, accomplished in only 6 months, involved Fathom modeling a totally new statewide flood map which supplemented Base Level Engineering maps and local data, becoming a pivotal resource housed within the TWDB's Flood Planning Hub. The cursory floodplain data aided the Texas Regional Flood Planning Groups and engineering consultancies - guiding their flood planning and mitigation efforts across the state. Two years later, the TWDB plans to build on the success of the initial phase to understand future flood scenarios across Texas together with future urbanization projections including land use change for all the Regional Flood Planning groups. This has been achieved, with the help of partners from Fathom, AECOM and Aqua strategies. Their goal: to create future-focused flood mapping that projects potential flood risk for Texas in the year 2060. Collaborating closely with the State Climatologist, AECOM, and Aqua Strategies, Fathom has produced high-resolution future floodplain inundation mapping for Texas, representing fluvial, pluvial and coastal flood perils. Uniquely this project considered future rainfall pattern, sea level rise, changes in land use through future urbanization and the localized impacts of projected land subsidence. The project's outputs will provide a constant and detailed view of flood risk today and under future climate conditions across the state for a range of local and regional stakeholders. In this talk, the presenters will outline a step-by-step approach to constructing a future condition flood hazard map of Texas for the year 2060. They will delve into the reasons driving its creation, along with the challenges encountered when developing a map of such complexity. Their discussion will encompass the detailed process, data sources, and underlying assumptions that influence model results.

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 has over 22 years of private and public sector experience in engineering, flood risk reduction projects, modeling, mapping, capital improvement project portfolio management and delivery, management, and leadership. Prior to joining the TWDB in 2019, Reem worked for the City of Austin, AECOM, Pasminco Elura Mine, and Victoria Department of Natural Resources and Environment in Australia. Reem has multiple publications and has 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. A runner and a gardener, Reem's favorite part of life is being the mother of her two boys, fourteen-year-old Neal and nine-year-old Aurko.

Leveraging a "Liberal" Partnership for Mapping Success in Kansas

Maria Neeland, PE, CFM, Benesch, mneeland@benesch.com
Co-presenter: Joanna Rohlf, Kansas Dept of Agriculture, joanna.rohlf@ks.gov

Abstract: Updated modeling and mapping for many areas of Western Kansas has been relatively limited in recent history due to flat terrains and irrigation-influenced hydrologic challenges. However, the State of Kansas CTP, KDA-DWR, has largely completed 2-dimensional Base Level Engineering (BLE) for all of Western Kansas and is moving toward new effective maps for several counties. Following a BLE project in the area that indicated significant differences from the effective mapping, the City of Liberal

expressed interest in enhanced modeling to better serve the needs of the community. The City progressively decided to become a partner in the modeling and mapping effort and were willing to financially support a large portion of the data collection and modeling needed to achieve a detailed and accurate model. This included survey of culverts and underground storm sewer systems, collection of updated ground surface data, and detailed hydrologic and hydraulic modeling. The City coordinated with KDA-DWR for the scope and timing of a mapping project to ensure consistency with other projects in the State and strive towards FEMA quality models and mapping products that could be incorporated into a countywide mapping update. KDA-DWR was then able to secure FEMA funding for a data development project that would leverage the Liberal data and develop new data for the remainder of the county, ultimately moving towards a countywide mapping update. This presentation will highlight the partnership between the local community and state CTP to achieve a mapping product in which all parties have confidence.

Biography: Maria Neeland is a Project Manager at Benesch with 13 years of experience as a Water Resources Engineer, focusing on FEMA flood studies, stormwater analysis, flood mitigation projects, and community management planning. Maria blends her technical and communication skills to effectively coordinate projects that involve multiple disciplines and/or various stakeholders and leads the Kansas CTP work for Benesch. Joanna Rohlf is the Floodplain Mapping Coordinator with the Kansas Dept of Agriculture. She waded into the floodplain world 15 years ago on the private side as a GIS analyst and has been with the state for 5 years. She has experience in every phase of the RiskMAP cycle and enjoys working with the public. Joanna currently serves as the CTP sub-committee co-chair of the Engineering and Mapping Committee and served as the election's co-chair for ASFPM for three years and has been an ASFPM member since 2010.

NC RAFT: A Resiliency Framework Helping NCDOT Prepare for Future Flood Hazards with Digital Solutions

Garrett Shields, WSP USA, garrett.shields@wsp.com
Co-presenters: None

Abstract: In the wake of Hurricanes Florence and Matthew, the NCDOT was left with the major task of preparing our state's infrastructure for the future, one where flood events will be more severe, with greater frequency and less predictability. Fortunately, North Carolina is a data rich state, with access to high-resolution statewide flood datasets, LiDAR and both 1D & 2D hydraulic modeling. To aid this effort and leverage the assets available, NCDOT partnered with the NC Division of Emergency Management (NCEM) and WSP to produce innovative, digital flood resiliency products (NC RAFT) that will aid transportation stakeholders in preparing for and implementing a resilience-focused strategy that will ensure that traffic and commerce continue to flow in spite of flood waters rather than be overtaken by them.

Biography: Mr. Shields is an Assistant Vice President at WSP USA serving as the NC Geospatial Technologies Manager for the Environmental Waters business line in WSP's Captial District. He manages a team of GIS Analysts, Application Programmers and Database administrators and all associated geospatial projects within North and South Carolina. He is a proud graduate of Appalachian State University and has over 15 years' experience with floodplain mapping, database development, natural hazard risk assessment and automated tool development. Garrett is also a Certified GIS Professional and Certified Floodplain Manager.

H9: Modeling Unique Features & Problems
Track: Modeling

Complexities in Hydrologic Modeling in Cold Climate and Depression-Dominated Areas: Insights from the Red River and Missouri River Basins

Mohsen Tahmasebi Nasab, PhD, AECOM, mohsen.tahmasebinasab@aecom.com
Co-presenters: None

Abstract: Cold climate regions are characterized by extended winters with persistent snow cover, leading to frozen ground conditions. To understand the implications of climatic shifts on hydrological patterns in these regions, it is imperative to analyze the role of cold climate processes (e.g., snowmelt and freeze-thaw processes) in altering watershed response. However, challenges in obtaining spatiotemporal data for these processes have restricted the efficacy of hydrologic models. Moreover, in areas dominated by surface depressions, the filling-spilling-merging dynamic significantly affects the timing and magnitude of surface runoff generation. While individual depressions are often regarded as "micro-scale" features, areas with a high density of these depressions (e.g., the Prairie Pothole Region) have a marked impact on broader "macro-scale" hydrological processes. This presentation will focus on the intricacies of hydrologic modeling challenges encountered in cold climate regions and depression-dominated landscapes. Particularly, the theoretical foundation for the development of a grid-based hydrologic model for cold climate regions and depression-dominated terrains will be discussed. The developed model introduces novel approaches to modify existing surface runoff and snowmelt generation methods. The model also incorporates a D-Cubed delineation approach to account for the impacts of depression storage on surface runoff generation. Case studies from the Red River of the North Basin and the Missouri River Basin will highlight the significant role of soil freeze-thaw, snowmelt, and surface depressions in shaping the streamflow hydrograph.

Biography: Dr. Mohsen Tahmasebi Nasab is a water resources engineer at AECOM and a researcher who has served as a civil engineering professor at the University of St. Thomas and Bucknell University. Dr. Tahmasebi Nasab's expertise lies in modeling and analyzing hydrologic processes. Particularly, his work focuses on improving our understanding of macro-scale hydrologic processes in cold-climate regions and refining the macro-scale depiction and modeling of areas dominated by depressions in hydrologic models. To achieve these objectives, he develops macro-scale hydrologic models in which downscaled satellite data are incorporated. Beyond his professional pursuits, Mohsen is passionate about engineering outreach and actively volunteers in various community organizations.

Holy Flood! Bridge Scour and Riprap Countermeasures in Moab, Utah

Colton Smith, PE, CFM, J-U-B Engineers, Inc., csmith@jub.com
Co-presenters: Cameron Jenkins, cjenkins@bowencollins.com and Ben Miner, bminer@bminer@halengineers.com

Abstract: Riverbank and channel scour poses a significant challenge and threat to the structural integrity to roadway and pedestrian crossing in Moab, Utah, a region renowned for its unique landscape. The unique landscape of sandstone poses a risk to Moab as the sandstone in the watershed acts like an impervious surface causing the surface runoff to be high after heavy rainfall events. These events have

caused flooding within Moab City and have caused significant scour in the stream channels and at road and pedestrian crossings. The most recent event occurred on August 20, 2022 which caused significant flooding within the City and scour at a number of roadway and pedestrian crossings. Our presentation will focus on the approach, evaluation, and design of scour and riprap countermeasures utilizing the modeling capabilities of HEC-RAS and SRH-2D and model outputs used to calculate the countermeasures at multiple roadway and pedestrian crossings along Mill and Pack Creeks.

Biography: Colton is a professional engineer and CFM at J-U-B Engineers. He is experienced in hydrologic and hydraulic modeling and water resources engineering. This includes site runoff modeling, culvert analysis, rip rap protection design, watershed Risk Map studies, FEMA floodplain mapping, flood protection, watershed planning, master planning, and stream stabilization. Colton enjoys working on challenging projects that include innovative solution in planning, modeling, design, and construction management.

Evaluating the Unique Drainage Issues of an Underground Tunnel
Patrick Bussen, PE, CFM, Benesch, pbussen@benesch.com
Co-presenters: None

Abstract: Drainage issues at an underground tunnel required a more vertical approach than a typical hydrology and hydraulic study. Maintenance issues caused by persistent water ingress into the tunnel triggered further study, leading to an evaluation of potential solutions to this unique stormwater issue. Lying nearly 150 feet below the ground surface, uncertainty in groundwater movement and other site features required a somewhat unconventional approach to assessing the issues, while the presence of sinkholes and detention ponds on the ground surface created another level of complexity. The unique characteristics of the site and the stormwater issues led to a multi-pronged solution, both rerouting and detaining flows on the surface.

Biography: Patrick is a water resources engineer and technical manager with Benesch in the Topeka, Kansas office. He has 13 years of professional experience, focusing on hydrologic and hydraulic engineering, stormwater drainage analyses, flood inundation mapping, flood reduction studies, levee performance evaluations, and dam breach analyses. Patrick has experience with stormwater mitigation and alternatives analysis and has performed technical reviews of complex hydrologic and hydraulic studies across multiple states. Patrick attended the University of Kansas State for both his Bachelor's degree and Master's degree in Biological and Agricultural Engineering.

Concurrent Session H

J1: FEMA and Non-FEMA Mitigation Funding and Programs
Track: Mitigation

FEMA's Safeguarding Tomorrow Revolving Loan Fund Program: A New Way to Fund Mitigation Projects
Rhiannon Kincaid, PE, FEMA, rhiannon.kincaid@fema.dhs.gov
Co-presenters: None

Abstract: FEMA has launched the Safeguarding Tomorrow Revolving Loan Fund (RLF) Program, providing a unique and sustainable funding opportunity for mitigation projects. This program provides capitalization grants to states, territories, certain tribal governments, and the District of Columbia, allowing them to establish a revolving loan fund. The fund offers low-interest loans to assist local governments in carrying out mitigation projects, thereby reducing vulnerability to hazards and fostering greater community resilience. The Safeguarding Tomorrow RLF program complements FEMA's Hazard Mitigation Assistance grant portfolio, supporting mitigation projects at the local government level and enhancing the nation's resilience to natural hazards and climate change. With the excitement of the program's first year, many questions arise, along with valuable lessons learned. This session will commence with a brief introduction to the Safeguarding Tomorrow RLF program, outlining its fundamentals and revolving loan funds. Subsequently, it will delve into the details of the first-year lessons learned by FEMA and program participants. Additionally, program staff will address significant decisions made by FEMA during the program's first year, such as, application, selection, awards, and reporting processes. They will also review the information available in program support materials, which are currently accessible to assist entities in succeeding with their revolving loan funds, as well as resources still in development.

Biography: Rhiannon is the Safeguarding Tomorrow Revolving Loan Fund Section Chief with a background in engineering, planning, and emergency management. After early days in her career working in stormwater management, she joined FEMA as a contractor on Hurricane Katrina recovery in New Orleans. After getting her Professional Engineering license, she became a consultant assisting on the NEPA permitting process for large transportation projects, as well as emergency management planning such as developing the Business Continuity Plan template and guide for water treatment facilities throughout the US. She returned to FEMA in Public Assistance and later joined FEMA Region 2, working with New York City on disaster recovery efforts following Hurricanes Sandy, Isaias, and Ida, as well as Covid-19. In January of 2023 she joined FEMA Hazard Mitigation Assistance as the Section Chief for the Safeguarding Tomorrow RLF Program.

SBA's Expanded Disaster Efforts

Shannon Rhoten, U.S. Small Business Administration, shannon.rhoten@sba.gov
Co-presenters: None

Abstract: The U.S. Small Business Administration (SBA) is a key driver in the recovery of communities and businesses in the aftermath of a disaster. Historically, SBA has provided disaster assistance primarily through disaster loan programs after a disaster. The agency has recently re-imagined its disaster recovery and resilience-building capabilities to bring a more wholistic approach to recovery beyond traditional lending. The agency's new Office of Disaster Recovery & Resilience (ODR&R) is leading an enterprise-wide effort to bring the entirety of SBA's resources and programs to the table to assist individuals, businesses, and communities recover from a disaster. This "Whole-of-SBA" effort aligns and leverages the agency's core programs towards disaster recovery. Through this work, the agency is positioned to invest in and support the entirety of a community's recovery, while also building resilience and mitigating against future disasters. This session will provide an overview of SBA's new Office of Disaster Recovery & Resilience (ODR&R), as well as an overview of the agency's "Whole-of-SBA" effort. A key focus will be on examining the key regulatory changes to the agency's mitigation loans to help disaster survivors to better mitigate against all hazards, regardless of the associated hazard in the disaster declaration. These changes will help provide more opportunities for individuals and businesses

to take a more holistic approach to recovery and resilience building. This session will conclude with an interactive discussion on how the SBA and local communities can work together to promote the use of mitigation loans.

Biography: Shannon Rhoten is the new Deputy Director for the Disaster Data Analytics and Information Technology (DAIT) Division within the Office of Disaster Recovery and Resilience. Most recently, she served as the Lead of the Data Analytics and Research Team (DART) within the Office, which she expanded over the previous five years from a one-person operation to a dynamic team of analysts and GIS specialists. The team is tasked with providing data analytics, reporting, research, geospatial and mapping products, and event situational awareness for executive and operational use. She started at SBA in 2015 as a member of the Presidential Management Fellows Program, with prior service at the U.S. Department of the Treasury's Office of International Markets and Development; as part of the PMF Program, she also served a detail at the Economic Development Administration (EDA) within the U.S. Department of Commerce. In her free time, she is pursuing her Public Leadership Certification from Harvard's Kennedy School of Government and serves as a feline care and behavior volunteer at DC's open intake animal shelter. She has a MA in International Commerce and Policy (IPE/Finance) from George Mason University and a BA in Political Science (NatSec) from Christopher Newport University. She is also a graduate of the U.S. Office of Personnel Management's Center for Leadership Development and Office of Management and Budget's Federal Data Science Program. She resides in Washington, DC with her cats.

USACE Nonstructural Case Studies

Jennifer Roberts, USACE, National Nonstructural Committee, Jennifer.C.Roberts@usace.army.mil
Co-presenters: Andy MacInnes, USACE, Andrew.D.Macinnes@usace.army.mil

Abstract: Nonstructural solutions including structure elevation, floodproofing, and buyouts are effective approaches to manage flood risk. In this session, the USACE National Nonstructural Committee will share case studies of USACE constructed projects and upcoming authorized projects that have used a variety of nonstructural solutions to achieve flood risk management. This presentation will provide an overview of interesting case studies of USACE projects from throughout the country. The presentation will feature inland and coastal case studies of varying scopes. Additionally, it will provide an overview of upcoming USACE nonstructural projects recently authorized and funded by the federal government. The USACE National Nonstructural Committee is a team promoting the evaluation and implementation of nonstructural solutions to water resource problems. It provides leadership and support for the consideration and construction of nonstructural flood risk management strategies in USACE studies and projects.

Biography: Jennifer Roberts is a planner for the Army Corps of Engineers, Regional Planning and Environment Division South where she serves as a member of the National Nonstructural Committee, the New Orleans District Environmental Justice Working Group, as well as the New Orleans District Inclusion, Diversity, Equity and Accessibility Council. Jennifer leads flood risk, coastal storm risk, ecosystem restoration, andnavigation planning efforts. Jennifer works with teams nationwide to resolve complex technical and political issues collaboratively. As a member of the National Nonstructural Committee at the Corps she works with a team across the enterprise to provide technical assistance to teams considering nonstructural flood risk management alternatives. Jennifer has more than 20 years of experience leading teams through the collaborative planning, design, and restoration efforts.

J2: NFIP and Alternatives to the NFIP
Track: NFIP

Hyperconcentrated flood, mud flow, or debris flow? Navigating uncertain terms pertaining to the National Flood Insurance Program and flood after fire

Kara Jacobacci, LEG, FEMA, kara.jacobacci@fema.dhs.gov
Co-presenters: None

Abstract: Post-fire events are not universally covered under the National Flood Insurance Program. To be eligible for reimbursement, a property must be affected by an event that meets the criteria for a mudflood or mudflow. This typically means a fluidized event; however, debris flows are not always considered eligible. There are challenges in determining fluidity and water content during post-event reconnaissance and different ways to describe the continuum between hyperconcentrated flood and debris flow. The Standard Flood Insurance Policy lists "mudflow" as one of the definitions for flood but describes mudflows as "A river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water. Other earth movements, such as . . . a saturated soil mass moving by liquidity down a slope, are not mudflows." Researchers and practitioners should take note of this distinction and be sure to use precise language when describing events in official documentation. This presentation will showcase the conflicting ways debris flows and debris floods are described both in policy and on websites and other public-facing media and discuss the impact of this uncertainty.

Biography: Kara has a background in geology, specifically landslides. She lives in Washington state and enjoys spending time outdoors. She currently works for FEMA Region 10 as a Risk Analyst.

Flood Insurance Systems and Regulatory Flood Maps: What Can the US Learn from Canada, the European Union and Australia?

Anna Serra-Llobet, Dr., University of California Berkeley, annaserrallobet@berkeley.edu
Co-presenters: None

Abstract: Flooding is the most common and costly disaster caused by natural hazards in North America, Europe and Australia. Increased probability of extreme floods due to climate change and expanding urban development in flood hazard zones are increasing flood risk. This creates a challenge for many countries seeking to provide affordable flood insurance to floodplain residents. This presentation summarizes the results of a 2-day workshop at the University of California Berkeley in November 2023 in which researchers, practitioners and policy-makers from the United States, Canada, the European Union and Australia reviewed the state of the art in flood risk management approaches worldwide with emphasis on the interface between insurance, flood mapping and land use planning regulations. This collaboration has the goal to expose researchers and government officials to innovative approaches in a variety of jurisdictions, thereby expanding the 'toolbox' available for managing flood risk. This workshop included a visit to lab of Professor Kenichi Soga in the Department of Civil and Environmental Engineering, to learn about innovative technological approaches being developed to further prepare, prevent, and mitigate the harmful effects of flooding, such as sensors providing early warning of potential weaknesses in levees. A field trip to Sacramento featured risk reduction projects (such as

levees and flood diversions) and insights into current challenges in land use planning in these low-lying areas.

Biography: Anna Serra-Llobet is an environmental scientist whose research concerns to flood risk management policies. Anna Serra-Llobet received her PhD in Environmental Sciences from the Autonomous University of Barcelona. After finishing her PhD, she interned at the Water Unit of the Directorate General for the Environment at the European Commission (European Union) in Brussels. Currently she is a researcher at the Center for Catastrophic Risk Management of the University of California Berkeley, conducting research on sustainable flood management strategies, comparing the US, the EU and other regions in the world. She co-chairs the ASFPM's (Association of State Floodplain Managers) International Committee.

Building A Financially Sustainable National Flood Insurance Program (NFIP)
Allison Heck, Federal Insurance Directorate, FEMA, allison.heck@fema.dhs.gov
Co-presenters: Barbara Montoya, FEMA, Barbara.Montoya@fema.dhs.gov

Abstract: This presentation will provide a general overview of the current NFIP financial structure, including discussion of the debt the NFIP has with Treasury ($20.525 Billion as of September 2023), the statutory requirements related to how the NFIP is financially structured, and FEMA's on-going efforts to build a more financially sustainable NFIP through legislative proposals. This presentation will also touch on two areas of financial stability that the NFIP is currently able to leverage to build a solid financial foundation through reinsurance and investments. Note: Material subject to change based on Congressional actions related to reauthorization and/or other reforms.

Biography: Allison Heck is the Financial Management Division Director for Federal Insurance at FEMA. In her role, she oversees the management of NFIF and Reserve Fund of the NFIP as well as the NFIP's Reinsurance Program. She has over a decade of experience supporting the mission space at FEMA across response, recovery, and mitigation in strategy, policy, programmtic, and financial matters. She has her PhD in Planning, Governance, and Globalization from Virginia Tech, master's degrees in Urban and Regional Planning and Anthropology from the University of Florida focusing her research on the built environment and social systems.

J3: Research in Risk Communications
Track: Risk Communication

A Comparison of Commercial Flood Risk Tools for Real Estate End Users: Free and Open Data from the Private and Public Sectors
Eric Coughlin, CFM, GISP, ABS Group, ecoughlin@eagle.org
Co-presenters: Jon Ordog, jordog@absconsulting.com and Andrea Jackman, ajackman@absconsulting.com

Abstract: Advertising flood risk to potential real estate buyers is an ongoing challenge both for the Federal Insurance and Mitigation Administration (FIMA) and the commercial sector's insurance, construction, and real estate industry. Apps and websites for use by the general public – such as Zillow,

Redfin, and First Street Foundation – can offer overlapping and sometimes conflicting information on a property's risk for flood exposure. ABS Group's team of Risk Analysts & Data Scientists conducted an informal survey which developed into a more structured comparison of the public commercial risk products with FEMA's National Risk Index and similar Risk MAP data. The findings raise interesting questions around communication of flood risk to a non-technical public, how we process natural hazard risk information when receiving conflicting input, and the impacts of this information on personal, long-term financial decisions in real estate.

Biography: Eric Coughlin is a senior GIS analyst and project manager with 23 years of experience with geospatial technologies and project management consulting. Eric specializes in geospatial analysis, natural hazard modelling and risk assessment, and hazard mitigation planning. Eric is a GISP, a CFM, and a FAA Part 107 Certified Remote Pilot.

Using Research and Behavioral Insights Related to Flood Insurance to Increase Community Resilience

Sarah Devaney-Ice, FEMA, sarah.devaney-ice@fema.dhs.gov
Co-presenters: None

Abstract: Increasing individual flood insurance coverage is a key step toward community resilience, yet millions of Americans remain unprotected. Many are unaware of their flood risk and/or incorrectly assume flood damage is covered in their homeowners or renters coverage. However, floodplain managers, emergency managers and other local stakeholders have a strong understanding of their communities' needs and are uniquely positioned to help dispel common misconceptions and educate residents about their actual flood risk and coverage options. Equipping these stakeholders with insights into consumer behavior can help them encourage flood insurance acquisition and protect their communities against the financial impact of flood damage.

Over the past few years, FEMA's National Flood Insurance Program (NFIP) has conducted surveys, focus groups and additional research to gain insight into the drivers, barriers and general behaviors of consumers and insurance agents around flood risk and insurance. In this presentation, the NFIP will share research findings and their implications. Highlights include: insights from the NFIP's unique methodology of using customer personas to identify and connect with prospective policyholders; how factors such as climate risk, price and peace of mind affect a consumer's decision on whether to purchase flood insurance; drivers that motivate insurance agents to sell flood insurance; barriers consumers and agents face in buying and selling flood insurance; sources consumers use to learn about flood insurance; national consumer trends that influence flood insurance policy sales; and the rapid evolution of the flood insurance landscape.

This presentation will allow attendees to walk away with actionable knowledge regarding consumer behavior that they can use to better connect with community members and ensure their communities are prepared for flooding and its aftermath.

Biography: Sarah Devaney Ice currently serves as the Chief for the Marketing and Digital Engagement Branch within FEMA's Federal Insurance Directorate. In this role, Ms. Devaney Ice oversees the NFIP's innovative marketing techniques to broaden the awareness and understanding of the value of flood insurance. Ms. Devaney Ice has been supporting the NFIP in various roles since 2005. Ms. Devaney Ice

holds an undergraduate degree in Geography & GIS from Missouri State University and an MBA from the University of Maryland.

Why is Flood-Risk Communication being ignored by the public?

Karyn Reid, Virginia Department of Conservation and Recreation, karyn.reid@dcr.virginia.gov
Co-presenters: None

Abstract: Flood-risk communication is the first step to mitigating the impacts of flooding. This is why it is the first leg of the three-legged stool of the National Flood Insurance Program (NFIP). If no one knows they are at risk, they are not going to take any action to change their risk. But even before anyone can know their risk, they have to be willing to listen. Information that is not approachable will be ignored. Information that is not presented with fun will be forgotten. A developmental framework for creative interactive engagement and a tangible success story will be the highlight of this presentation. The developmental framework is a formula of major variables and limitations to consider when creating interactive engagement. The success story of a flood-risk interactive engagement will demonstrate the advantages of interactive engagement and the benefits of the developmental framework. This presentation will testify interactive engagement's ability to best communicate flood-risk, by igniting interest, fostering conversation, and memorializing the intended message. This presentation, being a form of interactive engagement, will also igniting interest in other flood-risk interactive engagement options, fostering conversations about incorporating interactive engagement into all flood-risk communications, and memorializing the presentation and its message.

Biography: Karyn is a Floodplain Program Planner at Virginia's Department of Conservation and Recreation. She graduated from Appalachian State University with a Bachelors in Community & Regional Planning and is a Certified Floodplain Manager (CFM). She is the Outreach Coordinator for the Division of Floodplain Management of DCR.

J4: Designing Infrastructure in Arid Regions
Track: Arid Regions

Benefits of Alternative Culvert Design Methods in Arid Environments

Darren Hinton, PE, PhD, NHC, dhinton@nhcweb.com
Co-presenters: Daniel Brogan, dbrogan@nhcweb.com

Abstract: On-going issues with drought, wildfires, and population growth in the arid Southwest have highlighted vulnerabilities with the sediment and debris performance of culverts and bridges. Flashy hydrology and the response within watersheds to burn scars frequently result in large sediment pulses and debris masses that plug road crossings, elevating the risk of infrastructure damage and loss of life. Tight budgets for transportation departments are strained, making it difficult to maintain these crossings.   While a number of different design methods are available, culverts are frequently designed solely based on hydraulic capacity: the ability to pass the design flow without overtopping the road. This approach generally results in more economical construction costs relative to other design methods since the culvert opening is minimized. However, considering the life cycle cost and risk associated with culverts may justify the use of a larger cross sectional flow area. This would increase the upfront

construction cost but would lower long-term maintenance costs and lower the risk of damage and failure occurring some time during the design life of the crossing.   This presentation specifically discusses alternative culvert design methodologies and describes the benefit for arid environments in terms of hydraulics, geomorphology, and economics. Methods considered include Stream Simulation, a method typically used for fish passage, and a flow regime method. A case study is included to compare life cycle cost and includes a discussion about situations where the alternative methodologies may be preferable to the hydraulic capacity method.

Biography: Dr. Hinton has over 18 years of experience in river engineering and hydraulic modeling. Four of those years were spent managing one of NHC's four physical hydraulic laboratories. He has worked on a range of projects in Utah, California, and Washington, including the design of hydraulic structures, culverts, canals, streambank protection, and other river features. His professional experience is complemented by graduate research in bedload transport, stream restoration, and open channel flow. Darren enjoys spending time backpacking, birding, running, and doing anything with his wife and five children.

Design Considerations for Transportation Infrastructure Subject to Wildfire-Induced Flooding

Megan Frye, PE, FHWA, megan.frye@dot.gov
Co-presenters: None

Abstract: As climate change amplifies the frequency and intensity of extreme weather conditions, communities across the US face escalating risks of post-wildfire flooding, particularly in Western regions where the expansion of human settlements intersects with fire-prone ecosystems. Such scenarios often compromise transportation infrastructure, necessitating innovative adaptation and resilience strategies. This presentation will investigate adaptive design approaches to bolster transportation networks against the dual threats of wildfire and subsequent flooding. It will explore methods for identifying, analyzing, and evaluating adaptation strategies to address the most significant risks to transportation systems within wildfire-prone riverine landscapes. Attendees will gain insights from in-depth risk assessments, economic analyses, and a series of case studies that demonstrate a spectrum of successful resilience-building interventions.

Biography: Megan Frye serves as a Hydraulic Engineer with the Federal Highway Administration's (FHWA) Resource Center providing training, technical support, and technology development and deployment for internal and external stakeholders. Her work with FHWA includes 15 years of construction management, project development, and hydrologic and hydraulic analysis and design experience. She worked more than 10 years with the Federal Lands Highway Division on transportation projects in unique and complex settings across the nation's federal lands. She graduated from Carroll College with a Bachelor of Arts Degree in Civil Engineering and the University of Minnesota with a Master of Science Degree in Water Resource Engineering. Ms. Frye specializes in hydrology and hydrologic modeling and assessment and design of bridges and culverts and is a registered professional engineer in the State of Washington.

Difficulties of Owning, Operating and Maintaining a Levee in an Arid Region

Ben Rood, WSP, ben.rood@wsp.com
Co-presenters: Tamaran Woodland, PE, CFM, Salt Lake County Flood Control, twoodland@slco.org

Abstract: Salt Lake County Flood Control owns, operates, and maintains the 18 mile Surplus Canal levee system, the largest levee system in the State of Utah. This presentation will discuss the Surplus Levee Rehabilitation project that began after the 2012 USACE inspection that resulted in over 450 unacceptable encroachment violations and removal of the levees from the Levee Safety program. Salt Lake County has worked over the past 10 years to bring these levees back in to compliance, and has found that there are unique challenges associated with a levee that visually compares more to a speed bump than a typical levee system. Specifically we will discuss hurdles associated with privately owned levee sections, property acquisition 60 years after levee construction, rail road crossings, addressing encroachments and diverse challenges that come with a levee that bisects the largest city in the State of Utah.

Biography: Ben Rood specializes in surface water, hydrology, and hydraulic engineering. He has a passion for hydraulic modeling of rivers, storm drains, and bridge scour. Ben has assisted in many public infrastructure projects including roadway bridges, debris basins, channel restoration, levee rehabilitation, and storm drain systems. Ben's favorite vacation destination is boating at Lake Powell.

J5: Benefits and Co-Benefits of Natural Floodplain Functions
Track: NBF

Mapping the Risk Reduction Benefits of Coral Reef Conservation – Hawai'i Case Study

Ashley Hoke, MA in Applied Geography & Geospatial Sciences, NiyamIT, ahoke@niyamit.com
Co-presenters: Doug Bausch, dbausch@niyamit.com and Maureen Kelly, maureen.kelly@fema.dhs.gov

Abstract: Effective disaster risk reduction measures are vital to coastal communities around the world. Nature-based solutions (NBS), such as coral reef conservation, are emerging as sustainable alternatives to conventional approaches. This study demonstrates the effectiveness of coral reef conservation in mitigating flood risk. Leveraging FEMA's open-source Hazus Flood Assessment Structure Tool (FAST), and open data from the U.S. Geological Survey (USGS) and the US Army Corps of Engineers (USACE), we quantified and enhanced the assessment of the economic benefits of coral reef conservation in Hawai'i. This presentation will explore a scenario modeling flooding resulting from the potential loss of the upper 1 meter of coral reefs. The study analyzes the Average Annual Loss (AAL) and losses avoided based on a series of 4 flood scenario return periods with and without coral reefs. Our case study finds that preserving the upper 1 meter of coral reefs for the main islands of Hawai'i provides the state with $629 million in annual losses avoided to buildings. A hot spot analysis of the losses avoided identifies areas where conservation efforts could be prioritized. The flood reduction benefit can now be combined with FEMA's Ecosystem Service Value Updates to incorporate the additional aesthetic, food, habitat, recreation, and education benefits of NBS. These findings endorse the efficacy of NBS in disaster risk mitigation and demonstrate an applicable methodology using accessible tools and data. FAST combines structure data with flood depth information and damage functions developed by the engineering community to estimate flood impacts for every building in a study area. Given structure data and a depth grid, FAST calculates economic losses, building damages, and debris for approximately 10,000 structures per second. Its ability to manage extensive datasets and its open-source accessibility make it a versatile tool for data-driven disaster risk reduction planning and disaster response worldwide.

Biography: Ashley Hoke helps manage FEMA's Hazus Program, which provides standardized methods for estimating loss from earthquakes, floods, tsunamis and hurricanes. Ashley oversees development of risk assessment methods for the Hazus Program as well as planning for the future enhancements and development of external tools. She has over 5 years of direct project experience, an MA in Applied Geography & Geospatial Sciences, including a Master's GIS Certificate. She collaborates alongside product owners to identify business needs and consults on solutions, writing software and data documentation, creating communications and outreach content, public speaking and science communication, video editing, map production, IT troubleshooting, and GIS data organization and analyses.

Versatility of Nature-Based Solutions: Protections and Benefits from the Parcel to Community Scales

Emily Donahoe, J.D., National Wildlife Federation, donahoee@nwf.org
Co-presenters: None

Abstract: This session will highlight the major takeaways from National Wildlife Federation's newest showcase report, titled Versatility of Nature-Based Solutions: Protections and Benefits from the Parcel to Community Scales. The session will introduce the idea of natural infrastructure and nature-based solutions as approaches that not only provide hazard mitigation benefits but also provide a plethora of co-benefits to support healthy and resilient communities and ecosystems. Through a series of compelling showcase stories, this session will illustrate the remarkable adaptability and diversity of these nature-based solutions across a spectrum of scales, addressing a wide array of hazards while also providing invaluable co-benefits to the surrounding environment and community. These stories will serve as a testament to the efficacy of nature-based solutions in fostering resilience and promoting the health of our communities and ecosystems. This presentation will provide participants with an enriched understanding of the versatility of nature-based solutions but also with actionable insights. These insights will empower attendees to champion the integration of natural infrastructure into their respective realms, ultimately contributing to the cultivation of healthier, more resilient communities.

Biography: Emily Donahoe is a Policy Specialist for Resilient Coasts and Floodplains at the National Wildlife Federation and is based out of Washington, D.C. In their role, Emily serves as a policy representative and researcher on critical issues pertaining to disaster resiliency, hazard mitigation, and climate change adaptation. Prior to their role at NWF, Emily received a J.D. from The George Washington University Law School, where they concentrated their studies on the intersection of land use law, environmental justice, and disaster policy.

Designing Wildlife Benefits in a Stream Restoration: Willow Creek Case Study

Troy Carmann PE, CFM, ICON Engineering, Inc., tcarmann@iconeng.com
Co-presenters:

Abstract: Willow Creek is a perennial stream with headwaters in the Pike National Forest. Willow Creek flows through Roxborough State Park en route to the South Platte River just upstream of Chatfield Reservoir. On its path to the Platte, Willow Creek passes through the Sterling Ranch development. Sterling Ranch will provide nearly 10,000 new homes, a school system, and new parks and open space when complete. Additionally, Willow Creek is designated as a wildlife corridor for the area and is recognized as habitat for Preble's meadow jumping mouse, a Federally-listed threatened species. To

help navigate the complexity of this project and ensure that any stream improvements would create a community amenity, and increase the stream's resilience to changing watershed characteristics, Sterling Ranch Development Company (Sterling Ranch) decided to engage Douglas County and the Mile High Flood District (MHFD) about including Willow Creek in MHFD's Development Improvement Program (DIP).

In 2018, a multi-disciplinary team that included ICON Engineering, Valerian LLC, Great Ecology, and ERO Resources, was hired by MHFD to design higher functioning and lower maintenance (HFLM) stream improvements to Willow Creek in partnership with Sterling Ranch. The design team made use of the abundant space made available by Sterling Ranch to construct a resilient stream and floodplain system that not only considers the future changing hydrology, but also the wildlife and public amenity that open space provides. The resulting project was constructed in the fall of 2021 by Naranjo Civil and has shown immediate improvements on aesthetics and habitat value.

While the design team is proud of the stream design, which utilized pool-riffle morphology and multi-stage channel grading to create a HFLM stream corridor, we recognize that this is a story many in our industry have likely heard before. Instead of focusing on the stream design itself, this presentation will focus on the challenges and lessons learned pertaining to wildlife considerations within the stream restoration project.

- Designing stream crossing structures for wildlife passage;
- Designing for wildlife and ecology within a stream restoration site
- Community connections to the stream in a wildlife corridor;
- Overall project outcomes.

Biography: Not everyone that spends their childhood in the creek behind their house becomes an engineer, but Troy Carmann did. The fact that the county landfill was less than a mile upstream didn't seem to bother anyone and the water seemed fine. A bike trip from San Francisco to Washington DC one summer gave him a unique perspective of civil infrastructure and teamwork, and an internship the following summer launched his 27-year career at ICON Engineering where he is now President. Troy holds Civil Engineering degrees from both Iowa State University and the University of Colorado. Today, he treasures opportunities to connect with the ecological, economic, and enigmatic communities around infrastructure problems and participate in a solution that the next generation of engineers can learn from.

J6: Innovative Tools and Ideas for Stormwater Management
Track: Stormwater

Integration of Advancing Transportation Infrastructure with Stormwater Management Techniques
Kirsten Heerding, EIT, Kimley-Horn, kirsten.heerding@kimley-horn.com
Co-presenters: None

Abstract: The advancement of electric and automated vehicles poses the possibility for adaptations to transportation infrastructure as it relates to stormwater management. Impervious area associated with the transportation industry currently is mitigated through the use of underground storm drain infrastructure, however the adaption of automated vehicles could allow for a reduction of impervious surfaces associated with highways, local streets, and parking lots. These reductions could have large implications for decreased flood risk in urbanized regions. The increased presence of electric vehicles is also prompting the development of roads for vehicle charging during car operation via induced electromagnetic waves. The magnetic metals required for inductive charging include copper and zinc, both of which pose pollutant concerns in stormwater runoff. During a rain event, runoff has the potential to directly interact with and become polluted by these heavy metals through the pores of asphalt pavement.   This presentation will discuss the effects of adopting new roadway design strategies, such as those discussed in the University of Minnesota's Future Streets: Leveraging Autonomous Shared Vehicles for Greater Community, Health, Equity, Livibility, and Prosperity, on flood risk in developed areas. This discussion will include a case study and flood model for a San Diego watershed using impervious reduction assumptions presented in the University of Minnesota's findings. This case study will be used to determine the potential base flood elevation reduction given "future streets" strategies, and it will also discuss likely challenges in adopting these strategies. The presenter will also discuss the effects of implementing charging pavements on stormwater quality, and the general safety of runoff interacting with induced currents within the road during storm events.

Biography: Kirsten has 2 years of experience working on civil engineering projects for Kimley-Horn. She graduated with her Bachelor of Science Degree in Environmental Engineering and Master of Science Degree in Civil and Environmental Engineering from California Polytechnic State University, San Luis Obispo. She specializes in surface water projects including floodplain studies, storm drain infrastructure improvement plan development, and stormwater quality mitigation studies.

River Trail School's Agricultural Program: Urban Forest & Stormwater Reuse

Joanna Colletti, PE, CFM, GRAEF-USA, Inc., joanna.colletti@graef-usa.com
Co-presenters: None

Abstract: River Trail School, a school within Milwaukee Public School (MPS) system, caters to a community of 400 K-8 students located on the Northwest side of Milwaukee. Young minds are provided with a unique and invaluable gateway to explore career pathways in agriculture that are typically overshadowed in an urban upbringing. The school received funding from the Fresh Coast Protection Partnership to take this non-traditional agriculture program one step further by designing a self-supporting Urban Forest on school grounds. The site includes over 100 fruit and nut trees for students to study and take the produce to market to sell. In conjunction with Vincent High School's agriculture program, MPS will become the only school district in the country to have a K-12 agriculture program. GRAEF designed and consulted on the project. The scope included a series of berms and swales created to improve stormwater management and provide a water supply for the fruit and nut trees planted on the berms. The urban forest was positioned on an under-utilized area of the school grounds that used to sheet drain over turf grass and impervious areas to the city's combined sewer system. Now, the swales and berms create natural drainage for stormwater runoff to be captured, stored, cleaned, and infiltrated, which in turn provides a source of water for the trees. The stormwater runoff will support the entire system, which is designed to capture, treat, and temporarily store over 176,000 gallons of stormwater every time it rains. This project exposes students to strategies and techniques in stormwater

management and permaculture they can take with them into high school, college and throughout the rest of their lives. This presentation will reveal the innovative civil engineering and stormwater methods employed in this unique project, which provides educational opportunities to local students for long-term success.

Biography: Joanna Colletti is the Market Area Leader - Water with over 25 years of private and public experience as a professional engineer. Her career includes working as an engineering consultant in the private sector and working in the public sector for the Lake County Stormwater Management Commission and the McHenry County Department of Planning & Development. She has been involved in a wide variety of projects including floodplain and stormwater management, civil site design, hydrologic and hydraulic analyses of riverine and urban drainage systems, regulatory permitting and enforcement, construction monitoring, and wetland delineations. Her experience also includes project management, standard operating procedures/policies development, stormwater ordinance and technical reference material updates, grant administration, and regulatory compliance. She has given presentations at conferences, workshops, public meetings, and board meetings on various stormwater topics and significant stakeholder issues. She has given expert witness testimony at several court cases. Ms. Colletti is the recipient of the 2021 IAFSM Floodplain Manager of the Year award and was named one of McHenry County's Best Under 40 of 2012. She holds a Bachelor of Science in Civil Engineering from Bradley University. She is a licensed Professional Engineer in the State of Illinois and a Certified Floodplain Manager.

Building Flood Resilient Cities: An Analysis of Causes, Risks and Mitigation Options

Mehedi Tarek, Streams Tech, Inc., mtarek@streamstech.com
Co-presenter: Sayedul H Choudhury, mtarek@streamstech.com

Abstract: Urban flooding has become a significant natural hazard, impacting infrastructure, urban mobility, and public safety. This research highlights engineering deficiencies and regulatory gaps that exacerbate flood consequences, with a focus on Tropical Storm Ida's impact on New York City in September 2021. Using the GeoSWMM 2D model, the study examines flood characteristics, factors augmenting urban flood risks, and mitigation options. The results indicate that obstructions like walls exacerbate flood risks by impeding overland flow, as observed in Woodside, NY., where three people died from basement flooding during the Tropical Storm Ida. A wall, which generates backwater, results a 3-ft rise in flood depth during a 1-percent-annual-chance storm event. Additionally, unless the project site is designated as a Special Flood Hazard Area (SFHA), prevailing urban drainage design practices often only evaluate stormwater infrastructure for a design storm with 10 to 15-year return period. Given the rising rainfall intensities due to climate change, it is crucial to assess the effects of development and transportation projects on both local and downstream flooding. Current design shortcomings sometimes turn city streets into torrents during intense storms. Furthermore, since the National Flood Insurance Program (NFIP) has left pluvial flood management unaddressed, local communities require support to create stormwater programs targeting these urban floods. This study recommends a reassessment of urban planning, consideration of dual-drainage design for stormwater management systems and protection of overland flow paths from future developments. In a dual-drainage system, overland flow paths convey water that overflows the storm sewer system during major storms. While an overland flow path might not be a discernible channel, it can be identified through topographic data analysis and protected using local ordinances mimicking the NFIP processes. Implementing this proposed approach is

imperative for proactive planning of flood-resilient cities, particularly in anticipation of climatic challenges.

Biography: Mehedi Hasan Tarek is a Senior Environmental Engineer, leading critical watershed management projects at Streams Tech, Inc. With over 14 years of combined professional and research experience, he boasts extensive expertise in stormwater, flood, and water quality modeling and environmental microbiology. He received his Ph.D. in Civil Engineering from West Virginia University in 2023. Earlier, he completed his B.S. in 2009 and M.S. in 2014 from the Bangladesh University of Engineering and Technology (BUET).

J7: Modeling for Mitigation & Design
Track: Modeling-2

A Blueprint for Flood-Resilient Communities: Using Modern Tools to Identify and Prioritize Solutions

Matthew Zelin, PE, Hazen and Sawyer, mzelin@hazenandsawyer.com
Co-presenters: None

Abstract: Many communities throughout the country suffer from routine and often severe flooding due to a combination of riverine flooding, undersized stormwater collection systems, and/or tidal flooding. For most of these communities, an initial step is to develop detailed hydrologic and hydraulic (H&H) models to assess runoff and where flooding has occurred. An initial challenge after developing the H&H models is prioritizing which flooding problems to address. This presentation will describe an approach to prioritizing which projects have the greatest flood reduction potential so that communities can make informed decisions. The presentation will draw on numerous, completed projects and case studies.   An initial step in developing an H&H modeling tool is to identify which software to use, the level of modeling detail needed, and where flooding has occurred. The presentation will address these topics, including an approach to identify which software is most suitable for communities, ideas on how to right-size your modeling detail, and how to identify past flooding events using social media. The use of social media has helped tremendously in confirming past flooding events with photos and videos that can be used for model calibration and verification. Methods to crawl through social media sites will be discussed as well as how to spatialize this information. The presentation will briefly highlight the means and methods of developing hydraulic models but on new ideas on how to develop more sophisticated two-dimensional (2D) models, including: how to increase the resolution of DEMs/terrains to better reflect urban surfaces (curbs, medians, etc.), development of detailed 2D surfaces to reflect these surfaces, as well as integrating open-channel and closed-pipe systems. After the models have been developed and the flooding understood, a major challenge is how do communities identify the most crucial projects that will address flooding? Often there is so much pluvial flooding it is hard to determine where to spend resources. Because communities have a limited budget, it's important to decide which flooding problems are worthy of investment. For several communities throughout the Country, from urban to semi-urban, Hazen has developed a methodology to categorize flooding risk areas, quantify the impact of the flooding on structures and infrastructure, and prioritize which risk areas should be

selected for solutions. This methodology will be discussed along with examples from several cities throughout the Country.

Biography: Matthew Zelin is a Senior Associate with Hazen and Sawyer in Silver Spring, MD. Matt has a BS and MS in Civil Engineering and is a professional engineer. He specializes in hydrologic and hydraulic modeling, conveyance design, and geospatial analysis.

Modeling Benefits to Habitation for Improved Flood Mitigation Project Analysis

Rameez Qureshi , Freese and Nichols, rameez.qureshi@freese.com
Co-presenters: Courtney Corso; courtney.corso@freese.com

Abstract: Natural disasters, particularly floods, pose significant threats to communities, damaging infrastructures and displacing residents. While mitigation projects can help reduce these impacts and hasten recovery, their evaluation often presents challenges. Specifically, evaluating benefits like ensuring safe residential habitation can be elusive due to the inherent difficulties in both modeling and quantifying these benefits. Frequently, the benefit-cost ratio, a standard investment measure, falls short in capturing the true value of residential flood mitigation projects, primarily because residential structures themselves tend to be less costly. While federal agencies possess methods to pinpoint the primary benefits of a project, secondary benefits remain elusive, given the intricate interplay of physical, environmental, and socio-economic systems.   In our study, we introduce a method to gauge some of these indirect impacts. Using Harris County, Texas, as a case study, we aim to better understand and mitigate flooding risks for residents. We employ a system dynamics modeling approach, examining the interactions among various system components, including the flow of products, residents, resources, and information. By combining system features, like infrastructure capacities, with constraints, such as preserving residential structures, and incorporating causal feedback, we can both predict performance and interpret system behaviors. This is done by simulating the aftermath of a disaster event, followed by the community's subsequent recovery. We utilize a series of differential equations on the Vensim Modeling Platform, producing behavior-over-time graphs to juxtapose habitation scenarios with and without mitigation measures, allowing for a tangible quantification of the benefits of habitation.   The presentation will provide policymakers, especially those in flood-prone coastal areas, with a more comprehensive lens to assess the multifaceted, and often non-economic, advantages of mitigation projects.

Biography: Rameez Qureshi is an engineer with the water resources planning team at Freese and Nichols. At FNI, Rameez has been involved in conducting a comprehensive multi-watershed residential resiliency benefit study. Additionally, Rameez has helped FNI develop regional water plans for the state of Texas. Before joining FNI, Rameez helped substantial civil infrastructure initiatives in India, where he excelled in project management, strategic planning, and rigorous monitoring of public sector enterprises. His international experience further extends to aiding public sector clients in Chile and Peru, where he assessed and reformed regulatory practices to enhance the resilience of public water systems against critical challenges. Rameez received his Ph.D. and master's degree from Texas A&M University.

High Level Coastal Flooding Analysis Using HEC-RAS

Ashikur Rahman, Michael Baker International, ash.rahman@mbakerintl.com
Co-presenters: Mujahid Chandoo, MCHANDOO@mbakerintl.com and Momtahana Binte Habib, momtahana.bintehabib@mbakerintl.com

Abstract: HEC-RAS has been a widely popular software to use for riverine flooding studies. Usually coastal flooding analysis is done using a different software such as- ADCIRC or Delft3D and then combined probability approach is used to determine different annual probability flood events. However in many projects inside coastally influenced areas, separate coastal modeling is not possible due to the limitations of scope. With the increase in 2D capabilities, HEC-RAS is being increasingly used for both riverine and high-level coastal analysis. NOAA has a significant number of coastal tide gauges around the U.S. with years of recorded data that can be used to perform such coastal analysis. Some logical assumptions and engineering judgments also needs to be made for such analysis. As climate change and sea level rise become more mainstream in design considerations, many agencies are either mandating or recommending some-level of coastal analysis as well. This presentation begins by describing a few scenarios where high-level coastal analysis can be done. The presentations will then exemplify a couple of case studies emphasizing a TxDOT bridge replacement project in a coastally influenced zone. The case study presentation will include detailed descriptions of how NOAA data can be used to make assumptions and engineering judgements. Finally, the presentation will summarize the key results and findings, challenges we faced and limitations of the study. Listeners will leave with an understanding of how to use a familiar and widely-used tool, HEC-RAS, to perform coastal analysis.

Biography: Ashikur Rahman is a water resources engineer with 6 years of industry experience. Ashikur has experience in H&H modeling, drainage analysis and construction management and delivered projects for federal, state and private clients. Prior to joining Michael Baker International, Ashikur worked for Atkins and Braun Intertec. He has a Bachelors and Master's degree in civil engineering. Ashikur is passionate about voluntary works for the community.

J8: Coastal Mapping
Track: Mapping

FFRMS Coastal FVA Challenges and Solutions
Heather Zhao, PE, CFM,PMP, AECOM, heather.zhao@aecom.com
Co-presenters: Elena Drei-Horgan, Ph.D, CFM , elena.drei-horgan@aecom.com; Erik Nerrie, CFM, GISP, frederik.nerrie@aecom.com; and Erin Benford, PG, erin.benford@aecom.com

Abstract: FEMA's Federal Flood Risk Management Standard (FFRMS) plays a pivotal role in bolstering resilience against increasing flood risks. To help support the implementation of the FFRMS, Compass, as a FEMA Production and Technical Services (PTS) contractor, was contracted to develop Freeboard Value Approach (FVA) that are FFRMS flood hazard mapping and supporting information for areas within FEMA Zone 2 covering most of the Southeast. This presentation will focus on developing the FVA for the coastal flood hazard areas. We will outline the limitations, workflow, and necessary collaboration in managing the extraction of coastal flood hazard information to the packaging of the data for final delivery. We will delve into the challenges encountered such as mapping the levee-protected areas, the Primary Frontal Dune areas, the runup/overtopping areas, and areas where zones of multiple base flood elevations (BFEs) converge. We will also present solutions all PTS contractors agreed upon after discussions with FEMA.

Biography: Heather Zhao is a senior coastal engineer/PM with AECOM. She has experience in conducting hydrologic and hydraulic analysis for riverine and coastal hazard areas for FEMA Flood Insurance Studies (FIS). She has worked on numerous FEMA FISs and is the AECOM coastal SME for the FFRMS FVA project.

High Resolution Land Cover for Coastal U.S. (and Beyond): What Can It Do for You?

David Betenbaugh, GISP, CFM, CSS (working on contract for NOAA's Office for Coastal Management (OCM), david.betenbaugh@noaa.gov
Co-presenters: None

Abstract: This presentation will introduce a new high resolution land cover data product from NOAA's Office for Coastal Management. Land cover is a foundational data set that provides valuable information for a range of applications, including floodplain and stormwater management, land use planning, disaster risk reduction, and climate adaptation. For almost two decades, NOAA's Office for Coastal Management (OCM) has been producing standardized, national landcover and change information (at a 30-meter resolution) through its Coastal Change Analysis Program (C-CAP). More recently, NOAA has begun developing a high resolution version of this data product, moving from 30 meter to 1 meter resolution. This more detailed land cover data supports a variety of applications at the local, site-specific level and can provide valuable insight for planning and decision making activities. Join this presentation to hear how communities and organizations have been using this new data product for projects like stormwater and storm surge modeling, Community Rating System mapping activities, risk analysis, as well as several other applications.

Biography: David Betenbaugh is a Senior Geospatial Analyst working on contract at the National Oceanic and Atmospheric Administration's (NOAA) Office for Coastal Management (OCM). David has worked at OCM for 13 years and has contributed to a variety of activities, including data development, training delivery, maintaining web-based tools, and providing technical support to coastal communities. He holds a Master's Degree in Environmental Studies from the Graduate School at the College of Charleston.

From Pilots to Prototypes: Progress on FFRD Dataset Conceptualization over the Past Year

Christina Lindemer, FEMA, Christina.Lindemer@fema.dhs.gov
Co-presenters: Lauren Schmied, Lauren.Schmied@fema.dhs.gov; Andy Bonner, Andrew.Bonner@aecom.com; and Eric Kencel, Eric.Kencel@aecom.com

Abstract: Multiple efforts have been undertaken over the past few years to develop and test the technical methodology for coastal and inland engineering analysis that will be implemented as part of FEMA's Future of Flood Risk Data (FFRD) initiative. Concurrent with ongoing inland pilots with the US Army Corps of Engineers (USACE) to develop methodologies, the first round of coastal probabilistic data that will be leveraged under FFRD was delivered in early 2023 to FEMA from USACE. Upon receipt, FEMA began to demonstrate how many derivative flood hazard and risk datasets and products that can be developed based on this probabilistic information. This included the development of an interactive visualization prototype to help further illustrate the value and benefits of FFRD data with stakeholders. This presentation will provide an overview of the progress FEMA has made on conceptualizing FFRD datasets over the past year, sharing the related prototypes and visuals that the FEMA coastal team has developed. Progress that has been made to plan for and prototype similar products and datasets for inland flooding sources will also be shared. The presentation will help attendees gain a better

understanding of the types of comprehensive flood hazard and risk datasets that will be available under FFRD and will share examples and interactive visuals of how FFRD data can be used to support decision-making at both the property and community (or larger) level.

Biography: Christina Lindemer is a coastal engineer and technical lead at Federal Emergency Management Agency (FEMA) Headquarters working on methodology development for Future of Flood Risk Data. She provides flood expertise in support of decreasing the nation's risk exposure through mitigating actions. Prior to this position, she was a senior coastal engineer with FEMA Region IV in Atlanta. She was provided technical guidance and project management for coastal flood hazard mapping efforts throughout the southeast. Christina attended the University of Delaware for her undergraduate and graduate degrees, a Bachelor of Civil Engineering with Distinction, and a Master's in Civil Engineering.

J9: Evaluating Data Uncertainty in Modeling
Track: Modeling-1

Quantifying flood protection reliability with uncertainty and nonstationarity
Timothy Stephens, Ph.D., P.E., Dynamic Solutions, LLC, tastephens@dsllc.com
Co-presenters: None

Abstract: Flood risk and reliability at a particular location on the floodplain is typically communicated as a precise value. However, these estimates neglect inherent uncertainties, often assume stationarity, and potentially underestimate communicated reliability. This presentation outlines novel techniques and applications for incorporating uncertainty and nonstationarity into flood protection reliability estimates. Reliability depends on channel and floodplain flow capacity and the occurrence likelihood of a flood capable of exceeding that capacity. However, flow capacity is uncertain and can change through time due to erosion/deposition, land cover, or others. Flood likelihood is uncertain due to data and methodological limitations, and it can change through time due to climate, land use, or other factors. Consequently, flood protection reliability is characterized by a distribution that can reveal locations of increased/decreased certainty and enable decision making based on contextually appropriate levels of confidence. We quantify the distribution of reliability at two contrasting study sites, Little Sugar Creek, Charlotte, NC and the Mississippi River, St. Louis, MO by considering uncertainty in flow capacity and uncertainty and nonstationarity in flood loading (i.e., magnitude-frequency relationships). Flow capacity uncertainty is quantified by two techniques, Monte-Carlo simulations of flood hydraulics and an analysis of field measurements. A nonstationary gumbel model fit to annual peak flows quantified flood loading. Reliability is calculated by integrating the marginal probability distribution of flow capacity and flood loading. This procedure can then be implemented in a bootstrap scheme that samples uncertainty in the gumbel model to quantify the distribution of reliability over a planning horizon or to quantify a design flood magnitude based on a desired level of confidence. Mapping distribution of reliability revealed variance along regulatory floodplain boundaries intended to communicate constant risk. This work shows that neglecting uncertainty and nonstationarity can substantially underestimate flood risk and provides a transferrable tool for floodplain management.

Biography: Dr. Stephens is an engineer and scientist working on a wide array of multi-faceted and interdisciplinary water resources projects ranging from research, applications, and design. His expertise includes hydrodynamic modeling, flood risk analysis, fluvial geomorphology, ecosystem restoration, among others. At Dynamic Solutions he strives to address water resource challenges with the best available science and innovative solutions.

Extracting Streams from DEM using Deep Learning and the ArcGIS Python API

Sanjay Negi, PE, PMP, CFM, WSP, sanjay.s.negi@wsp.com
Co-presenters: None

Abstract: Streams are a crucial component of the FEMA Risk Map study, and accurately mapping them from a Digital Elevation Model is essential. Deep learning can be used to extract streams from DEM using the ArcGIS Python API. The workflow will cover importing necessary libraries, obtaining data for analysis, and exporting training data, including visualization of training data samples, training the deep learning model, assessing model accuracy and visualizing results, saving the trained model, and using it for model inference. Participants will be shown how to compare the results obtained from deep learning with those obtained using traditional methods in ArcGIS Pro, specifically the "Derive Stream as Line" and "Stream Order" tools. By the end of the presentation, participants will have a clear understanding of the deep learning techniques used for stream extraction, as well as the ability to apply these techniques to their data using the ArcGIS Python API.

Biography: I am a consultant at WSP, and I possess a burning passion for the programming of Python, the management of flood risk, and effectuating positive change in the world. To provide additional context about my background, I am a water resources/civil engineer with 5 years of experience in hydrologic and hydraulic modeling using HEC-HMS, HEC-RAS, and XPSWMM. I have conducted extensive watershed studies for FEMA flood risk map updates and validation. Additionally, I have designed and analyzed storm drainage systems, conducted field visits, and obtained river water samples for monitoring. I am proficient in using ArcGIS for project development and creating informative exhibits.

Enhancing Statewide Flood Resilience and Equity - Leveraging Geospatial Data for Advanced Hydrological Modeling

Brandon Palin, Ecopia AI, brandon@ecopiatech.com
Co-presenters: None

Abstract: Addressing the growing risk and increased costs of floods in the face of climate uncertainty needs practical solutions. Government bodies can utilize detailed land cover data to make better decisions for protecting people and property. Brandon Palin from Ecopia presents a pioneering case study focusing on the City of Peterborough, where integrating highly detailed and consistently updated land cover data has significantly advanced flood modeling and stormwater management for the city. Brandon will expand on the case study and give a sneak-peak on how these datasets are now being leveraged by early adopters on the state-level such as State of Texas for their Streamflow II project, where a statewide road elevation model was created incorporating LIDAR and road polygons - a fundamentally important initiative for public safety on roads during flood emergencies. Leveraging geospatial data at a statewide level provides a powerful resource for addressing flooding issues across multiple jurisdictions, promoting not just effectiveness but also equity. A statewide dataset can serve as a backbone for regional and local planning, offering standardized, regularly updated, and highly precise

data. This ensures that access to essential flood-risk information is open to all, enabling even under-resourced communities to implement effective resilience strategies in the face of climate uncertainty.

Biography: Brandon Palin is Senior Director of Public Sector & International Development at Ecopia AI. A geospatial data company that leverages ground-breaking advancements in artificial intelligence to convert high-resolution imagery of our earth into HD Vector Maps. These datasets are embedded into critical applications around the world, providing foundational information for critical decision-making, improve the welfare of societies, efficiency of economies, and health of environments. His main responsibilities are to lead the development of Ecopia's global solutions in developing markets and oversee North American public sector clients. Brandon holds a Master of Science in International Business from the Richard Ivey School of Business in Toronto, Canada, and a CEMS Master in International Management from the University of St. Gallen, Switzerland.

J10: ASFPM Showcase