2017 ASFPM Kanas City Conference Program
Concurrent Session Abstracts and Biographies

SESSION A
Tuesday, May 2 10:30-Noon

A1: Assessments to Evaluate & Prioritize Mitigation Options
Moderator: Michael Powell, CFM, ASFPM Regulations Cmte. Co-Chair, Delaware DNREC, michael.powell@state.de.us

Implementing a Proactive Land Acquisition Framework for Flood Risk Reduction
Sam Brody, PhD, Texas A&M University, brodys@tamug.edu
Additional Author(s): Wesley Highfield, Helen Walters

Protecting open space and critical natural resources is an important tool with which to mitigate the adverse effects of flooding. However, land acquisition and buyout programs are most frequently initiated in a reactionary, ad hoc manner after a flooding event has occurred. This approach often results in an uncoordinated pattern of open space acquisitions that does little to protect environmental assets or remove structures from areas vulnerable to flooding over the long term.   This presentation will report on the results of a proactive framework for identifying strategic candidate parcels for acquisition to protect against future storm events. It is essential to maximize ecological benefits when removing structures and/or protecting open spaces from development within flood vulnerable areas. We propose to: •Identify which ecological factors should be considered when proactively identifying candidate buyout parcels; •Develop a spatial statistical method for selecting candidate buyout parcels at the county level on the Texas coast; and   •Test the framework for all parcels in Galveston County, TX and calculate the implications for avoiding losses over the long term.   This presentation will be the first of its kind to comprehensively assess millions of parcels for acquisition to protect critical ecological functions and reduce the adverse economic impacts of flooding over the long run. The Galveston County case study will provide a pre-storm method for prioritizing storm surge protection buyouts. Furthermore, the project will produce data and analytical tools to support informed decision-making by those policymakers and community leaders currently working to develop a comprehensive storm surge protection system for the Upper Texas Gulf Coast. It is also anticipated that this project will have utility for other flood prone regions, such as New York, Florida, and Louisiana.

Biography
Samuel D. Brody is a Professor and holder of the George P. Mitchell '40 Chair in Sustainable Coasts in the Departments of Marine Sciences and Landscape Architecture and Urban Planning at Texas A&M University. He is the Director of Center for Texas Beaches and Shores and the Co-Director of the Institute for Sustainable Coastal Communities.   Dr. Brody's research focuses on coastal environmental planning, spatial analysis, flood mitigation, climate change policy, and natural hazards mitigation. He has published numerous scientific articles on flood risk and mitigation, and recently authored the book, Rising Waters: The causes and consequences of flooding in the United States published by Cambridge University Press. Dr. Brody teaches graduate courses in environmental planning and coastal resiliency. He has also worked in both the public and private sectors to help local coastal communities to environmental and flood mitigation plans. For more information, please visit www.tamug.edu/ctbs or www.tamug.edu/CTBS.

Owen County, IN Transportation Vulnerability Assessment
David Knipe, PE, CFM, Indiana DNR, dknipe@dnr.in.gov
Additional Author(s): Matt Riggs, GISP, CFM, The Polis Center

As part of the Risk MAP effort in Indiana, the Indiana Department of Natural Resources (IDNR) teamed with the Polis Center to conduct a Transportation Vulnerability Assessment for Owen County, IN. This was a multi-phase effort that included 1) GIS data analysis to rank potential vulnerable assets, 2) meeting with community to verify analysis, 3) compilation of potential action to reduce vulnerability, 4) proposed project site visits and 5) perform the analysis and document results. Based on the results of Phase I and II, six sites were selected for further analysis. These include areas which experience inundation and/or erosion issues. Many of the issues reported were observed following a significant rain event in the county. This allowed for a unique opportunity to document and validate the identified issues and refine the prioritization of the projects.   A focused analysis of the vulnerable assets will be performed including developing engineering hydraulic models for the site, creating flood depth grids, fluvial erosion hazard identification and cost estimates for suggested mitigation where applicable. Potential mitigation actions include correlation of flood depths to a nearby USGS stream gage for increasing efficiency of road closures, hydraulic analysis to assist with culvert design and expansion of bridge openings and impact of realigning a roadway outside of floodplain and fluvial erosion zone.

Biography

David is the Section Manager of the Central Basin Team in the Engineering Services Center of the Indiana Department of Natural Resources, Division of Water. As section manager, he is responsible for the development and review of hydrologic and hydraulic modeling for various floodplain management and dam safety applications. He also has been very active in the Division's program to modernize and update FEMA floodplain mapping for the state. David currently serves as co-chair of the Mapping and Engineering Standards Committee for the Association of State Flood Plain Managers. He has been with the Division of Water since 1992. David received a Bachelor of Science degree in Civil Engineering from Penn State University, a Master of Science in Civil Engineering degree from Purdue University, and is a registered Professional Engineer in the State of Indiana, and an ASFPM Certified Floodplain Manager.

Nonstructural Assessment in the Little Apple

Brian Rast, PE, PMP, CFM, USACE, Inst. for Water Resources, brian.t.rast@usace.army.mil
Additional Author(s): Randy Behm

Through the U.S. Army Corps of Engineers (USACE) National Nonstructural Flood Proofing Committee (NFPC) and the Silver Jackets Program, a large interagency partnership, including the Kansas Hazard Mitigation Team-Kansas Department of Emergency Management-Kansas Department of Agriculture Division of Water Resources-USACE-and local sponsoring from Manhattan, KS and Riley County, KS, has applied a process and several tools from the USACE NFPC to prepare the city to prioritize mitigation efforts in the floodplain of the Big Blue River. The city is already leveraging the results to take next steps towards implement the recommendations. The presentation will help attendees benefit from the analogy dealing with 49 structures in the community, which gave foresight on how to handle the overall total of 250 at risk structures in an associated floodplain management plan, complementing the local hazard mitigation plan. The scoping process and steps for doing a nonstructural assessment are covered in detail. Then, the NFPC's tools are described as applied to the community's flood hazard, including, in order of process, the Structure Attribute Table, the Nonstructural Flood Risk Management Matrix, and the nServo cost estimating tool. Measures considered in the nonstructural assessment include buyouts, relocation, elevating structures, fill basement, flood warning, and dry and wet flood proofing. The audience will see how the USACE process can be done by any community. They will also learn how it can apply green space, similar to ecosystem services, to buyout and relocation options. This process can be a technical service from USACE as a study under the USACE Flood Plain Management Services program, the USACE Planning Assistance to States program, and even actual studies leading to implementation with cost sharing between USACE and local communities. Most importantly, the audience will become familiar with the effort to conduct these nonstructural assessment studies, including scoping the effort under project management. Over 20% of these structures located in this community's base flood are feasible for federal assistance, and the audience will see which measures have the good benefit-cost ratios, including the application of the results geospatially, which provides visual mapping tools that can be used to gain public engagement in decisions leading to speedier implementation.

Biography

Mr. Rast works to enhance flood mitigation, risk analysis, nonstructural and flood proofing measures, floodplain management plans, flood warning systems, and emergency action plans. Mr. Rast has worked as an engineer in hydrology and hydraulics, since 1993. He received a BS Civil Engineering (environmental science) from Kansas State University in 1994. He did consulting for stormwater management and site development. In 2004, Mr. Rast earned a MS Engineering Management from the University of Kansas and began work as a project manager in the USACE, on Civil Works water resource projects in flood risk management. He completed advanced training from the Planning Associates Program and Leadership Development Program. He is a member of the USACE Nonstructural Flood Proofing Committee. Since 2009, as the Lead Silver Jackets Coordinator with state lead hazard mitigation teams, KS and MO, he has lead over ten interagency projects on flood resiliency. In 2012, the Kansas team became the 2011 State Team of the Year. In 2014, he did outreach tools for improving flood hazard mitigation work, including better public engagement strategies and leading the formation of the Region VII Mitigation Work Group. In 2016, he began work with USACE IWR on the Public Awareness and Communication Team.

A2: The Changing Face of Floodplain Mgmt. Policy

Moderator: Joy Duperault, CFM, Massachusetts DCR, joy.duperault@state.ma.us

Climate Change Policy Update: Overview of Federal Agency Responses to EO13690 & the Federal Flood Risk Mgmt. Standard

Shane Parson, PhD, PE, CFM, AECOM, shane.parson@aecom.com

Responding to concerns related to floodplain risks and climate change, on January 30, 2015, the President signed Executive Order 13690, establishing a Federal Flood Risk Management Standard (FFRMS) and a Process for Further Soliciting and Considering Stakeholder Input. Since EO 13690 has been issued, a number of federal agencies have proposed different approaches to incorporate the guidance given in the FFMRS for establishing design flood elevations (DFEs) for federally funded projects.   This presentation will provide an overview of the different approaches that FEMA, HUD, and the DOD have proposed to address the issues of 1) critical versus non-critical projects and of 2) the three possible approaches for calculating DFEs based on the Climate-Informed Science Approach (CISA), the Freeboard Value Approach (FVA), and the 500 Year Flood (0.2 Percent Flood) Approach. The FEMA and HUD approaches will be summarized from recent Proposed Rules and associated publications. The DOD approach will be based a recent project AECOM conducted with NAVFAC for military project design standards related to sea level change.

Biography
Dr. Parson is a Natural Hazard and Climate Change Modeling Analyst with the AECOM Germantown, Maryland Office. His expertise is in natural hazard and climate change modeling and planning, hazard mitigation grants and plans, benefit cost analysis, risk assessment, and water resources engineering. He has a varied background in private consulting as well as higher education and training. He was President of the Virginia Floodplain Management Association for five years and currently supports the VFMA Board. He is a certified Hazus Professional and Hazus Practitioner.

Levees & NFIP Reauthorization: Some Hot Topics & What to Watch
Kyle Gilster, Esq., Husch Blackwell, kyle.gilster@huschblackwell.com

Levees are critical to protecting people and property from floods, and to stemming the tide of flood losses, but their treatment in the National Flood Insurance Program (NFIP) is uncertain. As the current program authorization approaches its expiration on September 30, 2017, efforts are underway to reauthorize the NFIP. A status update will be provided, with a look toward what that could mean for levees and leveed areas. Included will be a legislative outlook, along with some of the principles for flood insurance reauthorization and reform begin discussed on, and off, the Hill: Providing Market Stability; Placing NFIP on Sound Financial Footing; Achieving Greater Transparency, Consumer Choice and Stronger P3s; Improving the Rate-Setting Process; and Updating and Reforming Mitigation and Mapping. There will be an overview of issues likely to arise, such as: Residual Risk, Federal Disaster Aid, NFIP Borrowing Authority, Feasibility of Catastrophic Disaster Insurance, Affordability of Insurance Coverage, Community-based Flood Insurance Policies, and Problems with the NFIP Claims Process. The presentation will inform those already, or preparing to become, engaged in the NFIP reauthorization process.

Biography
Kyle's experience in government at the state and national levels helps shape his role as a member of Husch Blackwell's Financial Services team. He has worked extensively with legislation related to banks, insurance, brokerage companies and trade finance. Notably, he was counsel on the House of Representatives Financial Services Committee for Chair Mike Oxley of Ohio and Subcommittee Chair Doug Bereuter of Nebraska. Kyle is experienced in matters concerning governmental affairs, ethics, government contracts and election law. He assists industry representatives from groups, companies and associations with legal services across the financial spectrum. Before joining the firm, Kyle served as a legislative aide to Nebraska Sen. David Maurstad in 1997-1998 and as a legislative assistant to U.S. Rep. Doug Bereuter from 1998 to 2000. Additionally, he held staff positions with the Nebraska Legislature and the Nebraska Attorney General's Office.

The Climate Science Approach in Floodplain Mgmt.
Kristina Murphy, EI, CFM, DuPage County, IL, cirruskmf@aol.com

Climate science and climate resilience are terms that have recently appeared in floodplain management. The Biggert-Waters reform act to the National Flood Insurance Program (NFIP) states that climate change science should be considered in floodplain mapping. The Federal Flood Risk Management Standard (FFRMS) states that a climate-informed science approach is the preferred method for establishing flood hazard areas. What is the Federal Emergency Management Agency's (FEMA) policy on climate change? What elements will be required to address concerning climate change?   What background information should floodplain managers be aware of concerning climate change? What are the projected effects and impacts to flood risk from changes in climate? Specific examples will be given regarding coastal regions, drought and fire prone regions, and areas

subject to increased rain fall. This presentation will detail the benefits of the climate science approach and provide recommendations and challenges to implementing the climate science approach.

Biography
Kristina Murphy, CFM, EIT, currently works for the Stormwater Management department of DuPage County, Illinois. She has over 16 years of experience in water resources engineering and floodplain management with consulting firms and government in northeastern Illinois and Denver, Colorado. She assisted Boulder County, Colorado, with flood recovery following the September 2013 flood. Her experience includes business development planning for climate change services, project management, hydrologic and hydraulic modeling, flood inundation mapping, design and permit review, Risk MAP flood insurance studies and Physical Map Revisions, and technical review of LOMR's and LOMA's. Kristina earned a Bachelor's of Atmospheric Science from the University of Louisiana at Monroe. She also has 14 years of experience as a meteorologist at Chicago O'Hare International Airport. She is active in the American Meteorological Society (AMS). She was president and treasurer of the Denver-Boulder AMS chapter and was the keynote speaker at the Chicago's chapter annual banquet.

A3: Modeling a Wave of Coastal Conditions
Moderator: Jeffrey Tabar, PE, D.CE, Stantec, jeff.tabar@stantec.com

Lake Michigan ADCIRC+SWAN Modeling for Flood Risk Analysis
Jeffrey Tabar, PE, D.CE, STARR II, jeff.tabar@stantec.com
Additional Author(s): Kenneth Hinterlong, Sarah Hayman, FEMA RV; Joe Faries, PE, CFM; Aaron Chen; Ali Marjani, PhD, PE, STARR II

FEMA has initiated a coastal flood analysis and mapping study to produce updated Flood Insurance Rate Maps (FIRMs) for coastal counties along the Great Lakes. The new Great Lakes Coastal Flood Study utilizes updated coastal flood elevations obtained from a comprehensive flood hazard study. As part of the study, storm surge and wave hazard analyses basin-wide for Lake Michigan were performed in order to increase the understanding of local flood risk, mitigation efforts, and improve local community resilience towards flood losses (life, property, and business) in the Great Lakes. A significant challenge faced during the study was that the wave conditions needed for completing the one dimensional (1-D) transformation analysis were not well understood or defined. To address this concern, a two dimensional (2-D) wave and water level model was developed for Lake Michigan. As part of this effort, a numerical computer 2-D model was developed by coupling Advanced Circulation Model (ADCIRC) + Simulating WAves Nearshore (SWAN). The SWAN model is a third generation, phase-averaged spectral wave model that simulates the transformation of wind-generated waves from deeper waters into coastal regions and inland waterways. SWAN provides high resolution wave data and captures wave refraction and shoaling, as well as, the impact of atmospheric forcing conditions on wave propagation in the nearshore. As a result, accurate wave energy and direction can be utilized for 1-D overland storm and wave flood hazard analysis. This presentation will describe the methods used, lessons learned and present an overview of the development and validation of a new lakewide ADCIRC+SWAN model.

Biography
Jeffrey is a coastal and civil engineer with 24 year of experience in engineering, climate change, flood risk assessments, resiliency planning, post storm damage assessments, project management, structural design, hydrodynamics, sediment transport, nearshore coastal processes, dredging and coastal engineering. He provides technical assistance for coastal flood control risk analysis and has worked over the years with local, state and federal agencies to ensure that work performed is completed accurately and is meeting the proper guidelines and policies. His experience includes providing complete, turnkey coastal services, conducting public meetings, assisting government agencies with mitigation planning, design and construction administrative services. Mr. Tabar holds a professional certificate as a Diplomat in Coastal Engineering (D.CE) from The Academy of Coastal, Ocean, Port & Navigation Engineers (ACOPNE). This certificate provides Mr. Tabar with international recognition of specialized knowledge and skills in the field of coastal engineering. Mr. Tabar also holds professional licenses in multiple states including: Louisiana, Florida, New Jersey, Massachusetts, and Delaware. Mr. Tabar has worked with public and private clients conducting coastal and flood risk analyses including the U.S. Army Corps of Engineers (USACE), the United States Coast Guard (USCG), Federal Emergency Management Agency (FEMA), the National Resources Conservation Service (NRCS), United State Fish and Wildlife Service (USFWS) and local and state agencies across the United States and international projects.

Gowanus Canal & Newtown Creek Storm Surge Barrier

Jonathan Goldstick, PE, CH2M, jonathan.goldstick@ch2m.com
Additional Author(s): Elise Ibendahl, PE, CFM

CH2M recently completed a study for the New York City Economic Development Corporation on flood protection for the areas surrounding New York City's Gowanus Canal and Newtown Creek. In 2012, Superstorm Sandy caused substantial flood damage to the neighborhoods surrounding these waterways. The Mayor's Office identified the waterways' flood protection as one of the priorities in the "NYC Special Initiative for Rebuilding and Resiliency" (SIRR) in June 2013. CH2M provided prioritized concept options for storm surge barriers, levees and floodwalls that would mitigate upland flooding and inform future studies and projects by federal agencies involved with these waterways, such as the USACE.

Modeling of storm surge considering sea level rise was completed for both existing conditions and various flood risk reduction measures. CH2M examined potential secondary economic and quality of life benefits and challenges of the flood risk reduction strategy. These included impacts on the working waterfront, critical infrastructure and upland businesses communities, connectivity between neighborhoods and industrial areas, public waterfront access and open space, recreational and educational/cultural/ecological programming, adjacent properties, and water quality and habitat. This presentation will discuss issues addressed in the study that include technical feasibility, infrastructure requirements, environmental issues and potential ecological enhancements, legal/regulatory parameters, implementation strategies, and capital and maintenance costs. Coordination with current planning efforts at the federal and state level and with community based planning initiatives will also be addressed.

Biography
Jonathan Goldstick has worked on projects on the New York City waterfront for almost thirty years and is the New York City Office lead for flood risk reduction projects, which have received significant funding since the region was hit by Superstorm Sandy. He holds a degree in Ocean Engineering and is the Area Manager for the New York City office.

Wave Runup: Does it Really Determine Floodplains? Corrections to Common Errors in Modeling & Mapping of Wave Runup & Overtopping

Joe Faries, PE, CFM, Stantec, joe.faries@stantec.com
Additional Author(s): Aaron Chen, Jeff Tabar

Wave runup occurs when the waves interact with a steep coastline feature (e.g. bluffs, bulkheads, levees) that is not inundated by storm tides (surge and wave setup plus tides). This wave runup occurs on the face of the steep feature itself. Wave runup only presents flood hazards inland of the steep coastline feature if the runup elevation exceeds the crest elevation of the feature resulting in wave overtopping. When overtopping does not occur, wave runup is negligible in terms of floodplain determination, save for a rare instance when development exists on the face of a bluff or another steep landform. Otherwise, there are recommendations in FEMA's Guidelines and Specifications on how to map overtopping. However, there are fundamental errors in many coastal flood studies where wave runup and overtopping are the dominate flood hazards. These fundamental errors result from far too few transects scoped for such flood studies considering wave runup and overtopping are very local phenomena. For example, wave runup is highly sensitive to the slope of coastal features, orientation of the shoreline, exposure to wave activity, and roughness of the coastal feature. Wave overtopping is sensitive to the crest elevation of the coastal feature, inland slopes, and other characteristics of inland terrain. Given these facts, wave runup and overtopping can vary at fine resolution along the coast. For example, wave runup and overtopping between adjacent lots, can differ owing to slight differences in coastal protection structures. Often, wave runup is used to delineate flood elevations along long stretched of coasts placing homes erroneously in flood plains.   These errors can be limited by vastly increasing the number of studied transects for wave runup and overtopping. Since wave runup and overtopping are typically calculated using empirical methods rather than relying on cumbersome databases and models like CHAMP and WHAFIS, scripts have been developed to batch process calculations. This batch process leads to a waning marginal coast for each transect. As such, the coast per transect for wave runup ought to be far less than that for overland wave modeling. Considering this, wave runup and overtopping ought to be scoped separate from any overland wave hazards. Adequate scope and proper modeling and mapping approaches would lead to higher quality coastal flood maps without a major increase in cost. In fact, costs are likely to be far less considering the lower likelihood of appeals, LOMRs, and greater public acceptance.   The presentation will support the case for increasing the number of studied transects wave runup and overtopping represent the coastal flood hazards is presented. Also, the modeling and mapping approaches that lead to more accurate coastal flood maps will be shared.

Biography

By education, Joe Faries is an economist and coastal/water resources engineer. In practice, Mr. Faries is a flood plain model and mapper, GIS analyst, software developer, and public outreach/science communication specialist. In the academic sector, Mr. Faries helped develop software (InVEST) with the Natural Capital Project and applied this software to quantify the protection from flooding and erosion by marine habitats under various forcing, climate change, and anthropogenic impact scenarios. As a flood plain modeler, Mr. Faries has strived to improve the technical merit and accuracy in coastal flood plain maps based on the belief that the tax paying public is his client and that accurate hazard prediction is key to better land use and public acceptance of flood maps. Mr. Faries has a particular passion for and skill in explaining science to policy-makers and the public at large.

A4: Nature-based Flood Reduction & Ecosystem Services

Moderator: Rebecca Pfeiffer, CFM, ASFPM Natural & Beneficial Funct. Cmte. Co-Chair, Vermont Agency of Natural Res., rebecca.pfeiffer@vermont.gov

Naturally Resilient Communities: Using Nature & Nature-based Solutions to Address Flooding

Nathan Woiwode, The Nature Conservancy, nwoiwode@tnc.org

As coastal and riverine flooding has become more frequent and rainstorms have become more intense in recent years, communities across the country are confronting the challenge of addressing current flooding threats while also making themselves more resilient in the face of future challenges, including issues of economic development and community wellbeing. Nature-based approaches to flood control can help on all of those fronts by reducing flooding while also providing economic, ecological, public health, and social benefits.   To help communities identify ways to invest in natural or nature-based flood solutions, the Naturally Resilient Communities partnership – a joint effort between ASFPM, APA, NACo, the Nature Conservancy, and ASCE – was formed. This partnership has been developing an online, interactive resource that will help municipal leaders and their staff understand the benefits of natural approaches to flood control and what options might work in their communities. This resource will be composed of two major components – an interactive siting guide and a set of real-world case studies: This presentation will present attendees with a selection of case studies describing how communities and their fellow floodplain managers employed nature-based solutions in the real world and will also provide a quick, real time demonstration of the Naturally Resilient Communities siting guide.

Biography

Nate Woiwode is the Project Manager for The Nature Conservancy's North American Risk Reduction and Resilience priority. In this role Nate manages the Conservancy's efforts to build the case for employing nature and natural systems to manage flood risk and build resilience in coastal and riverine communities across the United States.   Prior to joining the North America Water team, Nate worked for the Long Island chapter for eight years, where he helped guide many of the Conservancy's post-Sandy efforts in New York and regionally, including managing our engagement in the $1 billion Rebuild by Design competition and served as a key member of the team that supported Mark Tercek's role on the NYS 2100 Commission, convened by Governor Cuomo to develop long term recommendations on how to make New York State more resilient to the impacts of climate change. He also led the Coastal Resilience Team for the Long Island Chapter and was a co-lead of the New York State Climate Change Team. Nate also helped craft and pass New York's Community Risk and Resilience Act and the Seagrass Protection Act as well as serve as a member of the Staff Steering Committee of the NYS Sea Level Rise Task Force.

Ecosystem Service Valuation Tools for Floodplains

Mark Healy, Southern Illinois University, healy@siu.edu
Additional Author(s): Silvia Secchi, PhD

In 2015 we conducted an extensive review of existing decision support tools suitable for the valuation of ecosystem services. In turn, we chose six tools that maintain "off-the-shelf" capability and currently demonstrate the greatest potential for widespread dissemination and use. In order to aid natural resource managers' consideration of these decision support tools, we organized our findings into a three-part report. The first section defines and introduces twelve criteria for comparison and differentiation between the six selected decision support tools. The second section includes a collection of tool profiles that succinctly outline tool features, intended application, and an outlook on future development. The third section reviews the selected tools handling of eight ecosystem services grouped into biogeochemical, hydrological, and ecological categories. Tool functionality and resulting outputs are demonstrated and

discussed through firsthand assessment and reference to publicly available literature for further exploration. This presentation will highlight prominent methods and tools for the valuation of ecosystem services drawn from the report. Multiple tools' functionality will be showcased for a variety of ecosystem services pertinent to floodplain ecosystems. Key insights drawn from the comparative report will be communicated in the presentation.

Biography
Mark Healy is a graduate student in the Department of Geography and Environmental Resources at Southern Illinois University – Carbondale. In 2016, he authored a report for the Association of State Wetland Managers that comparatively analyzed ecosystem service valuation tools for wetland restoration. Currently, in conjunction with the Farm Service Agency, he is quantifying the loss of grasslands, wetlands, wildlife habitat, and associated delivery of ecosystem services resulting from expiring Conservation Reserve Program lands for two crop reporting districts in southern Illinois.

From Headwaters to Downtown: Informing Floodplain Restoration Priorities with Spatial Analytics & Ecosystem Service Valuation

Zachary Christin, Earth Economics, zchristin@eartheconomics.org
Additional Author(s): Tim Maguire, Lance Davisson, Ian Hanou, Keith Wood, Dana Coelho, Stacey Eriksen

The 2013 Colorado floods incurred property damage, loss of life, and sedimentation of major rivers and their tributaries. Compounding these problems were urbanization, drought, and wildfire, which contributed to degradation of natural and beneficial floodplain functions and the loss of flood resilience in the State of Colorado. The complexity of challenges facing Colorado requires an intricate and comprehensive approach to managing the watershed for flood and further wildfire. State floodplain managers, water utilities, government entities, and NGOs are in need of an approach to prioritizing conservation, restoration, and treatment of sensitive and threatened natural infrastructure. This collaborative effort brings together more than 40 organizations from public, academic, nonprofit, and private sectors to inform a framework that addresses these challenges.   In this presentation, we showcase a framework that enables the stakeholder community of the South Platte River Watershed (SPR) to prioritize restoration at a watershed-scale for flood and fire protection. The SPR is a primary source of drinking water for the Denver Metro Area, serving 1.3 million people, or 25 percent of Colorado's population. Half of the water supply to these 1.3 million customers originates in the SPR Basin.   More than two dozen spatial datasets were used and combined to identify priority areas related to surface water runoff, fire risk, sensitive habitat, valuable recreation, water quality, and vulnerable areas threatened by development. Our analysis incorporated a robust economic analysis that identifies ecosystem service value across the map identifying the highest priority conservation and restoration opportunities. Our results indicate that threats to the upper watershed include insect infestation, wildfire susceptibility, and development, requiring extensive forest treatment in priority areas. The location of recreation areas and sensitive habitat show where restoration will be most effective, particularly in an effort to reconnect currently fragmented forest plots.

Biography
Zachary Christin led research to incorporate environmental benefits for FEMA's BCA tool, resulting in FEMA Policy FP-108-024-01. Zac also participated in HUD's National Disaster Resilience Competition as a Subject Matter Expert on BCA. Zacn leads research focused on social and health valuation, urban systems, cultural services, and advancing applications of benefit-cost analysis (BCA) in federal policy.

A5: The Case for Quality Data
Moderator: Marc Pearson, GISP, CFM, Stantec, marc.pearson@stantec.com

Quantifying the Impact of 20-year Flood Frequency on Land Cover Change Type

David Alexander, PhD, FEMA HQ, david.alexander1@hq.dhs.gov
Additional Author(s): François G.F. Smith, PhD

Flooding is the most common and destructive natural disaster in the United States. Ninety percent of all disasters in the US involve flooding with impacts that cascade across the entire landscape. While advances have been made in weather forecasting and watershed modeling, it is still difficult to measure or characterize and assess the broad impact of flood inundation on the ground over a large area with historical context. However, flooding can be quantified over time and space if you have access to satellite imagery at regular intervals. This study explores how often the selected study area floods, and what impact the

frequency of flood events has on that landscape over a 20-year period using multi-date Landsat imagery and NLCD land cover data for the same area.   Approximately 20 years of Landsat imagery (ranging from 1995 to 2015) have been compiled for the study area in coastal North Carolina for one scene footprint. This is used to calculate a 20-year flood frequency layer. USGS EDC's NLCD land cover data is then obtained for the same area for the target dates, 1995 and 2015. By analyzing this information we characterize which classes changed, and what they changed to, given frequency of flooding.   This presentation will improve longitudinal understanding, at the pixel level, of flood risk. Empirical conclusions can be made on the impact of local land-use and economic development plans and infrastructure capacity. This approach can inform public policy and implementation strategies by identifying probable pathways toward improving community resiliency such as identifying areas best suited for voluntary buybacks to reduce repetitive losses, strengthening rebuilding ordinances for long term mitigation, expanding insurance coverage for homeowners and businesses, or making enhancements such as expanding spillways, raising levee heights, or deploying smart sensors to automate storm water drainage flow to name a few.

Biography
Dr. David Alexander has spent his entire career working with the First Responders, emergency management, and law enforcement communities to utilize advanced technologies to strengthen our ability to protect the homeland, respond to disasters and develop our economic and community resiliency. Dr. Alexander holds a doctor of philosophy from George Mason University, specializing in Earth Systems and Geospatial Information Science. Dr. Alexander currently serves as director of the Flood APEX program in the DHS Science & Technology Directorate. He is a current member of the National Geospatial Advisory Committee (NGAC) and Board of Directors of the U.S. Geospatial Intelligence Foundation.

Extreme Precipitation Analysis vs. Archived Storms in a Digital Age

Marian Baker, CFM, NOAA, NWS, marian.baker@noaa.gov

Historically, large precipitation storm data was collected by observers with rain gages or as bucket surveys. The US Army Corps of Engineers (USACE) collected these storm event summaries and supporting data through 1973 and published them in a catalog titled The US Storm Rainfall Data Volume 1 (USACE 1973).   Numerous studies were created using the USACE Rainfall Data, including the National Weather Service Hydrometeorological Reports (HMRs). These HMRs were used as guidance in the calculation of Probable Maximum Precipitation (PMP) at a variety of locations. In the 1990s, new methods to collect and review precipitation data began using Radar. Radar data was combined with rain gage, satellite, and climate data to create a map of precipitation coverage at 4km resolution. This precipitation product was called Multi-Sensor Precipitation Estimation (MPE). USACE has initiated the collection of MPE data for large storm events in a new database. The notable feature about digital precipitation data is the spatial variability of the areas of heaviest rainfall, which is not consistent with the older isohyetal data analysis originally documented in the USACE Storms Catalog. The result of this may be that older storms from the USACE Storm Catalog may not accurately depict extreme precipitation events, and may, on occasion, overestimate, or underestimate the basin average rainfall from an event. This presentation will give an overview of the USACE precipitation database. It will provide a very brief history of the program, how extreme precipitation was collected in the past, and how new data is collected based on modern MPE radar data. A look at the impacts of the older data collection methods vs. new data and how this may be impacting PMP studies on Corps projects. Finally a preview of the future Extreme Storms database that is planned to be open to all agencies.

Biography
Marian Baker is a Hydrologist, Meteorologist and Floodplain Manager with 26 years of experience working in the severe weather and flood warning programs in the National Weather Service, and in Floodplain Management, Precipitation Studies and hydrologic/hydraulic modeling with the Kansas City District Corps of Engineers. Marian has been a member of the Corps Extreme Storms Team with the Corps of Engineers from 2010 - 2016, and served as the Vice-Chair of the Sub-Committee on Hydrology's Extreme Storms Inter-agency Working Group from 2014-2016. Currently Marian is the regional hydrologist and floodplain manager with the National Weather Central Region in Kansas City, MO.

An Innovative Approach for Determining Storm Event Rainfall Probabilities: Case Study Hurricanes Matthew & Joaquin

Neal Banerjee, PE, CFM, ESP, nbanerjee@espassociates.com

There are numerous resources (e.g. news media, NWS and USGS websites, etc.) that report observed and forecasted precipitation during storm events. Although this information provides a general magnitude of a storm event, it precipitation is typically just reported as total rainfall depths over a loosely defined "storm" period. The duration and temporal distribution of the

event is often "lost in translation". This can lead to misinterpretation and miscommunication of the storm event probability/magnitude in trying to answer the common question "What magnitude storm event did we (or are we going) to have?". This presentation will introduce an innovative approach that can be used to determine and map the spatial and temporal storm event rainfall probability of any given storm. The presentation will illustrate the approach and present application of these techniques to support emergency preparation and response for major rainfall events in the Carolinas, including Hurricane Matthew and Hurricane Joaquin in 2016 and 2015, respectively.

Biography
Neal Banerjee is a Water Resources Department Manager for ESP in the Charlotte region. He has over 20 years of experience in water resources engineering and GIS 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.

A6: Communication About Residual Risk for Dams & Levees
Moderator: Michael Hanke, CDM Smith, hankemj@cdmsmith.com

The Art of Information Sharing
James Demby, Jr., PE, FEMA HQ, james.demby@fema.dhs.gov

Risk is the product of the likelihood of a structure being loaded, adverse structural performance, and the magnitude of the resulting consequences. In order to properly communicate risk to communities, it is important that we begin to reshape how we define information sharing. In order for a community to understand their risk, it needs to be articulated in such a way that allows them to incorporate dam risk reduction actions into their land use planning emergency operations, planning and response. Simply giving an inundation map to the general public does not effectively communicate the risk nor does it provide instructions to the population at risk on how to evacuate. Inundation maps are necessary in informing emergency managers, floodplain managers, community planners and other state and local officials on the potential dam hazard facing the population. The information from dam flood inundation map should be used by the local officials to inform the development of evacuation plans, emergency operation plans, hazard mitigation plans, Threat and Hazard Identification and Risk Assessments (THIRA), land use planning and risk communication strategies. Dam risks need to be understood and communicated in a manner to promote effective risk management actions and public safety; however, we currently lack a census among the dam safety community on how this should be done. Through a joint effort, FEMA NDSP and DHS Office of Infrastructure Protection, Dams Sector looked into the issue of sharing dam risk information in a two phase approach. Phase 1 consisted of developing a paper evaluating the advantages and disadvantages of sharing dam risk information. Phase 2 consisted of developing recommendations on what type of dam risk information should be shared and which should be safeguarded from the public. For Phase 1, DHS Office of Infrastructure Protection, Dams Sector, released a paper entitled, Benefits and Disadvantages of Sharing Dam Safety and Security Information (see enclosed). This paper was developed through the joint collaboration between the DHS Dams Sector and FEMA National Dam Safety Program (NDSP). The purpose of the paper was to present the benefits and disadvantages of sharing certain dam risk information among various stakeholders associated with managing and communicating dam risks. For Phase 2, during the 10 June 2015 Dams Sector Information Sharing Work Group meeting, it became evident that there was not consensus on sharing dam inundation information with the population at risk. See the attached document, Dams Sector Government Coordinating/Sector Coordinating Councils (GCC-SCC) Information Sharing Workgroup White Paper, for details. As a result of the impasse, FEMA's NDSP has put together a task force to capture best practices and to develop guidance for effective sharing and communicating dam risk information. The group sought to answer the bigger question of what is the most effective way to communicate dam risk to populations at risk from dam operations and emergencies. This proposed ASFPM concurrent session will unveil the Task Group's recommendations and final product.

Biography
James Demby is the Senior Technical and Policy Advisor for dam safety at FEMA and the program manager for the National Dam Safety Program. Mr. Demby is a Professional Engineer registered in Virginia. He has a B.S in Civil Engineering and a Masters in Engineering from Old Dominion University, Norfolk, VA. From 1990 - 2000, he worked for the U.S. Army Corps of Engineers, Norfolk District in the Geoenvironmental Branch. Mr. Demby duties included geotechnical design and analysis of military construction and civil works projects such as, barracks complexes, military family housing projects, hazardous toxic

waste (HTW) sites, highway bridge foundation design, Federal Navigation Channels, levees, and flood damage control structures. He was also the program manager for Norfolk District's Completed Civil Works Inspection Program. Notable projects included Richmond Floodwall, Gathright Dam, and James R. Olin Flood Protection Project. From 2000 - 2003, he moved to the South Atlantic Division and became involved with the following notable projects, Walter F. George Dam Rehabilitation, Herbert Hoover Dike Rehabilitation, and the Portugues Dam (Ponce, Puerto Rico). In 2003, he became the lead geotechnical engineer and dam safety officer for the USDA Forest Service National Headquarters. Mr. Demby joined the FEMA Dam Safety Program in April 2007.

In the Shadow of the Levee: Communicating Residual Risk

Steven Wolf, MCP3, JEO Consulting Group, jhenson@jeo.com

The USACE System Wide Infrastructure Framework (SWIF) program is maturing in the aftermath of Hurricane Katrina with new mandates for outreach to Levee system operators and their affected public to explain residual flood risks and the steps that people can take to be part of an emergency response process. Nowhere is the SWIF program taking greater implementation strides than here in the Midwest. A national model for public outreach and flood risk reduction communication has emerged. Learn some of the best management practices of this program directly from the team that helped to create this model.

Biography

Steven Wolf is the Community Engagement Director for JEO Consulting Group. He was IAP2's first Master Certified Public Participation Professional in North America, and has more than 36 years of combined national level government and private sector public affairs experience. Steve has been trained and worked directly on project challenges with the three top experts who founded the body of risk communication science. He has successfully applied risk communication techniques to resolve public controversies over engineering, environmental and other community development projects in Nebraska and nationwide for more than 25 years. Steve created the world's first risk communication based message mapping software product, called Key Message Manager, and has trained more than 3,500 multidisciplinary professionals in the use of risk communication principles.

Communicating Levee-related Flood Risk with the Risk MAP Playbook

Alex Wendel, Resilience Action Partners, alex.wendel@global-prairie.com
Additional Author(s): Starr Terrell

Today, millions of people throughout the United States live or work in proximity to flooding sources such as rivers and other waterways, vastly increasing the risks associated with flooding events. FEMA shares a mission with its State mapping partners and the U.S. Army Corps of Engineers (USACE) to help levee owners, flood control districts and agencies, local community officials and floodplain managers, the media, and other stakeholders who could be affected to understand and properly communicate the risk associated with living and working behind levees. As the fifth and latest section of the RISK MAP Playbook, the levee chapter focuses on the communication challenges and opportunities related to mapping levee-related flood hazards. In particular we will share how to effectively communicate flood risk with respect to levees as well as share best practices for community engagement. This session will provide a general overview of the RISK MAP Playbook and walk attendees through the specific content of the levee chapter. While every levee is different and every community's relationship with their levee is also different, the levee section of the RISK MAP Playbook seeks to provide a set of tools and tactics for how to consistently engage with communities about the risks and challenges associated with levees. This session will highlight the various risk communications and community engagement opportunities throughout the mapping process, showcase regional success stories and provide examples of levee-related risk communications materials that can be utilized no matter where in the mapping process a community is currently.

Biography

Alex Wendel is a member of the CERC National Team providing support to FEMA's National Levee program. He has been involved in all aspects of the CERC's development of the RISK MAP Playbook...from initial idea to content development to dissemination and socialization. He previously served as the CERC-L in Region VII. Alex's company, Global Prairie, is part of the Resilience Action Partners JV supporting FEMA through the CERC contract. He has been at Global Prairie since the company was founded in 2008 and has spent nearly his entire career working with large and small companies and organizations to manage their reputations and enhance their brands. He has an established track record of managing cross-functional account teams focused on the realization of client objectives. Prior to joining Global Prairie, Alex was a vice president at FleishmanHillard. Alex also has held a number of positions in Washington, D.C. and worked for the mayor of Kansas City. He is a returned Peace Corps Volunteer, and taught English at a secondary school on Sakhalin Island in the Russian Far East from 2001-02. Alex currently serves on the boards for the Salvation Army of Kansas and Western Missouri and is chair of the Bloch

Advisory Council at the Henry W. Bloch School of Management at the University of Missouri-Kansas City. Alex graduated from American University in Washington, D.C. with a BA in political science. He is also a graduate of the Greater Kansas City Chamber of Commerce's Centurions Program as well as the Civic Council's Kansas City Tomorrow Program.

A7: Tools for Risk Communication
Moderator: Stephanie Bany Porter, GISP, CFM, AECOM, stephanie.porter@aecom.com

Engaging Millennials in Flood Risk: Lessons Learned from the New North Carolina Flood Website for Multi-Audience Outreach
John Dorman, CFM, North Carolina DPSEM, john.dorman@ncdps.gov
Additional Author(s): JoAnn Howard, H2O Partners, Inc.; Laura Wilson, ESP Associates

This presentation will show how North Carolina enhanced its robust next-generation mapping program to more effectively share and distribute flood risk information in order to improve the resilience of North Carolina communities through integrating proven applied learning techniques. This project recognized that different user groups (millennials, realtors, insurance agents, community officials, surveyors, citizens) have different risk information needs. We will provide lessons learned on how to coordinate information and outreach for individual audiences. Focus group outcomes were incorporated into the new NC Flood web design to channel users to relevant risk information, including short videos of stakeholders describing their use of the flood hazard information in their work and lives. Responsive and mobile website design techniques are used to extend communication across platforms. John Dorman's leadership has once again charted new techniques for using data to protect lives and property and contribute to the general well-being of North Carolina citizens.

Biography
John Dorman serves as the Director of the North Carolina Risk and Information Management Program which was established as a Cooperating Technical State by FEMA, and as such is responsible for the design, acquisition, analysis, and dissemination of data, models, analysis, systems and applications associated with all hazard / threat risk management. Mr. Dorman has managed North Carolina's statewide acquisition of LiDAR-derived topographic data, digital orthophotography, building footprints, and special flood hazard areas as well as managed three national risk management demonstrations: Integrated Hazard Risk Management; Digital Flood Risk Management; and, Sea Level Rise Impact Study. The U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) selected John Dorman as a member of the Technical Mapping Advisory Council (TMAC) which was tasked with developing recommendations for FEMA's flood mapping program to ensure that flood insurance rate maps reflect the best available science and are based on the best available methodologies for considering the impact of future development on flood risk. He is a Professional Engineer and Certified Floodplain Manager (CFM).

The Listening Dashboard: EPA Drives Flood Resilience with Data Analytics
Janice Roper-Graham, ABC, PMP, CFM, Outreach Process Partners, Janice@opp-llc.com
Additional Author(s): Nushat Thomas, EPA

EPA's Water Security Division (WDS) has the mission to keep our nation's water supply operational during a flood. The challenge is that local utilities are under regional, local or private operational control. EPA has neither the direct authority, nor the ability to directly fund the individual utility-level risk analyses or retrofitting needed to make local water utilities disaster resilient. So it is a persuasive exercise. This session will describe how EPA WSD used interviews, user activity monitoring, and media/social listening tools to gauge the effectiveness of their outreach and inform their communications strategy. It will also showcase how EPA WSD has automated and improved their understanding of their target stakeholder's perspectives and needs through various data feeds into a Tableau dashboard. This dashboard gives them near real time insight into emerging issues and their stakeholder's response to their outreach. Even better, the dashboard requires minimal effort to maintain after set up because it automates many of the stakeholder analysis and outreach performance tracking efforts that had been done manually by graduate interns. This presentation will showcase tools and strategies to improve the listening side of your strategic communications plan, and how to use that information to achieve your mission.

Biography
Janice Roper-Graham, ABC, CFM sits at the intersection of strategic communications and technology. In the early 2000s, she served as a Client Executive with USi (now AT&T), the firm that pioneered cloud technology. She then set up a MarketingEngineSM for eTelemetry, a business intelligence firm that holds a patent for real-time social network analysis. In

2005, Janice founded Outreach Process Partners, LLC (OPP). OPP helps government agencies leverage technology and data analytics to improve communications and enhance program performance. OPP's past and current flood risk mitigation-related clients include FEMA's Building Science Branch, the National Dam Safety Program, USACE New Orleans District, FIMA Strategic Communications Branch, Risk MAP, Hazus, GSA's Green Buildings, DisasterAssistance.gov, and EPA's Water Security Division. Janice is a GovLoop Featured Blogger. She has spoken at conferences on growth hacking, communicating science to non-technical audiences and the listening side of communications. Janice co-founded with Mark Walton (retired NOAA) "Flood Risk Education" campaign which has given seven Wards Flood Models so far to ASFPM chapters. She is currently working in partnership with the Project Management Institute (PMI) on federal best practices studies. The first in the series on performance measures was released November 2017. Janice holds an M.S. in Systems Management and a Graduate Certificate in Information Systems from the University of Southern California, and dual B.A. degrees in English and Psychology from Salisbury University. She is an Accredited Business Communicator with the International Association of Business Communicators and a Project Management Professional with PMI.

Communicating Relevant, Actionable, Flood Protective Actions to the Public
Jacqueline Snelling, FEMA HQ, jacqueline.snelling@fema.dhs.gov

Even in locations that have a history of flooding, Americans remain largely unprepared for these disasters. Findings from a 2015 national survey conducted by the Federal Emergency Management Agency (FEMA) indicated that only 34% of a sample of Americans living in areas with a history of floods had read, seen, or heard information on how to prepare during the past six months. Only about a half thought a flood could happen where they live. Only 43% indicated that they had a disaster plan that they had discussed with their household. Only 41% thought that preparing can be of significant help. FEMA, in concert with all of you as well as other Federal Agencies and stakeholders and communities across the country, is working through national and grassroots campaigns for action to increase the number of people who understand which disasters are most relevant to their community, know what to do to be safe and mitigate damage, take action to increase their preparedness, and participate in community resilience planning. Despite the considerable challenge represented by the gap between current practice and our goals for resilience, there are some important signs of progress, indicators of promising practices, and areas where we can advance preparedness by applying current research and science. New work that integrates multi-disciplinary factors that impact flooding may hold an important key to improving the public understanding of the different flood scenarios and the preparedness, and mitigation actions that are relevant to their households and communities. This session will present an overview of the current protective action research review and the foundation for examining and refining the flood preparedness messaging to increase relevant risk awareness, and motivations for actions to prepare and mitigate for relevant flood hazards.

Biography
Ms. Snelling currently serves as Senior Policy Advisor to the Director in FEMA's Individual and Community Preparedness Division (ICPD) with responsibilities for national policy and guidance, research, evaluation and assessment, and initiatives to support individual and community preparedness and resilience at all levels. As part of these duties, her current responsibilities include an annual household survey to improve understanding of attitudes and behaviors for preparedness and to track progress in public actions to prepare. She also manages a project to update FEMA guidance to the public on protective actions for identified hazards including twelve natural hazards. The project includes review and documentation of the research base for protective actions, recommendations for revisions to guidance for America's PrepareAthon and other FEMA public guidance materials, recommendations for research priorities to support guidance, and coordination with FEMA, interagency, key organizations and the academic community for consistent research-based protective action messaging to the public.

A8: AECOM Showcase
Moderator: Dr. Gerald E. Galloway, Jr, Glenn L. Martin Institute, gegallo@umd.edu

Communicating the Value of the National Flood Mapping Program

AECOM invites you to join us as we explore new ways to communicate the value of the National Flood Mapping Program in the years to come. Credible, modern, nationwide flood mapping data is a driver for economic growth, security, and protection of our nation's most-critical assets.

B1: Floodproofing
Moderator: Michelle Staff, CFM, Wisconsin DNR, michelle.staff@wisconsin.gov

Development & Implementation of Dry Flood Proofing Stored at the Point of Use
Jeffrey Roushey, PE, CFM, ILC Dover, roushj@ilcdover.com
Additional Author(s): Jonathan Hinkle, PE, CFM

ILC is most well-known for the application of softgoods composite technology for extra vehicular space suits and impact attenuation bags to land rovers on Mars. This presentation will examine the development and application of flood mitigation projects derived from NASA and DHS programs.   These dry flooding proofing products use softgoods made of high strength webbings, such as Kevlar, to create an innovative system that can hold back significant water pressure. Softgoods are flexible, lightweight materials that can be stowed in smaller volume than they occupy upon operation. The ILC infrastructure protection systems embrace the benefits of softgoods by allowing the barriers to pack in a small volume and store at the point of use. The advantage of store at point of use system is critical to ensure that the system can be deployed prior to the flood waters.   It is critical to understand the advantages and disadvantages of dry flooding proofing before making a flood mitigation selection. The factors in this presentation will apply across the multiple systems and is based on the implementation of ILC projects at the federal, state, and municipal level. ILC has designed and built a full scale test facility to demonstrate new technology for flood mitigation. The goal of the facility is to demonstrate that the critical factors for selecting dry flood proofing could be satisfied. These factors include ease of storage and ease of deployment. The ILC systems are designed to deploy by two people in less than 10 minutes. Another critical factor is the resilient nature of the design and demonstration of impact resistance. The presentation will cover the latest results from our testing and discuss future plans for dry flood proofing.

Biography
Mr. Roushey is the Senior Product Engineer for the Infrastructure Protection and Flood Mitigation business at ILC Dover. He graduated from the University of Delaware with a Bachelors in Mechanical Engineering, currently holds a professional engineering license and is a certified flood plain manager. He holds one patent and has several pending patents related to flood mitigation and infrastructure technologies.   Since joining ILC in 2008, Mr. Roushey has been involved with and lead in the development of, several innovative product designs, such as inflatable reentry vehicles and military ocean floats. Most recently, Mr. Roushey has focused on the development of systems to protect property and personnel from flooding events such as Superstorm Sandy. Specifically, he has led the development of the Resilient Tunnel Plug system, and the Flex-Gate™ and Flex-Wall™ systems in support of protecting critical infrastructure from flooding.

An "Opening" Argument: The Controversy Over Floodshields & the Protection of Glass Storefronts & Curtain Walls
James Colgate, AIA, Esq., CFM, Bryan Cave, james.colgate@bryancave.com

The program will analyze the current requirements of 44 CFR 60. 3 and ASCE 24-13 relating to floodshields for dry floodproofing for non-residential buildings. Particular emphasis will be directed at the requirement that the walls be impermeable to water, except for the openings. What happens when there are more openings than wall? Can this satisfy NFIP and ASCE 24? This is not as simple as you might think.

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

Preparing a More Resilient NYC: Flood Emergency Plans

Clinton Peterson, CFM, New York City Dept. of Bldgs., cpeterson@buildings.nyc.gov
Additional Author(s): Wendy Wan, RA, CFM

When proposed dry-floodproofing involves human intervention, the New York City Department of Buildings (DOB) requires the submission of a Flood Emergency Plan. Using available guidance from FEMA and ASCE 24, the DOB has been working to refine Flood Emergency Plans for many buildings along NYC's rivers and ocean.
This presentation will explain components of Flood Emergency Plans for non-residential buildings in NYC. The presentation will highlight how NYC has amended and interpreted the requirements of ASCE 24 Section 6.2.3 in recent building code revisions, and how FEMA guidance from documents such as P-936 Floodproofing Non-Residential Buildings influences Flood Emergency Plans reviewed by NYC DOB.

Biography

Clinton Peterson is a Code Development Architect for the New York City Department of Buildings. He joined the Department shortly after Hurricane Sandy working with the Build It Back team on recovery efforts. He has since transitioned to a team within the Department's Technical Affairs division providing floodplain management support for New York City. Clinton received his Masters of Architecture from Parsons The New School for Design in New York City and has a Bachelors of Art in Mathematics from Carleton College in Minnesota. Clinton is a Certified Floodplain Manager and a Registered Architect in New York State.

B2: Overcoming Resource Challenges for Floodplain Mgmt. Administration

Moderator: Anita Nance, Indiana DNR, anance@dnr.in.gov

Resources for Rural Communities (Building a Framework for Successful Floodplain Mgmt.)

Becca Fricke-Croft, CFM, Atkins, becca.croft@atkinsglobal.com
Additional Author(s): Cory Garyotis, PE, CFM, Alabama DECA

Rural communities often lack the resources and organizational structure within their agency to meet the requirements for regulating floodplain development under the NFIP. However, there are strategies and tools that can be utilized by floodplain administrators to keep their program and their communities compliant. Alabama DECA - Office of Water Resources recently developed a how-to guide and training workshop to convey those tools and resources to the floodplain administrators in these rural jurisdictions.   In this presentation, we'll talk about the unique challenges that rural communities face and highlight strategies and resources that floodplain managers can use to comply with the NFIP and keep development safe from flooding. Topics include identifying potential development, enforcing floodplain regulations without a building code, creating a permit process, and how to team up with other agencies.   We will also share the handbook developed for rural Alabama communities and highlights from the workshops.

Biography

Becca Fricke-Croft is the Training and Outreach Lead for the FEMA Region X Regional Service Center. As a former elected official and local floodplain manager, she possess 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.

Reducing Barriers to CRS Entry: Introducing the Oklahoma CRS Toolkit

Monica Cardin, CCEA, CFM, City of Del City, OK, mcardin@cityofdelcity.org

Communities in search of recognition for their sound floodplain management programs and premium discounts for their residents and businesses are increasingly looking toward joining the CRS. Unfortunately, too many of these communities quickly find that the barriers to entry too high and abandon their efforts. Local FPAs may never find the growing number of resources that exist to help with CRS applications, because it is too easy to get lost in credit calculation formulas and impact adjustment maps.   In truth, it is possible to successfully complete the application process and achieve a Class 8 rating without delving in to the more complicated activities, allowing communities to earn credit for their ongoing risk reduction activity, encouraging additional program improvements, and providing a starting point for future efforts.   This presentation will introduce the Oklahoma

Floodplain Managers Association's CRS Toolkit, part of OFMA's "Every Community Can Be a Class 8" outreach initiative and will demonstrate that a Class 8 rating is achievable for communities of all sizes and resources.

Biography
Monica Cardin, CCEA, CFM   Monica Cardin is the Floodplain Administrator and CRS Coordinator for the City of Del City, Oklahoma and is the immediate Past-Chair of the Oklahoma Floodplain Managers Association.   As City Planner and Deputy Director of Community Services, she is responsible for the day-to-day operations of the department, which includes Planning and Zoning, Permitting and Inspections, Code Enforent, Licensing and Administration, and Stormwater Management. She directs the City's plan review committee, serves as staff liaison to the Planning Commission and Board of Adjustment, and represents the City on a number of outside boards and committees. As Floodplain Administrator and CRS Coordinator, she has successfully administered a higher-standards ordinance in a developed, flood-prone community, has been responsible for the City's application to join the Community Rating System, and conducted a large number of substantial damage evaluations in the wake of the disastrous Spring 2015 flooding.   Ms. Cardin holds a Master's in Public Administration from the University of Central Oklahoma and a Bachelor of Arts in Political Science from the University of Kansas. She is a Certified Floodplain Manager and Certified Code Enforent Administrator and also holds certifications as Zoning Inspector, Permit Technician, and Property Maintenance and Housing Inspector.

The Importance of a Unified State Floodplain Program: Working Together to Build More Robust Local Floodplain Mgmt. Programs Throughout Montana
Traci Sears, CFM, Montana DNRC, tsears@mt.gov
Additional Author(s): Walter Ludlow, PE; Tiffany Lyden, CFM; Michelle Phillips, CFM

This presentation will explore how flood risk assessment and floodplain management are critical components to the sustainability of a local community. Too often, local communities are trying to balance high workloads with stagnant or reduced budgets that do not adequately support staff and property owners' needs. Staff turnover and workload constraints additionally hamper local officials' ability to effectively serve their citizens. As a result, Montana's State Floodplain Program has developed essential tools and coordination to better support local officials and their floodplain management programs. By successfully integrating outreach, training, and Community Assistance Visits/Contacts with Risk MAP projects, Montana's Floodplain Program has built a more uniform approach to assisting local floodplain management programs throughout the state, thereby bolstering local capacity to assess and address flood risk.

Biography
Traci Sears, CFM has served as the CAP/NFIP Coordinator for the State of Montana in Helena since 2007.   Traci currently serves as the DRNC Liaison for the Association of Montana Floodplain Managers (AMFM) Board, and has previously served on the board as the Secretary and Vice-Chair. Traci was also a founding member and currently serves as the lead representative for the Montana Silver Jackets Program and is also serving as Group Facilitator for the recently started Montana Community Rating System Users Group.   Prior to her role with the state, Traci was a land use planner with Flathead County. She brings a strong land use background in lakeshore, zoning, subdivisions, and floodplain management to her current position. Ms. Sears received a B.A. in Criminal Justice and a minor in Land Use Planning from Florida Atlantic University and has been a Certified Floodplain Manager since 2006.

B3: Changing Climate & Rainfall: A Modeling Perspective
Moderator: Jeanne Ruefer, PMP, CFM, ASFPM Region 9 Director, Tetra Tech, jeanne.ruefer@tetratech.com

Climate-Modified Hydrology Tests in Colorado: What if the Next Flood Is Worse?
Brian Varrella, PE, CFM, Colorado DOT, brian.varrella@state.co.us
Additional Author(s): James Wulliman, PE; Derek Rapp, PE, CFM, CPESC

Climatology, meteorology and hydrology are at the forefront of a familiar debate in the United States and around the world. Together they help us understand the natural world around us to understand weather trends that impact how and where we can grow food, influence the efficiency of our systems to transport goods and services, and affect our community health and wellbeing. Recent federal policy in Executive Order 13690 reaffirms a four-decade commitment to wise use of taxpayer resources to mitigate the impacts of a changing natural environment on human infrastructure. The Colorado Department of Transportation (CDOT) collaborated with Muller Engineering and the Federal Highway Administration (FHWA) determine how

future floods may or may not impact transportation systems in Northern Colorado. The Coupled Model Intercomparison Project (CMIP) multi-model dataset was used to access hydrologic projections for the Big Thompson River watershed, which was ground-zero for catastrophic regional flooding of 2013. The results of this analysis will be applied to decision-making protocols and plans embedded in the Colorado Resiliency Framework ethos, and will allow FHWA, CDOT and private industry the opportunity to provide consensus recommendations on maintenance and construction of federally- and state-funded highways across Colorado. These recommendations can then be applied to regional planning efforts across the state to create resilient outcomes for the taxpayers of Colorado. Partners entered the process in the last half of 2016; stop in to see what they discovered through this pilot project journey in 2017!

Biography
Brian Varrella is the Colorado Department of Transportation (CDOT) Hydraulic Unit Lead for the northeast quarter of Colorado. His 18 year career is equally shared between private consulting and public service, and he current volunteers as a Board member for the Association of State Floodplain Managers (ASFPM) and the Colorado Association of Stormwater and Floodplain Managers (CASFM). Mr. Varrella is a survivor of 3 presidentially-declared flood disasters and spends his free time recreating on Colorado's rivers and streams; these experiences drive his professional passions for public safety, ecological enhancement, and fiscal responsibility. Recently he has collaborated with other state agencies to help create the Colorado Resiliency Framework, and he is leading an effort at CDOT to implement 2-dimensional hydraulic modeling and GIS into daily practices at the Department of Transportation.   Mr. Varrella is fortunate to have worked on projects in 23 states, is a Certified Instructor for the National Highway Institute, and is a national instructor for the Emergency Management Institute's 4-day field-deployed course on Managing Floodplain Development Through the NFIP (E/G273). If you would like to connect with Mr. Varrella, plan to meet in the field and bring your hiking boots, waders, and skis.

Flood Hazard Identification & Risk Assessment Using Predicted Rainfall: 2016 Missouri Flood Event Case Study
Thomas Schweitzer, PE, PMP, GISP, CFM, Atkins, thomas.schweitzer@atkinsglobal.com
Additional Author(s): Scott McAfee, FEMA; Vikram Shrivastava, Atkins

The perception that FEMA's flood hazard information is primarily for flood insurance prevents the use of this data for flood risk communication for upcoming flood events as well as disaster recovery following flood events. This presentation will discuss how the availability of accurate predictive and actual rainfall along with FEMA's hydrologic and hydraulic models for Missouri were used to develop expected floodplain and depth grid information. A comparison of this with the actual flood levels will be presented along with expected losses (from Hazus) and actual losses. The intent of this presentation is add to the discussion on increasing the use of FEMA's flood hazard and risk assessment models for real world specific events – both in advance of events for flood risk warning and after the fact for timely disaster response.

Biography
Mr. Schweitzer has more than 30 years of collective experience in engineering consulting and GIS technologies. His engineering experience includes civil site design, transportation design, environmental assessment, water resource engineering and floodplain mapping. He has over 16 years management experience in FEMA Floodplain Mapping Program and is the lead for STARR II national study production and MT-2s processing. He also served as Program and Division Manager for Atkins geospatial technologies group for 10 years managing geospatial projects and a large team of geospatial professionals performing GIS needs assessments, and technology and geospatial data and application development. For Atkins he has lead several large geospatial projects such as the USACE National Levee Database inventory and mapping data collection program, covering 27 USACE Districts and the collection over 6,100 mile of levee high accuracy centerline, elevation, and attribute data. He has his P.E., PMP, CFM, and GISP certification and is a Sr. Project Director and Vice President at Atkins.

An Alternative Temporal Rainfall Distribution for Hydrologic Analysis & Design
Joseph Wilson, PE, PH, Wilson Hydro, joe.wilson@wilsonhydro.com

This presentation will demonstrate an alternative temporal rainfall distribution to the current nested intensity distributions typically used in most hydrologic models. Estimation of flood flows is necessary to the determination of flood risk. Precipitation is a key element in determining flood flows. The temporal distribution of rainfall is an essential input into any hydrologic model. The depth, temporal distribution, frequency, spatial distribution, and duration have a significant impact on the computed peak discharges and runoff volumes. This presentation provides an alternative regional temporal distribution derived from observed rainfall

records. Assumptions and limitations of the nested-intensity approach (NRCS Type II) and the proposed distributions will be discussed.

Biography
Mr. Wilson has over 30 years experience working exclusively with hydrology and hydraulics. He holds an undergraduate and Master of Science degree in Civil Engineering from the University of Missouri-Rolla (currently Missouri S&T) with emphasis in hydraulics and hydrology. Mr. Wilson continues to be involved in rainfall frequency and temporal distribution research. He has taught undergraduate engineering hydrology as a teaching fellow at the University of Missouri-Rolla. He has served as an expert witness for various stormwater related problems and has served on a national FEMA Scientific Resolution Panel for flood plain mapping appeals. He is the owner of Wilson Hydro, LLC, in Rolla, Missouri.

B4: Response to Recent Flood Disasters
Moderator: David Key, PE, CFM, ESP Associates, dkey@espassociates.com

Success, Challenges & Lessons Learned from Louisiana & Texas Flooding
Lisa Jennings, CFM, FEMA RVI, lisa.jennings@fema.dhs.gov
Additional Author(s): Charlie Cook, Cindy O Neal

This presentation will be about some of the success stories from the Texas and Louisiana flooding of 2016, as well as some of the challenges. It will focus on substantial damage requirements and needs after an event, to include DRT Team concept, training, having to go kits ready, expedited contract, and temporary occupancy. It will also discuss the Flood Map Mailbox initiative started as a result of the 2015 Texas flooding and how that has evolved in recent disasters in Texas and Louisiana, the partnership and assistance provided to IA for the placement of the Manufactured housing units in the floodplain. We will discuss some of the challenges faced in Louisiana and proposed advanced mitigation measures. The presentation will provide attendees with an example of lessons learned, and some of the toolkits, fact sheets, and products developed that could be utilized in future events.

Biography
I have a Bachelor of Science degree in Emergency Administration and Planning from the University of North Texas. In addition, I am a graduate of FEMA's original leadership programs. I have been with FEMA for 22 years, all in Mitigation. My background has been Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance Program (FMA), but a majority of the 22 years has been in the National Flood Insurance Program (NFIP) and managing the Community Assistance Program. I am the Post Preliminary compliance Team Lead for Region VI as well. I have worked numerous disasters such as Hurricanes Katrina and Ike and most recently the Texas and Louisiana Flooding, all as the Deputy Branch Director for Mitigation.

2015 South Carolina Flood Impacts on Dams
Sam Crampton, PE, CFM, Dewberry, scrampton@dewberry.com
Additional Author(s): James Demby, Jr., PE, National Dam Safety Program, FEMA

From October 1-5, 2015, heavy rainfall over parts of South Carolina resulted in the failure of approximately 50 state regulated dams, one Federal dam, two sections of the levee adjacent to the Columbia Canal and many unregulated dams. A Dam Task Force was deployed by FEMA Mitigation in support of recovery efforts. The group was tasked to assess the dams and provide their expertise and insights to the State of South Carolina, FEMA HQ, FEMA Region IV, and the Joint Field Office (JFO). One of the recommendations from the Dam Task Force was to provide state and local officials with consolidated data about select dams regulated by the state that breached during the storm/flooding event. The intent of this data was to help officials identify potential Hazard Mitigation Grant Program (HMGP) projects, inform land use decisions and support comprehensive recovery options that consider vulnerable critical infrastructure and high value mitigation targets.   In response to this recommendation and in close coordination with the SC Department of Health and Environmental Control, 49 dams were visited and assessed. The purpose of these visits was to give a clear assessment of dam conditions to inform the development of recommendations for recovery. A combination of field reconnaissance and desktop research was performed to identify at-risk infrastructure and potential mitigation options as a holistic approach to dam risk management that results in state, local, and private stakeholders, including dam owners, having a better understanding of risk. This was supplemented with a detailed meteorological assessment for each dam to quantify the probabilistic rainfall and fractional Probable Maximum Precipitation values observed within the watershed

upstream of each dam to give a better understanding of the severity of flooding and to perform a comparison with current state design standards.   This presentation will summarize the observations made during this effort and will highlight some of the recovery advisories and fact sheets that were prepared to support the recovery efforts including: •Reconstruction and rehabilitation options for each dam; •Consequences of future breaches; •Options and recommendations for mitigation; •Options for Hazard Mitigation Grant funding; •Options for risk reduction; and •Recommended efficiencies and improvements for dam risk management efforts among stakeholders.

Biography
Sam Crampton has over 15 years of experience in hydrology, hydraulics and dam safety. He has co-authored several guidance documents for the National Dam Safety Program including "Federal Guidance for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures", FEMA P-946, July 2013, "Assessing the Consequences of Dam Failure, A How-To Guide" and "GeoDam-BREACH Users Manual", 2013. He holds a Master's degree in Civil Engineering from Loughborough University in the UK and is a registered Professional Engineer in 7 states.

A Tale of Two Floods
Rob Davis, PE, City of Cedar Rapids, IA, r.davis@cedar-rapids.org
Additional Author(s): Teresa Stadelmann

In June 2008, the Cedar River crested at over 31 feet in the City of Cedar Rapids – 19 feet above flood level. Floodwaters spread across more than 10 square miles of the city, causing over $5.4 billion in damages. Over 1,000 blocks in the heart of the community were flooded, more than 300 public buildings and 900 businesses were damaged, and 5,390 homes belonging to more than 18,000 citizens were affected. In September 2016, eight years and three months later, the same river crested at the second highest level on record – 22 feet, threatening homes and businesses once again. This time, the City was fortified with new equipment, an interim flood-fighting plan, experience, and perhaps most importantly, resolve. The City, contractors, and local volunteers quickly mobilized to construct a temporary flood control system in three days that successfully protected both sides of the river. Using these two very different flood experiences as background, Flood Control System Program Manager Rob Davis will provide information on the City's master plan for flood control and its efforts at advocating for permanent flood protection. The presentation will include an overview of the master plan – including funding, mitigation tactics, planning, construction sequence, and implementation – as well as infrastructure and alignment improvements that further strengthen its cost effectiveness and flood-fighting abilities.

Biography
Rob Davis brings 30 years of professional civil engineering experience to his position as Cedar Rapids Flood Control Program manager. Prior to joining the City of Cedar Rapids, Davis worked for 11 years in the private sector doing consulting work as a civil engineer and project manager for municipalities, park districts, airports, railway companies, transit facilities, and development companies. He began his career with the City of Cedar Rapids in 1998 as Project Manager and moved into Interim Engineering Operations Manager in 1999 and then full time Engineering Operations Manager in 2000, where he oversaw some of the City's largest infrastructure projects including roads, bridges, storm water and sanitary sewer management projects. After the Flood of 2008 damaged more than 1,000 city blocks and more than 300 public buildings, Davis managed flood-damage assessments and the reconstruction and mitigation of City facilities from future floods. His work included the post flood development, including the Cedar Rapids Convention Center and Hotel. He has served in his current role for the past two years, where he leads the planning, design, and construction of the $625 million permanent flood control project for both sides of the Cedar River. Davis is licensed as a Professional Engineer in Iowa and holds Envision Sustainability Professional accreditation. He earned a Master of Business Administration from Rutgers University, a Master of Science in Civil Engineering from the New Jersey Institute of Technology, and a Bachelor of Science in Civil Engineering from Penn State University.

B5: Tranforming the Flood Mapping Program
Moderator: Michael Grasso, GISP, CFM, CDM Smith, grassomj@cdmsmith.com

Innovative Initiatives in FEMA's Flood Mapping Program: Planning for the Future
Rick Sacbibit, PE, FEMA HQ, patrick.sacbibit@fema.dhs.gov
Additional Author(s): Laura Algeo, PE

In 2015, the Technical Mapping Advisory Council (TMAC) provided multiple recommendations to FEMA that, once implemented, will "efficiently and effectively advance the identification, assessment, and management of flood hazards and risk." These recommendations, when considered alongside other Risk MAP program initiatives already underway, represented some of the most "transformative" opportunities the program had seen in years. Recognizing the opportunities and challenges that existed in implementing such changes, those within FEMA's Flood Mapping Program leadership team engaged their Production and Technical Services (PTS) providers on ways to leverage technology, efficiencies, and new ideas to help accomplish these goals. The result of these efforts was the development of multiple technical innovative initiatives, each of which was designed to address different program needs. Several of the innovations centered on TMAC's recommendations #10 and #14 to move to structure-based risk ratings and assessments, and set out to address the data needs, methodologies, and delivery approaches for such a change. Other PTS innovations focused on strategies that would help implement TMAC's recommendation #16 to continue moving to an all-digital platform, such as identifying necessary enhancements to FEMA's geodatabase, data and process requirements to support online LOMCs, and the impacts of developing a nationwide point-and-click BFE data source for regulatory purposes. This session will provide an opportunity for attendees to hear from FEMA and its PTS providers about the specifics of these and other innovative initiatives within FEMA's Flood Mapping Program, and how their outcomes and outputs are being used to advance the overall implementation of Risk MAP and TMAC objectives.

Biography
Mr. Rick Sacbibit, P.E. serves the Branch Chief for the Engineering Services Branch within the Risk Management Directorate at FEMA Headquarters. He is currently FEMA's National Flood Mapping Program Manager and serves as a Mapping Operations subcommittee member of the Technical Mapping Advisory Council. Over the course of his career, Rick has assisted in developing numerous flood mapping standards and policies supporting the National Flood Insurance Program (NFIP) that have enhanced the identification of flood hazards throughout the country. He has also supported over 10 Presidentially-declared disasters, including Hurricane Katrina and Superstorm Sandy, and provided FEMA oversight as the Acting Disaster Operations Team Lead within FIMA's Regional and Disaster Support Office in 2015. After Superstorm Sandy, Rick led the technical development of the advisory flood mapping effort that served as a critical recovery tool for all Federal recovery actions. He has been associated with FEMA and the NFIP for 20 years. Rick holds a B.S. in Civil/Environmental Engineering from Virginia Tech and has been a registered professional engineer in the Commonwealth of Virginia since 2001.

FEMA's Flood Mapping Program: Enhancements Due to NFIP Reform & TMAC Recommendations
David Bascom, FEMA HQ, david.bascom@fema.dhs.gov
Additional Author(s): Tucker Mahoney

The Biggert-Waters Flood Insurance Reform Act of 2012 (BW-12) established the Technical Mapping Advisory Council (TMAC), a Federal Advisory Committee Act (FACA)-governed body that is authorized to review and make recommendations to FEMA's flood mapping program. On March 21, 2014, the President signed the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) into law. The law repealed and modified certain provisions of the BW-12 and makes additional program changes to other aspects of the National Flood Insurance Program (NFIP). The legislative mandates of BW-12 and HFIAA coupled with the recommendations delivered by the TMAC in their 2015 and 2016 reports inform the future state of FEMA's flood mapping program. These requirements and recommendations vary significantly in level of effort and impact; some will be refinements to current operations and others are transformational, such as the recommendation to transition from the 1% annual chance as the basis of flood insurance ratings to a structure-specific flood frequency determination. Mr. Bascom will provide attendees with an understanding of the near term and long term program enhancements informed by flood mapping reform and the TMAC's recommendations and will provide insight to the future state of the program and how the mapping program intends to transform to get there. Attendees will have the opportunity to ask questions and gain insight to FEMA's implementation efforts.

Biography
Utilizing his background in water resources engineering, David Bascom has served FEMA's National Flood Insurance Program for over ten years, first conducting engineering reviews of map updates for the FEMA National Service Provider during Map Modernization, and currently as a the Chief for the Federal Insurance and Mitigation Administration, Risk Management Directorate (RMD), Engineering Resources Branch (ERB). In addition to his role as ERB Chief, Mr. Bascom acts as the lead for managing mapping reforms and recommendations from the Technical Mapping Advisory Council (TMAC).

New Tools for Obtaining Community Input into the Flood Hazard Identification Process
Ferrin Affleck, PE, CFM, Atkins, ferrin.affleck@atkinsglobal.com
Additional Author(s): Jennifer Marcy, CFM; Soumya Sagarika, CFM

The flood hazard identification process has been scrutinized in the past for its lack of transparency, for the inability to address community concerns prior to preliminary map release, the difficulty in communicating technical information to non-technical stakeholders, and other issues. Now more than ever, the need for more open communication and transparent processes is clear, as illustrated by several TMAC Recommendations and Implementation Actions, NFIP Reform requirements, and new standards being implemented by FEMA in order to include more up-front community input and technical information. STARR II developed a white paper for FEMA studying the impact of flood hazard modeling parameters on BFEs and the width of the SFHA—two items of great importance to communities. We studied the impacts of channel bathymetry, structures, and Manning's N values on BFEs and SFHA widths to determine which parameters are most/least important. Originally meant to help FEMA Regions and CTPs best utilize limited resources, the results of this paper can also be useful for obtaining early community input into mapping process in several ways. Frist, this information can be utilized to explain the applicability of models and model inputs in the first new 30-day review period. Mapping Partners can also use this information to tell communities what really matters—where they should focus their energies if they wish to submit data during the second new 30-day review or at any other time during the study. This presentation will focus on the results of the study, and include tips and tools for communicating what matters, where, in a format that is easy to understand and that participants can take away and use in their next flood hazard identification project.

Biography
Ferrin Affleck is a water resources engineer for Atkins specializing in floodplain hazard management. He has more than a decade of water resources engineering experience, including floodplain mapping for Map Modernization and Risk MAP projects, LOMR/LOMA preparation and review, and drainage studies for urban development. In the last 8 years, Mr. Affleck has worked as a contractor to FEMA and CTPs on floodplain mapping studies in studies in 11 states. Mr. Affleck earned a Bachelor of Science degree in Civil Engineering from the University of Nevada, Las Vegas, and he is a licensed Professional Engineer and Certified Floodplain Manager.

B6: View from the Dry Side: Addressing Levee Deficiencies
Moderator: Rodger Denick, PE, CFM, Stantec, roger.denick@stantec.com

In a Levee Midlife Crisis? A SWIF Success Story
Dan Fricke, PE, LEED AP, CFM, JEO Consulting Group, dfricke@jeo.com
Additional Author(s): Ross Lawrence, EI, CFM

The Lower Platte South Natural Resources District (NRD) in Lincoln, Nebraska is the local sponsor of the federally constructed Salt Creek Levees. Evolving US Army Corps of Engineers (USACE) policy has modified PL 84-99 Rehabilitation Program eligibility determinations such that certain features receiving unacceptable inspection ratings can result in an "Inactive" designation for the entire levee system. In 2014, the Salt Creek Levees, now over five decades old, received unacceptable inspection ratings resulting in an "Inactive" designation in the PL 84-99 Rehabilitation Program. When their levee system was faced with a mid-life crisis, the NRD moved forward with development of a System-Wide Improvement Framework (SWIF) plan to resolve deficiencies and to maintain "Active" status in the PL 84-99 Rehabilitation Program.
Beyond just seeking to fulfill a USACE requirement in developing a SWIF, the NRD chose to embark on a comprehensive evaluation and planning effort with a focus on holistic flood risk reduction as well long term infrastructure sustainability. This presentation will utilize the NRD as a case study for model SWIF planning and levee sponsorship. An overview of the comprehensive evaluation and planning effort will be provided. This presentation will discuss details of deficiencies that created the need for the SWIF plan, rectification project development, interagency collaboration, interim risk reduction measures including risk awareness communication, and capital improvement budgeting and planning.

Biography
Dan Fricke is a Project Manager in the Water Resources Engineering Department at JEO Consulting Group, Inc. where he has worked for over 10 years. He holds Bachelor of Science degree in Civil Engineering from the University of Nebraska at Lincoln. He is a licensed Professional Engineer in Nebraska and Iowa as well as an Association of State Floodplain Managers Certified Floodplain Manager and serves on the Board of the Nebraska Floodplain and Stormwater Managers Association. His professional experience includes floodplain analysis and management, stormwater engineering, watershed planning, hydrologic and hydraulic analyses, and geographic information systems. His efforts

have been focused on levees for the past several years including accreditation feasibility analyses, levee improvements, FEMA certification and System-Wide Improvement Framework (SWIF) planning.

Ross Lawrence is a Project Engineer in the Water Resources Engineering Department at JEO Consulting Group, Inc. where he has worked for over 4 years. He holds a Bachelor of Science degree in Agricultural Engineering from the University of Nebraska at Lincoln. Ross is a registered Engineering Intern in the State of Nebraska as well as an Association of State Floodplain Managers Certified Floodplain Manager. His professional experience includes levee, stormwater, and stream improvement design projects; floodplain analysis and management; hydraulic analyses; levee construction and accreditation; levee System-Wide Improvement Framework (SWIF) development; and levee operation and maintenance.

Who's the Boss? Special District Woes, Land Use Goals, & Leveed Land

Colin Rowan, Multnomah Cnty. Drainage Dist., OR, crowan@mccd.org
Additional Author(s): Sara Morrissey, Columbia - Multnomah Cnty. Drainage Dist.

In Oregon, there are over 333 miles of levees. Half of the levee miles are operated by special purpose districts that typically have limited professional, technical, and financial resources and limited, if any, regulatory authority. Oregon's levee networks are tired. Currently, only 45 miles of levees in the state are accredited by FEMA. Through PL84-99, the US Army Corps of Engineers rates 35% of these levee miles as unacceptable, 43% as minimally acceptable, and have not inspected the remaining 22%.   Special purpose districts, such as drainage districts, are often local sponsors of federally constructed flood damage reduction structures such as levees and are faced with complex governance challenges. In many cases, the maintenance and operation of a sound levee system is the responsibility of the special district while communities often dissociate zoning and development decisions from said district. Due to the presence of levees and many interrelated considerations (or lack of consideration), communities with land use authority often continue to permit development in these areas, creating operation and maintenance challenges. This presentation explores the topic of development in leveed areas from the perspective of land use planning and statutory authority in Oregon. Presenters will explore issues faced by special districts, the interplay between agencies in comprehensive planning, and the limitations of statutory and regulatory authority confronted by levee operators. Many or all of the threats faced by Oregon will certainly be familiar to attendees from throughout the county.   This presentation will also provide a closer look at the Portland Metropolitan region's collaborative solutions-focused multi-stakeholder program, Levee Ready Columbia (LRC). While focused on levee accreditation and remaining active in PL84-99, LRC builds capacity and raises the profile of the manifold challenges within the leveed area. The partnership is an excellent example of potential capacity building avenues available in Oregon.

Biography
Colin Rowan is the project manager for the LRC program at MCDD. Colin is a planner and a historian, holding a Masters of Urban & Regional Planning from Portland State University and a Masters of History from Northeastern University. Colin's favorite ice cream flavor is salted caramel fudge. Before coming to the world of floodplain management, Colin worked as a consultant in sustainable transportation.   Sara Morrissey is the program manager for the Levee Ready Columbia (LRC) program at the Multnomah County Drainage District No. 1 (MCDD) in Portland, Oregon. Sara is a planner, holding a Masters of Urban & Regional Planning from Portland State University. Sara's favorite ice cream flavor is chocolate peanut butter. Sara has professional experience as a consultant in transportation and natural resource planning and permitting.

Lower St. Francis Levee System 11 & 12 Study: An "Outside the Box" Approach to Unlocking Large Systems

Lee Beshoner, PE, CFM, FTN Associates, ljb@ftn-assoc.com
Additional Author(s): John Bourdeau, CFM, FEMA RVI

As part of the Lower-St. Francis Watershed Discovery project, FEMA Region 6 is evaluating the Lower St. Francis Levee System 11 and 12 in Arkansas and Missouri. This review centers on the possibility of accrediting major sections of both Levees for NFIP mapping purposes, with the understanding that a few minor sections are deficient and would not be accredited in the areas impacted by these deficiencies. These systems are very long and made up of multiple segments, which has resulted in many Arkansas counties remaining unmapped or on hold, while waiting for the entire system and every component to meet FEMA standards. These two systems are very robust, have stood the test of time and floods, and have been evaluated by USACE in NFIP Levee System Evaluation Reports (LSER). To date only minor deficiencies exist at the ends of both systems. FEMA and the AR Cooperating Technical Partners (CTP) have used information obtained from the LSER reports for both systems to identify known weak spots in the levee. Multiple breach scenarios were conducted using HEC-RAS 5 and the 2D functionality of the

program, to determine the inundation area behind the levee that might be experienced should the levee fail. The resulting mapped areas will then be used to determine where projects can and cannot be continued until the deficiencies are fixed. This presentation will focus on the value of creative problem solving, the approach and methodology used; how the data is/will be used and shared; coordination with other local, state, and federal agencies (and regions); and general lessons learned to hopefully make the approach a possible solution to solve instances where robust but de-accredited levee systems are holding up projects and maps.

Biography
Mr. Beshoner is a Water Resources Engineer in Fayetteville, AR, for FTN Associates, Ltd., a water resources/environmental consulting firm based in Little Rock, AR. He is a registered professional engineer in the States of Arkansas, Louisiana, Mississippi, Missouri, Oklahoma, and Texas and is a Certified Floodplain Manager. He has 14+ years of experience in water resources engineering, including analysis with hydrologic/hydraulic and water quality modeling, flood insurance studies, and engineering design in diverse riverine and coastal environments. He is FTN's lead engineer in the use of GIS in hydrologic and hydraulic applications and is project manager/engineer for the State of Arkansas CTP contract.

B7: Michael Baker International Showcase
Moderator: Jeff Sparrow, PE, CFM, Michael Baker Int'l, jsparrow@mbakerintl.com

The Future of Floodplain Management and Mitigation: A State and Local Perspective
Panelists:
Tim Trautman, PE, CFM, Program Manager, Engineering & Mitigation Program, Charlotte-Mecklenburg Storm Water Services;
Tom Morey, RS, CFM, State of Kansas NFIP Coordinator, Kansas Dept. Agriculture;
Carey Johnson, State of Kentucky CTP Program Manager, Kentucky Div. Water;
Mitch Paine, CFM, State of Nebraska NFIP Coordinator, Nebraska Dept. Natural Res.

B8: Local Stormwater Project Successes
Moderator: Reuben Cozmyer, PE, CFM, AECOM, reuben.cozmyer@aecom.com

Designing & Managing Complex Urban Streamway Projects with Multiple Objectives
Chad Johnson, PE, CFM, Olsson Assoc., cjohnson@olssonassociates.com

Design and management of urban stream projects present a variety of technical and non-technical challenges and often divergent views of "success" from various stakeholders. Often, there are many different stakeholders including adjacent land owners, nearby residents, City or municipal staff, governing body members, City, State, and Federal permitting agency staff, utility company staff, and possibly others. Meeting the technical and non-technical requirements of all these stakeholders requires vision, solid technical design data, translation of technical criteria and results to non-technical presentations, and a willingness to find compromise solutions where not all stakeholders are completely happy. Two projects where these skills were utilized exemplify the potential for successful design and management of projects with multiple objectives.   Although the impetus for the two projects was different, the road to success was similar. The Monitor Square Storm Drainage Improvements were funded by flood mitigation funds provided by Johnson County and the City of Overland Park, KS. The project identified 13 residences and a roadway inundated by the 1% annual chance event. The existing channel was a narrow, tree lined channel with insufficient capacity, and the solution included a mix of property buyouts and channel improvements, including overbank wetlands and parallel overflow channels, to improve capacity. The South Creek Restoration Project improved an approximately 1-mile stretch of stream within the City of Springfield, MO with the primary objectives to improve habitat for macro invertebrates, improve water quality, and provide public outreach and public education opportunities. The solution included restoring the channel with meanders and native vegetation while protecting adjacent infrastructure. This presentation will provide an overview of the technical and process considerations of the vision, design, stakeholder and public outreach, and sometimes iterative communication that is needed to meet the needs of various stakeholders and bring a project to successful fruition.

Biography
Chad has over 18 years of experience in floodplain management, stream evaluation and "improvement", and a variety of geotechnical and stormwater management projects. He is involved in projects from initial inception to final construction and ongoing maintenance, including stormwater planning, river or system modeling, report preparation, design and construction

document preparation, and construction engineering. He also provides on-call consulting to a number of local communities in the Kansas City area, and he has worked on everything from nuisance flow across a sidewalk to flooding along the Missouri River. He is currently leading projects for design and permitting of dams and reservoirs, urban stormwater rehabilitation, urban stream flood reduction, and asset management and regulatory compliance for municipalities. He graduated in 1997 with a BS in Civil Engineering from Brigham Young University, and he graduated again with an MS in Civil Engineering from the University of Kansas. He is a native of California living in Kansas with his wife and three of his four children.

Zone AO Challenges in Oklahoma's Prairie Heartland

Janet Meshek, PE, SR/WA, CFM, Meshek & Associates, jmeshek@meshekengr.com

In 2015, the City of Woodward set out to implement a plan to deal with antiquated inaccurate floodplain mapping. A northwestern Oklahoma community adjacent to the North Canadian River, Woodward has a downtown business district covered by a large blanket Zone AO from two "human-caused" overflow sources. Both streams were constructed to divert stormwater away from its natural watercourse, one to accommodate a railroad (Unnamed Tributary) and the other to accommodate development (Woodward Creek Tributary). Floodplain maps date back to the 1970's and using USGS 15-minute quadrangles with 10-foot contours to develop floodplains. Woodward is a small community with a lot of pride in its heritage. Numerous attempts to revitalize its historic downtown area had failed to overcome its biggest hurdle - the negative implications associated with building or renovating in a flood zone.   To fund its needed improvements, this progressive prairie community developed a Stormwater Utility Fee. This fee was then used to fund new HEC-RAS 1D and 2D modeling of the affected streams and overflow areas to determine a more definitive floodplain using LiDAR data accurate to 1-foot contours. Currently because of the AO zone, buildings must be floodproofed to 1 foot above the HAG. This requirement is complicated by the fact that most buildings share common walls with adjacent buildings. Upstream from the AO zone on the Unnamed Tributary, the City and County own property with a damaged high hazard dam in need of emergency repairs and improvement. Plans were developed to rebuild the dam, meet the requirements of the Oklahoma Water Resource Board dam safety requirements and add additional storage to reduce downstream flows significantly. This project will be completed in the Spring of 2017. In addition, the design and construction of a stormwater detention facility immediately upstream from Highway 412 is underway to eliminate overflow from Unnamed Tributary. This stormwater project will be followed by the design and construction of another stormwater detention facility on Woodward Creek Tributary which will eliminate the AO zone completely. Participants will learn how any community, no matter the size, can become flood-resilient through careful planning, creative funding, and progressive leadership.

Biography
Ms. Meshek is an Oklahoma State University graduate with a BSCE in 1977 and an MSCE in 1987. In her 39 years of experience in engineering. Meshek has prepared master drainage planning studies, written or updated ordinances and criteria manuals and supervised several municipal studies, including capital improvement project prioritization and updating municipal fee schedules. She has served as an expert witness in numerous drainage-related litigation cases, including damage and condemnation cases for the City of Tulsa and for the Oklahoma Department of Transportation.   Ms. Meshek served on Governor Frank Keating's Tar Creek Superfund Task Force Drainage and Flooding Subcommittee in 2000. She was honored as the Oklahoma State University Chi Epsilon Chapter Honor Member in 2001. She served as the Oklahoma Floodplain Managers Association Chair in 2002-2003. She has received numerous OFMA awards and still serves the organization as its newsletter editor. Ms. Meshek currently sits on the board of the Disaster Resiliency Network, a non-profit organization dedicated to creating disaster-resistant and sustainable communities.

Watershed-scale Stormwater Improvements with Innovative Funding

Aaron Gwinnup, PE, HR Green, agwinnup@hrgreen.com

South Ravine Park is located in southern Sioux City, Iowa. Quick Creek flows through the park and outlets to the Missouri River, draining 1.75 square miles of the sensitive "Loess Hills" soil formations in western Iowa. These rare and fragile landforms are extremely sensitive to hydrologic modification and the resulting erosion can be quite dramatic. A variety of projects and practices are being implemented and thanks to the Iowa DNR's SRF - Sponsored Projects Program, and various stakeholders, efforts are well underway to preserve and protect the park, stream and surrounding natural areas from further degradation. Join the conversation to find out what best practices are being implemented and how innovative funding was used.

Biography
Aaron Gwinnup, PE, is a professional engineer practicing in water resource management with specific expertise in design of stormwater "best management practices", traditional stormwater infrastructure, ecological restoration, stream restoration, water modeling and GIS software, and general project management. In addition to working as a dedicated engineer with HR Green,

Aaron is a volunteer member of the Iowa Stormwater Management Manual technical review committee, and operates a small family farm in eastern Iowa. This diverse combination of academic research, business and project management, and stormwater engineering design experience make Aaron a well-rounded engineer.

C1: Local Mitigation Success Stories

Moderator: Timothy Trautman, PE, CFM, ASFPM Mitigation POD Facilitiator, Charlotte-Mecklenburg Storm Water Svcs., tim.trautman@mecklenburgcountync.gov

Creating Successful Partnerships: Lower Onion Creek Flood Mitigation Buyout Project

Pamela Kearfott, CFM, City of Austin, TX, pam.kearfott@austintexas.gov

Central Texas is known as the "Flash Flood Capital of the World". Flooding is the most frequent and the costliest disaster facing the City of Austin, and the most deadly. With thousands of houses and roadways in the floodplain, the city's goal is to change those statistics. In order to protect lives, property, and the environment from the impact of flood events, the City of Austin has multiple flood mitigation objectives, including the reduction of depth and frequency of flooding for all structures in the 100-year floodplain. These objectives are achieved, in part, by implementing flood hazard mitigation projects. Projects range from channel or bridge modifications, to floodwalls, detention ponds, improved storm drain systems, and acquisition of flood prone structures. Buyouts are generally only pursued in areas where structural mitigation options would not be feasible or cost effective. To date, the City of Austin has purchased over 950 homes in the floodplain and retains the deeds to those properties to prevent future development. The structures have been demolished and the areas have been converted to green space to preserve the natural and traditional character of the floodplain. One of the largest flood mitigation buyout projects implemented by the City of Austin is in Lower Onion Creek. With an expected total project cost of $170M, this project area consists of 855 properties at risk of flooding in a 100-year event, with the majority of them also at risk in more frequent events. Following a flood in 1998, the City began acquiring properties in this area. Due to very limited project funding, however, buyouts occurred at a limited pace for several years. Major flood events in this area in 2013 (the flood of record) and 2015 underscored the need for continued implementation of this buyout project. Originally, the Lower Onion Creek buyout project was funded solely through appropriations of the City's drainage fees. In recent years, however, the City of Austin has successfully pursued several partnerships with federal agencies and local organizations to help leverage City funding to allow for greater efficiency in pursuing this mitigation project. The largest partnerships in the Lower Onion Creek project area have been with the U.S. Army Corps of Engineers (USACE) and FEMA. In 2014, the City formalized a partnership with the USACE to share the buyout costs for more than half of the project area and to work together to construct recreational amenities on the acquired property and implement floodplain restoration measures. Over the last 10 years the City has also secured approximately $9M in FEMA Hazard Mitigation Grant Program funding to further offset project costs. As the buyout activities draw to a close, the City of Austin is also exploring partnership options with local community groups to further enhance the project area with uses and activities that are consistent with the City's flood safety objectives and floodplain regulations. This presentation will provide an overview for other municipalities and floodplain managers of the City of Austin's Lower Onion Creek Flood Mitigation Buyout Project. The implementation of the project using federal and local partnerships will be discussed along with lessons learned, challenges faced, and ideas for future buyout strategies.

Biography

Pamela Kearfott is an engineer and certified floodplain manager in the City of Austin's Watershed Protection Department. She and her engineering teams perform hydrologic and hydraulic modeling of creek and watershed systems, analyze and evaluate flood hazard solution alternatives, and design flood hazard mitigation projects. She also sponsors and manages capital improvement projects for the City, including multiple floodplain buyout projects. A native of Illinois, Ms. Kearfott is a graduate of Northwestern University where she earned a Bachelor of Science Degree in Environmental Engineering. She is also a graduate of the University of Texas at Austin where she earned a Master of Public Affairs and a Master of Science in Environmental & Water Resources Engineering. Ms. Kearfott served in the Peace Corps as an environmental education extension agent in Senegal, West Africa.

Kingfisher, OK: Small Town Makes it Big through Collaboration

Rita Henze, RWA, R/W-NAC, CFM, Meshek & Associates, rhenze@meshekengr.com
Additional Author(s): Dave Slezickey, City of Kingfisher

Built between the confluence of 2 creeks in 1889, the City of Kingfisher, has had a long history of flooding and been studied numerous times resulting in big price tags. In 2007, the City experienced its worst flood ever and set out to build a coalition of agencies and funding to mitigate its flooding. City leaders, officials, and flood victims joined County officials, the Kingfisher

County Conservation District, the Oklahoma Conservation Commission (OCC), and the U.S. Natural Resources Conservation Service (NRCS) to develop a mitigation plan consisting of voluntary acquisition and floodproofing. With the assistance of a state legislator, City advocates convinced the State Legislature to fund up to $4 million in flood control measures through OCC.   With $4 million in seed money, City leaders learned that approximately $14 million in FEMA Hazard Mitigation Grant Program (HMGP) funds were available from recent disasters. The City worked closely with the Oklahoma Department of Emergency Management (OEM), and in 2012, Kingfisher was awarded $6 million in matching HMGP funds to acquire 48 structures voluntarily and floodproof 2 structures.   The project faced numerous hurdles, some due to the funding complexity, some related to citizen skepticism, and some politically-motivated. Regardless, the City acquired 34 structures and floodproofed 1 structure.   When a FEMA HMGP Pilot Closeout (Program) for Uncommitted 2010-2013 Funds became available in 2015, OEM notified the City of its eligibility for an additional $6.7 million. Using residual funds from leveraging funds in Phase 1, the City had matching funding available for Phase 2 for the acquisition of 63 structures. In 2015, the Phase 1 acquisition area flooded again, but this time there were no structures or lives at risk. In 2019, when Phase 2 is finished, everyone in Kingfisher Creek floodplain will have been given the chance to relocate outside harm's way. Flooding will still occur in Kingfisher, but because of its collaborative effort, the City will be more resilient. Participants will learn about building successful collaborations and funding mechanisms and potential obstacles to improve community resiliency.

Biography
Ms. Henze joined Meshek & Associates, PLC, in 2009, to lead the firm's Planning and Right-of-Way Acquisition Services. She has over 30 years of experience in public right-of-way acquisitions and planning municipal projects for stormwater, capital improvements, parks and fairgrounds.   Prior to joining Meshek & Associates. Henze was employed by the City of Tulsa Public Works Department as its Real Estate Manager. During her 16-year tenure, she managed right-of-way acquisition services for all street, drainage, sanitary sewer and water projects for the City of Tulsa.   She has successfully implemented over $4.0 million in FEMA HMGP and FMA grant programs for the City of Tulsa and over $6 Million in HMGP grants for the City of Kingfisher as well as successfully writing HMGP grants totaling more than $15 Million. She is currently responsible for the implementation of the City of Kingfisher's $9 million Phase 2 HMGP Voluntary Acquisition program consisting of over 63 structures.   Ms. Henze has a B.A from Western Illinois University and an M.A. in Urban Studies from the University of Tulsa. She is a Certified Floodplain Manager and a certified Right-of Way Agent and Negotiator (R/W-NAC from the IRWA).

Locking Down the Right Flood Mitigation Plan
Donald Green, PE, Michael Baker Int'l, dgreen@mbakerintl.com

In October 2015 at the Columbia Canal, record-setting precipitation from a 1,000-year event led to overtopping and breach of a 3-mile long dike along a power canal that caused loss of the primary water supply for over 180,000 residents at the capitol of South Carolina and surrounding communities, and loss of water supply for the City's hydroelectric plant. Emergency response by the City of South Carolina, FEMA, FERC, USACE and South Carolina National Guard restored temporary water supply to the primary intake for the City' water treatment plant. The Columbia Canal is a pre-civil war era structure that is listed on the National Register of Historic Places and serves as a critical City' asset. Michael Baker International, Inc. was retained to complete a NEPA analysis to identify a preferred alternative to repair flood damage to the breached dike. Primary cost-benefit objectives considered included restoration of a reliable water supply intake, hydropower generation, flood-fighting resiliency improvement, enhancement of recreational opportunities, preservation of cultural and historic assets, and reduction of future flooding potential. This presentation delves into the challenges and solutions that were achieved through the decision-making process to maximize cost-benefit to both reduce risk of flood loss and preserve natural, cultural and historic resources.

Biography
Donald Green, P.E. is a Technical Specialist for Michael Baker International, Inc. Mr. Green is a MSCE graduate of the University of Pittsburgh and a practicing engineer with 38 years of experience. Mr. Green's primary focus is design of structures with complex soil-structure interaction. Mr. Green has extensive experience investigating and designing flood protection, navigation, dam, retaining wall, and bridge foundation structures. Mr. Green led the panel of experts that was assembled by FEMA to prepare the overtopping section of Operating Guidance 12-13, Non-Accredited Levee Analysis and Mapping Guidance. Mr. Green is a Certified Instructor for the National Highway Institute (NHI) and teaches Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures on behalf of FHWA. Mr. Green has served as an expert witness and lead investigator for forensic investigations.

C2: Changing Attitudes About Higher Standards
Moderator: John Squerciati, PE, CFM, Dewberry, jsquerciati@dewberry.com

Engaging Private Enterprise to Promote Flood Safety

Jennifer Gerbasi, CFM, Terrebonne Parish, LA, jgerbasi@tpcg.org

Whereas freeboard is demonstrably cost effective for the buyer who could enlist the private sector to implement a rational flood safety choice, not everyone understands the value of flood safety. Surprisingly, the real estate finance industry ignores the value of risk reduction. Freeboard is a widely accepted method of flood risk reduction increasing the life expectancy of housing stock in the face of uncertainties such as rates of relative sea level rise, subsidence, and high water marks from storm surge. However, that investment in many cases has to be made up front by the buyer. Mortgage companies and appraisers show no recognition of the increased cost or value of flood safety. While studies show that sales prices can be discounted in the floodplain (6-7%), there is no valuation in appraisals of compliance with the BFE or additional risk reduction efforts. Builders looking for more cost effective building approaches may be choosing floodsafe methods for financial gain. This would be further encouraged if the real estate industry (including mortgage companies and appraisers) understood and placed a numeric value on flood safety. This presentation will provide case studies regarding the flood safety value appraisers should recognize, and provide suggested approaches for enlisting the appraisers and mortgage companies to support this and other privately funded flood safety efforts. Let's help the private sector work.

Biography
Jennifer Gerbasi joined the Terrebonne Parish Consolidated Government Department of Planning and Zoning, Houma, LA in July 2008 to implement the Hazard Mitigation and Long Term Recovery Plans for the Parish. Toward that end, Jennifer has developed successful applications for FEMA hazard mitigation grant programs, drafted the Gustav/Ike Recovery Plan for over $135M in Community Development Block Grant funds and has implemented programs for elevations, acquisitions, reconstructions, marine debris removal, and critical facility hardening projects. New ventures include terrace creation and oyster bed surge protection systems. Jennifer's earlier work included policy and advocacy work in the areas of soil and water protection in Tennessee and the Mississippi River Basin, water rights, and international trade. She has earned degrees in law from the University of San Diego and Georgetown Law School, a Master's of Professional Sciences from Cornell University, and has earned certifications as a Water Operator and Floodplain Manager.

The Dollars & "Sense" of Flood Resiliency

Adam Reeder, PE, CFM, CDM Smith, reederaj@cdmsmith.com
Additional Author(s): Manuel Perotin, PE, CFM, CDM Smith

Historically we have relied on codes and standards to address the minimum freeboard requirements with respect to flood-prone buildings. This presentation will discuss and recommend flood mitigation options based upon a business model of more resilient buildings being less expensive for owners than constructing to code minimums. Current codes rely on flood insurance rating maps reflecting the historic flood risk and not reflecting future projected risks from changing conditions, such as increased runoff and sea level rise, thereby often miscalculating a building owner's total risk. Reducing damage to property, building contents, and reduced business interruption will be considered as well as potential reductions in flood insurance premiums.
The presentation will begin with identifying the minimum code requirements and then make the case that with both single-family residential and large buildings that we should be encouraging owners and lenders that increased freeboard is necessary to protect their investments. This approach encourages the building stakeholders to evaluate their construction requirements in terms of financial resiliency and potential return on investment rather than relying solely on the codes.

Biography
Adam Reeder is a civil/structural engineer with over 20 years of experience in a wide range of structural engineering projects. He is a nationally recognized subject matter expert for FEMA's Building Science Branch in wind and flood mitigation. Mr. Reeder is a principle author of several FEMA publications including FEMA 936, Floodproofing Nonresidential Buildings and in August 2016 drafted a report for FEMA on the economic benefits of freeboard for coastal public and commercial buildings.

Above and Beyond – 200-year Flood Protection for Sacramento's Future

Remi Mendoza, CFM, City of Sacramento, CA, rmendoza@cityofsacramento.org

Additional Author(s): Jim McDonald, AICP, CFM, City of Sacramento; Connie Perkins, PE, CFM, City of Sacramento

In October 2007 California adopted Senate Bill 5 (Machado) which mandated state and local comprehensive planning above and beyond the 100-year federal flood standard. As a result, California adopted a 200-year flood standard for levees protecting urban areas. This law was intended to discourage cities and counties from encroaching into flood prone areas with minimal protection. Sacramento was especially affected by the new State law because it is at the confluence of the Sacramento River and the American River, with flood protection provided by levees. This presentation will provide an overview of Sacramento's flood history over the last 150-years, an overview of how in 2016 the City became the first jurisdiction in California to comply the new SB 5 regulations for higher standards of flood protection, including crucial updates to the City's General plan and zoning code, and recent flood infrastructure challenges in 2017.

Biography
Remi Mendoza is a Certified Floodplain Manager with 10 years of planning experience, including long range and current planning. His key projects include the McClellan Heights and Parker Homes Special Planning District, Florin Road Corridor Plan, and Sacramento Center for Innovation Specific plan.   He was most recently the project manager for the City's 2035 General Plan Update and assisted with the 2016 Comprehensive Flood Management Plan.

C3: Advancements in Hydrologic Data & Methods
Moderator: Mark Forest, PE, CFM, HDR, mark.forest@hdrinc.com

Forging the Middle Ground Between Regression Equations & Detailed Basin Hydrologic Modeling
Carey Johnson, Kentucky Division of Water, carey.johnson@ky.gov
Additional Author(s): Davis Murphy, Bret Lavey

In Kentucky, discharge estimates for the vast majority of riverine flood studies as part of FEMA's Risk MAP program (where gage data are unavailable) generally rely upon two approaches: USGS regional regression equations or detailed basin modeling in software packages such as HEC-HMS. However, there are a growing number of reasons why different approaches to hydrology may be desirable. It is not uncommon to observe some communities' lack of confidence in regression equations, and they have limitations which make their use unfit for some situations. On the other hand, detailed hydrologic studies are expensive to produce which limits their widespread application. With these considerations in mind, it is clear that a middle of the road approach is needed that can employ more of the direct modeling commonly found in detailed studies but with new tools and techniques that minimize the amount of labor and expense necessary to create those studies. The primary goals and outcomes of these efforts are to develop tool(s) to be implemented in watersheds throughout the Commonwealth to provide local officials and stakeholders with: (1) a more accurate estimate of runoff relative to regression equations and resulting flood hazard products, (2) a rainfall-runoff based model that can be leveraged to improve KDOW's CERC efforts by providing greater value and capabilities to stakeholders and better assist in future conditions modeling, and (3) a model that is capable of assisting in the advancement and evaluation of potential flood mitigation solutions. The Kentucky Division of Water (a FEMA Cooperating Technical Partner), and its study contractors, AECOM and Stantec, have created methods to produce discharge estimates aimed at filling the gap between approximate and detailed hydrologic approaches. The team proposes three methods: the first method implements the latest capabilities of HEC-RAS to model effective rainfall distributions over a two-dimensional mesh; the second method uses a simplified approach to TR-55 and is implemented as a suite of custom model builder routines in ArcGIS; the third method utilizes a suite of ArcGIS tools, many already commonly applied, and simplifying assumptions particularly regarding watershed timing and runoff routing to streamline the generation of HEC-HMS models.   Each of the three methods was used to estimate recurrence interval discharges at several common locations within a 10.7 mi2 gaged sub-catchment of the Highland-Pigeon watershed in western Kentucky. The discharge estimates from each method are compared to regression equations, detailed HEC-HMS modeling, gage data, and one another. The team will recommend an approach and path forward based on outcomes of the comparisons and will utilize the approach for future flood hazard analyses.

Biography
Carey Johnson is an Environmental Scientist Consultant in the Kentucky Division of Water's (KDOW) Director's Office. His primary responsibilities include coordinating water resources-related activities across the Division and managing the Cooperating Technical Partners (CTP) program for the Commonwealth of Kentucky. He has overseen flood hazard map updates for all counties in Kentucky and is currently leading Risk MAP efforts. He serves on the KY State Hazard Mitigation Council, the statewide LIDAR/orthoimagery technical advisory committee, the FEMA CTP Community of Practice steering committee, and serves as a subject matter expert to the Technical Mapping Advisory Council (TMAC). Carey is also the state lead for the

Kentucky Silver Jackets charter. He is a founding member and current chair of the Kentucky Association of Mitigation Managers (KAMM). Carey spent 3 years as the KY state NFIP Coordinator prior to managing the CTP program.

Estimating Peak Flows for Ungaged Streams Using Trail Camera Images
Mark Hoskins, CFM, Michael Baker Int'l, mark.hoskins@mbakerintl.com
Additional Author(s): Tom Mihlbachler PE, CFM

The presentation will explain a new hydrologic modeling approach that will provide stream peak flow analysis/ calibration using hundreds of stream images provided by an inexpensive trail camera. Topics covered: 1) Hydrologic Modeling Basics: a) Stream flow peaks affected by climate change and watershed development b) Estimating reasonable hydrologic model parameters c) SCS Method: Peak Shape Factor background c) Regression Equations have goodness and limitations 2) Useful Website Examples: a) Hourly Rainfall Grids within the lower 48 states b) Huff Rainfall Distribution Excel spreadsheet for any time step 3) Making Stream Movies: a) Buying a Good Trail Camera b) Free Movie-making Software c) Trail Camera Setups d) Posting the stream movies to residents Verifying stream responses with an inexpensive process allows municipalities to better protect properties and upgrade stormwater infrastructure. Stream peak flows change with location and intensity, due to increased sub-watershed development, more intense storms (climate change), and deteriorating stormwater infrastructure. Predictive hydrologic models need to be calibrated to recent events. Although several hydrologic commercial software packages have great looking results with animated hydrographs and time dependent glowing culvert pipes, all hydrologic models need to be periodically calibrated with recently observed stream hydrographs. Using a trail camera (with 5 minute interval images), will provide that verifiable, accurate and relevant hydrologic calibration information. It may take a few months before you capture a large storm, but these image observations are worth the wait. Using these visual images and transforming them into a movie, verifies runoff and can additionally be used to outreach stormwater issues to residents. Example stream movies will be shown during the presentation, although popcorn will not be provided.

Biography
Mark Hoskins, PE, CFM works for Michael Baker International as a surface water manager in the Chicago office. He has hydrologic experience both in the private and public sectors. Some of his work includes projects needing watershed modeling, highway drainage design and stormwater permit review. Recently Mark has worked on promoting stormwater messaging outreach for municipalities, educating families on the need to better maintain stormwater infrastructure. Mark teaches a day-long seminar covering the National Flood Insurance Program basics to several state floodplain associations. He graduated from the University of Connecticut with a BSCE and from Principia College with a BS in Biology/Environmental Sciences.

Delivering High-quality, Integrated Topographic Data for Flood Modeling
Stephen Aichele, USGS, saichele@gmail.com

The USGS 3D Elevation Program (3DEP) is expanding LIDAR coverage across the Nation, providing the opportunity to not only improve elevation and hydrographic data, but also to combine the two datasets into useful topographic information. 3DEP is a cooperative program led by the USGS to develop 3-D mapping and enhanced elevation data for the US. The NHDPlus High-resolution (NHDPlusHR) provides the first effort to bring high-resolution hydrographic data together with enhanced elevation data at a national scale to provide geospatial data both for local projects and continental efforts such as the National Water Model. This presentation will also include a summary of the findings of the recent Hydrography Requirements and Benefits Study, a description of activities underway and planned for FY17, and an overview of the vision to deliver better topographic information for the Nation.

Biography
Steve is a Geographer with the USGS National Geospatial Program. He has 20 years experience in hydrology and manages the USGS Hydrography Requirements and Benefits Study, designed to develop the next generation of hydrography data products.

C4: The Role of Wetlands in Watershed Mgmt.
Moderator: Eileen Shader, American Rivers, eshader@americanrivers.org

What Floodplain Managers Need to Know About Wetland Condition: NWCA 2011 Finds Relationship Between Hydrological Stress & Wetland Health
Myra Price, EPA, price.myra@epa.gov

Additional Author(s): Gregg Serenbetz, W. Michael McDavit, Annie Rossi

In 2011 the Environmental Protection Agency (EPA) in partnership with the states and other federal agencies conducted the first national assessment of the ecological condition of the nation's wetlands encompassing both tidal and non-tidal wetlands along our coasts to prairie potholes and meadows in the interior plains. This work is part of EPA's National Aquatic Resource Surveys, a series of statistically-based assessments designed to provide the public and decision makers with nationally consistent and representative information on the condition of the nation's waters. The National Wetland Condition Assessment (NWCA) 2011 report was released in May 2016 and provides valuable insight into the Nation's wetland health, finding more than 50% of wetlands are not in good condition. In addition, the study found that the leading problems associated with wetland health and condition are: surface hardening; removal of vegetation; ditching; and non-native plants. This presentation will provide resource and flood plain managers with informative results of this study, especially in regard to stressors connected to condition. The presentation will also share national and regional findings, showing relative and attributable risk of stressors to condition which in turn may suggest steps for minimizing stress, increasing condition and possibly improving functional performance of wetlands especially with regards to flood attenuation and risk.

Biography
Myra Price is an Environmental Protection Specialist for EPA's Wetlands Division. She has work for EPA in Washington, DC for seventeen years in both regulatory and non-regulatory programs. Her main focus in the Wetlands Division is on the wetlands grant program and wetland restoration. Myra is the EPA coordinator for the 5-Star Wetland Restoration Challenge Grant program. She has received degrees in Watershed Management, Chemistry and Biology from New Mexico State University and the University of Arizona.

*Assessing Multiple Functions of Missouri's Bottomlands: Laying the Groundwork For Wetland Conservation
Frank Nelson, Missouri Dept. of Consv., frank.nelson@mdc.mo.gov
Additional Author(s): Dave Diamond, Missouri Resource Assessment Partnership

The Missouri Department of Conservation is undertaking a new Wetland Planning Initiative. It realizes the multiple uses the state's bottomlands provide for a variety of landowners, agencies, and municipalities. Effective coordination and planning with partners is paramount, especially as monetary and natural resources become tight. Assessing the past and current conditions of Missouri's bottomlands is the first step in identifying priorities, opportunities, and trade-offs as it relates to wetland conservation. There are a variety of geospatial datasets including, National Wetlands Inventory, soils, hydrology, topography, land cover, and potential natural communities that are available today to help guide practitioners to evaluate and inform decisions at various scales that relate to our watersheds and floodplains.
The status and functions of wetlands can be assessed through a couple of approaches. Some methods focus primarily on what wetlands look like, while others emphasize the landscape position and potential interactions with the adjacent surroundings. Both tactics have their strength and weaknesses when examining Missouri's bottomlands. We are working towards building off of the different strengths of these classification systems and tailoring them to ecological functions in the state. This should provide a baseline for the historic and present extent of Missouri's bottomland habitats and help identify the functions that occur across a gradient of wetland types and landscape positions. By using a range of geospatial data and professional input from partnering agencies this assessment is planning to help identify locations and deficits that account for reducing flood damages, pinpoint locations that are best suited to sequester carbon, define habitats that may be crucial for streamflow maintenance, and put into context the factors contributing to nutrient cycling. This assessment is the first step to help Missouri Department of Conservation and our partners prioritize wetland conservation in the future.

Biography
Frank Nelson is a Wetland Ecologist and has a Masters of Fish and Wildlife Sciences degree from University of Missouri-Columbia and a Bachelor's degree from William Jewell College. For the past 12 years Frank has worked closely with wetland and waterfowl biologists across the state on a variety of projects. His focus is utilizing research and technology to enhance wetland management and wetland restoration. One of these projects is the renovations at Duck Creek Conservation Area in southeast Missouri.

*The Iowa Watershed Approach
Allen Bonini, Iowa DNR, allen.bonini@dnr.iowa.gov

State of Iowa: The State of Iowa will receive $96,887,177 in NDRC funding to support the Iowa Watershed Approach, a holistic watershed-scale program designed to sustain its valuable agricultural economy while protecting vulnerable residents and communities. HUD funding will enable several watersheds to form Watershed Management Authorities, which will develop hydrological assessment and watershed plans, and implement pilot projects in the upper and lower watersheds, as well as invest in more resilient, healthy homes in Dubuque.

Biography
Allen Bonini is the Watershed Improvement Program Supervisor for the Iowa Department of Natural Resources. He leads staff that support the formation of Watershed Management Authorities in the state of Iowa. The Section is also responsible for the Department's broader watershed improvement efforts, including the TMDL Program, the Section 319 Nonpoint Source Pollution Program, the development of an in-lieu fee stream mitigation program and, most recently, helping carry out the Iowa Watershed Approach project. Allen holds a degree in Ecology from the University of Illinois and has spent the past 40 years working in Iowa, Minnesota and Illinois as an environmental professional in a variety of technical and managerial positions, mostly in the areas of water quality and solid waste management.

C5: Improving the Customer Experience with Mapping
Moderator: Mike Schlesener, GISP, AECOM, mike.schlesener@aecom.com

Keeping Customer-centric Aspirations in Technical Processing
Amanda Rabenstine, CFM, Michael Baker Int'l, amanda.rabenstine@mbakerintl.com
Additional Author(s): Bryan Anderson, CFM, Michael Baker Int'l

Understanding the regulatory requirements and adhering to guides and standards can be straight forward enough for technical processing, but how we do we keep grounded and center operations on the customer? We will give you an inside look at the FEMA Mapping Information eXchange (FMIX), FEMA's contact center who interacts one on one with over 100 thousand stakeholders per year, and how their relationship with FEMA's MT-1 processing contractor, who processes thousands of applications monthly for mostly property owners, can improve the image and branding of the Agency through behind the scenes communication and collaboration. We will go in-depth on FMIX background, evolution and services; MT-1 application processing and reviews. How the FMIX and MT-1 contractor coordinate with one another on hot topics and potential areas of interest all while still aspiring to drive the FEMA customer experience initiative. Lastly what does the future hold for the FMIX and MT-1 processing? This presentation will give you an inside look at the FMIX and MT-1 group coordination, customer interactions and what goes on behind the scenes.

Biography
Overseeing the FEMA Map Information eXchange (FMIX) for the past few years, Amanda Rabenstine takes pride in the successes her and her employer, Michael Baker International, part of the FEMA Customer Data Services (CDS) team, to implement new strategies centered on enhancing stakeholder experiences and coordination efforts across the Agency . A graduate from the University of Maryland, Baltimore County, Amanda obtained a Bachelor of Science degree in Geography and Environmental Systems with a focus on government relations and public policy. She has 15+ years combined experience teamed on projects specialized in customer support services and public affairs, which of the past 7 years have been focused on the National Flood Insurance Program policy and floodplain management interpretation and administration. Amanda, a certified floodplain manager since 2011, has been fortunate to facilitate review sessions and proctor ASFPM CFM exam sittings.

The Flood Risk Snapshot: Using Flood Risk Datasets to Personalize Flood Risk
Joe Martinenza, PE, Georgia DNR, joseph.martinenza@dnr.ga.gov
Additional Author(s): Jeffrey Butler

Communication of flood hazard risks is of paramount concern to the State of Georgia. We all desire to reduce the impact of floods and the devastation they cause to life and property in our communities. The Internet provides a powerful platform to publish the wealth of information generated by today's flood studies. The Georgia Department of Natural Resources has developed a website that helps homeowners quickly determine their personalized flood risk and learn more about the effects and regulation of the special flood hazard area. The site empowers homeowners and community officials – who may not be familiar with a typical GIS interface, or may not have access to expensive software – by providing them with valuable decision making

information. Users can quickly locate a property, either using a known address or by clicking the map, to identify the flood risk status and create a flood risk report that captures all of this information and presents it in an attractive and sharable format: the Flood Risk Snapshot. The Flood Risk Snapshot helps a homeowner, community official, or any other interested party understand flood risk in a personalized map based report that includes Changes Since Last FIRM, effective and preliminary special flood hazard areas, as well as flood depth's across multiple recurrence intervals and a location's probability of flooding over a typical 30 year mortgage period.   In this presentation we will look at how to incorporate the regulatory and non-regulatory spatial datasets into a communication and outreach tool that allows homeowners, flood plain officials, and interested parties to understand how flooding impacts them and their communities.

Biography
Joe is an engineer with the Georgia Department of Natural Resources, Floodplain Management Unit. He graduated from Pennsylvania State University in 1996 with a degree in Agricultural and Biological Engineering, specializing in water resources. Before moving to the DNR last year, Joe spent 19 years in the private sector performing and managing flood risk studies for numerous clients across the country. His current day-to-day responsibilities include managing Flood Risk Projects, conducting public outreach, and assisting with Community Assistance Visits.

Flood Risk Information for the Masses: Estimated Base Flood Elevation Viewer
Diane Howe, CFM, FEMA, RVI, diane.howe@fema.dhs.gov
Additional Author(s): Elizabeth Savage, H2O Partners

Strategic investments over the past couple years have produced hundreds of thousands of miles of flood risk information throughout the states of Arkansas, Louisiana, New Mexico, Oklahoma and Texas. FEMA Region 6 embarked on developing an Interactive Viewer to allow residents, communities and states to interact and utilize this information publically. The information shared through this viewer includes stream wide network analysis prepared with 1D and 2D modeling approaches to produce estimated flood extents, water surface elevation grids, depth grids and flood risk assessments.   The Estimated Base Flood Elevation Viewer is the initial release of interactive mapping platform to allow residents, communities, emergency management, local and regional planners and watershed groups to interact with flood risk, providing an overview of flood potential based on the Region's Base Level Engineering efforts. Personal reports allow users to interact with engineering results, returning point and click estimated water surface and estimated flood depth within the regulatory floodplain.   Future releases of the interactive tool will allow users to interact with the Hazus based results and provide estimated Base Flood Elevations for structures and buildings outside the regulatory floodplain. This presentation will provide an inside look to the coordination requirements, data preparation and storage lessons and provide attendees with lessons to learn from.

Biography
Diane Howe is a Certified Floodplain Manager currently serving as the Risk MAP Lead for FEMA Region 6 in Denton, TX. Her career with FEMA began in 2006 in support of the mapping outreach and risk communications efforts in the Greater New Orleans area. Those efforts expanded to the Regional level in 2009 where her ongoing projects expanded to include coastal outreach for Texas, support of all Risk MAP watershed projects, Levee Analysis and Mapping Procedure (LAMP) efforts, Region 6 Base Level Engineering, communicating map changes and Mitigation Advisor to the NDRS in disasters. Diane's roles at FEMA's Regional office also includes developing Regional Risk MAP online communication solutions, communication coordination with the Cooperating Technical Partners (CTPs), and developing communications and community engagement components of Risk MAP implementation in Region 6. Prior to her work with FEMA, Diane had over 20 years of experience in public speaking, outreach, and program development and management in the private sector. She keeps busy with family, three rescue dogs, and home improvement projects… and she specializes in "herding cats."

C6: FEMA Showcase
Moderator: Eric Letvin, Esq, PE, CFM, FEMA, eric.letvin@fema.dhs.gov

FEMA HMA Grants and Updates
Karen Helbrecht, FEMA, karen.helbrecht@fema.dhs.gov

Topics: Hazard Mitigation Grant Program (HMGP) vital signs; 2017 Pre-Disaster Mitigation (PDM) and Flood Mitigation Grant (FMA); External Stakeholder Workgroup; Pre-Calculated Benefits and eco-system services.

FEMA Floodplain Management Updates
Rachel Sears, FEMA, rachel.sears@fema.dhs.gov

Topics: The Floodplain Management Value Proposition – How to Measure Floodplain Management Activities against the Community Customer Experience; The Federal Flood Risk Standard & Interagency Federal Floodplain Management Task Force Activities; The Agricultural and Multi-Family Building Studies; Community Rating System Update; Map Adoption; Recent NFIP Probation Cases; Endangered Species Act (ESA) Updates; and Restructuring of the FPM Division to serve stakeholders.

FEMA Building Science Update
Dan Bass, RA, CFM, FEMA, daniel.bass@fema.dhs.gov

Topics: The Building Science Branch will present recent and upcoming work. Topics include updated publications and guidance documents, building code- related activities, the update to the Technical bulletins as well as other special projects.

C7: Training & Messaging
Moderator: Michael Moya, Halff Associates, mmoya@halff.com

Supporting Communities, States & Federal Partners – Being a Trusted Advisor to All Levels of Government
Elizabeth Savage, PE, H2O Partners, esavage@h2opartnersusa.com

To get what you want from someone, you must first focus on giving them what they want! In the ever changing world of floodplain management and floodplain mapping, professionals must work harder than ever to not only maintain their engineering skillset and knowledge base, but learn consulting skills to translate technical information, processes and results into a digestible format. "Clients" come in many forms, your boss, your co-workers, a community official or staff member you are working for, communities within a project study area, or a neighbor or resident who will be affected by the engineering or other technical data you are preparing. Technical mastery of one's discipline is not enough, the ability to earn the trust and confidence of clients is paramount. The role of a trusted advisor is one that is hard to come by and yet sought by many. Here are a few nuggets that will be discussed further: • Advisory skills are similar to those of great teaching. • The role of an advisor is to be an expert guide in the process of reasoning through any problem. To demonstrate the importance of trust, the presenter will provide experiences and examples -- successes and mistakes - to provide some best bet approaches to growing your confidence in consulting for clients of all types. Defining success, understanding underlying requirements, identifying opportunities to break "out of the box", and active listening principals are the basis of building your career as a trusted advisor.

Biography
Elizabeth currently serves as the Regional Program Management Lead (or RPML) supporting the FEMA Region 6 offices in Denton, Texas. With more than 15 years of experience, Elizabeth regularly sits on internal strategic initiative teams at both the Regional and Headquarters level. Ms. Savage is a visionary with tactical application working across and among numerous federal partners to initiate the Interagency Federal Management or INFORM (InFRM) team within the Region. She has supported engineering, data delivery, program and project outreach, training, collaboration and efficiency initiatives throughout the country, participating in the Hurricane Sandy and the 2015 Central Texas Advisory Base Flood Elevation data releases. A huge supporter of the Cooperating Technical Partners program, Elizabeth has assisted the FEMA Region in defining how Risk MAP could look for each State. Implementation strategies and forward leaning project and program planning are her favorite pursuits. With Risk MAP Elizabeth's goals include developing ways to empower communities to make long term risk reduction decisions, grow capacity and capability at the local level and strengthen partnerships at every level of government. She remains at the front of her field and never shys away from a "what if" question or scenario.

*A Chapter's Role in Communicating Risk & Training Our Floodplain Managers
Craig Wenger, AICP, LEED GA, CFM, Michael Baker Int'l, cwenger@mbakerintl.com
Additional Author(s): Joseph Ruggeri, New Jersey DEP

The New Jersey Association for Floodplain Management, a State Chapter of ASFPM, has learned valuable lessons about the role of a State Chapter following a disaster. Following Hurricane Sandy, the organization took a hard look at the role in the state

that they could serve. While there have been many initiatives under taken by the organization since then and since its creation, this presentation intends to share the success stories of communication, training, web development, and ESRI's non-profit program.   The State of New Jersey saw and continues to see a boom in funding resilience planning and the development of incredible risk communication toolsets in the wake of Hurricane Sandy. FEMA and their contractors created Region2Coastal.com which has been incredibly successful in communicating the latest risk and mapping projects being developed throughout the region. Additionally almost all of the universities in New Jersey have created web tools and incredible services for the public. These tools combined with the growing use of websites for hazard mitigation planning, and other resilience planning has created a massive amount of information. With this influx of resilience planning, research and countless data sources being developed in New Jersey and Region 2 as a whole, NJAFM saw a role as a coordinator of information. In order to accomplish this, NJAFM leveraged web development and ESRI's non-profit program to host and spread the good news of the work being done. The organization is now transforming the platform to host training modules and other resources to build upon the successes that have come in New Jersey. The goal of this presentation is to showcase this product and describe the path for any of ASFPM's chapters to create similar products. The presentation will discuss at a high level the tools used for hosting the products, the cost of the sites, and a strategy to sustain these tools into the future at little cost to the organization.

Biography
Mr. Wenger has worked with Michael Baker for the past 8 years and currently leads their water resource group for New Jersey. His experience includes subwatershed delineation, Federal Emergency Management Agency (FEMA) Flood Insurance Studies, hydrologic studies, stormwater management, stream modeling, scour analysis, and flood economics forecasting. Mr. Wenger has extensive experience with Geographic Information Systems (GIS) and the integration of those tools with engineering tasks, including the Arc Hydro Tool set. Mr. Wenger is also fluent in various programming languages which has improved workflow and quality control in the projects at Michael Baker. He has served as the Chair of the New Jersey Association for Floodplain Management for the past 3 years and now serves as the past chair. His current passion project with the group is to use the organization's platform to deliver flood information from a variety of source to the residents and stakeholders of Region 2.

What Did You Say? How to Effectively Convey Technical Concepts to a Non-technical Audience
Necolle Maccherone, CFM, Michael Baker Int'l, necolle.maccherone@mbakerintl.com
Additional Author(s): Lisa Messano, CFM, Michael Baker Int'l

The flood hazard mapping industry has a very specific and often technical language to describe our processes and products. Often our attempts to demonstrate the accuracy and value of our products backfire and we cause more confusion, frustration or misunderstanding with our explanations.   We'll open with talk about effective messaging (clear, concise, and credible) and human risk perception. Using plain language, graphics, analogies, and storytelling we will demonstrate effective ways to explain commonly misunderstood words, phrases and concepts in floodplain management.   Examples of successful real world use of plain language to communicate risk will be provided.

Biography
Necolle is a Project Manager for Michael Baker International and serves as Cooperating Technical Partners Lead for Resilience Action Partners, FEMA's Community Engagement and Risk Communication contractor for Risk MAP. She has worked extensively within the National Flood Insurance Program since February of 2001 including support of the Cooperating Technical Partners Program, assisting in processing flood studies, writing special and Congressional correspondence, and updating and reviewing local Hazard Mitigation. She most enjoys risk communication and public outreach.   Necolle is the immediate past Chair of Maryland Association of Floodplain and Stormwater Managers and a Certified Floodplain Manager. She holds a B.S. in Environmental Studies from the State University of New York at Buffalo and has completed coursework towards a Master's degree in Environmental Sciences and Policy from Johns Hopkins University.

C8: Improving Green Infrastructure Functionality & Acceptance
Moderator: Jacob Tysz, CFM, ASFPM Region 2 Director, Atkins, jacob.tysz@atkinsglobal.com

Rain to Recreation, A Promise Fulfilled: Regional Watershed Approach to Manage Stormwater
Thomas Jacobs, PE, CFM, City of Lenexa, KS, tjacobs@lenexa.com
Additional Author(s): Ronald Norris, PE, Olathe & Lenexa, KS (formerly)

Lenexa, Kansas is a rapidly growing city in the Kansas City metropolitan area. A city of 47,000 residents and a daytime population roughly double that. Lenexa has a reputation as a progressive, technology-savvy city, whose citizens enjoy a hometown sense of community.   Creating a Vision In the late 1990s, Lenexa began developing a new, innovative approach to manage stormwater. This stemmed from the city's community-visioning process, Lenexa Vision 2020. The City initiated this process to provide focus for changes in future development for the undeveloped western two-thirds of the city.   Community Drivers Lenexa doesn't have major flooding problems; however a severe flood hit the area in October 1998 – one of the worst in the area's history. New requirements of NPDES Phase II reinforced the importance of the community's vision and the city's efforts.   Approach In the past, Lenexa managed stormwater in the traditional way, but this led to localized flooding, erosion, and massive stream degradation, which was expensive to repair.   With the new approach, Lenexa began viewing stormwater as a community asset and a valuable resource rather than a problem, and thus created "Rain to Recreation." The goals of Lenexa Rain to Recreation are to reduce flooding, protect water quality, natural habitat and the environment, and provide recreation and education opportunities for the community.   The promise of Rain to Recreation was that Lenexa would reduce flooding through land use planning; creating lakes, bio-retention facilities, detention basins, wetlands, streamside parks, and trails; providing water quality improvements, flood control, and recreational enjoyment; and providing educational programs to increase community awareness of water quality issues.   This presentation will showcase the Rain to Recreation success story from inception through long term operation and maintenance. It is a watershed level stormwater management system for water quality, habitat function, and community benefits.

Biography

Thomas Jacobs is a licensed engineer with 30 years of experience working for consulting engineering firms and local government. For the past 15 years, he has served in his current position with the City of Lenexa as Stormwater Engineer. Tom's duties focus on stormwater related items including project management for regional stormwater projects, stream restoration projects, and storm system rehabilitation projects. He is also Lenexa's Stormwater Group leader responsible for NPDES Phase II compliance, floodplain management, and flood insurance.   Tom is a Certified Floodplain Manager and member of ASFM. Tom is active in the Kansas City chapter of the American Society of Civil Engineers, serving on the Board and recently as Chapter President. He is an active member of the Government Relations Committee and Committee Chair for production of the Kansas and Missouri Infrastructure Report Cards.   He is also active in the American Public Works Association, serving as a Member of the MARC/APWA task force for the original writing of the Regional Manual of Best Management Practices for Stormwater Quality. This document has served as the regional water quality design manual since 2003. Tom served as the Committee Chair for the first revision of BMP manual. He continues to serve as a member of the BMP subcommittee and water resources committee.   Tom has a BS in Civil Engineering from South Dakota State University and a MS in Water Resources Engineering from the University of Kansas.

Building Resilient Communities with Green Infrastructure One Code at a Time
Julia Noordyk, University of Wisconsin, noordykj@uwgb.edu

Green infrastructure is a proven and effective means to improve water quality, habitat and flooding by reducing stormwater pollution and volume, but there remain critical barriers to its implementation. Outdated local regulations can have a broad impact on implementation of green infrastructure and often will directly or indirectly discourage or prohibit its use. Since 2012, 1000 Friends of Wisconsin has worked with 28 municipalities in Milwaukee, Wisconsin to audit, revise and prioritize codes and ordinances that deter and prohibit the more widespread use of green infrastructure. To help replicate this approach and facilitate the development of strategic code and ordinance revisions for green infrastructure in other communities, the University of Wisconsin Sea Grant Institute, with support from the NOAA Coastal Storms Program, developed the Tackling Barriers to Green Infrastructure: An Audit of Local Codes and Ordinances guidebook. The Audit will assist local zoning, land use and stormwater staff, planners and consultants in reviewing codes and ordinances to promote and advance green infrastructure practices in their own communities. What makes this project unique in comparison to similar audits? We recognize the need for a "no judgement" approach in working with municipalities to audit their codes and ordinances. Barriers to green infrastructure can vary widely within the code language -- specific rights, specific prohibitions, partial limits, practices mentioned with no guidelines for implementation, etc. Therefore, solutions to code barriers need to be customized for the specific municipality and cannot be satisfactorily addressed by model ordinances. During this presentation you will learn about why codes and ordinances are a major barrier to green infrastructure, common code challenges and the impact code changes can have on stormwater runoff volume and pollution. You will also be introduced to the Audit which includes a community-oriented engagement approach and provides a detailed codes and ordinances auditing tool.

Biography
Julia Noordyk is the Water Quality & Coastal Communities Specialist at the University of Wisconsin Sea Grant Institute. She works closely with the Clean Bay Backers, a citizen advisory committee helping to restore the health of Green Bay and providing education and outreach to elected officials. Julia is also the Great Lakes NOAA Coastal Storms Program Outreach Coordinator and focuses on hazard mitigation, community resilience and reducing stormwater impacts with green infrastructure. A former NOAA Coastal Management Fellow, Julia came to Sea Grant from the Maine Coastal Program where she was a senior planner working on outreach programs in offshore wind energy, water quality and coastal public access. Julia has a M.S. degree in conservation biology and sustainable development from the University of Wisconsin-Madison.

How to Live with Water: A Collaborative Model for Improved Water Mgmt.

Jamelyn Austin Trucks, CFM, Atkins, jamelyn.trucks@atkinsglobal.com
Additional Author(s): Nathan Lott, Greater New Orleans Water Collaborative

Cities are struggling to redefine their relationship to water management, as communities move away from heavily relying on engineered systems towards embracing green infrastructure and new methods to deal with increasing flood and environmental risks. Budget-strapped local government agencies are struggling to respond to the demands of aging infrastructure and community engagement is needed as cities move towards how to live with water approaches. The Greater New Orleans Water Collaborative represents a unique case study and ongoing success story of how interdisciplinary, diverse, and flexible community-led organizations can play a critical role in supporting, and sometimes pushing, government agencies towards improved water management.   This presentation will provide insight about the Water Collaborative which now represents over 400 individuals, non-profit organizations, businesses, and government representatives seeking to address critical water management issues in the Greater New Orleans region. Formed in response to a lack of coordination, the Collaborative facilitates the flow of information on emerging water management opportunities and fosters collaborations among participants. Focus areas include: demonstration projects, policy, advocacy, education, and outreach. Recognizing that the region's long-term sustainability depends upon urban water management efforts working in parallel with coastal protection, restoration, and other measures to address severe weather and sea level rise makes this a model for community resilience.

Biography
Jamelyn Austin Trucks has 20 years of experience in the areas of mitigation, disaster resilience, planning, project development, and business development. Her experience includes management of stakeholder engagement, financial analysis, budget development, contract negotiations, training, database testing, federal grant administration; and policy development and implementation. Ms. Trucks' understanding of federal, state and local government policies and procedures in relation to federal disaster grant implementation as well as her active involvement in Federal Disaster Response assists clients in applying best practices as well as developing improved methodologies. She currently serves as the President of the Greater New Orleans Water Collaborative (www.nolawater.org) Steering Committee and Chair of the Advocacy Working Group, she has joined the 2016-2017 Board of the Audubon Riverside Neighborhood Association, and completed the 2016 Bryan Bell Leadership Forum hosted by the Committee for a Better New Orleans. She has a strong personal and professional interest in promoting the value of a collaborative and grass roots approach to changing the conversation on how each of us can make a difference in protecting our communities from future flood risk.

D1: Mitigation & Resilience Planning
Moderator: Cindy Popplewell, PE, CFM, Amec Foster Wheeler, cindy.popplewell@amecfw.com

Improving Community Resilience Through Integrated Risk Modeling & Community Planning
Mike Robinson, CFM, AECOM, mike.robinson@aecom.com
Additional Author(s): Dana Bres, PE, Research Engineer, HUD

The U.S. Department of Housing and Urban Development (HUD), in partnership with the NOAA Office for Coastal Management, American Planning Association (APA), Association of State Floodplain Managers (ASFPM), National Association of Counties (NACo) and AECOM, is exploring strategies to more effectively integrate risk assessment and mitigation planning resources into the larger array of local community planning processes.   Phase I (presented on at the 2016 conference) included the creation of an inventory of GIS-based models, tools, datasets, methodologies and other resources for flood risk reduction, based in part on direct input from APA, ASFPM and NACo members. This inventory documents each resource's relevance to local planning processes, including "points of intervention" where each resource can be used at the local level. One example of the type of resource included is NOAA's Digital Coast.   Phase II was to develop a workshop showcasing resources from the inventory for two pilot communities where opportunities have been identified to integrate resources into their local planning processes (for example, as part of updates to a comprehensive plan, hazard mitigation plan or consolidated plan). Efforts will be documented in a report highlighting successful activities.   Phase III will consist of outreach to other communities on how they can replicate the process in their own planning area. Recommendations will also be provided to model and tool developers to help enhance their resources for the purposes of community resilience. Findings of the project will also be channeled back to APA, ASFPM and NACo members.   This presentation will cover the information above and will be engaging and relevant to participants, particularly local officials. With the explosion of online data in recent years, especially with regard to risk modeling, it is crucial to provide leadership and guidance in identifying, understanding and integrating resources effectively in local planning processes for better decision making.

Biography
Mike Robinson, CFM is a Senior Planner with AECOM with a strong, 15-year background in hazard mitigation planning, emergency management, floodplain management, risk assessment and risk communication. He has worked closely with local, state and Federal government agencies throughout the United States in the development and implementation of risk reduction plans and programs aimed at making communities more resilient to natural hazards.

Drought, Fire, & Flood: Connecting the Hazards & Planning for the Triple Threat
Jeffrey Henson, CFM, JEO Consulting Group, jhenson@jeo.com
Additional Author(s): Rebecca Appleford, CFM

It may seem counterintuitive to worry about flooding during drought and wildfire. However, parts of the nation, including Colorado, California, and Texas, have already experienced the impacts and devastation of extreme flooding following drought and fire. When drought conditions persist, soil hardens and wildfires easily ignite, ridding the land of vital vegetation that slows down and traps rainfall. Parched and burned land is inefficient at absorbing rainfall into the ground, which leads to rapid runoff. Residents living in and near recently burned areas may not realize that there is a residual risk for flooding even after wildfires are under control and drought conditions have passed. It is likely that many communities already have plans in place for floods such as flood procedures, emergency operation plans, evacuation routes, etc. They may also have drought management plans and wildfire plans, but it is unlikely that any of these plans identify how communities can prepare for flooding in the event of a drought-stricken and burned environment. Climate studies indicate these extreme swings from drought to flood are likely to increase in frequency and severity in a warming world, making it critical for communities to identify and prepare for these interconnected threats.   This presentation will draw clear connections between these three hazards, why it is important to consider the impacts of drought and fire on the potential for flooding, and how best to plan for flooding in a dry and scorched landscape.

Biography
Jeff serves as the senior planner and department manager for JEO's Hazard Mitigation and Emergency Planning Department. Over the past several years, Jeff and his team have updated 21 of the 24 hazard mitigation plans across Nebraska and have

completed several mitigation plans in South Dakota and Iowa. In addition to their work on hazard mitigation plans, Jeff and his department conduct emergency management exercises, develop emergency response plans, risk awareness communication plans, and facilitate public outreach efforts. Furthermore, the department has conducted wildfire mitigation exercises for stakeholders in the Nebraska Panhandle. In 2015, JEO was recognized as planning firm of the year by the Nebraska Chapter of the American Planning Association and the HMEP team was recognized for excellence in public engagement as a part of developing a local drought management plan.   Jeff has a bachelor's degree in Crisis and Disaster Management and a master's degree in Community and Regional Planning. He continues to collaborate with the University of Nebraska-Lincoln in the delivery their hazard mitigation course each fall.

Implementing Socio-Ecological Resilience into Floodplain Planning, Design, & Capital Projects
Steve Moddemeyer, CollinsWoerman, smoddemeyer@collinswoerman.com

Floodplain planning, design, and capital spending is often trapped in an engineered resilience mindset that is no longer appropriate for the extreme uncertainty and accelerating change of the 21st Century. In this session we describe how floodplain managers can implement the principles of socio-ecological resilience in order to create flexible and adaptable community-based outcomes. We describe how to: 1) set resilience performance goals for community functions, facilities, and infrastructure by building on the NIST Community Resilience Planning Guide; 2) develop broader alternatives to traditional spending by applying a resilient design performance standard based on the principles of socio-ecological resilience such as developed first for Boulder County and cities; 3) implement a triple-bottom-line business case that plugs directly into existing governmental budget setting processes.

Biography
Steve Moddemeyer is a water and land strategist with more than 25 years of experience leading governments, land owners, and project teams towards increased sustainability. He specializes in creating tools and policies that lead to resilient infrastructure systems for buildings, neighborhoods, cities and new town developments. He has extensive experience with complex public/private development issues and the development of sustainable strategies for major capital improvement projects. He has Tribal, local government and private sector experience in watershed planning, habitat restoration, urban water policy development, sustainable and resilient design including 3 years with the S'Klallam Indian Tribe; 14 years with the City of Seattle; and 9 years as a private consultant with CollinsWoerman. He is currently serving on the "core team" for the National Academy of Sciences' Resilient America Roundtable pilot project in Seattle, WA. He helped to develop the Resilient Design Performance Standard for Boulder County CDBG-DR Collaborative and has years of local, national and international experience developing and applying integrated sustainability and resilience strategies for watersheds, land use, and infrastructure.

D2: International Floodplain Management Policy
Moderator: Bo Juza, PhD, CFM, ASFPM International Cmte. Co-Chair, DHI, boj@dhigroup.com

The Economic Argument for Amphibious Retrofit Construction
Elizabeth English, PhD, University of Waterloo, english@ecenglish.ca

Amphibious retrofit construction is a non-structural flood mitigation and climate change adaptation strategy that works in synchrony with a floodprone region's natural cycles of flooding. An amphibious foundation retains a home's connection to the ground by resting firmly on the earth under usual circumstances, yet it allows a building to float as high as necessary when flooding occurs, with a vertical guidance system that provides resistance to lateral forces. Unlike houses elevated to a fixed level, amphibious houses can easily accommodate varying levels of floodwater.   Amphibious construction also offers economic benefits compared to permanent static elevation (PSE). Detailed cost comparisons show that amphibious retrofits on average range from 1/3 to 1/2 of the cost of PSE.   Loss Avoidance Studies performed for amphibious retrofits in two North American locations (Louisiana and Manitoba) provided average LARs of 2.1 and 5.7, respectively, demonstrating the potential for cost savings by implementing amphibious retrofits in these locations.   Lastly, permanent static elevation (PSE) increases a building's vulnerability to wind. A collaborative study with colleagues at LSU determined that elevating the mean roof height of a home from 4m to 10m by implementing PSE creates a 75% increase in Expected Annual Loss due to increased wind damage. Amphibious buildings, as they remain close to the earth's surface during windstorms, do not experience this increased exposure to wind and resulting losses.   This presentation will discuss the potential for measurable cost savings that accompanies the implementation of amphibious retrofit construction, by describing 1) the installation process and why it can be so inexpensive, 2) two Loss Avoidance Studies that were performed for amphibious retrofit installations and the range of high Loss Avoidance

Ratios that resulted, and 3) analysis of the wind vulnerability of PSE and consequent increased Expected Annual Loss, compared to that of amphibious retrofit construction.

Biography
Dr. Elizabeth English is Associate Professor of Architecture at the University of Waterloo in Cambridge, Ontario. She was formerly Associate Professor - Research at the LSU Hurricane Center. Her experience in education, practice, teaching and research is in both Architecture and Civil Engineering. Dr. English is the founder and director of the Buoyant Foundation Project, a not-for-profit organization based in Breaux Bridge, Louisiana, and Cambridge, Ontario, that works on the development of amphibious foundation systems as a low-cost, low-impact flood mitigation strategy that supports the preservation of traditional housing forms and respects local cultural practices. Current projects focus on the needs of vulnerable low-income communities in coastal Louisiana and Texas, northern Canada, Jamaica and Vietnam. She came to flood mitigation from a background of many years of wind engineering research in the area of wind loads on buildings. Dr. English is a member of the ASFPM Non-Structural Floodproofing Committee, the ASCE Multi-Hazard Mitigation Committee and, at the University of Waterloo, the Water Institute and the Interdisciplinary Centre on Climate Change. She holds a Bachelor of Arts in Architecture and Urban Planning from Princeton University, a Master of Science in Civil Engineering from the Massachusetts Institute of Technology, and a PhD in Architectural Theory from the University of Pennsylvania. In August 2015 Dr. English served as co-chair of ICAADE 2015, the first International Conference on Amphibious Architecture, Design and Engineering held in Bangkok, Thailand. She will host the second ICAADE at the University of Waterloo in June 2017.

The EU Floods Directive: What We Can Learn from the European Experience

Anna Serra-Llobet, University of California, Berkeley, annaserrallobet@gmail.com

This presentation will help to identify elements of the first cycle of the implementation of the European Union (EU) Floods Directive that could be implemented in the US to improve flood risk management strategies. The European Union (EU) Floods Directive recognizes the entire flood risk management cycle, focusing on prevention, protection and preparedness, and required member states to map flood hazard and risk. EU member states were required to submit flood hazard and risk maps by 2013 and flood risk management plans by 2015, which must be updated every 6 years. The maps and plans had to satisfy certain requirements, but with some freedom for exactly how they were developed, thus, they differ to some extent among member states, and even among regions of member states. These material is now available, offering an excellent opportunity to analyze it and identify elements that could be implemented elsewhere to improve flood risk management strategies.

For example, in Catalonia (Spain), the regional water agency for the Catalan River Basin District has been able to use flood risk maps to prioritize implementation of flood risk measures. The regional agencies' authority stems from the EU Water Framework and Floods Directive, which require top-down control by such a competent authority. Another interesting aspect of the implementation is the "coordination" between different flood-related agencies and plans. Because flood risk management plans must take into account the entire cycle of flood risk management, plan development should include all actors involved in flood management at different governance scales (national, regional, and local). With an estimated 100,000 local and 300 state-level agencies dealing with water issues, sometimes with narrowly-defined and conflicting missions, coordination between flood managers and a flood-risk based approach has become a critical issue for improving flood risk management in the US.

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 in 2011. 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 postdoctoral researcher at the Institute of International Studies of the University of California at Berkeley working on sustainable flood management strategies in the US and the EU.

A Review of Risk-based Approaches in the US & Abroad: Lessons for the NFIP

Mike Seering, PE, CFM, AECOM, mike.seering@aecom.com
Additional Author(s): Jim Murphy, AECOM; Jonathan Simm, David Powers, HR Wallingford

The approach to floodplain risk management in the US has evolved around the National Flood Insurance Program's use of probability maps (i.e. FIRMs) to determine flood insurance requirements and the cost of maintaining flood insurance. While the NFIP has provided flood insurance at subsidized rates, flood disasters over the last 10+ years have shown that the program was not sustainable at the current rate structure. Biggert Waters 2012 and the Homeowners Flood Insurance Affordability Act of 2014 showed the need to make these rates more sustainable and suggested that actuarial

rates should apply. To further complicate the issue of assigning flood insurance rates, areas behind levees face a more complex risk calculation due to the joint probabilities of the floods that occur and the structural defenses that protect homes and businesses. Full risk approaches are increasingly being adopted in the US and abroad, and within the insurance industry. This approach is thought to offer a more defensible source of flood risk management and has the potential to address federal concerns regarding sustainable funding for the NFIP. This presentation will provide an overview of collaborative research on best practices for the use of systems based flood risk analysis, including recommendations by the National Academy of Sciences, US Army Corps of Engineers as well as international organizations. This research will culminate in a formal engagement with stakeholders to identify opportunities and barriers for the use of these full risk approaches to meet the objectives laid out in BW-12 for reforming the NFIP.

Biography
Mike Seering, PE, CFM is a Project Manager and Hydrology & Hydraulics Team Leader with the AECOM Germantown, Maryland office. His expertise is in flood studies, levee analysis and mapping, and procedural support for FEMA. He has managed numerous flood study projects and performed hydrologic, hydraulic, and floodplain mapping studies for a variety of clients and geographies.

D3: Advancements in 2D Modeling
Moderator: Gib Jones, PE, CFM, Dewberry, gjones@dewberry.com

Hyper-resolution Flood Assessments in Urban Areas Using 2D GPU Modeling
Reinaldo Garcia, PhD, Hydronia, rey@hydronia.com
Additional Author(s): Asier Lacasta, Javier Fernandez, Mario Morales, & Pilar Garcia-Navarro

Flood assessments using two-dimensional (2D) models were until recently forced to use relatively coarse resolution due to limitations in topographic data, and exceedingly low performance of the sequential computer codes. However, often there is a need to use high resolution models in urbanized floodplains where many small scale terrain characteristics and urban features can have a significant impact on the flood behavior such as frontal wave arrival times, and inundation patterns. The increased availability of LiDAR topography has brought the opportunity to use flexible-mesh 2D models with cells small enough to ensure capturing the complex urban environment. Still, many 2D modeling tools sometimes require days if not weeks to run typical 24-hour and even 6-hour flooding events with this kind of resolution. GPU-based 2D hydrologic and hydraulic models have proven able to accelerate 2D simulations more than 100 times with respect to conventional models, opening new opportunities for sub-meter flood evaluations. This work describes hyper-resolution (<1m) flood simulations in urban areas with the RiverFlow2D GPU 2D model using unstructured meshes of more than 1 million cells with cell sizes ranging from less than 0.5 m to several meters. These meshes are able to resolve at hyper-resolution streets, buildings, culverts, walls, levees, and bridges in the 2D mesh. The applications presented involve integrated hydrologic and hydraulic modeling with spatially variable rainfall events, infiltration, and multiple stream inflows. Results show extremely detailed depth and velocity patterns, and the importance of mesh resolution to accurately calculate flood progression, and inundation extent. Performance metrics indicate that the GPU model is able to finalize runs of 6-hour and 24-hour storm events between 25 and 62 times faster than the non-parallelized model reducing computer times from 3 days to little more than 1 hour.

Biography
Reinaldo Garcia is the Director of Model Development and Applications at Hydronia, LLC, and has more than 35 years of experience in hydraulic modeling including sediment transport dynamics. He developed his first 2D model in 1982. He is the creator of the RiverFlow2D model and has contributed to the development of high performance, GPU-based 2D flood simulation models. Reinaldo is a consultant of the Interamerican Development Bank and the World Bank in international flood assessment projects has developed hazard mapping methods that are used worldwide and has worked in projects in more than 20 countries, including the USA, Central and South America, Europe, and Asia.

From Nuisance Flooding To Major Disasters: Analyzing Urban Low Impact Development Techniques with a 2D Flood Routing Model
Noemi Gonzalez Ramirez, PhD, FLO-2D Software, noemi@flo-2d.com
Additional Author(s): Karen O'Brien, M.S.; Jimmy O'Brien, PhD, PE, FLO-2D Software

Two-dimensional flood routing models predict spatially variable hydraulics and water surface elevations to capture the physical processes of flooding for varying topography and roughness and complex flows in urban areas. Flooding risk assessment is becoming more refined and in response, hazard maps are more accurate to support mitigation planning. As our cities become more developed, the vulnerability increases creating flood hazards associated with increased storm intensities, diminished storm drain system capacity, land use changes, and limited low cost mitigation opportunities. Concepts and designs of Low Impact Development (LID) can be automatically assessed in the FLO-2D model. The FLO-2D PRO model use a novel approach to evaluate LID strategies including bio-retention, green roofs, rain gardens, permeable pavement, drainage disconnection swales, and on-site storage. The presentation will cover the fundamental keys to accurately predict the area of inundation, including the storm drain system as well as the complexity of flooding in unconfined urban areas. Integrating cutting edge flood modeling to evaluate the mitigation scenarios will facilitate urban planning and LID adaptation. The Flood Control District of Maricopa County encompassing the different cities in the Phoenix metro area have conducted a number of FLO-2D flood hazard studies that combined the urban features, canals and channel flow, and storm drain system structures to assess the flood hazard in the Area Drainage Master Plans. LID techniques to improve retention storage and integrate with the storm drain are discussed with examples from Phoenix flooding studies.

Biography
Dr. Gonzalez is a water resources engineer with 15+ years of experience developing and applying hydraulic and hydrologic models. She has written code for numerical models of flooding systems and hydraulic conveyance. Dr. Gonzalez has an extensive coding experience in in both finite element and finite difference models and their applications. She has been a project engineer for Riada Engineering, Inc. and FLO-2D Software for the last 6 years. Dr. Gonzalez is the developer of many of the specific tools and features in the FLO-2D model and supporting processor programs. She is the author of FLO-2D storm drain component and has conducted a number of project applications of this component for the Flood Control District of Maricopa County.

Creative Applications for 2D Rapid Inundation Modeling
Elise Ibendahl, PE, ENV SP, CFM, CH2M, eibendah@ch2m.com

Rapid inundation solvers, such as Flood Modeller's 2D FAST solver, provide results in seconds or minutes as opposed to hours or days, which are up to 1,000 times faster than traditional 2D flood models. Rapid inundation modeling's main use is identifying flood inundation areas when an answer is needed quickly that gives a general idea of the inundation extent. However, more innovative applications are emerging as the use of rapid inundation modeling becomes more widespread. This presentation will explore the unique applications of Flood Modeller's 2D FAST solver that push innovation, enhance the presentation of risk, and help identify effective flood management solutions. Highlights include a detailed introduction to rapid inundation modeling and unique applications for rapid inundation modeling with real-world examples, including: •Localized stormwater problem hot-spot identification for master planning applications •Assessing Flood Insurance Rate Map (FIRM) Zone A areas •Establishing detailed modeling extents •Refinement of inland storm surge propagation •Surface extent of SWMM sewer network surcharging •Establishing boundary conditions for detailed 2D modeling

Biography
Elise Ibendahl is a Senior Technologist Water Resources Engineer at CH2M. She is a licensed engineer in the State of Missouri, Certified Floodplain Manager (CFM) and Envision Sustainability Professional (ENV SP). She has over 20 years of water resources experience. She is a respected leader in the engineering community, currently serving as A Trustee for the ASFPM Foundation, ASCE's Region 7 Governor At-Large, and Chair of the St. Louis Chapter of EWRI. Ms. Ibendahl often serves as a senior technical resource for the hydrology and hydraulic (H&H) components of CH2M projects throughout the world and is an active Public Assistance contractor for FEMA. She also currently serves as the Assistant Quality Assurance Lead for the City of Omaha CSO! Program. She is experienced in hydrologic and hydrologic modeling in a variety of platforms for sewers and open channels and has expertise in both 1D and 2D modeling. She has performed design and analysis for projects locally and around the United States containing aspects of drainage and stormwater management studies, including stream restoration, flood control study and design, stormwater master planning, green infrastructure solutions, sediment transport, and floodplain permitting.

D4: Preparing Local Governments for Disaster Workloads
Moderator: French Wetmore, CFM, French & Associates, french@frenchasoc.com

Preparing Your Floodplain Administration & Building Department for a Disaster

Manny Perotink, PE, CFM, CDM Smith, perotinma@cdmsmith.com
Additional Author(s): Adam Reeder, PE, CFM, CDM Smith

When disasters strike local floodplain administrator and building officials typically experience an exponential increase in operations. With required inspections and a surge in building permits alone, these departments can experience much more than a 100% increase to their typical workload. This session will focus on post-disaster floodplain and building permit administration including: planning and preparing for disasters; available training; executing inspections (preliminary damage assessments, safety evaluations in accordance with ATC-45, substantial damage inspections, etc.); staffing; building code, insurance, and other programmatic requirements; leveraging data collection for multiple purposes; permitting; lessons learned from recent disasters; and resources available.

Biography

Mr. Perotin is a Senior Project Manager with CDM Smith. He has more than 15 years of experience in civil engineering, risk and vulnerability assessments, hazard mitigation, benefit-cost analysis, floodplain management, planning, disaster recovery, and project management. He has worked on dozens of natural disasters as a FEMA Technical Assistance Contractor. 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 and contributing author to multiple FEMA publications. 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. He is a U.S. Army veteran, a licensed Professional Engineer in Florida, and a Certified Floodplain Manager.

Disaster Preparedness for Local Code Officials

Gary Mullinix, CBCO, CFM, SAFEbuilt, gmullinix@safebuilt.com
This presentation will outline resilient strategies local code officials should utilize to effectively prepare and respond to disaster events. Focus is for the preparation of code officials to manage required permitting for reconstruction of damaged structures. Basic concepts of pre-planning are discussed including the broad scope of preparations, training needs of responders, and effective disaster response to ensure proper regulation. Emphasis is promoted for resilient planning and construction design to mitigate future losses.

Biography

Gary Mullinix has over 35 years of experience in residential and commercial construction and development with 25 of those years as a carpenter foreman, superintendent, project manager, disaster response official, Building Official and inspector, plans examiner, certified flood plain manager, Planning and Zoning Official, and Development Official. Gary started with SAFEbuilt organization as an on call combination inspector between serving with FEMA as a disaster reservist FQS qualified Floodplain Specialist in major flood events. Since beginning work full time with SAFEbuilt he has held the role as building official and plans examiner primarily in the City of Decatur and Milton, GA as well as other satellite municipalities in the east Atlanta metro area.

Floodplain Mgmt. Post-disaster: How to Handle Activity Demands from Residents, State, & FEMA

Julie Grauer, FEMA HQ, julie.grauer@fema.dhs.gov

This presentation will give insights and recommendations for floodplain managers in a post-disaster environment. Unlike the weeklong "272 – Managing the Floodplain Post-Disaster" course, this session will provide an abbreviated coverage of issues with a checklist approach of what topics to focus on and how to prepare for and better enable the community to recover from a disaster. The session will break down disaster task areas to include; the individual & households program, flood insurance, debris removal, substantial damage, public assistance, mitigation grants, maps, floodplain management, FEMA resources, and community staff communications. Takeaway handouts will include checklists, templates and web links for the disaster task areas.

Biography

Julie Grauer has a bachelors degree in Environmental Science and masters degree in Hydrology. She has worked in the field of water resources for over 25 years including work for a private environmental engineering firm on environmental clean-up issues, the State of Kansas NFIP Coordinator, the Program Coordinator for a watershed based water rights program and for the last 12

years with FEMA working in Risk Analysis and the Floodplain Management and Insurance Branches. She has worked for FEMA Mitigation Division in the four Midwest states for Region VII, and currently the six New England States for Region I. Her deployment history includes flooding, hurricane and tornado disasters starting with Hurricane Katrina and has worked in various FEMA disaster response positions in Louisiana, Texas, Kansas, Iowa, Nebraska, Missouri, Vermont, Maine, New Hampshire, Massachusetts, Rhode Island, and Connecticut.

E1: Leveraging Funding for Mitigation Projects
Moderator: Jen Marcy, CFM, ASFPM Training & Outreach Cmte. Co-Chair, Atkins, ennifer.Marcy@atkinsglobal.com

Financing Resilience in Connecticut: Current Programs, National Models, & New Opportunities
Wayne Cobleigh, CPSM, GZA GeoEnvironmental, wayne.cobleigh@gza.com
Additional Author(s): Rebecca French, PhD, Connecticut Inst. for Resilience & Climate Adapt.; Wayne Cobleigh, Jessica LeClair, Yi Shi, Howard C. Kunreuther, James G. Dinan, Wharton School, University of Pennsylvania

This presentation reviews the advantages and challenges of developing new and alternative public and private financing programs for resilience to flooding and severe weather. Existing programs in Connecticut for low-interest loans and special tax districts indicate that resilience financing is possible. Using property assessed financing methods for clean energy (PACE) and resilience (PAR), leveraging federal grant dollars to capitalize a resilience bank, and a new proposal for resilience bonds, offer potential resilience financing mechanisms. Despite the significant potential gains to safety and solvency by investing in resilience, addressing challenges related to flood insurance, achieving neighborhood-scale resilience, and setting standards for resilient design and construction still remain. In March 2017, S.B. 973, An Act Concerning Residential Sustainable Energy Program, which was improved from its 2016 version, began the legislative approval process. This bill includes PAR finance for residential resiliency building improvements such as hurricane wind resistant roofing and flood protection measures. If S.B. 973 becomes law, Connecticut will have a unique PAR financing method for improving the energy efficiency and resiliency of homes vulnerable to severe weather and sea level rise that could be a model program for other states. This presentation aims to educate you about options and challenges ahead for financing resilience.

Biography
Wayne Cobleigh, CPSM is Vice President – Client Services with GZA GeoEnvironmental, Inc., in Norwood, Massachusetts. He received his B.A. degree in Biology with a Concentration in Environmental Science from Colby College and an MBA from University of Phoenix Online. Since 2013, Wayne coordinated with Connecticut Department of Energy and Environmental Protection (DEEP) and a multi-disciplinary team of architects, engineers, regulators, financial lenders, trade association leaders, risk managers and insurance professionals sharing a common interest in solving the problem of escalating NFIP and property casualty insurance premiums. He is also researching resilience finance methods for the City of Boston's Climate Ready Boston initiative with a research team led by the University of Massachusetts Boston's Sustainable Solutions Lab.

Solutions for Capturing Cost Share by Leveraging Multiple Funding Sources to Maximize Recovery Options
Franki Coons, CFM, AFC Partners, afc_partnersllc@yahoo.com
Additional Author(s): Keith Cranford, Hunt, Guillot & Assoc.; Jamelyn Trucks, CFM, Atkins

This presentation will focus on options for successfully leveraging multiple funding sources to capture cost share requirements and maximize recovery and mitigation activities. Successful approaches require early, informed decisions for various programs both public and private. the emergency management community must collaborate to increase resilience by incorporating innovative actions before, during and after events. This presentation outlines major actions that have been successful and discusses next steps to improve upon current processes.

Biography
Ms. Franki Coons is a managing partner with AFC Partners, LLC, which provides technical advice and assistance related to disaster recovery, mitigation and planning assistance, evaluation and support for nuclear and other industrial exercises and events. Ms. Coons served as Branch Chief for Grants Implementation at FEMA headquarters, managing FEMA's post-disaster and non disaster mitigation grant programs. Prior to accepting that position, she managed the HMGP in Louisiana for several events including Katrina. She had been with FEMA from 1995 through 2016. She worked in commercial nuclear power for 14 years before coming from to FEMA.

Developing Coordinated Funding to Reduce Local Flood Risk

Jonathan Raser, CFM, Tetra Tech, jonathan.raser@tetratech.com
Additional Author(s): Alison Miskiman, GISP, CFM, Tetra Tech

While multi-jurisdictional hazard mitigation planning is the norm throughout most FEMA Regions, recent efforts to coordinate sustained, multi-jurisdictional grant funding pursuit efforts to elevate and acquire flood-prone properties are facilitating local plan implementation and proving the benefits of scale. This presentation will provide a case study of multi-million dollar FY15 and FY16 Hazard Mitigation Assistance (HMA) projects focused on reducing local property-owner flood risk, both pending and awarded. It will illustrate how recent multi-jurisdictional grant application efforts have been organized and led, surveying and managing a diverse group of municipal governments and property owners, establishing inter-municipal and inter-county agreements, and administering the projects once awarded. Specific challenges will further address local concerns over acquisitions, property-owner cost share, project and reimbursement timelines, multi-owner structures, and maximizing grant funding priorities in the nationally-competitive arena.   This presentation will promote greater local and regional subscription to available grant funding resources through collaborative efforts that have a sustained focus and long-term vision.

Biography
Jonathan Raser, CFM has over 30 years of experience in environmental and risk assessment/hazard mitigation project management.   His current work includes managing State and Local Hazard Mitigation Plan (HMP) projects regulated under the Disaster Mitigation Act of 2000 (DMA 2000), and the nationwide development of this business sector. Mr. Raser was the project manager for recently approved Morris, Hudson and Cape May countywide HMP update projects, which included the submission of an $8 million/38 property residential elevation grant application for Cape May County under FY16 FMA. Mr. Raser and his staff supports numerous counties and jurisdictions with plan implementation from annual plan review, grant application support, continued public, and stakeholder outreach, and plan updating. He has FEMA training on Benefit-Cost Analysis (BCA) for mitigation projects, and has prepared and submitted numerous BCAs and grant applications under the Unified Hazard Mitigation Assistance programs (PDM, FMA, and HMGP).

E2A: Flood Insurance in Practice & Theory

Moderator: Katie Sommers, CFM, Wisconsin Emerg. Mgmt., katie.sommers@wisconsin.gov

NFIP Changes & Pricing

Phillip Dunn, National Flood Services, phillip.dunn@nationalfloodservices.com

A key component for a community to continue to thrive and develop after a flood is flood insurance. As a Floodplain Manager, you are working directly with citizens inquiring about flood risk which can lead to discussions regarding flood insurance. Legislation is changing the National Flood Insurance Program. This session will focus on recent as well as upcoming changes such as: •New Methods of Rating properties that are Newly Mapped •Elimination of Pre FIRM Subsidies for policies with coverage lapses •The Types and Benefits of Grandfathering •Clear Communication of Risk Mailed Directly to Policyholders Understanding these changes will help prepare you to work with your citizens as they seek your guidance.

Biography
Phillip Dunn is a Compliance Specialist with National Flood Services and has been with NFS for 11 years. He has over 18 years of insurance industry experience including sales, underwriting, management and compliance. He has a detailed understanding of the rating guidelines of the National Flood Insurance Program including RCBAPs, Submit-for-Rate, and V-zone risks. Phillip was a licensed Property and Casualty Broker/Agent for four years while serving as Office Manager for Farmers Insurance. He holds both an A.A. and B.A. Degree in Business Administration with an emphasis on Economics, as well as the Associate in National Flood Insurance (ANFI) designation.

Update from FEMA's Office of the Flood Insurance Advocate

Rhonda Montgomery, CFM, FEMA HQ, rhonda.montgomery@fema.dhs.gov
Additional Author(s): Errol Garren, CPCU, CFM

Since standing up the Office of the Flood Insurance Advocate in December 2014, the Office of the Flood Insurance Advocate has responded to more than 800 inquiries during the last two years, released two annual reports outlining ongoing customer challenges, and continues to help customers navigate the NFIP processes. In this session, Rhonda

Montgomery, FEMA's Deputy Flood Insurance Advocate, and Errol Garren, Advocate representative, will share the OFIA's insights into customer challenges from its 2015 and 2016 Annual Reports, discuss key areas of inquiries related to insurance, mapping, floodplain management, and hazard mitigation grants. This presentation will share insights of customer inquiry and provide discussion on recommendations from the 2016 Office of the Flood Insurance Advocate Annual Report.

Biography
Rhonda Montgomery is the Deputy Flood Insurance Advocate at the Federal Insurance and Mitigation Administration and has been in this position since October 2016. Prior to the Deputy Flood Insurance Advocate, Rhonda was on detail to the Executive Office of the President's Council on Environmental Quality as the Deputy Associate Director for Flood Preparedness. Rhonda lead CEQ's efforts for providing assistance to agencies as agencies implement EO11988 as amended and the Federal Flood Risk Management Standard.
Previously Rhonda served as the Executive Officer for the Federal Insurance and Mitigation Administration at FEMA. In that capacity Rhonda assisted FIMA leadership in its overall risk reduction goals. Prior to her Executive Officer work at FIMA, Rhonda was a member of the Floodplain Management Branch; the Floodplain Management Branch provides tools and resources to help communities navigate NFIP requirements and implement higher standards of floodplain management. The Floodplain Management Branch also serves as FEMA's technical consultation office for EO11988, EO13690, and FFRMS. Rhonda was previously the Kansas State Floodplain Coordinator and worked in local government for the City of Snoqualmie, Washington. Ms. Montgomery has held her Certified Floodplain Manager designation since 2000 and received her MPA from the University of Kansas.

Is it In or Out? Rethinking the Mandatory Purchase Requirement
Duncan Hastie, PE, Dewberry, dhastie@dewberry.com
Additional Author(s): Michael Buckley

One of the biggest challenges in communicating flood risk to the public has been the mindset of whether you are in or out of the Special Flood Hazard Area (SFHA). It is commonly believed that if you are "in", there is a risk. If you are "out" then there is no risk. Much of this misunderstanding is reinforced by the mandatory purchase requirement. This has also been the source of much political conflict and controversy, particular recently due to the large number of reissued flood maps and the increasing cost of insurance. FEMA expends considerable resources addressing these issues, such as responding to congressional inquiries and issuing LOMAs and LOMRs, which could be better spent dealing with flood risk reduction and flood safety. It is time to consider abolishing the mandatory purchase requirement, at least as it is currently structured. In this presentation, we put forth an alternative that shifts the focus from "in vs. out" to evaluating the degree of risk, allowing for a broader range of risk coverage and reducing the conflicts and political pressures generated by the current system.

Biography
Mr. Hastie is a Water Resources Engineer with 20 years experience working with FEMA programs, including most recently the Risk MAP Program. He has working with risk identification, mitigation, and insurance issues at the local and state level, as well as directly supporting FEMA. Mr. Hastie has overseen a number of CTP program firsts, including the first and largest Risk MAP Watershed project to be completed, the first dam safety risk assessment pilot performed through Risk MAP, and one of the most successful partnerships and data sharing examples with USACE and USGS on a Risk MAP project. In addition, he has served as Regional Manager with oversight of Risk MAP task orders in FEMA Region VI, in which he oversaw four of the earliest LAMP projects.

E2B: Local CRS Implementation Across the Country
Moderator: David Stroud, CFM, Amec Foster Wheeler, david.stroud@amecfw.com

Marriage of Dallas, TX CTP & CRS: A Blissful Union
Steve Parker, PE, CFM, City of Dallas, TX, stephen.parker@dallascityhall.com
Additional Author(s): Jarred Overbey, PE, CFM; Jack Young, PE, CFM

Often times you are scrolling through your social media feed or simply walking in a park and you stumble upon a happily married couple affectionately holding hands or posing with their picture book family. What you are seeing is the culmination of hard work, mutual cooperation, and persevering through common struggle. Before marriage, these two people were strangers, each with

individual goals, which inadvertently, were actually aligned in the same direction. Like our wedded pair, The City of Dallas/FEMA CTP and CRS programs started out as strangers to one another, but with common vision.   In 2004 the City of Dallas determined the need for detailed study and mapping for approximately 250 stream miles. The current out of date stream studies did not accurately reflect flood risk throughout the community. This prompted the City of Dallas to join the FEMA CTP program in July 2010. Through the CTP program, the City of Dallas has had the added benefits of accurate and updated engineering, flexibility with scope, FEMA funding, and identification of areas of mitigation actions.   The City of Dallas joined the CRS program in 1991 with a Class 10. In 2011, the City obtained a Class 5, the best in Texas. The results of the CTP program has helped the City maximize the points on CRS Activity 410: Floodplain Mapping. Furthermore, the City has been able to leverage the yearly CTP projects to develop and maintain a regulatory floodplain layer which is used for development, outreach, mitigation projects, flood protection information/assistance, and warning and response.   The presentation demonstrates, that the marriage of the FEMA CTP and CRS program has allowed the City of Dallas to create a dynamic floodplain management program which can be adapted to meet the community's needs and benefits all residents.

Biography
For the last 27 years, Steve Parker has worked for the City of Dallas. During most of this period, he has worked in Floodplain Management; including the last 14 years as Program Manager. Steve is involved in the design and construction phase of Capital Improvement Projects for paving, drainage, erosion, and flood control projects through Bond Programs. Currently, he manages a Flood Control/Drainage Needs Inventory totaling over 400 projects and in excess of $1.5 Billion in estimated costs. His group of 10 Professional Engineers and Certified Floodplain Managers is responsible for implementing Dallas's floodplain regulations as they pertain to development and improvements near the 100-year floodplain. As a floodplain manager, he identifies a problem and develops a solution that complies with sound floodplain management practices. Steve's professionalism and leadership throughout his career have been the foundation that shaped the City of Dallas's proactive, comprehensive, and strong floodplain management program.

Fort Collins, CO: Be Flood Ready – A CRS Program for Public Information
Marsha Hilmes-Robinson, CFM, City of Fort Collins, CO, mhilmesrobinson@fcgov.com

In 2014, the City of Fort Collins, Colorado, initiated a Program for Public Information (PPI) following guidance from the Federal Emergency Management Agency's Community Rating System. This effort brought together internal and external stakeholders, as a Floodplain Management Public Information Committee. The goal was to bring outside stakeholders together with the City to develop partnerships, provide additional expertise and perspectives and create consistent messaging for the public to guide the City in the future. The process included review of existing outreach projects and development of new initiatives. During the subsequent two years, the City and its stakeholders implemented multiple flood-related outreach programs to the entire community, as well as to specific target audiences. Fort Collins: Be Flood Ready has become the slogan for the numerous outreach projects to promote flood awareness.   This presentation will discuss the results of the committee in developing and implementing the Fort Collins PPI, including lessons learned and notable successes. An overview of key messages, target audiences and projects will be presented. Lessons learned include: the difficulty in documenting success with public outreach, the changing focus of external stakeholders and managing expectations for the number of projects to be implemented. Successes include: coordination with Colorado State University in reaching college students as a key target audience, a partnership with the local Board of Realtors, more interactive community events and utilizing the committee to brainstorm outreach ideas related to an upcoming RiskMAP project. The PPI and the Fort Collins: Be Flood Ready slogan have emerged as important tools in supporting flood awareness in the community.

Biography
Marsha Hilmes-Robinson has been a Floodplain Administrator with the City of Fort Collins, Colorado, since March of 1997. She was actively involved in the recovery efforts of the July 28, 1997 Fort Collins Flood and was involved in both the response and recovery of the 2013 flooding. She became a Certified Floodplain Manager in 2001. Ms. Hilmes-Robinson is the Community Rating System (CRS) coordinator for Fort Collins, a CRS Class 2 community. She is currently the Chair of the CRS Committee of the Colorado Association of Stormwater and Floodplain Managers. Prior to working for the City of Fort Collins, she was a project manager with the U.S. Geological Survey Water Resources Division in Las Vegas, Nevada. Ms. Hilmes-Robinson holds a M.S. Degree from Colorado State University specializing in fluvial geomorphology.

The NFIP's Community Rating System: Bridging Adaptation Gaps in Coastal Communities
Mary-Carson Stiff, JD, CFM, Wetlands Watch, mc.stiff@wetlandswatch.org

Recent reforms of the National Flood Insurance Program are impacting planning, businesses, and the economies of coastal localities. One program offers an innovative and attractive solution to locality staff, elected officials, and residents, while simultaneously encouraging adaptation and resilience planning in communities. The National Flood Insurance Program's Community Rating System is a voluntary incentive based program that rewards localities that take extra steps to reduce flooding with lower flood insurance premiums. Mary-Carson is the Chair of the Coastal Virginia CRS Workgroup and will discuss the Workgroup's activities, work products, & activity consulting that assist local government staff in participation and success in the CRS Program. In addition, this presentation will highlight successful regional collaboration to create CRS activity templates & the needed reform of the CRS Program to more easily credit green infrastructure practices that occur at the parcel or multi-parcel level. Examples of these practices include living shorelines, rain gardens, and other elective flood reduction actions.

Biography
Mary-Carson Stiff is Director of Policy at Wetlands Watch where she specializes in the National Flood Insurance Program and helps advise local governments as they plan for sea level rise adaptation. She is a Certified Floodplain Manager, Chair of the Coastal Virginia Community Rating System Workgroup, and Board Member of the Virginia Floodplain Managers Association. Before joining Wetlands Watch she worked as Consulting Manager for Policy & Programs for the Virginia Coastal Policy Center at William & Mary Law School, where she obtained a J.D. in 2013. Her work experience includes: Legal Intern for the Virginia Outdoors Foundation, Conservation Defense & Public Policy Intern for the Land Trust Alliance, and Legal Intern for Virginia Sea Grant and the Middle Peninsula Planning District Commission. Mary-Carson graduated from Bates College with a B.A. in English Literature in 2008. She lives in Norfolk and serves on the Norfolk Environmental Commission and the Chesapeake Natural Event Mitigation Advisory Committee.

E3: 2D Modeling & Mitigation
Moderator: Mike Schlesener, GISP, AECOM, mike.schlesener@aecom.com

Elkhorn River Long-term Bank Stabilization Project
Sara Mechtenberg, PE, FYRA Engineering, smechtenberg@fyraengineering.com
Additional Author(s): Bob Gregalunas

The Elkhorn River is a major river on the outskirts of the Omaha, NE metropolitan area that feeds into the Platte River. During a flood on the Elkhorn River in June of 2010, approximately 325 ft of land was washed away on outer bend of a very sharp meander and the river bank migrated towards a primary road corridor with residential housing. The Papio-Missouri River Natural Recourses District had FYRA Engineering develop a solution that would provide the most stable protection for future. The design of the long term solution includes the excavation of a pilot channel with a gentle curvature that will develop into a new river channel over time with flood flows, and eventually convey a significant portion of the flow away from the existing bankline of concern. This will reduce the stresses incurred during high flows and reduce the risk of damage along the existing bankline. This design will restore a historic channel of the Elkhorn River while still maintaining capacity to carry flow in the existing alignment. The reduced velocities within the original channel will provide aquatic habitat improvements for the endangered pallid sturgeon and other native species of fish. The design required bathymetric surveying and intensive two-dimensional hydraulic modeling of the river segment to assess the stability and flow regimes of the preferred alternative, and to plan habitat location and orientation. Permitting coordination with the USACE was performed, construction documents were developed, and construction observation services were performed upon implementation in January 2016.   This presentation will discuss all aspects of the project from background and geomorphology, detailed two dimensional hydraulic modeling (using SMS software), bank stabilization measures using on site materials, coordination with the USACE and the success of the project to date.

Biography
Sara received a BS in Biological Systems Engineering from the University of Nebraska-Lincoln. She is a Professional Environmental Engineer and has 10 years of professional experience in water resource consulting. She has been involved in a wide variety of projects including dam design, reservoir/fishery design, lake restoration, community-based watershed management planning, concept-level alternatives analysis, and stream/wetland restoration and mitigation. Previous involvement with an environmental sciences group provided her experience with jurisdictional wetland evaluations and permitting procedures. Her current responsibilities include design and modeling for projects ranging from initial concept development to final design.

SMART Flood Risk Planning Using HEC-RAS 2D

Brinton Swift, PE, CFM, HDR, brinton.swift@hdrinc.com
Additional Author(s): Janelle Moyer, PE, ENV SP, CFM

Development of communities and infrastructure within complex floodplains has necessitated the need for analytical tools capable of representing dynamic hydraulics. Two dimensional (2D) modeling has long represented a useful tool for identifying flood risks on more complicated systems, and has become significantly more available with the release of HEC-RAS 2D.   The Lower Santa Cruz River, in Pinal County Arizona, is a good example of a complex system requiring flood risk planning with 2D tools. Flooding impacts a range of developments, infrastructure, and communities along the 80 mile project reach. The flood damage has been widespread, forcing aerial evacuations, bridge closures, serious local erosion, and larger channel migration.   This project was initiated under the USACE's active planning portfolio of risk-informed, SMART planning studies, which follows the 3x3x3 Rule (3 years, $3 million, 3 levels of vertical coordination). The objective of this study is to develop and evaluate a viable array of potential flood risk management alternatives to reduce the probability and severity of flood damages. This required performing baseline and future without-project conditions hydrologic, hydraulic, and sediment transport analyses, as well as, geotechnical investigations. This project reach is a highly braided dynamic riverine system that was not well suited for simple 1D analysis. HEC-RAS 2D was selected to investigate this complex hydraulic system more efficiently with combined numerical approaches. However, incorporating the 2D analysis into existing planning and risk evaluation processes required adaptive and unique approaches. This presentation will cover how to incorporate the techniques required to utilize a HECRAS 2D model on a SMART planning project. With the trend of projects needing to be completed more efficiently, the approach used on this project is a good example of how to properly use new analytical tools to significantly improve our ability to understand and evaluate floodplain behaviors with far more accuracy.

Biography
Brinton Swift is a Project Manager in the Denver HDR office. Mr. Swift has over 10 years of experience in water resources. He has experience managing a broad array of water resources projects and major technical tasks. His experience ranges from leading complex hydraulic and sediment analyses of a 1 billion dollar sediment diversion on the Mississiippi River to leading information gathering and agency coordination for a California Statewide Master Flood Control Plan. Mr. Swift's technical experience spans the private and public sectors with a focus on hydraulic analysis, sediment transport, river mechanics, and drainage system design and analysis for development and civil design projects. His experience also includes site civil design, water quality reports, and storm water pollution prevention plans and BMP site inspections.

Urban Floodplain Modeling with HEC-RAS Combined 1D/2D Fargo, ND

Adam Nies, PE, CFM, Houston Engineering, anies@houstoneng.com
Additional Author(s): Greg Thompson, PE, CFM

Fargo, North Dakota's largest city, is continuing to expand its jurisdictional limits to the south. With technological advancements in floodplain modeling, the effects of development in flood prone areas is becoming more apparent. The city recognizes that developing in these areas may adversely affect adjacent floodplain elevations. Following the flood of record in 2009, the city began an excruciating effort to construct permanent flood protection while pursuing accreditation by FEMA. Per North Dakota law, issuing a levee construction permit requires proof of no adverse flooding impacts to adjacent properties (or obtain property rights where impacts exist). Therefore, the city retained Houston Engineering, Inc. to conduct a floodplain evaluation that identifies the effects of levees constructed to protect existing and future development.   The study began utilizing the previously developed unsteady state HEC-RAS model from the Fargo/Moorhead Diversion Project. Additional detail was added to more precisely address unique characteristics of the in-town area. Existing conditions represents a no-levees scenario, allowing overland flooding to pass through neighborhoods and streets within the city. Note that this condition has never occurred with the emergency flood fight efforts conducted by the local communities. Then, with-project conditions incorporates the levees along the Red River and adjacent tributary drains.   Following 1D unsteady modeling, the mitigation required to offset the floodplain impacts were quite substantial. However, calibrating a model to represent overland flooding through town that has never occurred was challenging and it was anticipated that a 2D model could better define existing conditions flooding through town. This could potentially result in less overland flow, which results in less flooding to mitigate.   This presentation compares the 1D vs. 2D unsteady HEC-RAS modeling results for simulating flooding through the city. It also highlights the 2D model setup and a significant level of sensitivity analyses to substantiate model parameter assumptions.

Biography
Mr. Nies received his B.S. in Civil Engineering in 2010 from North Dakota State University in Fargo, ND. He has been employed with Houston Engineering for 6 years conducting flood risk management design and analyses. He is registered as a

Professional Engineer in North Dakota and Minnesota. Mr. Nies is also registered as a Certified Floodplain Manager (CFM) from the Association of State Floodplain Managers.

E5: Coastal Impacts of Climate Change
Moderator: Brian Caufield, PE, D.CE, CFM, CDM Smith, caufieldba@cdmsmith.com

Storm-induced Coastal Erosion for Flood Insurance Studies & the Missing Link to Forecasting Coastal Flood Damage Impacts: Erosion, Runup, & Overtopping
Jeff Gangai, CFM, Dewberry, jgangai@dewberry.com
Additional Author(s): Tucker Mahoney, FEMA

FEMA is re-evaluating how it addresses coastal storm induced erosion for flood coastal flood hazard mapping. This presentation will show new data analysis from modern storms such as Hurricane Matthew and how the erosion amounts compare to current FEMA Methodologies. Proposed changes of how storm inducted erosion is calculated will also be presented. Along open coasts erosion, wave runup and overtopping occurs during coastal storms. During storm surge flooding forecasting, presently only storm surge is considered and may under predict the flooding and damages along open coastlines. Using the USACE CSHORE model this presentation will also show how adding the effects of erosion, wave runup and overtopping improves the forecast of damaged and flooded areas along the open coasts.

Biography
Mr. Jeff Gangai has been practicing coastal engineering for over 20 years. He holds a Bachelor of Science in Maritime Systems Engineering from Texas A&M University at Galveston and a certificate in Coastal Engineering from Old Dominion University. His area of specialty is coastal hazards including coastal processes and marine structures. Before joining Dewberry he worked for five years with the U.S. Army Corps of Engineers at the Galveston, TX District. For over 15 years he has worked at Dewberry on the National Flood Insurance Program for the coastal regions of U.S., evaluating and reviewing coastal flood hazards. He serves as a senior coastal technical specialist and coastal project manager supporting coastal flood studies.

Accounting for Long-Term Erosion & Sea Level Rise in New England: A TMAC Recommendation
Elena Drei-Horgan, PhD, CFM, AECOM, elena.drei-horgan@aecom.com
Additional Author(s): Brian Caufield, PE, CDM Smith; Jeremy Mull, PE, AECOM

The Technical Mapping Advisory Council (TMAC) has provided recommendations within the December 2015 "Future Condition Risk Assessment and Modeling" report that stresses the need to provide information on the future impacts of long-term coastal erosion and sea level rise (SLR). As a result, FEMA Region I has funded a pilot study to develop and apply a technical approach for estimating potential long-term erosion in the New England area. Three sites along the Massachusetts, Rhode Island and New Hampshire shorelines have been selected for the study, and are representative of the coastal geomorphology within Region I. The study will leverage existing long-term erosion and shoreline change data where possible, and will implement a new technical approach where there is no data. This study will use a one-dimensional, transect-based approach to extract coastal topographic features from LiDAR data and determine erosion rates. SLR scenarios for the years 2050 and 2100 (Paris et al., 2012) will be included in the analysis to account for the potential acceleration of historical, long-term erosion due to rising water levels.

Biography
Dr. Drei-Horgan has more than 16 years of academic and private experience in the study of coastal processes. Her expertise covers a broad array of engineering and science disciplines in the field of coastal engineering, including coastal geomorphology, flood hazard analysis and mapping, geospatial data analysis, coastal risk and sea level rise assessment and cost/benefit analysis. She is a national Subject Matter Expert in the field of flood hazard analysis. Elena is currently a Technical Leader and a Project Manager with AECOM. She was the recipient of the 2016 ASCE Orville Magoon Sustainable Coast Award.

Looking to the Future - San Francisco Bay Area Increased Flooding Scenarios
Kristen MacDougall, CFM, AECOM, kristen.macdougall@aecom.com
Additional Author(s): Mark Lightner, AECOM

Increased flood risk due to climate change has become an important consideration for coastal communities. This presentation will discuss the creation of the FEMA Non-Regulatory Coastal-Specific dataset, Increased Flooding Scenarios, developed as a supplemental dataset under Region IX's San Francisco Bay Area Coastal Study. Using the most up-to-date floodplain data, a custom methodology was developed to deliver this dataset in a relatively short time frame with a high degree of accuracy. This presentation will cover in detail the specific methods and GIS tools used to develop increased coastal flood elevation scenarios of +1, +2, and +3 feet above the 1-percent-annual-chance (100-year) coastal floodplain, along with the associated supporting community outreach efforts. While hands-on work was necessary to supplement the GIS methodology, automation with python scripting allowed more time to be spent on ensuring the quality of work. To support community outreach, the Increase data was published on the FEMA GeoPlatform, and supported by FEMA standard GIS deliverables, an informational Fact Sheet, and Work Maps. The resulting data and maps are intended to support floodplain management, planning, and conservation efforts for the San Francisco Bay Area.

Biography
Kristen MacDougall has 15 years of GIS-based floodplain mapping and Flood Insurance Study production experience, and has contributed to mapping riverine and coastal flood insurance studies across the United States in almost all FEMA Regions, most recently focusing on coastal and riverine floodplain mapping efforts in Region IX. Throughout her career as a GIS Specialist and ArcGIS SDE database administrator at AECOM, Kristen has gained concrete experience with relational database design and development, while applying the Enterprise Geodatabase model to enforce FEMA guidelines, specifications, and standards for flood insurance and flood risk data within a production environment. Kristen is a Certified Floodplain Manager and is an active member of the FEMA-PTS Regulatory Products team.

E6: Changing Risk Analysis Methods in a Changing World
Moderator: Gene Barr, CFM, Arcadis, gene.barr@arcadis.com

Using Risk Analysis to Inform Levee Investment Priorities in the California & Dutch Deltas
Jessica Ludy, CFM, Environmental Science Assoc., jessica.ludy@gmail.com
Additional Author(s): Larry Roth, PE

Catastrophic levee failure in the California Delta would be devastating to people, water supply, infrastructure, and California's economy. Five thousand miles away, flooding also threatens millions of people and important infrastructure systems in the Netherlands, much of which is below sea level and protected by dikes. The two Deltas are not so different. The development of each was enabled by an initial "Poldering" or, pooling of resources to form Reclamation Districts and Waterboards over a common purpose: drain the lowlands and build levees to keep the water out. The thousands of miles of levees that once enabled farming and navigation now also protect dense and urban development.   Flood risk cannot be eliminated, and climate change and sea level rise threaten the well-being in both Deltas. Furthermore, financial resources are limited to maintain and improve all the levees and dikes. How safe, then, is safe enough? Which risks should be addressed first? Tolerable Risk Guidelines recognize that society is willing to live with some risk in order to secure certain benefits. TRG represents a shift from flood control to flood risk management and supports policy formulation based on a clear understanding of both the probability and consequences of flooding. It enables the evaluation of trade-offs and informs decision-making on flood risk reduction investments to include land use, and emergency response. In contrast to design standards specifying levels of flood protection which address only the flood hazard, TRG enables decisions based on full and transparent consideration of the consequences of flooding and residual risk. When applied to flood risk management decisions, the TRG process is useful in allocating scarce resources, achieving equity, and promoting efficiency. This presentation will describe how TRGs are being applied in the Dutch and California Deltas to inform levee improvements and other flood risk management investment priorities.

Biography
Jessica Ludy is a senior water resources planner in San Francisco, California. She works with local, state, and federal agencies on risk analysis and communication. Jessica was a Fulbright Scholar at TU Delft in the Netherlands where and is Co-chair of the Training and Outreach committee with the Association of State Floodplain Managers. She is also a liaison to ASFPM's International Committee and an Associate for the ASFPM Foundation.

Climate Change & its Effect on the Resiliency of Our Dams & Levees
Scott Brand, PE, HDR, scott.brand@hdrinc.com

This presentation will look at the various ways that we can make our dams and levees more resilient to effects of climate change. Climatologists point to effects of climate change including more extreme weather patterns, (long-term droughts and prolonged flooding), sea level rise, and increasing temperature of the earth. According to NOAA data, over the last 17 month, eight (8) extreme level events with less than a 0.2% chance of occurring (termed a 500 year event) have happened. Studies have shown that warmer air is able to hold more water vapor which eventually forms clouds and come to the ground as rain. Therefore, with higher ground temperatures, more water vapor and the volume of rain is higher. Studies have also shown that rainfall intensity is increasing as a result of climate change. The effects on our dams, levees, and reservoirs will be reviewed. In particular, the effects on our drainage basins and flood hydrology will be discussed. With higher potential runoff in our drainage basins and increased flood flows into our reservoirs, hydrology for a given site is likely changing rapidly. With higher potential inflows into our reservoirs comes with it the potential for dam failures as observed recently in Texas, South Carolina, and Louisiana. Major Hurricanes such as Katrina and Sandy caused devastating damage, breached many dam and levee systems and threatened many other facilities. The topic of making our dams and reservoirs more resilient to withstand the effects of climate change will be studied in detail. Topics such as armoring our dams with RCC to allow overtopping, increasing our spillway capacity by various means, raising dams, parapet walls, and fuse plugs are only a few topics which will be covered.

Biography

Mr. Brand is a licensed geotechnical engineer who has spent 30 years working on dams, levees, and hydroelectric power plants. His responsibilities include design analyses of concrete gravity, RCC and earth dams, dam inspections, preparation of detailed drawings, evaluation of soil data for seepage and slope stability analyses of existing embankments, Federal Energy Regulatory Commission's (FERC) Part 12 Safety Inspection Reports, excavation design and dewatering, design of rock/ Post –Tensioned Anchors (PTAs), preparation of technical specifications, analysis of various cutoff wall systems, evaluation of embankment instrumentation data, and performance of geotechnical subsurface investigations. He has prepared many design geotechnical reports covering the geotechnical design analyses for major dam and hydro projects. Mr. Brand has served as lead geotechnical engineer, project engineer and Manager of design teams during the design of a wide variety of dams and hydro related structures. He has also worked on a wide variety of levee, lock and dam projects and flood damage reduction projects for the U.S. Army Corps of Engineers.

Application of Risk Informed Decision Making & Potential Failure Mode Analysis to Improve Resiliency of Critical Floodplain Infrastructure

Robert Beduhn, PE, ENV SP, HDR, bob.beduhn@hdrinc.com

The application of Risk Informed Decision Making (RIDM) and use of Potential Failure Mode Analysis (PFMA) has gained broad application in the management of diverse dam portfolios. The dam industry has utilized life safety as the primary consequence. This technique has also been applied to levee systems with life safety once again as the primary consequence. However, many communities are unable to afford significant risk reduction through levee improvements or construction of new systems. Recognizing disasters are inevitable communities are focusing on response, recovery and overall community resiliency in order to speed recovery after a breach or overtopping event. Following more recent global disasters, there has been an emphasis on infrastructure resiliency and critical lifeline infrastructure systems. Building from recent work by the United States National Institute of Standards and Technology, HDR has developed and tested a Risk Informed Decision Making process that applies techniques from the Dam industry and applies the methodology more broadly to critical community infrastructure systems. This paper and presentation will summarize the methodology and present on pilot testing of this method identifying critical infrastructure systems and resiliency improvements in a coastal floodplain environment. The methodology has important public policy and climate change planning implications. It will assist communities in assessing critical community functions, prioritizing infrastructure protection schemes and allowing for faster recovery following a disaster event

Biography

Mr. Beduhn is a senior vice president with extensive experience in assisting Clients implement flood damage reduction programs. As HDR's Director of Civil Works he is technically responsible for a team of technical advisors, subject matter experts and practice leaders specializing in dams and hydraulic structures, levees, flood risk management, hydrology and hydraulics. He has a broad understanding and technical competency in the the many facets of flood damage reduction and disaster risk management. Mr. Beduhn has continued to enhanced his technical expertise in sustainability, resiliency and cost/risk/value engineering. Mr. Beduhn is an Envision Sustainability Professional, Associate Value Specialist and has been very active member in National Institute of Standards Educational series for the Community Resiliency Guide, ASCE's Resiliency Division, a member of the sub-committee on Water, Waste Water and Inundation Systems and a Member of the Coastal, Ocean, Ports and Rivers Institute sub-committee on Alternative Infrastructure Financing.

E7: What's New at FEMA for Outreach

Moderator: Bruce Bender, CFM, ASFPM Insurance Cmte. Co-Chair, Bender Consulting Svcs., babender@cox.net

Enhancing the NFIP: Lessons Learned from FEMA's Customer Experience Initiative

Priscilla Scruggs, FEMA, FIMA, priscilla.scruggs@fema.dhs.gov
Additional Author(s): Rachel Sears, FEMA/FIMA Mitigation Directorate

Since 2015, the Federal Emergency Management Agency (FEMA) has been working on several initiatives to transform the National Flood Insurance Program (NFIP) into a simple and easy experience that customers can value and trust. During the Summer of 2016, FEMA embarked on the Customer Experience for Communities Initiative to better understand a community's impressions and satisfaction with the agency's programs and initiatives. FEMA reached over 650 communities to gather information on where FEMA's involvement was bringing value to communities and where they could improve. FEMA received feedback on the journeys that communities take through the NFIP lifecycle, including updating flood risk information; planning for hazard mitigation; and funding mitigation projects. FEMA is leveraging the lessons learned from this initiative to improve its engagement with communities; enhance how flood risk information is shared; and augment existing tools and products. Floodplain managers and local officials can also use the information gleaned from this initiative to improve their efforts to manage flood risks in their communities.

Biography

Priscilla Scruggs is currently the Director of the Communications & Management Division within the Federal Insurance & Mitigation Division of the Federal Emergency Management Agency (FEMA). Ms. Scruggs establishes the vision and direction of the Communications and Management Division. Responsibilities include supporting data-driven decision-making for the FIMA's senior leaders in the areas of financial management, human capital management, facilities management, and systems management. Ms. Scruggs has been a certified Contracting Officer's Representative since 2002 as well as a trainer/facilitator in Total Quality Management since 1994. She received her Bachelor of Science in Civil Engineering from West Virginia University.

Customer-centric Approaches for Communicating Map Changes

Priscilla Scruggs, FEMA, FIMA, priscilla.scruggs@fema.dhs.gov
Additional Author(s): Sarah Devaney-Ice, FEMA

In the wake of criticism following Super Storm Sandy, the Federal Insurance and Mitigation Administration (FIMA) launched an effort to understand the most important opportunities to improve the National Flood Insurance Program (NFIP) policyholder experience. During this effort, we learned that customer satisfaction suffers during map changes regardless of whether premiums increase or decrease! As such, the program and map change customer journey was prioritized by our organization as one of the biggest opportunities to improve the customer experience. Since the summer of 2016, FIMA's program and map change team has redesigned the journey to a multi-pronged notification and support effort that includes written notifications, a supporting website, and agent outreach. The team is currently holding pilots in communities to test the notifications and website. We are also engaging with our Write Your Own (WYO) partners to design agent outreach approaches and business rules for how to best target at-risk and uninsured properties. The intent of this concurrent session presentation will be to share the best practices and lessons learned from our pilots and engage the audience on implementation considerations.

Biography

Priscilla Scruggs is currently the Director of the Communications & Management Division within the Federal Insurance & Mitigation Division of the Federal Emergency Management Agency (FEMA). Ms. Scruggs establishes the vision and direction of the Communications and Management Division. Responsibilities include supporting data-driven decision-making for the FIMA's senior leaders in the areas of financial management, human capital management, facilities management, and systems management. Ms. Scruggs has been a certified Contracting Officer's Representative since 2002 as well as a trainer/facilitator in Total Quality Management since 1994. She received her Bachelor of Science in Civil Engineering from West Virginia University.

The Future of FEMA's Coastal Flood Information

Tucker Mahoney, FEMA HQ, tucker.mahoney@fema.dhs.gov
Additional Author(s): Brian Batten, Jeff Gangai, Michael DelCharco

FEMA's coastal flood risk mapping program is at a critical juncture. Updated coastal flood hazard analyses are underway, or have been completed, for 100% of the United States populated coast. While FEMA and its Mapping Partners continue that initiative to its completion, it is also important to prepare for the future and to evolve the coastal program. Future program efforts should include the Technical Mapping Advisory Council recommendations, evolving internal and external stakeholder needs and priorities, and growing interest in future flood risk resources. FEMA is planning and prioritizing the future coastal program to address major technical, program management and integration, and communications needs over the next several years. This session will focus specifically on communication and data sharing needs.   Today, gaps remain concerning the information coastal communities and stakeholders want and need to improve their resiliency to coastal flood and flood-related erosion hazards. FEMA has undertaken some initiatives to better understand the needs of stakeholders, such as the Customer Experience and the Flood Risk Products surveys. However, it is important that FEMA better understand the needs and preferences, as varied as they may be, of coastal communities, so that the right information can be provided at the right time to stakeholders. The session will look at both how FEMA has historically conveyed flood risk information and what we are learning from how our colleagues can share present and future flood risk data.   This presentation will engage coastal stakeholders to provide feedback and input on the design of FEMA's existing and future coastal flood risk information.

Biography
Tucker Mahoney is an emergency management specialist for FEMA, in the Federal Insurance and Mitigation Administration. As a senior member of the Engineering Resources Branch, Ms. Mahoney is responsible for administration of the coastal floodplain mapping program and researching and implementing major change initiatives for flood hazard analyses performed under the National Flood Insurance Program. Prior to joining HQ in 2013, Ms. Mahoney worked as a Coastal Engineer in Region 4 for four years. She received her Masters of Civil Engineering from Johns Hopkins University, and a Bachelors of Engineering and of Arts from Dartmouth College. Ms. Mahoney is a registered Professional Engineer in Georgia.

E8: Green Infrastructure to Reduce Flood Damage
Moderator: Tim Hillier, PE, CFM, ASFPM Coastal Cmte. Co-Chair, CDM Smith, hillierts@cdmsmith.com

China's Sponge Cities Initiative, Lessons Learned from the US
Kari Mackenbach, DCES, ENV SP, CFM, ms consultants, kmackenbach@msconsultants.com

Chinese cities are suffering from catastrophic floods and in most cities water quality is also very poor. Experts say that climate change and rapid urbanization are the key concerns for Chinese cities. Although China has an extensive drainage network, it still can't catch up with the fast expansion of Chinese cities. An initiative known as "sponge cities," was started in 2013 by the President of China. This new approach which involves sustainable design aims to build up infrastructure to collect excess rainfall and integrate flood control in urban planning. In the United States, this movement is more aligned with the terminology green infrastructure or integrated planning implementation. The goal is to translate some of our lessons learned here in the United States to cities in China wanting to learn about integrated solutions. ms consultants is helping several sponge cities with their planning and implementation strategies for sustainable design.

Biography
Kari is the Director of Sustainability for ms consultants and will lead the Integrated Planning Coordination for this Blueprint Columbus effort. She has more than 21 years of experience in many facets of sustainability. Kari started off her career as a local floodplain manager and from this early experience she forged an appreciation for taking a different approach to solving problems. Kari realized early on that when the public is involved your decisions need to be transparent and easily communicated to all stakeholders. This is why Kari is perfect for this role. Kari is also very passionate about green infrastructure and sustainable alternatives. Anyone who knows her or has seen her present on the topic knows that she believes in green! With this passion also come realism. She works closely with her team to evaluate the right green infrastructure strategies and solutions for what is trying to be resolved. Whether its water quality, quantity, mitigation flooding or all of the above her focus is always on does this strategy make sense both cost effectively and long term.

Would You Like to Understand the Flood Control & Resiliency Benefits of Green Infrastructure?
Jennifer Walker, PE, D.WRE, CFM, Watearth, jwalker@watearth.com

If you're interested in learning more about the flood control benefits of Green Infrastructure, this presentation is a perfect introduction to the resiliency benefits of integrating Green Infrastructure into the flood control system. Project case study

comparisons of peak flow reductions for design storm events ranging from three to 12 inches are presented for redevelopment, new development, and watershed-level projects. Modeling results and project details are included for high-rainfall, arid and semi-arid climates as well as soils ranging from sandy to clay and locations with high groundwater levels. Several of these case studies used Green Infrastructure as the primary method of flood control (detention) for the project.

Biography
Jennifer Walker, P.E., D.WRE, ENV SP, CFM, QSD, President of Watearth, Inc. is one of the first engineers to receive the Diplomate, Water Resources Engineer certification. Walker has a Masters in Civil Engineering, is a Certified Flood Plain Manager, and is a licensed Professional Engineer in multiple states. Walker's experience includes developing a California statewide Low Impact Development (LID) modeling tool for Phase II communities in collaboration with California State Sacramento's Office of Water Programs, which is funded by the State Water Resources Control Board. Walker serves as LID technical expert on the San Francisco Bay Area Regional Green Infrastructure Tool and the San Francisco Bay Area Green Plan-It Master Plan in collaboration with the San Francisco Estuary Institute. Walker is also Principal developer of a model on behalf of the Texas Water Development Board to evaluate water conservation Best Management Practices statewide.

Changing the Paradigm: Stormwater Mgmt. in New Orleans, LA
Jessica Watts, PE, D.WRE, ENV SP, CFM, CDM Smith, wattsjl@cdmsmith.com
Additional Author(s): Dana Brown, Dana Brown & Assoc.

The City of New Orleans' drainage system reflects the city's unique history. The Greater New Orleans (GNO) area continuously struggles to manage its drainage systems, despite ongoing development, soil subsidence, and sea level rise. The City of New Orleans' drainage system serves nearly 95 square miles with approximately 1,500 miles of pipe. In 2009, The City of New Orleans commissioned CDM Smith to develop hydrologic and hydraulic computer modeling evaluation using the US EPA Storm Water Management Model (SWMM) to determine the traditional drainage infrastructure improvements required to convey the 10-year, 24-hour storm. It was envisioned that this evaluation would serve as a baseline to determine the potential of other stormwater management options to exceed it in level of service or reduction in cost. Many stormwater green infrastructure (GI) facilities were considered for the GNO area to determine the ones most relevant for use. The criteria include both desired characteristics for the GIs and limiting conditions inherent to the GNO area. The Pontchartrain Park and Gentilly Woods neighborhoods, collectively known as Pontilly, were approved by FEMA for a Hazard Mitigation Grant Program (HMGP) project. The design of a stormwater management system for the Pontilly area will seek to manage each drop of rainwater where it falls. Though not practical everywhere, this approach nevertheless calls for a distributed, but connected, series of GIs linked together in a stormwater "mitigation train." Building upon the opportunities envisioned in the Pontilly Stormwater HMGP project, green infrastructure possibilities for the GNO area are being explored. This new vision of what stormwater management could be is beginning to be realized as multiple neighborhoods and large site projects are being designed and constructed throughout the City of New Orleans.

Biography
Ms. Watts graduated magna cum laude with a bachelor's degree in Civil Engineering from Christian Brothers University in Memphis, Tennessee in 1996; was awarded the Young Engineer of the Year award by the Memphis Chapter of TSPE in 2000; and obtained a master's degree in Water Resources Engineering from the University of Texas, Austin in 2006. Ms. Watts is a Professional Engineer, Certified Floodplain Manager, and Diplomate Water Resources Engineer with CDM Smith and has over 17 years of experience in engineering. She is currently actively working on Green Infrastructure projects in the Greater New Orleans area with construction costs estimated at over $60 million. Ms Watts is also serving as the President of the Greater New Orleans Section of the Society of Women Engineers.

E9: States Day: Mitigation
Moderator: George Riedel, CFM, ASFPM Nonstructural Floodproofing Cmte. Co-Chair, Michael Baker Int'l, george.riedel@mbakerintl.com

**Development & Feasibility of a State Led Flood Audit Program*
Michelle Burnett, CEM, CFM, Rhode Island EMA, michelle.burnett@ema.ri.gov

In May 2016 House Resolution R-8267 was introduced to the Rhode Island Legislature, which called upon the State to investigate the feasibility and fiscal ramifications for implementing a Flood Audit Program. The intent was to develop a flood audit program, similar to an energy audit, but specifically for flooding on a State wide level. Theoretically, flood audits would be performed in an effort to strengthen the resilience of Rhode Island communities and residents against the effects of both coastal and inland flooding. This would be accomplished by assessing structures on a case by case basis and providing information, education and potentially a suite of mitigation recommendations to property owners that are at risk for flooding.   The House Resolution called upon an existing State led Council to create a Flood Audit Task Force. The Task Force members included a variety of subject matter experts, and specifically requested the inclusion of a Certified Floodplain Manager (CFM). The Resolution required the newly created Task Force to develop a Feasibility Report and provide its findings to the Rhode Island House of Representatives by February 15, 2017.   This presentation will walk the audience through the process by which the Rhode Island Flood Audit Task Force was created, the discussions and findings that were made, as well as the results of the final Feasibility Report which was submitted to the House of Representatives. Since no program of this kind existed when this was being developed, it provided an opportunity for Task Force members to think outside the proverbial 'box', develop a method to perform flood audits on a State level, and potentially lay the groundwork for a State-led Flood Audit Program.

Biography
Michelle Burnett, CFM, CEM joined the Rhode Island Emergency Management Agency (RIEMA) in May 2008. Michelle spent almost six years as the Rhode Island State Floodplain Coordinator, and was involved in all aspects of floodplain management. Since her appointment as Assistant Chief of Planning at RIEMA in 2013, Michelle maintains her involvement in all aspects of floodplain management, but is now heavily involved in a variety of planning efforts covering all phases of disaster management, including preparedness, response, recovery and mitigation. With over 16 years of experience dealing with planning and environmental issues, Michelle is currently the Region 1 Director on the Association of State Floodplain Managers (ASFPM) Board of Directors. Originally from New York, Michelle received her Bachelors Degree in Marine Biology and Masters in Marine Affairs and Coastal Policy, both from the University of Rhode Island.

Community Resilience & Historic Resource Preservation: Preserving Quality of Life in Connecticut
Scott Choquette, CFM, Dewberry, schoquette@dewberry.com

After Superstorm Sandy devastated large portions of the Northeast in 2012, the Disaster Relief Appropriations Act of 2013 (PL 113-2), provided funding to the Department of Interior's National Park Service to examine historic and cultural resources preservation in the context of resilience planning for natural hazards. Connecticut is developing the first statewide program to examine these two quality of life issues together at a statewide scale.   With over 3,200 historic resources either in the Special Flood Hazard Area or projected Sea Level Rise areas, in its four coastal counties alone, Connecticut realized the importance of balancing historic preservation with coastal and other resilience initiatives. The presentation will overview how CT modernized its historic inventories, served data to users, conducted gap analysis of plans, policies and regulation for 91 communities, and provided recommendations for including historic/cultural resources resilience in documents ranging from master plans to hazard mitigation and resilience plans and land use regulations.   Additionally, five Regional Council of Government Charrettes and one-on-one technical assistance meetings with 28 municipalities were conducted, as well as an updated flood resilience chapter in the State Historic Preservation Plan and a Best Practices Guide. This project will provide an approach and resources to other states, counties and communities that recognize the importance of protecting valued resources from flooding and other hazards, while maintaining community character and the historical integrity of the resources in harm's way.

Biography
Mr. Choquette is a professional planner in Dewberry's New Haven, CT office. He leads the firm's resiliency planning work in the northeast. Prior to joining Dewberry in 2002, Scott served as State Floodplain Management Coordinator and Deputy State Hazard Mitigation Officer for Connecticut. He has been a member of ASFPM since 1993 and has served on its Board as both a Regional Director and Secretary. He has worked on flood risk management, hazard mitigation planning and resilience projects in the northeast and nationally for 24 years.

Silver Jackets – Teaming to Mitigate and Manage State Flood Hazard Priorities
Ellen Berggren, USACE, ellen.m.berggren@usace.army.mil

The USACE Silver Jackets program was established in 2005 under its National Flood Risk Management Program. The program purpose was to promote and support state-led interagency teams to improve public safety and reduce flood damages through collaborative solutions that leverage and optimize agency resources. The USACE as a committed and active member of all state Silver Jackets teams provides institutional support to encourage collaboration and coordination, and financial and technical

support using existing programs to contribute to interagency efforts advocating nonstructural flood risk management solutions. Participation on Silver Jackets teams is voluntary. Presently there are 48 active teams in 47 states and the District of Columbia. Flood risk management responsibilities are shared among various federal, state, tribal, local governments, and other groups. Silver Jackets teams link members' missions, resources and expertise to accomplish a state's priorities. The presentation will provide a brief summary of the history and background of the Silver Jackets program, highlight collective and individual team flood hazard management efforts, and outline future program directions. The overview will demonstrate the benefit of teaming at all levels of government to assist states with addressing flood hazard challenges.

Biography

Ms. Ellen Berggren is a member of the U.S. Army Corps of Engineers National Flood Risk Management Program team at the Institute for Water Resources, and Deputy for the National Silver Jackets program. She joined USACE in 2008, managing flood risk management, water supply and ecosystem restoration planning studies; developing interagency partnerships; and supporting the Idaho Silver Jackets team and state teams located in the northeastern United States. Her career spans thirty years as a planner and project manager for Federal and State agencies and the private sector, leading collaborative and interdisciplinary processes to find solutions to water resources challenges. Ms. Berggren received a B.S from Arizona State University in Environmental Planning and Landscape Architecture and a M.S. in Interdisciplinary Studies, with a Water Resources and Public Policy emphasis from Boise State University.

F1: Encouraging Mitigation Action
Moderator: Jeremias Alvarez, PwC, jeremias.alvarez@us.pwc.com

Flood Economics: How Flood Mitigation Investment Returns Positive Benefits
Kathleen Boyer, FEMA HQ, kathleen.boyer@fema.dhs.gov
Additional Author(s): Leo Abruzzese, Economist Intelligence Unit; Sarah Devaney-Ice, FEMA HQ; Seleana Bines, Resilience Action Partners

Convincing local elected officials to invest in mitigation can be difficult. It is human nature to do what will pay off the most now, even if it means we may have to suffer more in the future. Considering the effects of flooding are typically far removed from a focus on the immediate, it is difficult for decision makers to rationalize the required funding needed for mitigation action to protect their communities from future flood risk.   Flood Economics (www.floodeconomics.com), developed by the EIU on behalf of Resilience Action Partners and FEMA, is a new, web-based information resource developed to overcome aversion to mitigating future flood risk and to combat the lack of resources and information about why communities should invest. It is designed to help local elected officials, mitigation professionals, and stakeholders: (1) improve awareness of the multitude of economic, social, and environmental benefits to communities; (2) highlight how communities are funding mitigation efforts; and (3) encourage people to share this knowledge with key industry experts and affected stakeholders, creating a ripple effect.   This presentation will explain the methodology and analysis driving Flood Economics and discuss ways it can be utilized to encourage mitigation action. A live demonstration of Flood Economics will also take place to demonstrate the core capabilities of the website: the five key takeaways, 11 case studies, and state-level mitigation data.

Biography
Kathleen Boyer is an Emergency Manager, Strategy Specialist and Policy Analyst with FEMA's Federal Insurance and Mitigation Administration (FIMA), where she has served since 2006. Kathleen manages the Mitigation Framework Leadership Group, a Federal interagency framework for developing national hazard mitigation policies and initiatives that cut across governmental programs. She also manages the FIMA Risk Management Directorate's long-term strategy development and manages a FEMA and Regional Community of Practice focused on advancing mitigation action nationally. Kathleen provided the Federal research and data coordination supporting the Economist Intelligence Unit's Flood Economics web tool and has managed other resilience performance measurement research projects. Previously she has also served as the managing Federal official for the Technical Mapping Advisory Council, a Federal advisory committee established to recommend improvements to the national flood mapping program. Kathleen also has expertise in the administration of Federal hazard mitigation grants and cooperative agreements. Prior to working for FEMA, Kathleen served in roles including Legislative Analyst for the University of California's Office of Federal Government Relations and the Director of Strategic Initiatives in Columbia University's Office of Research Development. She has a master's degree in public administration from Columbia University (1994).

**Mitigation Actions Through Communication*
George Riedel, CFM, Michael Baker Int'l, george.riedel@mbakerintl.com

This presentation will demonstrate how FEMA Regions VII engages their stakeholders to identify and influence flood Mitigation Actions for meeting the Risk MAP Action Metric Goal. FEMA Region VII formed a "Mitigation Action Tracker Work Group." This work group is made up of a representative from all four CTP States, the States' Contractors, FEMA Region VII staff, and FEMA Region VII RSC, CERC-L, and Mitigation Champion. The Mitigation Champion is the facilitator for the Work Group. The purpose of the Work Group is to discuss and review Mitigation Actions that have or will be entered into the Mitigation Action Tracker. This ensures a transparent and consistent understanding of the information from both the input and review perspectives. The Work Group holds bi-monthly calls. Some of the positive results from the Work Group are: •The Work Group calls allow FEMA staff and stakeholders to discuss and review Mitigation Actions on a regular basis. •It helps explain what the criteria are for Mitigation Actions. •Talking about Mitigation Actions on a regular basis assists the stakeholders in identifying Mitigation Actions and entering them into the Mitigation Action Tracker during the year instead of waiting until the end of the year. •These calls allow the Mitigation Champion to know when stakeholders are working on Mitigation Actions, which allows the Mitigation Champion to follow up on actions during the year. •The Work Group calls produce higher quality Mitigation Actions.

Biography

Mr. Riedel is an Associate Vice President for Michael Baker International. Based in Missouri, Mr. Riedel serves as a key coordinator of Baker's resources and services, focusing on business development and growth opportunities. Prior to coming to Baker, Mr. Riedel was the Deputy Executive Director of the Association of State Floodplain Managers (ASFPM) and leader of the Floodplain Management Program for the Missouri State Emergency Management Agency (SEMA). In the last 20 years, Mr. Riedel has focused exclusively on floodplain management and hazard mitigation activities. Currently, Mr. Riedel is the Mitigation Champion in FEMA Region VII with Resilience Action Partners. Responsibilities include working to support FEMA Regional staff to develop and update Region's action strategies, develop and support Risk MAP technical assistance for mitigation planning, and develop and provide mitigation planning training. Coordinate with and support FEMA RAD staff, States, and other Federal Agencies to ensure the timing of Risk MAP deployment aligns with other mitigation processes taking place within communities. Provide FEMA staff with coordination and conducting of meetings during the Risk MAP process. Support FEMA staff in the development, updating, and dissemination of mitigation outreach material, program guidance documents, toolkits, and handbooks.

Engaging Communities to Reduce Risk: Who, When, How, & Other Lessons Learned

Karen Amrhein, STARR II/ Atkins, karen.amrhein@atkinsglobal.com
Additional Author(s): Stacy Wright

The three-year Community Action Engagement Program in Region V concluded in September 2016, having engaged over 1,600 communities with the goal moving Risk MAP Action Measure 1 and 2 metrics forward. Seven different project types, including two variations on Discovery and four mitigation-focused engagement project types with community technical assistance, were implemented for over 1,600 communities. The program provided ample opportunity to try different approaches toward AM1 and AM2 advancement, and yielded many lessons learned and best practices. This final presentation on the program provides a summary of the different project types, explains what worked and what was less effective in helping communities advance risk reduction efforts, and provides insight that may help identify the most productive approaches to enabling communities to reduce risk.

Biography

Karen Amrhein currently serves as a Regional Standard Operations Manager for the STARR II Joint Venture, a Production and Technical Services contractor. Previously Ms. Amrhein served as STARRs Regional Community Engagement lead. She led efforts to design and implement a variety of community engagement programs for federal and state agencies including Discovery, Resilience, and mitigation action advocacy projects, as well as more technical efforts such as management of DFIRM projects and large program financials. Ms. Amrhein has presented trainings and workshops on everything from mapping needs assessments to Discovery to community engagement efforts that result in risk-reducing action.

F2: CRS: What's New & Local Program Administration

Moderator: Brian Varrella, PE, CFM, ASFPM Region 8 Director, Colorado DOT, brian.varrella@state.co.us

The CRS Program – Looking at Current Changes & Considering Measures of Effectiveness

Bill Lesser, CFM, FEMA HQ, bill.lesser@fema.dhs.gov
Additional Author(s): William L. Trakimas, CFM, ISO Community Hazard Mitigation; Molly J. O'Toole, PE, DWRE, CFM, Molly O'Toole & Associates, Ltd.

Implementation of the 2017 CRS Coordinator's Manual began in January 2017. With program update comes the opportunity for CRS communities to incorporate more climate resiliency. The first part of this session will highlight significant program changes, the CRS sea level rise standard and attention to special flood-related hazards. The second part will examine the CRS investigations into program effectiveness and approaches for measuring community success with CRS. This session will highlight the CRS's success stories website and studies that document the benefits of CRS. The goal of this session is to provide participants concrete, factual evidence of the benefits of CRS that they can take back to their communities and use to support more advanced CRS programs. This session will benefit both contractors and local officials.

Biography

Bill Lesser, CFM, works in the FEMA Federal Insurance and Mitigation Administration, Mitigation Directorate, Floodplain Management Division as the National Coordinator for the National Flood Insurance Program's (NFIP) Community Rating System

(CRS).   He coordinates overall operation of CRS through the ten FEMA Regional Offices with the support of Insurance Services Office which provides field delivery of the CRS to communities.   Bill has worked with FEMA since 1993 in various capacities including NFIP Community Eligibility and Compliance, Congressional Affairs, as a Subject Matter Expert with the FEMA National Emergency Training Center and most recently as the CRS National Coordinator. Prior to working for FEMA he worked with the Commonwealth of Virginia in the Floodplain Management Branch and with the Commonwealth of Massachusetts with the Department of Environmental Management.

CRS Cycle Visits Since 2013: Nuances, Triumphs, & Tribulations
Kimberley Pirri, PE, CFM, AECOM, kimberley.pirri@aecom.com

In 2013, a new Coordinator's Manual was issued for the Community Rating System. The 2013 manual represented a complete overhaul of CRS Activities, with significant changes to prerequisites, criteria, and scoring. Communities undergoing their first cycle verification visit were presented with the challenge of reviewing their entire program against the new manual and revamping their submittals to meet the new metrics and criteria.   Several communities in the Denver area have called on AECOM to assist with the program review, data gathering, documentation processing, and coordination needed to support these first Cycle Verifications. AECOM's team of engineers and GIS specialists have served as extensions of the communities to accomplish these tasks and have learned the nuances and experienced the triumphs and tribulations of the Cycle Verification process alongside our clients.   Join us for a presentation that highlights those lessons and successes.

Biography
Ms. Pirri is a Surface Water Design Engineer and Project Manager with 18+ years of experience in floodplain and stormwater management. Kim is also AECOM's local Floodplain Subject Matter Authority in Colorado supporting floodplain management permitting and project analysis needs across the Rocky Mountain States, including Community Rating System and Hazard Mitigation Plan support.

Coordinating CRS Success on a County Scale
Cynthia Addonizio-Bianco, AICP, PP, LEED BD+C, CFM, Tetra Tech, cynthia.bianco@tetratech.com
Additional Author(s): Rob Flaner, CFM

Success in the CRS program is predicated on an understanding of the programmatic capabilities of the community and how well it can address the CRS activities. To help communities address the obstacles that can prevent participation in the CRS, assessing baseline flood management capabilities will help communities gauge if they are ready to request a Community Assistance Visit (CAV) which is a pre-requisite to submittal of an application join the CRS program. To illustrate a progressive approach to leveraging resources, this presentation will look at case study of a county-wide CRS initiative based on the performance of a community baseline assessment of its programmatic capabilities to understand its readiness to attain sustainable participation in the CRS and to provide improvement statements to ready the community for successful participation in the CRS. The benefits of this pre-screening on a county-wide basis will be illustrated by a case study of Hudson County which is developing a complete CRS Action Plan tailored to each of the twelve Hudson County is communities. The result of the program, the CRS Action Plan, will serve as an ongoing resource for each community to support application and to maintain CRS participation. The baseline assessment is designed to meet and exceed the FEMA pre-qualification checklist for communities and will effectively evaluate the available resources and capability for sustaining CRS participation.

Biography
Ms. Addonizio-Bianco has over 25 years of experience in engineering and planning with a focus on flood mitigation and community resilience projects. Her experience includes the development and support of Post Sandy New Jersey resiliency plans as well as eleven New York Rising Community Reconstruction plans which focused on the implementation of short and long term solutions to reducing flood impacts on communities while supporting overall economic vitality.   As Community Resilience Program Manager at Tetra Tech, Inc., manages a wide range of resiliency and mitigation projects in accordance with HUD, FEMA and state requirements. These post-disaster plans include state of the art planning tools have be utilized to provide implementable plans.   Her recent experience in the field of community reconstruction has underscored her commitment to supporting the resilience of communities using traditional mitigation as well as community-based economic resiliency planning. Ms. Bianco is a Certified Floodplain Manager (CFM) and a Licensed Professional Planner in the State of NJ with accreditation from the American Institute of Certified Planners (AICP). In addition she is a LEED (Leadership in Energy and Environmental Design) Accredited Professional in building design and construction.

F3: Beyond Flood Modeling: Assessing Other Hazards & Components
Moderator: Nathan Slaughter, AICP, CFM, ESP Associates, nslaughter@espassociates.com

Mud & Debris Flow Study in Aspen, CO

Dai Thomas, PhD, Tetra Tech, dai.thomas@tetratech.com
Additional Author(s): Andrew Earles, PhD; Jim O'Brien, PhD; April Long

The City of Aspen, Colorado is located at the base of Aspen Mountain in the Rocky Mountain Range. Historically, the City has experienced mud and debris flows originating from Aspen Mountain with documented events occurring in 1919 and 1964.   The City conducted a mud and debris flow assessment to: (1) evaluate the potential risks (2) assess the economic costs including damage and cleanup, (3) set regulatory hazard mapping zones, (4) evaluate the potential impacts of wildfire on mud and debris flows, (5) develop mitigation alternatives, and (6) provide a tool for the City and land developers to assess the flooding impacts of proposed development on downslope properties including the impact and static forces on proposed buildings.   A FLO-2D model was developed that covers Aspen Mountain watersheds and the urban area from the base of the mountain to the Roaring Fork River. Rainfall runoff and infiltration was simulated with the model   in the watershed for the 1-hour, 2-, 5-, 10-, 20-, 50- and 100-year peak rainfall events. The hydrology was validated by comparing the predicted flood hydrographs to an existing Storm Water Management Model and comparing the unit runoff rates with other nearby studies.   The predicted flood hydrographs entering the urban area were supplemented with discharge versus sediment concentration rating curves to simulate hyper-concentrated sediment flows originating at points of concentration along the base of the mountain. The model output was used to develop (1) depth of inundation mapping, (2) risk hazard mapping and (3) integrated with cost-damage curves to assess the economic costs, and (4) to update the City's regulatory mudflow zones. Flood hazard scenarios associated with water flooding to mudflows were analyzed to consider conceptual mitigation measures. Buildings, street flow, walls, impervious areas, and hydraulic structures were some of the urban features model with FLO-2D mudflow component. Additional analyses were conducted to evaluate the potential impacts of wildfire on hydrologic runoff and on mud and debris flows.

Biography
Dr. Thomas is a Senior Water Resources Engineer at Tetra Tech and is based in their Fort Collins Colorado office. His primary area of expertise involves the integration of hydrology, hydraulic engineering, and river mechanics with fluvial geomorphology to solve river stability, flooding, and environmental problems. He primarily has worked on projects throughout the western and mid-western United States involving a broad range of stream types and physical environments.

Simulating Surface Runoff & Sediment Transport Using CHRE2D Model

Jennifer Duan, University of Arizona, gduan@email.arizona.edu

CHRE2D is a two-dimensional hydrodynamic and sediment transport model that simulates surface flow routing and sediment transport using numerical solutions of shallow water equations and the kinematic or diffusion wave approximation. The shallow water equations are discretized by the first-order Godunov-type finite volume method. The stability analysis showed that the friction source term increased exponentially as flow depth became very small. This breaks the balance between the friction and the slope source terms. An approximate solution to the momentum equation, kinematic or diffusion wave approximation, are introduced to compensate this balance. This technique enables the numerical model is accurate, robust and stable for both very shallow overland (e.g. 10-10 m) and concentrated channel flows. The resulted CHRE2D model is capable of simulating both hydrological flow (e.g. surface flow routing) and hydraulic flow (e.g. dam break), which has not been achieved in similar commercial software, such as FLO2D, ARM2D. Additionally, the CHRE2D model implemented the Grass-type sediment transport formula to simulate the total sediment load in both overland flow and channel flow. The application of CHRE2D model to the Rillito River watershed in Tucson, Arizona, and the Walnut Gulch Experimental Watershed in the Southwest Arizona will be presented. The sensitivities of modeling results with respect to land cover, land use, and soil types are analyzed. Further development of the model's capability to accommodate other hydrological processes, such as evapotranspiration, infiltration, are discussed.

Biography
Dr. Jennifer Duan, is the Delbert Lewis Distinguished Professor in the Department of Civil Engineering and Engineering Mechanics at the University of Arizona. She is a registered PE in Arizona and Nevada. She has won the prestigious National Science Foundation Career Award. She is the Principal Investigator in many federal, state, and local government funded projects. She has over 50 publications in peer-reviewed journals and conference proceedings. She also taught HEC-RAS2D training courses to many engineers in Arizona.

Connecting Mapped Risk to Actual Risk to What's at Risk
David Skuodas, PE, LEED, AP, CFM, Urban Drainage & Flood Ctrl. Dist., dskuodas@udfcd.org

There is a disconnect between how we map flood risk and how we use the assumptions from our floodplain models to inform how we manage vegetation along our stream corridors. Rarely do we revisit the original assumptions used to map our floodplains when pondering vegetation management. How much does vegetation management matter, and where? How could we efficiently analyze field conditions for miles and miles of floodplains and compare them back to the original modeling assumptions? How might we bridge this gap to make better use of our limited maintenance dollars, and to ensure that the actual flood risk aligns closely with the mapped flood risk? We typically map floodplains using a flood event based on specific rainfall intensity, volume, and duration, with static topography and fixed roughness values. In reality, flood discharges don't behave exactly like the design flood, geomorphology and erosion lead to topography changes, and vegetation health and density can fluctuate wildly. Vegetation changes happen fairly gradually (i.e. noticeably), can have a significant impact on roughness values, and are something we should be able to manage to reflect the mapped flood risk. Of the factors that impact flood hydraulics, it may be the easiest to manage.   This presentation will discuss ways we can be more strategic in our designs to account for mature vegetation, ideas for documenting and using roughness values in GIS to better inform how we manage vegetation, will look at case studies of various streams to illustrate how sensitive flood elevations can be to changes in vegetation, and will emphasize the need to consider the context of a particular stream reach when designing for and managing vegetation as it relates to flood hydraulics.

Biography
David Skuodas works at the Urban Drainage and Flood Control District (District), where he manages design, construction, and maintenance projects in Boulder and Adams Counties. He has worked at the District for the past 6 years. David was heavily involved in recovering from the 2013 Colorado flood in Boulder and surrounding areas, and is currently involved in over 30 projects worth a total of over $100 million in on going design and construction.   Prior to working at the District he was an engineering consultant for 9 years in Kansas, Nebraska, and Colorado working for clients such as the District, the U.S. Army Corps of Engineers, the Southeast Metro Stormwater Authority, the Colorado Department of Transportation, and the Colorado Water Conservation Board.   David received a Bachelor of Science Degree in Civil Engineering from the University of Florida in December of 2000. David is a registered Professional Engineer, a Certified Floodplain Manager, a LEED Accredited Professional, and a Toastmasters "Competent Communicator".

F4: Watershed-level River Planning & Management
Moderator: Claire Jubb, AICP, CFM, Charlotte Cnty., FL, claire.jubb@charlottecountyfl.gov

One Watershed, One Plan: A Case Study of Integrated Watershed Planning for Multiple Benefits
Shawn Tracy, HR Green, stracy@hrgreen.com

Comprehensive watershed management is being used in Minnesota to prioritize, target and measure implementation programs and projects that address multiple benefits for each dollar spent. Flood damage reduction and landscape and infrastructure resiliency efforts can be paired with water quality, water supply, habitat and recreational use benefits through integration of existing and supplemental plans, research, field data and local, on the ground knowledge of resource managers through our watersheds. This presentation provides an overview of the Watershed Approach and Minnesota's One Watershed, One Plan (prioritized and targeted implementation plan) process that achieves truly comprehensive, optimized water management on the HUC8 to field scale.

Biography
For 17 years, Shawn has served as project principal on watershed studies, planning and management focused on prioritized, targeted and optimized implementation. He leads watershed planning efforts on multiple-stakeholder projects such as Minnesota's One Watershed, One Plan program. Shawn's system's related experience is focused on watershed analysis and modeling, stream ecological functions analysis and restoration and stormwater management. He has been involved in such projects in Minnesota, Iowa, Missouri, North Dakota, South Carolina, New Mexico and Alaska. He is passionate about developing fully integrated plans that prioritize actions based on the cumulative benefits of ecological, economic and social values they facilitate.

Souris River, ND: Collaborative Flood Risk Mitigation Success Story

Terry Zien, PE, CFM, USACE, terry.r.zien@usace.army.mil
Additional Author(s): Michael Hall, North Dakota DES

The Souris (Mouse) River flows from Saskatchewan, Canada, into North Dakota through the communities of Burlington, Minot, Sawyer, Velva and then into Manitoba, Canada. The Souris River had a flood of record in 2011 with flows of 27,400 cubic feet per second at Minot. These flows devastated the basin's urban and rural communities, caused evacuations of more than 11,000 residents, and approximately $1 billion in damage to private and public property. A number of very significant knowledge gaps in the hydrology and hydraulics of the Souris River basin were revealed by this flood. These gaps led to difficulty in dealing with the rising floodwaters as well as planning for wise use of the floodplain in the recovery process. USACE, in collaboration with the ND Silver Jackets interagency team, developed a white paper to define the gaps. Seven major studies were identified: basin-wide hydrology, updated hydraulic models that included the headwaters in Canada and the downstream reach in Manitoba, areal coverage of the flow and stream gage network, interim risk reduction measures for the existing federal project features, non-structural mitigation, emergency action plan development, and a reservoir system analysis. An additional project to provide AHPS-quality flood inundation mapping has begun. The development of all of these products has involved continual engagement of the federal and state Silver Jackets team members, Canadian agency representatives, the Souris River Joint Board (SRJB), consultants, and the International Joint Commission (IJC). This has enabled one common set of engineering models to be developed and used by all parties, with on-going updates. In April of 2015, a series of public meetings was conducted for property owners in the rural ranch areas outside of the municipal boundaries in the basin, which has resulted in the implementation of a $23 million non-structural flood risk mitigation project using non-federal funds. Other basin-wide-studies are in progress and will use the existing engineering products.

Biography
Terry Zien is a Civil Engineer, worked at a consulting firm for 3 years (1985-1988), worked at the St. Paul District of USACE since May 1988 (28+ years) in Design, Hydrology, Hydraulics, and Programs and Project Management. He is currently the Program Manager for Planning Assistance to States and Flood Plain Management Services, Flood Risk Management, and the Silver Jackets Coordinator for MN, WI, and co-coordinator for ND. He is an adjunct employee to Emergency Management as needed for flood reconnaissance, State EOC liaison, and the St. Paul District Temporary Housing team. He has a BS degree in Geology, U of MN, 1983, and a MS degree in Civil Engineering (Hydrology and Hydraulics/St. Anthony Falls Hydraulic Lab), U of MN, 1985. Mr. Zien is a Licensed Professional Engineer in MN since 1991 and has been a Certified Floodplain Manager (CFM) since May 2012.

The Yellow River Initiative & the Restoration of the Kankakee River Basin

Robert Barr, Indiana University - Purdue, rcbarr@iupui.edu
Additional Author(s): Siavash Beik

The Kankakee River Basin is one of the most extensively modified watersheds in Indiana. Since 1977 the Kankakee River Basin Commission (KRBC) has struggled to balance drainage with sediment loss, flooding, and a long, increasing list of competing uses. The never-ending cycle of dredging and clearing the river has become increasingly unsustainable, and the politics of an interstate river basin more difficult. The KRBC has never tried to manage the basin in a vacuum; the Kankakee may be the most studied watershed in Indiana, but the questions have changed. A growing body of work has demonstrated that rivers need to be managed as systems. The "patch here and dredge there" strategy doesn't work. It simply moves the problem. The KRBC is part of this paradigm shift. They have fought with budgets and eroding sand dunes and flooding longer than anyone, and there is always more sand and water than money. The KRBC has recently asked the multimillion dollar question: "is there a better way to manage this river system?" There are no easy answers, but the KRBC with the help and support of the Indiana Silver Jackets has been working on new ways to better manage the Kankakee River Basin. In this presentation, we will discuss the new direction of the KRBC. A new path to better understand and address the many challenges facing the Kankakee River Basin – the Everglades of the North.

Biography
Robert Barr is a research scientist (fluvial geomorphology and hydrology) at the Center for Earth and Environmental Science at IUPUI. His primary research focus is on understanding the physical processes and form necessary to achieve and maintain healthy stream systems in a changing landscape. Bob has participated in numerous large-scale stream assessments, including the Yellow and Maumee Rivers in northern Indiana, Eagle Creek and White Lick Creek in Central Indiana, and several small streams in the Toiyabe and Toquima Mountain Ranges of north-central Nevada. Bob's current projects include the Indiana Fluvial Hazard Mitigation Program, the School Branch National Water Quality Initiative, the Kankakee River Basin Restoration

Initiative, and the Indiana Silver Jackets low head dam initiative. In addition to his academic research interests, Bob has served as a consulting hydrologist and fluvial geomorphologist for over 12 years.

F5: Modeling to Mapping to Warning
Moderator: Doug Marcy, NOAA, doug.marcy@noaa.gov

Rapid, Dynamic, & Real-Time Flood Inundation Mapping for Emergency Mgmt. (& Planning)
Sean McFeely, Riverside Technology, sean.mcfeely@riverside.com
Additional Author(s): Katherine Balster, Jude Kastens, James Halgren, Kevin Dobbs

The availability of accurate current and near-future flooding extents and depths is paramount for emergency management organizations to efficiently and effectively organize mitigation and response efforts. Knowing water depth along flooded routes is crucial to safely navigate firefighters and medical staff to their destinations while also protecting critical infrastructure. Creating continuous inundation maps has in the past required extensive hydraulic modelling and mapping algorithms, which, due to potential instabilities and long modelling times, is impractical in emergency situations. We are presenting a novel approach to rapidly and reliably generate real-time flood extents and depths for use in emergency management as well as floodplain planning. Riverside's Flood Inundation Mapping (FIM) approach is fast, dynamic, operational, scalable, flexible and, most importantly, practical. Computation of the FIM extents and depths is driven in real-time by current or forecast water levels at local or USGS gages along the reach. Dynamic river profiles between gaged points are estimated based on pre-computed hydraulic model results or other water level profiles, and inundation extent is quickly mapped using elevation modeling analysis. Because of its use of real-time observations of water levels, and the fact that it can compute miles of flood extents and depths in mere seconds, the system provides current situational awareness for emergency managers. FIM can be integrated into data and information streams already in use or FIM products can be accessed through the web, with the latter providing easy on-line access without committing local staff and IT resources during crucial times. This presentation will cover the development of this new approach to real-time inundation mapping and the specific ways the technology benefits floodplain managers and emergency managers.

Biography
Sean McFeely has over 15 years of experience working with software development teams. He specializes in communications between subject matter experts, engineers and customers to help turn complicated engineering requirements into user friendly solutions. His experience includes quality assurance, project management, user experience design and product management. He has worked in a variety of industries including structural design, data management, manufacturing and environmental sciences. While at work, you will find him doing market research, mock ups, prioritization, documentation, risk mitigation, project plans, task break down, and user interface design. Sean is currently working with Riverside Technologies to make affordable state of the art flood inundation mapping technology available to those in need.

Rapid Flood Mapping Using Inundation Libraries
Jude Kastens, University of Kansas, jkastens@ku.edu
Additional Author(s): Kevin Dobbs, James Halgren, Katherine Balster

Researchers at the University of Kansas (KU) developed a topographic floodplain model (FLDPLN) that has been used to map floodplains for many rivers and stream networks using simple hydrologic flow principles. The primary output from FLDPLN consists of a Segmented Library of Inundation Extents (SLIE). Once constructed, SLIEs can be used for rapid estimation of stage-dependent flood extent maps and depth grids calibrated to any point-source water surface elevation information such as from stream gages, high water marks, or shoreline points. With their quick turnaround and potentially wide-area coverage, SLIE outputs can improve situational awareness in support of maintaining a common operating picture during flood disaster response efforts and damage assessment. Preparedness applications include historical event simulation and scenario modeling. SLIEs have been developed for most of central and eastern Kansas using high resolution LiDAR elevation data, and also for several other sites around the nation and the globe. KU has partnered with Riverside Technology to enable SLIE outputs for end users, on-site or via the web, including near real-time depiction of estimated current and predicted flood extent and depth along with other features facilitative of information exchange with disaster response personnel. We will provide an overview of the FLDPLN model and highlight several real examples of flood extent estimation using SLIE outputs and associated tools.

Biography
Jude Kastens is an assistant research professor working for the Kansas Biological Survey (KBS) at the University of Kansas. He holds a PhD in mathematics from KU. Since 1999, Jude has worked for the Kansas Applied Remote Sensing (KARS) Program at KBS, where the focus of his work involves using remote sensing and other GIS data primarily for agricultural applications and for applications in flood and floodplain mapping and modeling, including extensive use of LiDAR data. His responsibilities extend to ecological modeling and assessment, wetland research, reservoir studies ranging from sedimentation to dam breach modeling, land cover mapping and change detection, and whatever else crosses his path.

The Water Is Rising – Scalable, Reliable, & Relevant Flood Warning & Forecasting Supporting First Responders

Jim Keith, PE, CFM, Walter P. Moore & Assoc., jkeith@walterpmoore.com
Additional Author(s): Andy Yung, PE, CFM; Nick Fang, PhD, PE

Changes in climate are resulting in more extreme events, both in terms of rainfall intensities or lack thereof, as well as additional uncertainty in spatial and temporal rainfall distribution. The challenge and need for effective Flood Warning Systems has never been greater. Each community's flood risk is unique, and therefore there is no silver bullet or one-size-fits-all solution when it comes to Flood Warning Systems.   Walter P Moore and Associates (WPM), in partnership with the University of Texas at Arlington (UTA), is developing scalable Flood Warning & Forecasting Systems which will enable City Emergency Managers to identify areas of inundation based on real-time rainfall information and allow the timely dispatch of first responders to close roads, evacuate, shelter-in-place, and/or begin rescue operations. Our approach generally includes a half-day workshop with City staff to determine user base, information needs, and how the data will inform decision-making and emergency response actions. Based on community needs and available data, the systems can range from simple tools to real-time, fully dynamic modeling and mapping.   This presentation will start with the need for Flood Warning Systems, technical challenges associated with response time and forecasting, community involvement, and the building blocks of a useful system. The authors will then demonstrate the variety of data needs, user groups, and features of an operational Flood Warning System which can be tailored to the specific needs of individual communities. Given the challenges and importance of disseminating reliable and relevant flood warning information to the public, the opportunities of fusing social-media into Flood Warning Systems will be discussed in the presentation.

Biography
Jim Keith is the Water Resources Practice Leader for Walter P Moore. He received his Bachelor of Science in Hydrology and Water Resources from Tarleton State University in Stephenville, Texas. Jim has over 16 years of technical and managerial experience in water resources planning and design projects including open channel and storm drain design, dam and levee design, breach analyses, and flood warning systems. Experienced in project management, business development, and recognized as a subject matter expert in his field, Jim is adept at listening to clients to successfully deliver efficient solutions on complex projects. Outside of work, he enjoys spending time with his wife and four children, cooking on his Big Green Egg, and writing and recording music.

F6: Levee Risk Modeling
Moderator: John Brubaker, PE, CFM, North Carolina DPS, dan.brubaker@ncdps.gov

Web-based Automated, 2D Levee-Failure Flood Simulation using DSS-WISE™ Lite
Mustafa Altinakar, PhD, University of Mississippi, altinakar@ncche.olemiss.edu
Additional Author(s): Marcus McGrath & Vijay P. Ramalingam, University of Mississippi; James Demby, Jr., PE, National Dam Safety Program, FEMA

National Center for Computational Hydroscience and Engineering (NCCHE) at the University of Mississippi (UM) developed a new version of the DSS-WISE™ Lite capability for web-based-automated dam-break flood modeling and mapping. The project was funded by the Federal Emergency Management Agency (FEMA). The previous version of the DSS-WISE™ Lite was available through DSAT (Dams Sector Analysis Tool) hosted on a server at the Argonne National Laboratory (ANL). The new DSS-WISE™ Lite capability is a standalone version accessed through DSS-WISE™ Web portal, hosted on a server at NCCHE. The simulation scenario is set up in 12 easy steps through a web-based graphical user interface (GUI) with a map server. The preparation of the input data for the numerical model, based on the user-provided scenario, is fully automated. The computational domain is a DEM, which is cut automatically from the USGS NED with 1/3 arc-second resolution with the user

specified cell size from 20 ft to 200 ft. The levees from the National Levee Data database are burned into the DEM at the specified cell size. The Manning's roughness coefficients are assigned based on the classified land use/cover available from NLCD 2011. The new version of the DSS-WISE™ Lite includes an option to propagate user-specified breach hydrograph over the natural terrain. This option can be used to simulate levee-breach flood propagation. Given the exceptional computational performance of the DSS-WISE™ Lite solver, this capability can also be used for real-time simulation-based emergency response planning. The paper briefly presents the new DSS-WISE™ Lite capability and demonstrates its use for simulating levee-failure floods using an example case.

Biography
Dr. Mustafa Altinakar is currently the Director and Research Professor at the National Center for Computational Hydroscience and Engineering (NCCHE) of the University of Mississippi in Oxford Mississippi, USA. He obtained his Ph.D. (1988) in Hydraulics at the Hydraulic Research Laboratory (LRH), Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, M.S (1980) and B.S. (1978) degrees in Civil Engineering at the Middle East Technical University, Ankara, Turkey. He also holds a Masters in Applied Mathematics from the Department of Mathematics at EPFL (1987). Before joining the NCCHE in Deber 2002, Dr. Altinakar served as the Acting Director of LRH-EPFL from 2001 to 2002 and the Head of the Fluvial Hydraulics Section of LRH-EPFL from 1997-2001. From 1989 to 1997, he was a Senior Design Engineer and Project Manager at Bonnard and Gardel Consulting Engineers Ltd. in Lausanne and took part in large-scale projects, including design of dams, hydroelectric power plants, flood protection schemes, drinking water supply and waste-water collection networks, etc. in Switzerland, France, Turkey, and North African countries. His research interests include fluvial hydraulics and its environmental aspects, sediment transport and local scour, flood simulation and mapping, natural hazards and emergency management, integrated watershed management, transport and fate of contaminants. He co-authored text books on hydrodynamics and on fluvial hydraulics, and has more than 150 publications. He is a member of the ASCE, IAHR, ASFPM and ASDSO. He is the past chair and current member of the IAHR Fluvial Hydraulics Committee.

Levee Performance & Floodplain Risk Analysis with HEC-WAT
Lea Adams, PE, USACE, lea.g.adams@usace.army.mil

The HEC-Watershed Analysis Tool (HEC-WAT) was developed by the USACE Hydrologic Engineering Center as a systems-based tool for integrating hydrologic, hydraulic, reservoir simulation and flow consequence evaluations. The Flood Risk Analysis compute option within HEC-WAT is a Monte Carlo-style compute that can be used to evaluate risk in a floodplain considering uncertainty in hydrologic and hydraulic inputs as well as multiple sources of flooding. This presentation will describe the HEC-WAT framework, demonstrate how HEC-WAT integrates other software such as HEC-HMS and HEC-RAS, and illustrate the application of HEC-WAT to evaluate risk in the interior of a floodplain as well as levee performance.   In addition, this presentation will cover how HEC-WAT analyses can support a new flood risk metric under development by USACE in support of FEMA National Floodplain Insurance Program levee certification. The new levee performance metric considers levee strength as well as overtopping height and reflects levee performance across the full range of possible flood events. This presentation will show that the HEC-WAT FRA compute option is well-suited to provide this type of evaluation for levee systems.

Biography
As the HEC Water Resource Systems Division Chief, Lea Adams currently supervises a group of thirteen staff with expertise in engineering, economics and computer science. Under Lea's direction, the WRS Division manages the training and technology transfer activities of the Center, and develops and integrates analytical methods for water resource planning activities. Technical and functional responsibilities of the Division are the training program administration; reservoir systems; water resource systems optimization; flood damage analysis; risked-based analysis; ecosystem restoration; and watershed studies. Lea has also served as an advisor to the USACE Nonstructural Flood Proofing Committee since 2013.   Prior to joining HEC in August 2013, Lea served a total of three years as first the Chief of the Hydraulic Design Section, then Chief of the Hydraulic Analysis Section of the USACE – Sacramento District. Technical work performed in the two sections supported more than 30 ongoing studies, and encompassed both dam safety and flood risk management projects. Lea joined the Corps via the Sacramento District in 2006 after 11 years with the private sector in water resources engineering.   Lea received a B.S. in Civil Engineering from the University of California, Davis, in 1993 and an M.S in Civil Engineering from the University of Washington in 1995. She is a registered engineer in the states of California and Washington.

Planning for Levee Breach in Dubuque, IA: Modeling & Development of Mitigation Strategies
Andy McCoy, HDR, andrew.mccoy@hdrinc.com
Additional Author(s): Rusty Jones, Deron Muehring

The City of Dubuque, Iowa, has evaluated the effects of the resultant flooding from a hypothetical Mississippi River levee breach along the City's levee system, the consequences of its failure, and has identified opportunities to mitigate the impacts from a levee breach. The United States Army Corps of Engineers (USACE) has performed hydraulic modeling to simulate the resultant flooding from five levee breach locations along the City's levee system. The USACE levee breach analysis was excellent starting point for additional more detailed analysis of evacuation routes, potential flood hardening, and overall resiliency planning and design. HDR has supported the City with further technical assistance, additional hydraulic modeling, breach parameter review and sensitivity analysis, and further identification of mitigation alternatives. As a result of this study, the City can supplement the development of an emergency action plan to protect its citizens from the impact of a hypothetical levee breach. The USACE HEC RAS 5.0 model was augmented with additional break lines, spatially varied Manning's roughness coefficients, and inclusion of buildings within the model domain. The additional modeling, further defined the depth of inundation, time to inundation, and inundation paths at critical infrastructure and transportation corridors for the hypothetical levee breach scenarios. The additional modeling provided an evaluation of how sensitive the hydraulic characteristics of the resultant flooding are to different breach locations (total of seven), characteristics (breach width and time to development), and river conditions (3 different events). This has helped the City further understand their risk and helped drive the identification of risk mitigation measures. An alternatives analysis for screening and evaluating potential projects, strategies, and solutions was conducted including an opinion of probable cost and a list of recommended projects, strategies, and solutions.

Biography
Dr. Andrew McCoy is a senior water resources engineer and numerical modeler, with more than 17 years of experience using computational hydraulics to complete evaluations involving flood inundation, river hydraulics, transportation facilities, channel restoration and stability, fish-passage facilities, water/wastewater facilities, trapping and collection systems, water supply planning, and suitability of habitat for select species. He has led numerical modeling studies for energy clients with complex flooding concerns and transportation clients with complex bridge configurations which require optimizing bridge openings and reducing flood levels upstream. He has led multiple studies considering spillway operations and their impact on downstream velocity patterns and bed shear stresses. He is a recognized expert in solving civil engineering problems with numerical modeling, and he has also authored peer-reviewed journal articles and conference proceedings in these areas. He has performed engineering studies and analysis in these other areas as well: prioritization of infrastructure projects in watersheds, watershed hydrology and hydraulics, stream restoration, water supply planning, suitability of freshwater mussel habitat, total dissolved gas modeling, bridge hydraulics/scour, river bank protection, pipeline and well-field layout, reservoir operations and sedimentation, cost estimating, water rights analysis, groundwater/surface water interaction, outlet works rating, stream gage siting, rating curves, and channel losses. His relevant computer modeling experience includes:

F7: Tools for Risk Communication & Floodplain Management
Moderator: CeCe McKiernan, CFM, Florida Floodplain Mgrs. Assn., executivedirector@flfloods.org

Crowdsourcing Mobile Apps in Floodplain Management
Gopal Raja, Ideation, Inc., gopal.raja@ideationinc.com
Additional Author(s): Lisa Apperly

Obtaining real time, georeferenced, perishable information during pre- and post-disaster events is critical to response, recovery, and mitigation data analysis and activities. With the proliferation of various mobile technologies and solutions, it has become easier to obtain a reliable set of data from the affected citizenry through crowdsourcing. Crowdsourcing is the practice of engaging a "crowd" or citizenry for a common goal, such as problem solving, data collection, or real time communication. Crowdsourcing is powered by new web technologies and social media, and it can take place on many different levels and across various industries. This presentation will focus on crowdsourcing for the purpose of floodplain management where the "crowd" may comprise roles such as a sensor, social computer, or micro tasker. However, given the variety of options that are available, it may be challenging for a response organization such as a federal, state, or local agency to determine which mobile solution(s) to use for the situation at hand. This presentation will address key elements of crowdsourcing mobile solutions, the current state of the technology, the latest innovations and applications in this field, and future opportunities. During this presentation, the following questions will be answered: -What are the different types of crowdsourcing mobile solutions? - What floodplain management crowdsourcing mobile solutions are currently being used? -What are some potential future directions and opportunities for floodplain management crowdsourcing mobile solutions? The information provided in this presentation will impart the knowledge needed as a basis for making an informed decision on implementing effective crowdsourced mobile

solutions.

Biography
Gopal Raja, Ideation's founder and President, holds an M.S. in Civil Engineering from Carnegie Mellon University and a B. Tech. in Civil Engineering from the Indian Institute of Technology. As an experienced information technology professional, he has worked with clients in both private industry and the federal government. Before launching Ideation in 2000, Mr. Raja served in such roles as Director of Software Engineering, Solutions Development Team Leader, and Chief Technology Officer for private companies serving mainly federal clients. He has recruited and managed numerous technology teams, supervised the day-to-day operations of engineering and software development groups, and worked with corporate clients and federal agencies to optimize their technological and organizational capacity. Mr. Raja holds two U.S. patents for innovations in information technology and two additional U.S. patents are currently pending approval on IoT applications in natural hazard risk management. Mr. Raja recently led the design and deployment of four mobile apps for the Federal Highway Administration, and these apps are currently being used by Federal Highway Inspectors across the nation. Mr. Raja is also currently leading the efforts for FEMA's Chief Technology Officer's FEMA Labs initiative to determine the best application of emerging technologies for whole community-wide communications, secure DevOps environment and data analytics before, during, and after disaster events.

Texas CHARM Engages Stakeholders: A Texas A&M and FEMA CTP Tool for Risk Communication
Steven Mikulencak, AICP, Texas A&M University, smikulencak@tamu.edu

CHARM (Community Health and Resources Management) is an innovative, participatory GIS tool that brings to the public a collaborative and game-style mapping exercise to improve risk awareness and long-range community planning. Equitable land use planning is one of the most effective tools for risk mitigation, and a community vision is too important to leave to the experts alone. The CHARM platform is designed to foster community dialogue and a public vision around these issues, while being informed by data and real-time analysis. In just the last year, with support as a FEMA CTP, Texas A&M University's Texas Coastal Watershed Program has engaged hundreds of stakeholders and elected officials from over two dozen Texas cities, large and small, using the CHARM platform. At these workshops, stakeholders work in teams to imagine their community's future and plan for its growth. Using a low-cost, interactive table-top mapping interface, teams access over a dozen map layers and choose from over a dozen development 'paints' to meet growth targets and future planning goals. In real-time, CHARM provides feedback about floods risks and impacts to homes, critical facilities, and natural areas, among other issues. Wrapping up, each table reveals their planning scenario, sharing their strategies and trade-offs with the larger workshop. The data used in each workshop is local, resulting in practical and meaningful conversations among stakeholders about planning for flood risk. More information can be found at communitycharm dot org.   This presentation will share professional observations gleaned from over a dozen workshops about how participatory GIS, through the CHARM mapping platform, can foster community dialogue about risk, planning, and vision. The presentation will touch on the stakeholder engagement process, the CHARM exercise, and the underlying data set.

Biography
Steven Mikulencak is the Planning Programs Leader for the Texas Coastal Watershed Program at Texas A&M University. He works from Houston, TX and specializes in stakeholder participation and planning tools for local decision-makers. He previously worked in the private sector assisting communities with land use, comprehensive plans, zoning, design guidelines, and GIS analyses. He now develops planning tools and planning outreach programs to support communities in Texas and around the Gulf. Projects include CHARM, The Texas Citizen Planner Program, FEMA CERC CTP Resiliency Workshops, the Highland Bayou Watershed Protection Plan in Galveston County, and is the lead facilitator for the TX RESTORE Roundtables. Projects are supported through partnerships with the National Sea Grant Office, FEMA Region 6, the US Fish and Wildlife Service, the US EPA's Gulf of Mexico Program, and the Galveston Bay Estuary Program. He earned his BS in Geology from Virginia Tech and his Masters in Urban Planning from Cornell University. Information about CHARM can be found at communitycharm dot org.

Federal Partnered Collaborations Helping to Build a Weather Ready Nation
Victor Hom, NOAA, NWS, victor.hom@noaa.gov
Additional Author(s): Kris Lander, PE, CFM

The National Weather Service (NWS) is embarked on numerous collaborative efforts at a local, regional, continental, and international scale to help society prepare for and respond to weather dependent events. Successful collaborations are built on mission, motivation, and drive. Mission, motivation, and drive, which are aligned with common partnered goals and ASFPM, help the collaboration thrive.   With a clear mission, NWS is motivated on its Weather-Ready Nation Roadmap. The roadmap itself is

insufficient to fuel the drive. The decadal analysis of the extreme weather threats, latest weather trends, and flood statistics provides the fuel. Driving the path of societal change is lonely without partners on the band wagon. Group identity fueling group momentum helps drive sustainable collaborations. Fueled by excitement, NWS representatives will share success stories involving collaborations in Flood Risk Communication, Warning, and Disaster Response: •NWS Advanced Hydrologic Prediction Services – Leveraging FEMA Flood Maps •NWS Advanced Hydrologic Prediction Services – Leveraging USACE National Flood Risk Management Silver Jackets Program •Integrated Water Resources Science and Services - Leveraging FEMA, USACE, USGS, and CUAHSI in building a more collaborative environment for sharing data, models, and code. The presentation will cover mission, motivation, and drive in the above programmatic areas in which NWS is collaborating with Federal, State, Regional, Community, and Academic Partners. These successful collaborations are strongly aligned with partnered goals and the ASFPM mission.

Biography
Mr. Victor Hom serves as the National Inundation Mapping Services Leader for NOAA's National Weather Service (NWS) Forecast Services Division Water Resources Services Branch. He helps oversee the water resources requirements, policy, guidance, and developmental activities to extend the functionality of AHPS (Advanced Hydrologic Prediction Service) through improving the communication of flood risks in conjunction with NOAA's water forecasts and warning services. Mr. Hom is also involved in a number of regional, national, and interagency collaborations in addressing the nation's riverine and coastal flood risks.

F8: Stormwater Mgmt. Policy
Moderator: John Gysling, PE, CFM, ASFPM Region 3 Director, New Castle Cnty., DE, jgysling@nccde.org

Stormwater Mgmt.- NAI, the State of the Art
Ron Flanagan, CFM, Flanagan & Assoc., rdflanagan@rdflanagan.com

The Nation's Floodplain Management Program has come a long way since its beginnings in 1969. The Presentation will identify the current 2017 State of the Art in Floodplain and Stormwater Management as practiced in the United States, with an emphasis on Tulsa, Oklahoma, widely acknowledged as a national leader in the field. The Presentation will cover The Natural Floodplains; Stormwater Law; The Impact of Urbanization; No Adverse Impact, Comprehensive Basin-wide Master Drainage Planning, and Multi-Objective Stormwater Facilities Planning. In addition, the Presentation will discuss remaining existing challenges yet to be resolved, such as Overland Flow and The Impact of Urban Development on Natural Channels

Biography
Ron Flanagan, CFM, is Principal Planner with Flanagan & Associates, LLC, Planning Consultants, Tulsa, Oklahoma. The firm specializes in Natural Hazards Mitigation Planning, with an emphasis on floodplain preservation and non-structural Stormwater Management. He has served as the City of Tulsa's Flood Management Consultant since 1974, and developed Tulsa's first and pilot Master Drainage Plan - Ron Flanagan, CFM, is Principal Planner with Flanagan & Associates, LLC, Planning Consultants, Tulsa, Oklahoma. The firm specializes in Natural Hazards Mitigation Planning, with an emphasis on floodplain preservation and non-structural Stormwater Management. He has served as the City of Tulsa's Flood Management Consultant since 1974, and developed Tulsa's first and pilot Master Drainage Plan Vensel Creek. Flanagan was a pioneer in multi-objective planning & design of stormwater facilities, and has planned and designed some of Tulsa's most innovative Flood Mitigation Projects, such as the national award winning Mingo Creek Detention Facilities and Centennial Park. He developed Tulsa's Multi-Hazard Mitigation Plan, one of the first in the nation approved by FEMA. He has been Tulsa's Community Rating System (CRS) consultant, a CRS Class 2 community. His projects have won many national design awards. He is Past-President of the Oklahoma Floodplain Managers Association (OFMA), an ASFPM chapter, a founding Board Member of the Natural Hazards Mitigation Association (NHMA), a founder of Tulsa Trails, recipient of FEMA's Outstanding Public Service Award, and 2009 Oklahoma Emergency Management Association's Outstanding Contribution to Emergency Management Award. The City of Tulsa has named the Mingo Trail system "Flanagan's Way", in his honor. OFMA

How Has Federal Stormwater Program Evolved & What Does it Mean for You?
Todd Williams, Michael Baker Int'l, todd.williams@mbakerintl.com

This presentation will discuss how the stormwater program has evolved over the years and what it may mean for Flood Control Agencies or permitted entities looking into the future. The presenter will draw from his personal experience working as an MS4

stormwater program manager, as a DOT Environmental Director and work as an environmental consultant. The discussion will focus on the evolution of the program at the State and National levels, audits of MS4s, a new focus on green infrastructure, and the benefits on developing positive working relationships with regulators.

Biography
Mr. Williams is a Senior Associate and Environmental Services Director with Michael Baker International in Phoenix, Arizona. Mr. Williams is a leader in the Arizona stormwater field with over 28 years of government experience providing Environmental Services throughout Arizona, the United States and Canada. Prior to working at Michael Baker International, Todd served as the Arizona Department of Transportation's Environmental Services Director (2006-2014) where he was hired to help develop the agency's environmental program and address some serious stormwater compliance issues. Todd also worked at Maricopa County (1997-2006) working at both the Flood Control District of Maricopa County and Maricopa County Environmental Services where he provided stormwater monitoring assistance to Phase I Cities (Phoenix, Mesa, Scottsdale and Glendale), served as a regional resource on stormwater issues and served as the first Stormwater Program Manager for Maricopa County, Arizona. Todd is a founding member of STormwater Outreach for Regional Municipalities (STORM).

Approaches for Determining & Complying with TMDL Requirements Related to Stormwater Runoff
Anna Lantin, Michael Baker Int'l, alantin@mbakerintl.com

Total Maximum Daily Load (TMDL) mandates require municipalities (traditional and non-traditional municipal separate storm sewer systems (MS4s)) to commit extensive resources (BMP implementation, institutional controls, extensive staff time and financial resources) to maintain compliance with stringent water quality regulations to address the federal and state impaired waters program. MS4s are being named as stakeholders in Total Maximum Daily Load (TMDL) management plans. Understanding runoff contributions and identifying the sources of pollutants, and compliance strategies for developing cost-effective TMDL management plans are important steps for maximizing water quality benefit at the least cost. With the overwhelming number of impaired waterbodies and aggressive deadlines MS4s face with addressing TMDL deadlines or for attaining waste load allocations deadlines, a well thought-out plan will provide practical information to help guide MS4s with information for addressing TMDL requirements related to stormwater runoff. This presentation will provide stormwater practitioners with scientific background and strategies to assist with TMDL evaluations and assist with decisions for compliance. A decision tree will be presented to assist stormwater practitioners and regulatory agencies in assessing if the MS4 should participate as a stakeholder in the development of a TMDL. The decision tree will include paths for alternatives to TMDLs, and options for innovative compliance strategies.

Biography
Anna Lantin, P.E. is a Senior Vice President, National Water Practice Lead and West Region Director for Michael Baker International. She is responsible for strengthening the firm's technical expertise and capabilities related to water in stormwater management, water/wastewater, water quality, ecosystem restoration and coastal engineering to ensure innovative project delivery. In addition to managing and sharing the technical information and advancements in water, she is also responsible for developing the practice through staff development and the implementation of strategic business development strategies. Ms. Lantin has extensive experience spanning over 25 years in stormwater management projects in hydrology, hydraulics, sediment transport, watershed restoration, stormwater quality research designs, Best Management Practices (BMP) design, construction oversight, BMP implementation, water quality monitoring, operation and maintenance, and performance data analysis. Ms. Lantin holds a B.S. in Civil Engineering from Colorado State University. She is a licensed professional civil engineer in Arizona, California, Nevada, Tennessee, Washington, and Utah. She is also a certified professional in stormwater quality, a qualified SWPPP Developer and Practitioner in the state of California, and a Construction General Permit Trainer of Record in California. Ms. Lantin is the Chair of the BMP Subcommittee for the California Stormwater Quality Association (CASQA). Her additional professional affiliations include membership in the American Society of Civil Engineers (ASCE), Transportation Research Board (TRB), American Association of Transportation Officials (AASHTO), and the Water Environmental Federation (WEF).

F9: State Chapter Action, Floodplain Regulations, Disaster Recovery
Moderator: Brock Remus, CFM, Atkins, brock.remus@atkinsglobal.com

Building an Effective Legislative Education Program to Support Flood Risk Reduction
Tom Leatherbee, AINS, MCP, CFM, Oklahoma Floodplain Mgrs. Assn., tleatherbee@cityofdelcity.org

Working with congressional and state legislative delegations is often an area of great concern for local officials and members of nonprofit professional organizations. Even setting aside the potential pitfalls related to tax-exempt status and lobbyist registration laws, most organizations and individuals are unable to find the right access, know the right timing or speak the right language, negating any impact they could have had on the legislative process. In Oklahoma, we have built a successful flood risk legislative education program around three core concepts: building relationships by providing value, focusing on issue specific education, and finding triggers to engage coalitions. This presentation will detail the building blocks of an effective legislative education campaign, explain how this campaign avoids areas such as impermissible lobbying activities, and take a closer look at some of its components, including the Map Change Assistance Program.

Biography

Tom Leatherbee is the Insurance and Regulatory Affairs Chair and Legislative Director for the Oklahoma Floodplain Managers Association, Inc. He oversees OFMA's relations with various federal and state agencies, works with federal and state legislators on policy and constituent service matters, serves as a resource with regard to legislative or administrative proposals that may affect floodplain management, and works to build coalitions to encourage flood risk reduction. In the office, Tom specializes in creative development and redevelopment projects. As Director of Community Services for the City of Del City, he is responsible for a consolidated department handling planning, development services, stormwater management and code enforent. He has overseen a number of projects that have used redevelopment financing to resolve longstanding flood risk problems, including demolition and commercial redevelopment of three blighted multifamily properties within the Special Flood Hazard Area and an 8.3 million dollar flood remediation project that allowed for a 50 acre, interstate-fronted mixed use project. He manages two significant Tax Increment Financing (TIF) districts and has negotiated numerous smaller development incentive agreements for rehabilitation of aging retail centers and infill development. Tom has also developed and implemented unique revitalization programs to stabilize city neighborhoods, including a nationally-recognized housing inspection program, an innovative Environmental Court, and a preservation district focused on mid-century Storybook Ranch architecture. Tom is a Certified Floodplain Manager and past Chair of the Oklahoma Floodplain Managers Association and is recognized by the International Code Council as a Master Code Professional, and has used this experience to streamline zoning, permitting and other regulatory approvals to create a risk- aware yet business-friendly environment that has positioned Del City as a competitive advantage for prospective residents and businesses.

Improving the Compliance of Manufactured Homes Installed in Floodplains

Suzanne Sarpong, Arizona DWR, slsarpong@azwater.gov

Permitting manufactured homes (MH) in floodplains (FP) presents many challenges for the local jurisdiction (LJ) from ensuring the permit for installation is reviewed by the floodplain personnel; clarifying which government entity reviews, issues permits and inspects the proposed installation; the relatively new HUD foundation requirements for MH in FP; working with the State Office of Manufactured Housing (OMH) to clarify their level of responsibility for review and approval of MH in FP; and how to better ensure submittal of as-built certification (i.e., Elevation Certificate) to the LJ. The State of Arizona, under a CAP-SSSE funded activity, worked with the OMH and LJ to better understand each entity's role in the permitting/inspection/certification process in order to develop Standard Operating Procedures (SOPs) to ensure greater compliance with the NFIP requirements. Following the formulation of the SOPs, ADWR prepared two presentations, one for floodplain managers and the other for the manufactured home installers, to help explain the permitting process and to facilitate better communication and understanding of the requirements. This presentation will present the information provided to the manufactured home installers at their annual certification training sessions. According to the OMH, this presentation for the installers has greatly contributed to the improvements in the installation practices for manufactured homes in floodplains.

Biography

Suzanne (Suzie) Sarpong is an employee of the Arizona Department of Water Resources in the Floodplain Management Division of Engineering and Permitting. She works with the National Flood Insurance Program (NFIP) Coordinator as the Community Assistance Program (CAP) coordinator, a part of the State Support Services Element grant program funded by FEMA for the NFIP in Arizona. Suzie has over 10 years' experience in floodplain management, having worked at Pima County Regional Flood Control District and the City of Tucson as a hydrologist and engineer, permitting development within regulatory flood hazard areas, prior to working with the State. She is a University of Arizona alumna with a BS in Geosciences and an MS in Engineering and is certified as a CFM and Professional Engineer in the State of AZ.

When Disaster Strikes... Again: Response & Recovery in South Carolina

Maria Cox Lamm, CFM, South Carolina DNR, coxm@dnr.sc.gov
Additional Author(s): Ed Dickson

The State of South Carolina and the entire southeast recently experienced a significant natural disaster in Hurricane Matthew, almost 1 year to the day after what was previously described as 'one of the worst flooding disasters in the State's history'. While the exact extent of the impact of this event is still being assessed, it is clear that this was yet another unprecedented event in a state that is still executing resilience activities following the flooding of last October. This presentation will go into detail about the Hurricane Matthew response and recovery efforts that are underway in South Carolina, while various state agencies are still trying to address the aftermath of the 2015 flood. This presentation will also begin to discuss South Carolina's path forward to becoming more resilient.

Biography

Maria Cox Lamm is the State NFIP Coordinator of the Flood Mitigation Program in the South Carolina Department of Natural Resources, Land, Water and Conservation Division and currently serves as Vice-Chair for ASFPM. She is responsible for the administration, coordination, and direction of all aspects of the South Carolina Flood Mitigation Program. She has been with the agency since July, 2004 and was previously the Associate Engineer in the SC Flood Mitigation Program. She has over 12 years of experience in the field of floodplain management. Maria graduated from North Carolina State University in 1998, and prior to working with the Flood Mitigation Program in South Carolina, she was employed by Wake County (North Carolina) Environmental Services in the Erosion, Flood and Stormwater Section.

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<u>SESSION G</u>
Thursday, May 4 10:30-Noon

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G1: Mitigation Project Process Guidance
Moderator: Robert Freitag, CFM, ASFPM Higher Educ. Cmte. Co-Chair, University of Washington, bfreitag@uw.edu

Elevation Project Outreach Education Tool Kit for Property Owners
Roderick Scott, CFM, L & R Resources, roderick.scott75@aol.com

The program will first overview the importance of this information as the NFIP continues to increase policy rate to actuarial on all pre-FIRM buildings. With an estimated 2.5 – 3million pre-FIRM buildings in the SFHA in the US, property owners need a way to plan, develop, finance and execute these projects and communities are concerned with the prospects of lower property values translating into lower revenues for schools and government operations. The program then proceeds to take the attendees through the education program components. The program examines the elevation certificate as the base information to start the elevation project. The elevation certificate information is then integrated into the project architectural and engineering plans for the job. With the plans developed, it is time to get construction estimates. With the proposed project costs identified a project budget can be finalized and financing sought. This program will review the non-grant financing opportunities for property owners and identify the need for larger pools of capital moving forward. This program will educate attendees of this program about the components of the flood hazard mitigation elevation projects and how important it is to provide this information to pre-FIRM property owners in their communities.

Biography
Rod is a flood hazard mitigation and historic building specialist with over 25 years of general contracting experience and 10 years of flood mitigation elevation experience. He has been involved with project development and management on over 300 flood elevation projects.   Rod has pioneered the development and deployment of the "Outreach Public Education Program" (OPEP), which provides education about how flood mitigation elevation projects work and how to put a project together for property owners. The program started in 2009 after Irene in upstate NY and was redeveloped and redeployed after Sandy along the NE coast in multiple communities. That project won the 2014 ASFPM Flood Proofing Award.   Rod is now consulting with the International Association of Structural Movers (IASM) whose members are involved in flood hazard mitigation elevation/relocation projects. The IASM is developing for deployment a "How to" program to educate property owners and managers about how to plan, develop, finance and execute a flood hazard mitigation elevation project with the National Association of Realtors a webinar for the Association of State Flood Plain Managers and an IASM version for internet distribution.

Best Practices in Home Elevation
Tammie DeVooght Blaney, Int'l Assn. of Structural Movers, tammie@iasm.org

Best Practices in Elevation will present multiple scenarios/case studies of Home Elevation Projects completed in 2016. The session will discuss the impact of sea level rise on communities, the NFIP, elevation certificates, flood hazard mitigation and the implications for changes in public policy. An explanation of the process of applying for and receiving an elevation certificate will be discussed. The NFIP will be discussed and its relation to flood hazard mitigation programs will be a focus of this presentation.

Biography
Tammie DeVooght Blaney is the Executive Director of the International Association of Structural Movers (IASM), a professional association representing over 300 structural moving and home elevation companies. DeVooght- Blaney's roles within the IASM include: managing membership, planning meetings and the Annual Conference, working with all IASM committees, general accounting, speaking at events, legislative outreach, public relations/marketing and serving as Editor of the IASM's Industry magazine – STRUCTURALMOVER. DeVooght-Blaney received her Bachelor's Degree from the University of Wisconsin-Oshkosh and her Master's Degree from Lakeland College in Sheboygan, Wisconsin. She is currently working on becoming a Certified Floodplain Manager through the ASFPM. DeVooght-Blaney is actively involved in working with individuals and communities on projects related to historic preservation, flood hazard mitigation and structural relocation.

*Transfer of Development Rights for Tax-base Neutral Flood Risk Management

Lisa Hollingsworth-Segedy, AICP, American Rivers, lh-segedy@americanrivers.org
Additional Author(s): Eileen Shader, CFM, American Rivers

Flood-prone communities are at increased vulnerability to loss of property and economic competitiveness, however, states like Pennsylvania have little incentive to participate in floodplain acquisition projects due to significant consequences for community tax base. Transfer of Development Rights (TDR), a traditional tool for protecting farmland, historic districts, and other significant land resources, is highly applicable as a catalyst for floodplain acquisition projects since it eliminates the tax base consequences of such actions. Case studies will highlight the benefits and drawbacks of Floodplain TDR (FTDR), examine the specific Pennsylvania land use and municipal government issues that limit the effectiveness of floodplain acquisition proposals, and review how FTDR can be the "missing link" that provides positive economic outcomes for communities considering FEMA floodplain acquisition programs. Session participants will gain an understanding of the application of Floodplain Transfer of Development Rights as a tool for reducing flood risk while improve the economic and tax-base outcomes associated with floodplain acquisition projects.

Biography
Lisa Hollingsworth-Segedy is an Associate Director for River Restoration at American Rivers. Her primary focus is eliminating barriers such as obsolete dams and failing culverts from streams and rivers to reconnect aquatic habitat, improve water quality, eliminate liability, elevate public safety, reduce flood risk, and retire obsolete infrastructure. Her background includes all aspects of water resource planning, environmentally sensitive area protection, community planning and zoning, and project management. She serves on the Board of Directors of the PA Chapter American Water Resources Association, and member of the American Planning Association and the American Institute of Certified Planners.

G2: Research in Floodplain Mgmt.
Moderator: Kenneth Ashe PE, PMP, CFM, Amec Foster Wheeler, ken.ashe@amec.com

*Who Lives in Floodplains? A Demographic Study in Nebraska

Mitch Paine, CFM, Nebraska DNR, mitch.paine@nebraska.gov

This presentation will highlight a 2016 project that the Nebraska Department of Natural Resources completed to better answer the question "who lives in floodplains?" One goal of the NFIP is to reduce the loss of life and property. But, as community leaders and state officials, another important goal is ensuring that nobody suffers more from flooding than anyone else. For this project, we analyzed 2010 Census data in over 60 different communities throughout Nebraska to gather demographic data on populations in the Special Flood Hazard Area. Based on this analysis, we aggregated the data, looked at special areas like X-Zone protected by levee, and developed a report summarizing the demographics of floodplains in Nebraska. Overall, we found a much higher percentage of renters that live in floodplains as well as those who identify as Hispanic/Latino. This new data has major implications for post-disaster planning as well as conducting outreach efforts to inform community members about flood risk. I will detail the rest of our findings in the presentation.

Biography
Mitch Paine works as the National Flood Insurance Program State Coordinator for Nebraska. He works on a variety of floodplain management and flood risk reduction projects for the Department of Natural Resources. He helps communities throughout Nebraska on understanding the NFIP, participating in the NFIP Community Rating System, planning flood risk reduction projects, and maintaining compliance with state floodplain management standards. Mitch manages the FEMA Flood Mitigation Assistance grant for the state of Nebraska and has helped apply for nearly $1 million in grants. Mitch holds a Master of Regional Planning from Cornell University and a Bachelor of Science from the University of Nebraska-Lincoln in Economics. He has previously worked for the World Bank and the Mayor of Lincoln, Nebraska.

Influence of Road Characteristics on Vehicle-related Flood Fatalities

Andrew Gissing, Macquarie University, Risk Frontiers, andrew.gissing@mq.edu.au
Additional Author(s): Matalena Tofa, PhD; Katharine Haynes, PhD, Risk Frontiers

A recent analysis of flood fatalities in Australia identified that 1859 people had died in floods since 1900 (Haynes, 2016). A large proportion of these deaths were the result of people entering flood water in vehicles. There has been some effort in recent

years to address this issue through educational campaigns with limited success. There has, however, been no previous research into how the characteristics of roadways influence the survivability of people in vehicles that enter floodwater.   Risk Frontiers has recently led research to determine the influence of road characteristics such as: location of a roadway, height of a roadway above the surrounding ground, presence of barricades, lightning, vegetation and signage.   This research has involved the research team visiting the locations of various recent vehicle related flood fatalities and undertake an observational analysis of factors that might have contributed to the circumstances of the death. Field visits have been followed up with interviews with local emergency services and local government to ascertain further details and determine what subsequent works, if any, have been completed since the accident or are in development.   This paper will provide an overview of this unique research and provide insights to determine the level of risk posed at certain locations as a consequence of roadway design.

Biography
Andrew is the Risk Frontiers Director Government Business and Enterprise Risk Management. He is an emergency and risk management expert. Andrew has performed various senior executive roles in the emergency management and social services sectors, including as the Deputy Chief Officer of the Victoria State Emergency Service and Director of Risk Management for the NSW Department of Family and Community Services.   Andrew is an experienced crisis leader having held senior state-wide leadership roles during some of Australia's most significant natural disasters such as the 'Pasha Bulka' Storm (2007), Black Saturday Bushfires (2009), and the Victorian Floods (2010/11). He has been author of state-wide disaster plans, policies and resilience strategies, for which he has received several awards.   Andrews's significant professional experience is complemented by his academic achievements having completed a Masters of Science (Honours) Degree and a Bachelor of Economics Degree. Andrew is also a graduate of the Australian Institute of Company Directors and a certified business continuity practitioner.

Creating a Water Risk Index to Improve Community Resilience
Lobna El Gammal, Carnegie Mellon University, lelgamma@andrew.cmu.edu
Additional Author(s): Kelly Klima, PhD

Floods are expensive; as of October, NOAA had already confirmed 13 billion dollar disasters in 2016 related to flooding and severe storm events. While flood risk reduction is an existent discourse and agenda in policy and insurance, vulnerabilities vary between communities; some communities may have aging infrastructure, or an older/poorer population less able to absorb a flood, putting them at increased risk from the hazards. As a result, some are considering environmental justice aspects of flood risk reduction.   To date, catastrophe models have focused on creating floodmaps (e.g., NOAA's Sea Level Rise Viewer, Climate Central's Surging Seas), or on linking hydrological models to economic loss models (e.g., HEC-RAS + HAZUS). However, this approach may be highly inequitable between areas of different income (as well as other demographics). Some have begun work on combining hydrology with vulnerability information (e.g., USACE's North Atlantic Comprehensive Coastal Study). To our knowledge, no one has tried to adapt the more advanced known heat risk theory to water risk by combining hydrology information (e.g., HEC-RAS, floodplain maps) with the social vulnerability (e.g., Cutter et al.) of the residents.   This project will create a method to combine water hazard data with a derived water vulnerability index to help a community understand their current and future water risk. We will use the case study area of Pittsburgh, PA, which faces severe precipitation and riverine flooding hazards. Building on present literature of factors influencing water vulnerability contextualized to the Pittsburgh region, we will identify, quantify, and map the top factors impacting water vulnerability. We will combine these with flood maps to identify the geospatial distribution of water risk.   This work will allow policy makers to identify location-specific aspects of water vulnerability and risk in any community, thus promoting environmental justice.   It is possible that this type of original research would create maps of relative water risk that may prove as understandable to the general public as other flood maps, and may also help to promote "just resilience".   This presentation will present a method to combine water hazard data with a derived water vulnerability index to present work on the geospatial distribution of water risk in Pittsburgh, PA.

Biography
Lobna El Gammal is a graduate student in Carnegie Mellon's Energy Science, Technology, and Policy program. She is completing a concentration in Engineering & Public Policy, under the supervision of Dr. Kelly Klima. Lobna obtained her undergraduate degree in Chemical Engineering at the University of Toronto where she was worked extensively on science and engineering education research. She also has experience working on environmental consulting in Egypt.   Dr. Kelly Klima is a Research Scientist at the Department of Engineering and Public Policy of Carnegie Mellon University with over ten years of research experience on adaptation, hazard mitigation, climate, extreme weather, and risk communication. Her research work supports community resilience throughout the world, and has been applied in the City of Pittsburgh, City of St. Paul, and counties in New Jersey. Previously, Dr. Klima worked at the Center for Clean Air Policy (CCAP), where she helped New York and Washington D.C. advance adaptation planning. Dr. Klima completed her doctoral research in the Department of Engineering and

Public Policy (EPP) at Carnegie Mellon University where she used physics, economics, and social sciences to conduct a decision analytic assessment of different methods to reduce hurricane damages. She has published several journal articles, is an active member of 9 professional societies, and serves on the American Geophysical Union (AGU) Board of Directors and the Steering Committee for the National Adaptation Forum. Dr. Klima also has an M.S. in Earth, Atmosphere, and Planetary Science (MIT), an M.S. in Aeronautics and Astronautics (MIT), a B.S. in Mechanical Engineering (Caltech), and a CFM from the Association of State Floodplain Managers.

G3: Automated Modeling to Identify Risk

Moderator: Victor Hom, NOAA, NWS, victor.hom@noaa.gov

2D Large Scale Automated Engineering for FEMA Floodplain Development in South Dakota

Eli Gruber, PE, CDM Smith, grubere@cdmsmith.com
Additional Author(s): Brooke Conner, PE

Recent innovations and efficiencies in hydraulic modeling and floodplain mapping have allowed the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) to improve the First Order Approximation (FOA) processes, now known as Large Scale Automated Engineering (LSAE). The innovations and efficiencies are in large part due to utilizing two-dimensional (2-D) hydraulic modeling, specifically HEC-RAS 5.0. 2-D modeling allows areas from approximately 1,000 to 1,400 square miles to be modeled with increased accuracy and shorter durations to address current program challenges, including the validation of Zone A studies and the availability of flood risk data in the early stages of a Flood Risk Project.   This presentation will describe the LSAE process through FEMA Region VIII's South Dakota 2-D LSAE Project. Approximately 18,000 stream miles in 25 counties of Eastern South Dakota were modeled and mapped by the Compass PTS JV Team. Discussion will focus on the technical aspects of the hydrologic and hydraulic model development, execution, and calibration. This presentation will also include discussion of the technical challenges encountered and lessons learned that can be carried into future applications of LSAE to improve on the application of innovative flood modeling and mapping techniques. The 2-D LSAE approach aims to balance efficiency and accuracy by leveraging the highest quality data available, while also applying "automated" techniques to develop and execute hydrologic and hydraulic models. The technical approach evolved throughout this project to accommodate challenges encountered in each stage of the model development process.

Biography

Eli Gruber is currently a water resources engineer at CDM Smith. Over the last 7 years he has worked on a wide variety of water resources projects with a focus on surface water hydrology and hydraulics. He obtained his M.S. in Civil Engineering from Colorado State University, has B.S. in Environmental Geology from Fort Lewis College, and is a licensed professional engineer in Colorado.

Out with the Old, In with the New: Implementing the Results of the Iowa Rapid Floodplain Modeling Project

Traci Tylski, CFM, USACE, Omaha Dist., traci.m.tylski@usace.army.mil

This presentation will show the continuation of the 2015 ASFPM "Rapid Floodplain Modeling" presentation pertaining to the Iowa statewide floodplain mapping project being completed in coordination with USACE and the Iowa Department of Natural Resources. USACE began working on the project in 2011 and has successfully finished updated hydraulic modeling for eight (8) HUC8 areas within the state of Iowa. This modeling process was majorly automated with some manual modeling efforts included. The presentation will focus on how the results from the previous ASFPM presentation are being used to make actual decisions and the implementation processes.   The project is located at the final stages of completion with products planning to be implemented into the FEMA Risk MAP program. Now that new information has been provided to these communities and the scopes of work have be completed, where does this information go from here? We've successfully shown new areas of flood risk, however, in the process of doing so, we have also provided concerning flood risk information to communities who are participating in the NFIP and CRS programs. What can we do to help? What programs are available to assist the implementation of these products and make the updated information useful to local communities without becoming a burden? This presentation will display the many options available at the closing of a floodplain mapping project, especially a mapping initiative to a state-wide magnitude. Current examples will be shown of communities with updated mapping and how to manage their risk with the new updated information. We want to leave this project complete with the ability for the public to easily use the final floodplain mapping products to make legitimate and current risk informed decisions.

Biography
Traci Tylski is a hydraulic engineer for the Omaha District - United States Army Corps of Engineers. Traci began her career with USACE in 2011 as a hydrologic engineering intern just before the 2011 Missouri River flooding event. She graduated from the University of Nebraska in 2013 with a bachelor's degree in civil engineering. During 2013-2014, she
worked for a private engineering firm and gained a vast knowledge in geotechnical engineering and design engineering. Traci returned to USACE in 2014 and started working in her current position within the flood risk and floodplain management section.

South Dakota LSAE: How FEMA & its Stakeholders Benefit from 2D LSAE

Brandon Banks, GISP, AECOM, brandon.banks@aecom.com
Additional Author(s): Brooke Conner, PE, FEMA RVIII; Brian Murphy, PE, PMP, D.WRE, CFM, CDM Smith

FEMA Region VIII made a strategic advancement in updating eastern South Dakota's flood hazard risk assessment information by initiating a large scale automated engineering project using HEC-RAS 5.0's two-dimensional (2D) rain-on-grid methodology to develop Zone A-ready products. Twenty-seven (27) counties are poised to benefit from over 20,000 square miles of updated engineering models comprising over 18,500 Unknown, Unverified, and Unmapped CNMS streams. Results from the LSAE will be used to assess effective Zone A SFHA validation status, map previously unmapped flooding sources, evaluate potential upgrades from Zone A to AE through the Discovery process, and convert existing paper products into FEMA's modernized inventory. This presentation is intended to provide an overview of the SD 2D LSAE approach, responses from stakeholders, and discussion of realized benefits with undertaking this and future advancements with 2D LSAE.

Biography
Mr. Brandon Banks has been with AECOM since 2004. Brandon earned his bachelor's of science degree in Geography/GIS from Northwest Missouri State University and his master's of science degree in Geography from the University of South Carolina at Columbia. He has over 12 years of experience working on and managing related FEMA flood hazard projects. His project management experience spans FEMA Regions IV, V, VI, VIII, and IX and include regulatory flood risk projects, non-regulatory flood risk products, and LiDAR procurement and QC.

G4: Response to Recent Flood Disasters II
Moderator: Dean Goodison, PE, CFM, Atkins, dean.goodison@atkinsglobal.com

Come Hell or High Water: The LFMA DRT Response to the Great Flood of 2016

Shandy Heil, CFM, Louisiana Floodplain Mgmt. Assn., shandy.heil@stantec.com
Additional Author(s): Chad Ross, CFM

On July 21, 2016, the Louisiana Floodplain Management Association's Board of Directors voted to create its Disaster Response Team. Just three weeks later, on August 12, a no-name storm poured down 6 trillion gallons of rain on south Louisiana. 13 people lost their lives and 146,000 homes were flooded. Operating with a minimal provisional budget, 25 active volunteer members, and a heavy dose of true Louisiana grit, the LFMA DRT sprang into action for its first post-disaster deployment. Immediately post-disaster, the DRT field team assisted communities by conducting substantial damage screening, reconnaissance, and estimate assessments; collecting high watermarks for operational and historic purposes; and delivering customized recovery outreach to flooded homeowners through education and technical assistance. DRT members unable to travel to the affected region participated by providing remote data entry, assessment, and GIS support.   Technical assistance provided by FEMA, USGS, and other partners allowed the DRT to document best practice field protocol and gain high-level proficiency in high water mark gathering and the substantial damage process. This effort was initiated to develop a pilot pre-disaster training program through which communities with limited resources can gain the tools and training they need to quickly and effectively initiate recovery actions post-disaster.   This presentation will demonstrate the capabilities of a DRT and provide participants with a roadmap to effective deployment and field data collection. Attendees will also learn how quick action following a storm event can greatly reduce time and effort throughout a community's recovery process. Further, the abilities of a DRT to perform essential pre-disaster training will be showcased.

Biography
Shandy is a Disaster Recovery and Mitigation Outreach Educator for the LSU AgCenter and a Building Science
Consultant for Stantec. Born and raised on the coast of Louisiana, Shandy's passion lies within helping the residents

and building practitioners of her state understand their risk from natural hazards and educate them on how to become resilient.

Louisiana Underwater: Resiliency Hangs in the Balance

Shona Gibson, FEMA RVI, shona.gibson@fema.dhs.gov
Additional Author(s): Jeffrey Giering, Louisiana State

Hurricanes have names-like Katrina, Rita, and Isaac. Names provide an identity upon which we can classify, curse, remember or try to forget. Yet the 2016 floods in Louisiana were unnamed, and for a while, unnoticed across the nation. But for tens of thousands of Louisianans, "when will the rain cease, when will the flood waters receded, and where can I find shelter?" were the only items that mattered. Following the extensive damage and loss of life from Hurricane Katrina, billions of dollars have been invested in Hazard Mitigation measures across the state to protect individuals and property from the effects of future hazards and disasters. Despite these efforts, Louisiana Resiliency hangs in the balance. The presentation provides risk information analysis collected from the Baton Rouge disaster field office following the 2016 floods. The Baton Rouge Hazard and Performance Analysis (HPA) engineering and GIS team performed forensic analysis of mitigated structures to determine if the measures were successful. Additionally flood inundation levels were analyzed by depth in each affected community and watershed. The results initially fed a number of missions including Substantial Damage, Individual Assistance, the Governor's Office of Homeland Security and ultimately the long term recovery strategy. Further refinement of the analysis was performed to determine the number of structures potentially impacted inside and outside the Special Flood Hazard Areas (SFHAs) and how higher standards, enhanced building codes, and other nonstructural measure could have prevented thousands of individuals and families from the trauma and devastation of destroyed or damaged homes. This presentation will take participants through the process of performing Loss Avoidance Studies and the analysis of hazard event data and demonstrate how and where it was used throughout out the life of the disaster and afterwards.

Biography

Shona has developed a diverse background in Risk Reduction efforts involving analysis of flood event hazard data during and after hazard events to inform recovery decisions and recovery strategy for her State counterparts. Recently deployed to the disaster field office in Baton Rouge, LA for both the March and August 2016 flood events, Shona lead a team of specialists in Loss Avoidance Studies and hazard event analysis to determine the extent and effectiveness of resiliency efforts in the state. She worked closely with the Louisiana Governor's office of Homeland Security and Environmental Protection and the Governor's Restore Louisiana Task Force to support the development of a Long Term Recovery strategy for the State. When Shona is not deployed to a hazard event, her responsibilities involve project management of RISK Map updates for the State of Louisiana. Prior to Shona's FEMA career, she was a hydrologist in the private sector designing and permitting storm water management and drainage systems for large scale residential and commercial projects incorporating green infrastructure and other best practices into the overall design reducing potential flood risk. Academic degrees include a Bachelor of Science in Environmental Engineering from the University of Florida.

History & Significance of Coastal Federal Disaster Declarations from 1953-2016

Darryl Hatheway, CFM, AECOM, darryl.hatheway@aecom.com

This presentation will look at the various kinds of historical disaster declarations that have impacted coastal areas of the United States. For coastal areas, there are about 30 different coastal-related disaster types. Some of these are the sole source of the disaster declaration and some are just sub-components of a much larger disaster event. The basis for understanding the significance of coastal disasters is provided by review of a FEMA database of over 45,300 Federal Disaster Declarations nationwide from 1953 to 2016. Review of the FEMA database of declarations noted that 20 to 22 percent of declared disasters are coastal-related, with a vast majority associated with impacts of hurricanes. This presentation will share a summary of historical regional assessments by coastal disaster type and by decade over past 60 plus years. It will also explore potential actions for consideration by floodplain managers in resilience planning and preparing for future coastal disasters. The assessment will help better understand the significant role and predominance of coastal disasters impacts on communities in each FEMA Region.

Biography

Darryl Hatheway is a Certified Floodplain Manager and Sr. Coastal Scientist with AECOM. He has over 38 years of experience in FEMA coastal flood insurance studies and hazard mapping, and is a coastal subject matter expert on NFIP for the Atlantic, Gulf, Great Lakes, and Pacific Coasts. His current focus is on the FEMA Risk MAP coastal studies nationwide, including FEMA Region IX and the California Coastal Analysis and Mapping Project Open Pacific Coast restudies of the entire CA coast. He has

assisted in completion and review (as senior technical advisor) for recent FEMA coastal flood insurance studies (FISs) in HI, CA, WA, NH, NYC, NC, SC, GA, FL, TX, and AL. Mr. Hatheway has also provided assessments of coastal storm impacts on built environment, prepared analyses of dune erosion and wave effects, assisted with natural disaster damage assessments, worked with state officials on coastal resource management programs, and engaged with community outreach programs. He is also currently providing support to AECOM's Compass team and FEMA on Technical Mapping Advisory Council recommendations on future conditions, sea level rise, and shoreline change mapping, as well as support on FEMA coastal guidance transformation and a coastal Coordinated Needs Management Strategy.

G5: Coastal Interactions
Moderator: Maureen O'Shea, AICP, CFM, Idaho DWR, maureen.oshea@idwr.idaho.gov

King Tides: How this Event has Risen into Our Vocabulary
Brian Caufield, PE, D.CE, CFM, CDM Smith, caufieldba@cdmsmith.com

Those living in the coastal floodplain are hearing about 'King Tides' in the media and local agencies are looking to crowd source flooding information during these events. While a King Tide, or perigean spring tide, is an especially high tide, it is not that unusual in that we can predict its occurrence and elevation. This presentation will look at tidal observations at the NOAA Tide Gage in Boston Harbor and looking at the past occurrences of King tide and evaluate how much the tide has changed in height through time. This presentation looks to answer the question about is flooding getting worse with each occurrence of a King tide.

Biography
Mr. Caufield is a coastal engineer with over 15 years' experience specializing in the areas of hydrodynamic modeling, flushing studies, wave transformation, coastal structure design and sediment transport. He has professional and academic experience with the analysis of nearshore wave conditions and impacts of waves on coastal erosion and in applying finite difference and finite element hydrodynamic models to predict tidal flushing of harbors and lake circulation modeling. Extensive experience developing and employing numerical models for sediment transport, nearshore spectral wave transformation, bathymetric evolution and 2- and 3-dimensional hydrodynamic processes.

Prioritizing Re-mapping & Analyses of Rivermouths in Coastal Areas Following FEMA Region IX's Coastal Re-study
Vince Geronimo, PE, CFM, AECOM, vince.geronimo@aecom.com
Additional Author(s): Ed Curtis, PE, CFM

As part of FEMA's Risk MAP program, FEMA is updating flood hazard data for 100% of the populated U.S. coast. The new coastal analysis and mapping does not take into account the combined influence of riverine hazards at the coastal interface. At these locations, FEMA uses a redelineation process to tie the new coastal mapping into the effective riverine mapping. The resulting Special Flood Hazard Areas at the mouth of the river is often shown inaccurately because the mapping does not meet the analytical requirements for mapping the flood hazard and may not represent the risk. Along the 1,200 mile open coast in California there are more than 120 riverine outfalls. This presentation will introduce a method to rank riverine outfalls so that future re-studies can focus on high priority areas. This demonstration project was implemented for California but can be implemented for other jurisdictional coastlines.

Biography
Vince Geronimo is a Senior Project Manager with AECOM. He has a diverse work history in the fields of civil, environmental, coastal, and water resources engineering. He has applied this expertise over a 20 year career in fluvial and coastal flood risk reduction and floodplain management. Vince currently manages a group of coastal engineers and geospatial practitioners in Oakland, CA. Together they support FEMA Region IX's California Coastal Analysis and Mapping Project and other clients with climate adaptation and coastal restoration services. As part of the risk identification and mitigation process, Vince works collaboratively with agency partners and stakeholders to formulate and facilitate community and public meetings to communicate technical information. He has a BSCE in Environmental Engineering and MSCE in Hydraulics; is a registered Professional Engineer in three western States; and is a Certified Floodplain Manager.

*NC Flood Warning System: Ground Truth Comparisons During Hurricane Matthew

Dan Brubaker, PE, CFM, North Carolina DPSEM, dan.brubaker@ncdps.gov
Additional Author(s): David Key, PE, CFM, ESP Associates

This presentation will provide an assessment of ground truthing exercises that occurred during and after the flooding caused by Hurricane Matthew in October 2016. This exercise compared the accuracy of North Carolina's Flood Inundation Mapping and Alert Network (FIMAN) to real high water marks and other technologies such as post-event imagery and drone flights. This presentation will also provide an overview of the FIMAN system and the historic flood impacts and damages to eastern North Carolina. Initial estimates project that Hurricane Matthew may have caused damage in over 100,000 homes in NC alone and some stream gages recorded flood elevations higher than any previous records. Other gages recorded elevations over the 1% annual chance flood event. This event allowed NC test FIMAN in real time to gain the following insights: improving confidence in the estimated flooding from FIMAN, IT solutions, pre-event activities such as evacuations and moving contents to higher elevations, swift water boat rescue planning, and other various lessons learned. The State of North Carolina developed its FIMAN over 10 years ago to provide real-time flood inundation and alerts for gaged stream locations across the state. These updates provide real time inundation polygons for discrete locations and extend approximately 1 mile upstream and downstream of stream gages. In 2015, NC Floodplain Mapping initiated a pilot study to evaluate the use of new geospatial datasets for realtime, seamless flood inundation mapping for entire river systems (not just in the vicinity of the gaging station). The technology and mapping algorithms leverages the State's vast investment in 100% digital flood hazard/modeling information, real time telemetry at stream gage sites and enhanced probabilistic GIS datasets to allow for "connecting the dots" and real time mapping of actual flood events for entire river systems.

Biography
Dan Brubaker, P.E., CFM has served as the National Flood Insurance Program Engineer for the State of North Carolina since June 2011, and as the NFIP Coordinator since January 2017. He assists North Carolina municipalities with technical questions and reviews of engineering reports, reviews engineering information associated with North Carolina map maintenance, provides training and community assistance visits, and provides engineering review of new and replacement bridge projects under the NCDOT Memorandum of Agreement. He graduated from the University of South Florida in 1991 and spent time in private consulting, serving with the U S Navy Civil Engineer Corps, and reviewing permits and managing capital projects for the City of Raleigh.

G6: USACE & FEMA Working Together with Your Help to Address the Nation's Levee Challenges
Moderator: Samantha Medlock, Willis Towers Watson, samantha.medlock@willistowerswatson.com

Panelists:Suzanne Vermeer, PE, CFM, FEMA HQ, suzanne.vermeer@fema.dhs.gov; Steven Fink, PE, USACE, steven.j.fink@usace.army.mil; Jim Murphy, PE, CFM, AECOM, jim.murphy@aecom.com
Both The US Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA) have the same overall objective, to reduce the risk to life and property. However, they implement distinctly different authorities involving levees; and depending on the levee, both agencies could be involved, although in different ways and for different purposes. FEMA and the USACE have been working to better align the exchange of levee information between the agencies including the shared use of data and the updates and integration of their two levee databases. There are many new levee related developments ranging from updates on the Levee Analysis and Mapping Procedures (LAMP), to WRRDA and the USACE Levee Safety Program, to the increasing application of risk based approaches for evaluating levee related risks. This session will include audience participation in an active round table discussion of levee related challenges and possible future directions and solutions.

Biographies
Suzanne Vermeer works for FEMA HQ in Washington, D.C. and serves as a levee subject matter expert developing and implementing levee mapping strategies for the National Flood Insurance Program (NFIP). She previously worked as a Civil Engineer for FEMA Region V where her primary responsibilities included contract and grant administration, and management of FEMA's floodplain mapping projects. She works with federal and state agencies, local municipalities, contractors, engineers and citizens to provide technical assistance related to engineering standards and floodplain management. Prior to joining FEMA, Vermeer worked as a consulting engineer on projects involving floodplain mapping, stormwater management, permitting and plan review. Her background includes design, surveying and construction engineering services. Ms. Vermeer received a Bachelor of Science degree in Civil Engineering from Iowa State University. She is a Registered Professional Engineer and a Certified Floodplain Manager.

Steve is the Headquarters Levee Safety Program Manager for the U.S. Army Corps of Engineers in Washington D.C. He oversees the actions of 8 Corps Divisions and 41 Corps Districts who are engaged in inspection, assessment, and risk communication for all levees within the U.S. Army Corps of Engineers portfolio. Steve has worked for the Corps since 1980, including 28 years in Walla Walla District (9 years as Chief, Geotechnical Design), 4 years at Northwestern Division as Levee Safety Program Manager and three years working for HQ Flood Risk Management as the System-wide Improvement Framework Manager. He has a B.S. in Civil Engineering, Washington State University, a M.E. in Civil Engineering (hazardous waste management), University of Idaho, and is a registered Professional Civil Engineer, Washington State.

With 40 years of experience, Jim is a National Policy Expert for Infrastructure, Dams/Levees. He assisted FEMA with their Levee Analysis and Mapping Procedures (LAMP) and other levee efforts. He serves as Vice-Chairman for the DHS/OIP subcommittee on dams and levee. He has worked with the USACE as a reviewer for the recommendations of the National Committee on Levee Safety. He is also on the American Society of Civil Engineers (ASCE) committee developing the dam and levee sections "Infrastructure Report Card".

G7: Best Practices in Floodplain Mgmt.
Moderator: Corey Garyotis, PE, CFM, Alabama DECA, corey.garyotis@adeca.alabama.gov

Managing Change in a Time of Transition: Tools & Best Practices for Floodplain Mgrs.
Katrina Tavanlar, Booz Allen Hamilton, tavanlar_katrina@bah.com
Additional Author(s): Kristin Murphy

The only thing constant in a Floodplain Manager's life is change. Whether its new elected officials, regulations, or requirements, Floodplain Managers need the tools and best practices on how to manage this change so as to maintain morale, productivity, and effectiveness. Learn more about how to reduce the negative impact of change in your organization.

Biography
Ms. Katrina Tavanlar has been providing change management, transformation, and communication solutions to over 21 federal agencies for the last 17 years. She serves as the Deputy Project Director for the Booz Allen Hamilton Program Management Team supporting the Federal Emergency Management Agency's (FEMA) Risk Management Directorate. In this role, Ms. Tavanlar works closely with FEMA leadership to ensure strategic and operational issues are addressed to the betterment of FEMA's five hallmark programs (e.g., Risk MAP, Hazard Mitigation, etc. Ms. Tavanlar is passionate about using her change management and communications expertise to foster behavior change in resiliency and environmental issues. Her work has received the highest honors from the Public Relations Society of America and PRNewswire. Ms. Tavanlar received a bachelors from the University of California, Berkeley and a masters from the Massachusetts Institute of Technology. She is currently a Senior Fellow with the Environmental Leadership Program and holds a Woodrow Wilson Public Policy and International Affairs Fellowship. Ms. Tavanlar has been an active member in the National Capital YMCA Triathlon Team for the last 10 years—supporting new triathletes each year.

Record Keeping for the Floodplain Administrator
Steve Samuelson, CFM, Kansas Dept. Agriculture, steve.samuelson@ks.gov

This presentation will cover what, when, where and how of record keeping for the local community official responsible floodplain management. A person can do a great job of managing the floodplain but if they don't keep good records it is almost a wasted effort.   As we all know, record keeping is the most exciting topic in floodplain management today. Ok, it isn't that exciting but it suddenly becomes very exciting when you are asked to produce a document and you can't produce it.   During the seminar there will be examples given of both record keeping successes and failures. By presenting different successful methods of record keeping it is hoped that community officials may pick up some tips on better ways to maintain records when they return from the conference.

Biography
Steve Samuelson earned a BS degree in criminal psychology in 1982. After failing in business he went to work for the government. Steve was the Zoning Administrator and Floodplain Manager for Lyon County, Kansas before he went to work for the Kansas Department of Agriculture. Steve has been the NFIP Specialist for KDA in the Division of Water Resources since

2007. Steve uses his experiences as a floodplain manager at the local level to support local floodplain managers across Kansas. One method of assisting communities is with training, training that is not just about the NFIP but details of how to be a floodplain manager. Steve is a CFM and on the Board of Directors for ASFPM Region 7.

Generating Data, Risk Awareness & Tools for Local Benefit: Base Level Engineering

Elizabeth Savage, PE, H2O Partners, esavage@h2opartnersusa.com
Additional Author(s): Diane Howe

Between 2014 and 2060, the U.S. population is projected to increase from 319 million to 417 million, reaching 400 million in 2051. States like Texas expect rampant growth in some areas of the state, growing populations in the suburbs of Dallas, Austin and Houston from 150-425%. These areas just beyond our large cities are in need of critical flood risk information to make informed development decisions prior to the influx of population growth. Base Level Engineering is a concept that produces broad flood hazard information and datasets using high quality ground information, automated modeling techniques and manual manipulation to create a base set of flood modeling that may be released at the initiation of a Flood Risk Project. The datasets allow: -FEMA to review the current inventory of flood risk information   -Provide technical information required to perform CNMS assessments -Generate basic Flood Insurance Rate Maps (FIRMs) for unmapped or unmodernized communities -Technical modeling that may be used by locals and developers for flood awareness   -Deeper dive discussions at Discovery, unearthing local data for model refinement and identification of potential mitigation projects   -Education of local elected officials with datasets that describe the variability of flood risk within a regulatory floodplain -Initiation of higher standards discussions far in advance of Preliminary FIRM preparation -   Delivery of technical data to local officials for use in future development review

Biography
Elizabeth Savage is a Program Professional with H2O Partners, Inc. based in Austin, Texas. She has 17 years of experience with FEMA's program delivery of flood hazard information. Her personal project portfolio includes work in a variety of services assisting the National Flood Insurance Program since her humble beginnings reviewer on incoming Letters of Map Revision in the Dewberry office in Atlanta.
Since 2009, Elizabeth has been involved in Regional and National efforts to increase efficiency, collaboration and acceptance through the Risk MAP program. She participates on a number of National and Regional workgroups spanning all program areas to assist teams in the selection, preparation and delivery of Risk MAP with the goal of increased capacity and ownership at the local community level.
A large portion of her professional career has been devoted to FEMA and its Mapping Partners, assisting her in her current position supporting FEMA Region 6 staff in Denton, Texas to design and implement the Risk MAP program at the project level.
When she is not asking "Why?" she will place her red pen down long enough to train. She can usually be found running road and trail races around the county, from 5Ks to 36 hour team relays covering 200+ miles.

G8: Local Stormwater Initiatives
Moderator: Stephen Noe, PE, Amec Foster Wheeler, stephen.noe@amecfw.com

Ladue, MO's Stormwater Mgmt. Program
Josiah Holst, PE, CFM, HR Green, jholst@hrgreen.com

Funded by a ½ cent sales tax, the City of Ladue's Storm Water Management Program (SMP) is a comprehensive, three-phased initiative to alleviate stormwater concerns in the community. Starting with problem identification city-wide, and proceeding through master planning and final design and construction of projects over a period of several years, the three phases of the SMP are: •Phase I: Needs Assessment •Phase II: Master Plan •Phase III: Projects   Prior to 2015, Ladue did not have a city-wide SMP that could be used for planning of future capital improvements to address stormwater problems and to support continued compliance with Missouri Department of Natural Resources Municipal Separate Storm Sewer System (MDNR MS4) regulations. Additional benefits of the SMP will be to review relevant policies at the City, State, and Federal levels and to provide a set of recommended guiding principles and policies specific to future development in the City.   Led by the City of Ladue and HR Green, Phase I of the SMP was completed in 2015. The primary goals were to: •Identify and confirm stormwater infrastructure problems located in the City; and •Compile a comprehensive listing and mapping of the infrastructure problems identified.   Phase II is being completed in 2017. The primary goals are to: •Develop policy, procedures, and an implementation structure for the SMP;   •Apply an advanced optimization tool to analyze thousands of alternatives to determine the highest

performing combination of basin, stream and storm sewer improvements to reduce flooding, stabilize streams, and improve water quality at least cost; and •Prioritize improvement options, and develop an adaptive long term planning strategy.   The presentation will discuss accomplishments, keys to successes and learned lessons from Phase I as well as provide a preview of "Phase II: Master Plan" that will serve as a roadmap for "Phase III: Projects" and beyond.

Biography
Josiah Holst, PE, CFM serves as a Project Manager for HR Green in the Water Resources Practice of the Water Business Line. Throughout his ten-year career and since joining HR Green in 2010, Josiah has been heavily involved in the planning, design, and management of over 100 stormwater management projects (including his role as lead civil engineer of Ladue's SMP and project manager of the City of Town & Country's SMP). Other relevant experience includes storm sewer design, pond design, alternative BMP design, pump station modeling and design, stream restoration, and water resource planning studies. He graduated with a Bachelor of Science in Biological Engineering from the University of Missouri-Columbia in 2005. Josiah is licensed as a Professional Engineer in the state of Missouri and a Certified Floodplain Manager.

A One Water Framework: Integrating Floodplain & Stormwater Mgmt. Requirements for Communities
Sara O'Brien, Williamette Partnership, obrien@willamettepartnership.org

Waterways are a nexus of regulatory and economic pressures for Oregon communities. Small communities must manage their rivers, streams, and floodplains to meet a complex and changing set of requirements. In the last year, significant developments have affected policies on floodplain and stormwater management. In April 2016, NOAA Fisheries released a Biological Opinion on the implementation of the National Floodplain Insurance in Oregon. The BiOp will significantly affect the way local governments in Oregon regulate and manage floodplains including new requirements for communities to minimize and mitigate for stormwater impacts from impervious surfaces placed in floodplains. At the same time, the Oregon Department of Environmental Quality is proposing to change and expand Municipal Separate Storm Sewer System (MS4) permit requirements for some communities.   Communities that need to address these new requirements will undoubtedly face challenges both in terms of the capacity they have to respond and the tools and information needed to ensure their strategies are effective in meeting water quality and floodplain management goals. This talk will explore how a One Water framework could connect the regulatory and resources silos for communities developing integrated approaches to policy and planning that i) build a common understanding of regulatory obligations related to the floodplain Biological Opinion and stormwater permitting, focusing specifically on where they can overlap; ii) identify the management actions that can be used to reduce costs and maximize environmental benefits, as well as the policies and technical information that would be needed to support them; and iii) foster partnerships between floodplain managers, stormwater managers, and the non-profit and research communities.

Biography
Sara O'Brien is Director of Strategy at the Willamette Partnership. She is the Partnership's resident policy expert on floodplains, mitigation, and endangered species. In her spare time, she likes to build effective programmatic approaches to compensatory mitigation around the western US. In prior positions, Sara worked on projects related to climate change, conservation planning, wildlife fire, and desertification at Defenders of Wildlife, the University of Arizona, and the Desert Research Foundation of Namibia. She holds an MS in natural resource management from the University of Arizona.

Evaluation of a Successful Watershed Partnership: 15 Years Later
Amanda Grint, PE, CFM, Papio Missouri River NRD, NE, agrint@papionrd.org

The Papillion Creek Watershed Partnership was founded in 2001 with guiding principles of cooperation, community participation and comprehensive watershed planning. The mission of the Partnership is to address issues related to surface water quality and stormwater quantity in the watershed by establishing goals and standards common to the region for development within the watershed through full build out. The Papillion Creek Watershed is 402 square miles and encompasses one-third of the State of Nebraska's population. The majority of the watershed is comprised of the Omaha metropolitan area. Nine of the 12 jurisdictions located in the watershed have participated in the Partnership for over 15 years. Over that time, the communities have initiated and successfully implemented NPDES Stormwater permits working together to meet program regulations, have established ordinances to protect water quality and have implemented a number of flood control structures. This presentation will give the audience history on a watershed partnership in an urban area. It will address the establishment, challenges faced and accomplishments of the partnership over 15 years. The details of funding and structure will also be addressed as a means to describe how these types of partnerships can exist and provide benefit long term.

Biography

Amanda attended the University of Nebraska in Lincoln and earned a Bachelor of Science degree in Biological Systems Engineering. She is a registered Professional Engineer in the State of Nebraska and a Certified Floodplain Manager. Amanda has worked for nine years in Stormwater Management and Water Resources at the Papio-Missouri River Natural Resources District in Omaha, NE.

H1: Building Resilience into Critical Facilities & Businesses
Moderator: Rob Flaner, CFM, Tetra Tech, rob.flaner@tetratech.com

Emergency Power Systems for Critical Facilities: A Best Practices Approach
Gregory Wilson, FEMA HQ, gregory.wilson2@fema.dhs.gov

There is a significant likelihood that utility power will not be available for an extended period of time during severe natural hazard events. Thus, it is necessary for critical facilities to have reliable sources of sustained electrical power to achieve continued operation. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas. Critical facilities must be prepared for a loss of utility power, and their ability to function without interruption during and in the aftermath of hazard events deserves special attention.   FEMA P-1019, Emergency Power Systems for Critical Facilities: A Best Practices Approach to Improving Reliability (September 2014), discusses the effects of natural hazards on electrical transmission and distribution infrastructure and on building systems. This document examines the vulnerability of electrical power systems to natural hazards, describes what equipment in critical facilities should be supplied by emergency power sources, how long the emergency power may be needed, the specific equipment needs of different types of critical facilities, and how emergency power can be supplied. It also provides guidance on how to assess the risks and vulnerabilities to the electrical power system, identifying performance goals for an emergency power system, and the importance of having realistic emergency management policies that address emergency power.   This presentation will introduce the publication and discuss how to determine what facilities are critical, what equipment within a critical facility is needed to allow the facility to function and provide services, and how to provide emergency power to a critical facility.

Biography
Gregory Wilson is a building science specialist in the Building Science Branch at FEMA's Federal Insurance and Mitigation Administration (FIMA) Headquarters in Washington, DC. The Building Science Branch is responsible for a broad range of mitigation activities that include; pre and post-disaster building sciences, working with model building code and standards-producing organizations; development of technical guidance documents related to hazard mitigation and coordination with various mitigation partners in the public and private sector. Mr. Wilson provides technical expertise for FEMA Building Science tools and publications, and leads FEMA Building Science's building code efforts. He supervised the FEMA Mississippi Hurricane Katrina NFIP Group from 2007-2010. Mr. Wilson also served as a Building Official in Ocean Springs, MS, and a Master Electrician in Fairfax, VA.

A Flood Vulnerability Assessment for Critical Facilities
Lisa Graff, CFM, Illinois State Water Survey, lgraff@illinois.edu
Additional Author(s): Molly Woloszyn

Even a slight chance of flooding can pose too great a threat to the delivery of services offered by the maintenance and operation of a community's critical facilities (e.g., hospitals, emergency services, utility providers, and government facilities). For a critical facility to function, building systems and equipment must remain operational. Despite the proactive nature of Cook County to address their flooding issues, a continued increase in heavy precipitation events in the region in the future could potentially result in costlier impacts on critical infrastructure and continue to endanger human lives. Critical facilities and key resources play an important role in ensuring a community continues to function during and after extreme weather events, like heavy precipitation. To determine the vulnerability of a critical facility to flooding, a Flood Vulnerability Assessment for Critical Facilities was developed through close collaboration between Illinois-Indiana Sea Grant, the Illinois State Water Survey, the Midwestern Regional Climate Center, and the Cook County Department of Homeland Security and Emergency Management. The goals of the assessment are to identify specific vulnerabilities of a particular critical facility, provide recommendations and/or resources in order to reduce a facility's risk to flooding, and to provide educational information to increase the awareness of risk faced from flooding. The Flood Vulnerability Assessment for Critical Facilities is now available online and was developed for use across the Central U.S.

Biography
Lisa Graff, a GIS Team Manager, has been with the University of Illinois, Illinois State Water Survey for 12 years. She is a GIS Professional and a Certified Floodplain Manager. Lisa is currently leading a team of GIS Specialists developing Digital Flood

Insurance Rate Maps, Discovery, Flood Risk datasets, and other products for FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) Program. In addition to Risk MAP related projects, Lisa has been involved with using Hazus to estimate potential losses due to natural disasters for Local Hazard Mitigation Plans as well as designing a Flood Vulnerability Assessment Tool for Critical Facilities.

Small- & Mid-size Business Disaster Preparedness & Resilience in New Orleans, LA

Taylor Daigle, AECOM, taylor.daigle@aecom.com
Additional Author(s): Jon Phillipsborn, AECOM

Small and mid-size business enterprises (SME) often suffer significant losses from natural disasters, when in fact they may take actions to be catalysts for recovery of the community after a natural disaster event occurs. AECOM conducted a survey of 208 SME's on six corridors in New Orleans to evaluate their disaster preparedness and resilience. As part of this project, funded by Walmart Foundation through the United Nations Office of Project Services and the United Nations Office for Disaster Risk Reduction, the AECOM team developed a SME interview survey tool based upon the UN's Ten Essentials for Disaster Risk Reduction and the AECOM/IBM Scorecard and conducted on-site face-to-face interviews with 208 businesses located on six corridors in New Orleans. Team members included Florida International University, IBM, PriceWaterhouseCoopers and the City of New Orleans Office of Resilience and Sustainability. A training program was offered to all participants and conducted on each corridor. The final report was issued earlier this year with recommendations that each business could implement as well as actions the City of New Orleans could take to assist SME's preparation to respond to and recover from natural disasters. This presentation will highlight the importance of the small business community in overall disaster recovery and share findings from the New Orleans study on how small businesses can themselves be more prepared, as well as how Cities can further support small businesses in disaster preparedness and resilience, which will also benefit the City. Additional benefits that will be discussed include the value of strengthening communication between the public and private sector on the topics of disaster preparedness and resilience. This will assist communities in being more resilient to natural disasters, including through upfront planning and greater ability to recover faster.

Biography
Ms. Daigle is an environmental engineering specialist in AECOM's New Orleans office. She holds a degree in Chemical Engineering from Tulane University. Ms. Daigle was the local project lead for AECOM's Disaster Resilience of Small to Mid-Size Businesses on New Orleans Historic Corridors Survey Project. In addition to work in resiliency, Ms. Daigle has experience in Title V, PSD, and minor source air permits in Louisiana, water permitting, SPCC/RCRA Contingency Plans, SWPPPs, and air monitoring. Ms. Daigle is a registered Engineering Intern in the state of Louisiana.

H2: Local Successes with Higher Floodplain Mgmt. Standards
Moderator: Rebecca Fricke-Croft, CFM, Atkins, becca.croft@atkinsglobal.com

A Collaborative Approach to Reduce Local Flood Insurance Rates in Coastal Georgia
Madeleine Russell, CFM, Georgia Sea Grant, madrusse@uga.edu

The Georgia Coast is low-lying and vulnerable to flooding. Population in coastal Georgia is rising; development pressures bring additional concerns about loss due to flooding. To address these concerns, coastal floodplain managers successfully coordinate their efforts to build coastal resilience and reduce loss of life and property through participation in the Community Rating System (CRS) a reward system set up by the National Flood Insurance Program (NFIP) that offers reduced insurance premiums. Every block of 500 CRS points earned gives a community an additional 5% discount for policyholders. CRS was initiated nationally in 1990 and by 2012, only seven coastal Georgia communities participated. However, flood insurance program reform in 2012 with the Biggert Waters Act and 2014 with the Homeowners Flood Insurance Affordability Act startled residents with hefty increases in flood insurance premiums. Communities on the Georgia Coast responded rapidly.
UGA Marine Extension and Georgia Sea Grant's Local Government Outreach Program began supporting coastal Community Rating System efforts in 2012 and by 2017, 18 of the 22 coastal communities entered the CRS and participate in an active Coastal Georgia CRS Users Group. This talk will highlight our approach and success on a local level with Coastal Georgia CRS Communities through an interactive overview of Coastal CRS scores.
Coastal Sea Grant plays an integral role in facilitating local Program of Public Information programs. We generate interest in the PPI, facilitate meetings, maintain momentum throughout the process, offer suggestions, participate in outreach events and coordinate interagency efforts. Success in the PPI depends on the choice of committee members, the ability to keep the project

moving forward, and seeing the tangible rewards in the form of additional CRS points. Intangible results include increased resiliency, collaborative partner engagement, cohesive communities and broader outreach capacity.
We are recognized for our commitment to coastal communities, even as people in political positions change office, as environmental conditions change on the coast, and as tools are developed that contribute to our understanding and outreach capacity. We are a constant, trusted partner in local affairs. We are an extra set of hands and another pair of eyes, networking resources into projects initiated on the ground. We facilitate research into communities that have invited us to participate in developing local adaptation priorities. We live here, we play here and we work here, and we have a long-standing relationship with all of our coastal communities that is unique and mutually beneficial.

Biography
Madeleine Russell, CFM, works for UGA Marine Extension and Georgia Sea Grant as Local Government and Natural Hazard Specialist. She coordinates efforts to assist local communities in building resilience and reduce risk to coastal hazards, collaborating with coastal floodplain managers to improve communities' scores in the Community Rating System Program. She is an active member of the Coastal Georgia CRS Users Group. Madeleine received a Master's degree in Marine Policy from the University of Delaware and a Bachelor's degree in Geography from the University of Vermont.

Raising the Bar: Adoption of Enhanced Elevation Requirements in New Orleans, LA
Jared Munster, PhD, AICP, CFM, City of New Orleans, LA, jemunster@nola.gov

In 2016, the City of New Orleans adopted their first new Flood Insurance Rate Maps since 1984. While the remapping was started prior to Hurricane Katrina, the reality of the storm, federal flooding, and subsequent infrastructure investments were an ever-present reality in the 12-year remapping project.   The 2014 DFIRMs remove substantial portions of Orleans Parish from the 100-year floodplain, leaving no base elevation requirement for most of the developable areas of the City. In recognizing this reality, the City's floodplain administrators were able to develop, adopt, and implement a freeboard standard that applies to all properties throughout the jurisdiction. New Orleans is a city that lives with water and by recognizing that reality, and in keeping with the City's Resilience Strategy, we were able to appreciate the true risk that results from living below sea level.   This presentation will provide an illustrative example for local floodplain administration officials in the development and implementation of heightened construction standards which can be enacted both within the floodplain and across communities and will discuss the risk of flooding in urban environments that can be caused by infrastructure failure or localized rain events. The goal of this presentation is to allow other communities to use the regulations adopted in New Orleans as a guide for how to prevent, plan for, and mitigate flood loss through implementation of construction regulations which exceed the baseline standards of construction codes or the NFIP.

Biography
Dr. Jared Munster is the Director of the Department of Safety and Permits for the City of New Orleans. Safety and Permits is the regulatory body charged with enforent of the zoning ordinance and development standards within New Orleans. Jared holds a BS degree in Urban Studies and Planning, a Master of Urban and Regional Planning degree, and a Ph.D. in Urban Studies from the University of New Orleans, and is also a Certified Floodplain Manager and a member of the American Institute of Certified Planners. He is responsible for coordinating the review and inspection of construction within the City of New Orleans and ensuring compliance with all applicable codes. During his tenure as Director, Dr. Munster has overseen the completion of FEMA's Community Assistance Visit, CRS Cycle Visit, and adoption of New Orleans's first new Flood Insurance Rate Maps since 1984.

Maximizing Your Floodplain Mgmt. Ordinance for Risk Reduction
James Holley, AICP, CFM, City of Blue Springs, MO, jholley@bluespringsgov.com
Additional Author(s): Karen McHugh, CFM; Scott Allen, Nancy Yendes, City of Blue Springs

To often communities settle for the minimum NFIP requirements when adopting their Floodplain Management Ordinance. This session will discuss what Blue Springs has done to adopt ordinance standards that go beyond the minimum requirements and reduce risk. We will further discuss Blue Springs' experience with public input for, and acceptance of our ordinance by residents and the development community.

Biography
James Holley is the Assistant Director of Community Development for the City of Blue Springs, Missouri. He has a 28 year career in Planning focusing on local government and suburban environments. During his career Jim has worked on large scale

campus development in Silicon Valley where public and private infrastructure merged to create a single "area" plan that provided active and passive amenities that served businesses within the Park as well as the community at large. Jim has also focused on large and small retail development with an eye on creating environments that attract patrons and retain businesses. James has drafted and participated in implementation of Comprehensive Plans, Development Codes, and Neighborhood/Area Plans. He has a keen interest in the public process and its impact on developing communities. James has a BA in Geography and Regional Planning from Western Washington University. He is an active member of the Local, State and National Chapters of the American Planning Association, and is a Certified Planner through the American Institute of Certified Planners. He is also is a Certified Floodplain Manager and a member of the State and National Chapters of the Association of State Floodplain Managers.

H3: Managing Data for Better Modeling
Moderator: Michael Cothard, PE, CFM, Christopher B. Burke Eng., mcothard@cbbel.com

Flood Study Needs Assessment, Process, & Tools for Bulk Geoprocessing of Large Datasets
William Jiang, PE, CFM, AECOM, william.jiang@aecom.com
Additional Author(s): Jeff Smith, PE, PMP, CFM

The Federal Emergency Management Agency (FEMA) has published thousands of flood discharges in Flood Insurance Studies (FISs) across the nation. Most common are estimates for various recurrence intervals, to include the 1% annual chance (100-year) flood, in the FISs' Summary of Discharge tables. Historically, these data were compiled into FISs purely in tabular form, making analysis of such data challenging. While new FIS specifications require that such data be included as part of a geodatabase, the transition of the historic inventory into geospatial data has been slow. As part of a joint effort between FEMA and the U.S. Geological Survey (USGS), the Compass team geospatially located over 7,400 such points, using a custom script in the Arc GIS environment, for all FISs in Pennsylvania and the Potomac River watershed. The final dataset included all standard geospatial and data layers required in FEMA's National Flood Hazard Layer (NFHL). Further, the data were linked to FEMA's Coordination Needs Management Strategy (CNMS) database. Using this CNMS linkage as well as other data, Compass evaluated discharge data for potential FIS corrections and new study needs. This presentation will provide an overview of the bulk processes and tools that Compass used to geolocate the 7,400 discharge points, including automatic point placement and related quality checks. Further, the presentation will review the results of data analytics conducted using the data. Taken together, the presentation provides a case study of efficient bulk updates to FIS data as well as use of such data to assess study needs and other hydrologic trends.

Biography
William Jiang works for AECOM, providing technical support to FEMA in Philadelphia, PA. Since he joined AECOM in 2015, he has been working exclusively under the FEMA's contract. Previously, he has involved with transportation and land development projects at couple different engineering firms. He is a registered Professional Engineer in Maryland. William graduated from Virginia Tech in 2010 with a B.S. in Civil Engineering. He also has a Master's degree in Civil Engineering from Georgia Tech.

Papillion Creek Watershed: Making the Most of Available Data
Lori Laster, CFM, Papio Missouri River NRD, NE, llaster@papionrd.org
Additional Author(s): Bob Gregalunas, PE

The Papio-Missouri Natural Resources District, as a FEMA CTP, began flood risk mapping efforts in the Papillion Creek Watershed in 2008. This watershed, which covers the Omaha metro area in Nebraska, saw increased development in the late 1990s-early 2000s. This watershed does not have significant stream gage history. When the hydrology study for the new mapping began, rainfall-runoff analyses were developed from NOAA Atlas 2 precipitation frequency estimates and storm-specific observations to develop frequency-discharge relationships. Most of the difficulty associated with rainfall-runoff analysis is locating sufficient information to perform calibration. Preliminary models showed wide-spread increases in peak discharges throughout the watershed, even in older, fully-developed areas. Due to funding issues, the study was delayed several times. In 2013, NOAA published Atlas 14 Volume 8 for the Midwest, increasing the point precipitation frequency estimates from Atlas 2 values. Because the modeling was not yet completed, the P-MRNRD decided to look at using the new data to make sure any maps published incorporated the best available data and to look at newer technologies to assist with calibration efforts. NEXRAD RADAR data was post-processed into 5-minute rainfall depths for several storm events for the purpose of calibration. Existing stream gages were used with recently calibrated USGS rating curves to assess the flood hydrographs for each storm event.

This information was used to recalibrate the existing rainfall-runoff model and provide a sound basis for modeling. An opportunity arose while preparing to re-calibrate the existing hydrologic model to revise the existing areal reduction factors and temporal distributions. It was found that both were in need of updating due to the addition of 50-years of newer storm information and more detailed data. This yielded a more complicated, but meteorologically correct method to construct design storms through three separate design events. The combined result of a revised design storm approach with a more detailed calibration yielded significant reductions in computed discharges for mapping efforts.

Biography
Lori Laster is a Certified Floodplain Manager with over 10 years of experience in floodplain and stormwater management. She is currently the Stormwater Management Engineer for the Papio-Missouri River Natural Resources District where she reviews development plans for compliance with local regulations, as well as managing projects relating to mitigation and stormwater management. Prior to joining P-MRNRD, she worked as a consultant specializing in industrial stormwater management for clients in the Western U.S. Lori is a board member and past chair of the Nebraska Floodplain and Stormwater Managers Association. Lori has a Bachelor's of Science in Geological Engineering from Montana Tech.

Flood Modelling - 9 Ways to Reduce the Cost of Flood Modelling
Phillip Blonn, PE, CFM, CH2M, pblonn@ch2m.com
Additional Author(s): Elise Ibendahl, PE, CFM; Jon Wicks

Flood modelling underpins many aspects of successful flood risk management. As with all aspects of flood management, there is continual pressure to ensure that best value for money is achieved in the modelling process. The following guidance is designed to help reduce the costs of modelling, while also ensuring that the outputs provide end users of the modelling with what they actually need in order to make robust flood management decisions.
The first and most important step is to clearly define the objectives for the modelling and to ensure that the modellers fully understand them. The objectives should explain the context, for example, what decisions the modelling will support and how the modelling outputs will be used. The second step is to develop a plan to understand the local flooding processes, data availability and project objectives, and use that to plan the modelling approach, will reduce the overall cost of the modelling. Additional important steps also include checking the data, executing an efficient model build, and checking the model. It is important to understand the performance of a model and how much confidence can be had in its outputs through a thorough calibration and validation process. Savings can also be realized through the use of automated production runs. Effective communications throughout the modelling process can realize savings by focusing on getting model outputs that are 'good enough' to meet the project objectives and bring all parties along to decisions made throughout the project. Finally, organization and standardization is key to successful project delivery of flood modelling.

Biography
Phil Blonn manages and leads a wide variety of projects involving hydraulics, hydrology, watershed planning, flood control, and storm water management. His experience has included work on major combined sewer overflow control programs, and stormwater and drainage design for airports, highways, railroads, industrial sites, and military bases.
This work has involved the use of hydrologic and hydraulic models including Flood Modeller, HEC-RAS, HEC-HMS, XPSWMM, and INFOWORKS, among others.

H4: Restoration Projects
Moderator: Jessica Lay, Olsson Associates, jlay@olssonassociates.com

Building a Floodplain Restoration Movement
Eileen Shader, CFM, American Rivers, eshader@americanrivers.org
Additional Author(s): Jonathon Loos, American Rivers

Disconnecting rivers from floodplains diminishes their natural and beneficial functions and benefits including safe conveyance of flood water, improved water quality and habitat for fish and wildlife. Floodplains can be reconnected and restored, along with their many benefits, but in many areas of the country these projects are rare. Achieving significant, scalable progress on floodplain restoration and reconnection requires a collaborative, strategic approach with multiple entities working together to build capacity for projects to be implemented. This presentation will discuss strategies that can be used to build capacity for floodplain

restoration projects including: fostering local leaders, developing landowner incentives, clarifying regulations, training project managers, cultivating funding sources, and building momentum. Our presentation will discuss how these strategies are being utilized in a new initiative to bring agencies, academics, practitioners, conservationists, and others together to promote multiple benefit floodplain restoration in the Midwest.

Biography
Eileen Shader is Director of River Restoration at American Rivers, a national non-profit river conservation organization. She currently leads American Rivers' initiative to restore and reconnect rivers to their floodplains as well as advocating for federal policy reforms that will promote the use of natural river management. Eileen is a Certified Floodplain Manager, Co-chair of the Natural and Beneficial Functions of Floodplains Committee for the Association of State Floodplain Managers, and a member of the steering committee for the Natural Floodplain Functions Alliance. Eileen has an M.A. in Environmental and Natural Resource Policy from The George Washington University in Washington, DC and a B.S. in Environmental Science from Elizabethtown College in Pennsylvania. She grew up in Stroudsburg, PA and currently resides in Camp Hill, PA.

Case Study: Bank Stabilization, Flood Reduction & Water Quality Improvement Design Build Project
Ajay Jain, PE, CFM, HR Green, ajain@hrgreen.com
Additional Author(s): Logan Gilbertsen, PE, CFM

Carpenter Creek is a perennial stream tributary to the Fox River in Carpentersville, Illinois. Carpenter Creek is a mapped floodplain (portion of it mapped as Zone AE with designated floodway and portion of it is mapped as Zone A). Numerous residential properties are located in the floodplain. Carpenter Creek is also located within the Jelkes Creek – Fox River Watershed (JCFRW). The Illinois EPA's Illinois Integrated Water Quality Report and Section 303(d) List indicates that portions of the Fox River within the JCFRW watershed are impaired for the designated uses of aquatic life and fish consumption. Portion of Carpenter Creek were severely eroded and per the JCFRW Action Plan it was estimated that approximately 23 percent of the sediment loads in the JCFRW are due to stream bank erosion. As a result, portion of Carpenter Creek reaches were identified as high priority projects in the JCFRW Plan.   The project was the recipient of funding through the United States Environmental Protection Agency's (EPA) Section 319 grant program. The project was successfully completed in Summer 2016 as a Design-Build project.   The improvements included 7,973 linear feet of bank stabilization to minimize critical erosion and to improve water quality by minimizing sediment and sediment-bound nutrient loading to the JCFRW. In addition, channel was relocated away from homes to add a riparian buffer while also improving channel conveyance and reducing flood heights. The restoration techniques included two-stage channel, stream meandering, riffle grade control structures, wetland basins, rain gardens and native vegetation. Approximately 43 properties will be removed from the floodplain through the LOMR process.   The presentation will discuss the conceptualization and securing of Section 319 funding, techniques used for bank stabilization and water quality improvements, monitoring and maintenance and LOMR application.   Presentation will also briefly discuss pros and cons of design/build contracting.

Biography
Ajay Jain, PE, CFM serves as a Practice Leader for the Water Resource practice for HR Green. He manages multiple projects and is responsible to provide technical and project management training and oversight to deliver successful projects to clients. Mr. Jain is a registered professional engineer, a certified floodplain manager and a qualified review specialist.

The Largest Wildlife Refuge Restoration Project in the Eastern US
Sravan Krovidi, PE, CFM, Amec Foster Wheeler, sravan.krovidi@amecfw.com
Additional Author(s): Matt Breen, PE, CFM

Prime Hook National Wildlife Refuge is located on west shore of the Delaware Bay. The Refuge was established in 1963 under the Migratory Bird Conservation Act as an important stopover along the Atlantic Flyway. The 10,144 acre refuge is divided into four units and provides habitat for over 300 species of birds and other wildlife. Units II and III were bermed in the 1980s and managed as freshwater impoundments, although the area was historically characterized by salt and brackish marsh. Tidal gauges indicate that the rate of change in local mean sea level (a combination of vertical movement of earth's crust and sea level rise) is 0.13 inches/year. It is estimated that over past 85 years 500 feet of beach front at Prime Hook has been lost. Several storm events over past 10 years overwashed the duneline, impacting the artificial freshwater impoundments. The breaches also factored in subsidence of local and regional landforms, and prolonged frequency and duration of flooding. This not only impacted the wildlife habitat but also the adjoining communities that have come to depend on this marsh for various recreation and farming activities. Most recently, the slow recovery of marsh was exacerbated by Hurricane Sandy. With Hurricane Sand Disaster Relief Act funding, U.S. Fish and Wildlife Service modeled potential scenarios to restore to salt water and brackish marsh as a more

resilient option to help Prime Hook adapt to the realities of sea-level rise and climate change. A restored marsh ecosystem would provide invaluable services to surrounding communities and it is estimated that the 5,000-acre wetland system, once restored, would provide approximately $53 million worth of ecosystem services. Join our construction superintendent on an airboat tour of the largest tidal marsh restoration projects, one focused on protecting fragile natural resources and improving coastal flooding resilience.

Biography
Mr. Krovidi has ten years of combined experience in Water Resources Engineering and Construction Management. He has a Masters and Bachelor's degree in Civil & Environment al Engineering from Rutgers University, NJ and Osmania University, Hyderabad India.

H5: Communicating Flood Risk
Moderator: Emily Whitehead, GISP, CFM, Stantec, emily.whitehead@stantec.com

Fill, Floodways & BFEs: The Unsteady State of Floodplain Mgmt.
Del Schwalls, PE, CFM, Schwalls Consulting, dschwalls@schwallsconsulting.com

When fill is placed outside of the channel and floodway of a flooding source, NFIP regulations allow the 1 percent annual chance floodplain designation to be removed from this land if it is elevated to the BFE. The floodway is defined by FEMA as "the channel of a river… and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot." By this very definition, as the portion of the 1 percent annual chance floodplain outside of the floodway is removed by the placement of fill, the BFE will increase by 1 foot. Therefore, this development, which met the minimum NFIP requirements at the time of construction, will inevitably be below the BFE. In the meantime, construction that directly affects the hydraulics of a flooding source, such as culverts and bridges, is incorporated into the flood study through the cut-and-paste Letter of Map Revision process. Over the course of time, modeling techniques and methods of acquiring topography change and improve, and watershed characteristics and stream geometry are modified by nature. The result is a BFE which is not stagnant. This presentation explores and examines the impacts that fill placement outside of the floodway, hydraulic structure construction, technological advancement, and natural changes have on an area's flood hazards. Issues such as improved hydraulic modeling and incorporation of more detailed topography are incorporated into the examination. The presentation shows the variable nature of a floodplain and identifies key problems with the set-in-stone approach to BFEs and floodplain management, with a strong focus on issues related to floodways.

Biography
Del Schwalls is President of Schwalls Consulting LLC, with more than 16 years of experience in hydrologic and hydraulic analyses, floodplain management, and water resources engineering. He has developed floodplain modeling and mapping across the nation, and specializes in conducting independent QA/QC of FEMA Flood Risk projects and Flood Insurance Studies (FISs). Mr. Schwalls has prepared numerous LOMAs, LOMRs, and CLOMRs across the Southeast US, and began his career in D.C. reviewing LOMRs and FISs for FEMA. He conducts trainings across Florida and up to New England on accurately completing FEMA Elevation Certificates (ECs) and addressing EC deficiencies. He assists communities with implementing, managing, and improving their overall CRS programs, including guiding them through CRS enrollment, annual recertifications, and five year cycle visits. In addition to CRS, he has extensive experience with the FEMA Hazard Mitigation Assistance (HMA) grant program, and served as a subject matter expert (SME) in HMA grants and FEMA benefit cost analysis for the States of Vermont and Colorado. He is currently the Hydrology SME to the Florida Commission on Hurricane Loss Projection Methodology. Mr. Schwalls holds a BS in environmental engineering from Mercer University, is a registered PE in FL, AL, GA, and SC, and became a CFM in 2003. He is the Region 4 Director for ASFPM, Vice-Chair of the Florida Floodplain Managers Association (FFMA), Co-Chair of the FFMA CRS/Insurance Committee, and served as an FFMA Regional Director for six years.

Communicating Flood Risk with a Story Map
Taunnie Boothby, CFM, Matanuska-Susitna Borough, AK, taunnie.boothby@matsugov.us

The Matanuska-Susitna Borough (MSB) is geographically the same size as West Virginia. This year we have reached over 100,000 people surpassing Fairbanks North Star Borough as the second largest community in the State of Alaska. We are the fastest growing area in Alaska. The MSB is currently undergoing a FEMA Risk Map Study that includes: *

Detailed hydrology and hydraulic modeling to include 71.9 miles of riverine study * Perform approximate riverine analysis for 316.6 miles; delineate 15.4 miles of existing areas. * Floodplain boundaries will be updated for the 1-percent and 0.2-percent-annual-chance (100- and 500-year) flood events. Thirty-Seven water bodies are being updated. To communicate changes in a format that will reach many learning styles MSB developed a Story Map using the ESRI Online product. This map is easy to understand and has been highly effective at our permit center and public meetings when discussing flood risk to a property owner. The MSB IT Director Eric Wyatt describes ESRI's Online Story Map product as PowerPoint on steroids. Here is the link to the Story Map: http://msb.maps.arcgis.com/apps/StorytellingSwipe/index.html?appid=9474c8ea28274376bfa7facb1a72942b. The easy to use slide bar shows how the changes in the current mapping could be changing in the future with the new data. In summary, the Story Map is allowing the Matanuska-Susitna Borough to have conversations that we wouldn't have been able to in the past, and because it is readily accessible on our website, others can use it too.

Biography
Taunnie Boothby has been a Certified Floodplain Manager since 2005. She accepted a planner position with the Matanuska-Susitna Borough in January of 2016 in long-range planning and beginning in November of 2016; she will focus on the Mat-Su Borough's Floodplain and Stormwater Management programs. Previously she was the State of Alaska NFIP Coordinator from 2007 - 2015, Planner for the State of Alaska's Map Modernization program from 2005 - 2007, and from 2001 - 2005 she was an Emergency Management Assistant with the State of Alaska. Additionally, Taunnie retired from the USN/USNR with 23 years' service. During her 23 years, she worked in Emergency Management, Military Support to Civil Authorities in support of a catastrophic disaster and she was recalled to Active duty and sent to the Middle-East following 9/11.

Be Flood SAF(ER): Situational Awareness for Emergency Response – A River Flooding Extent Map Viewer

Jared Allen, NOAA, NWS, jared.allen@noaa.gov

Situational awareness of river flooding and its time evolution through flood extent mapping is critical for emergency management resource allocation, decision making, and public notification. The National Weather Service (NWS) Austin/San Antonio, TX forecast office has developed a prototype ArcGIS Online (AGOL) web mapping application called Flood SAF(ER) – Situational Awareness For Emergency Response. This application displays current radar, NWS weather warnings, observed, and forecast river heights, plus their current respective hydrographs. More importantly, AGOL web-maps spatially depict modeled river flood extents for critical impact categories (minor, moderate, major, and flood of record stages). The river flood extents were modeled using the U.S. Corps of Engineer (USACE) Flood Event Simulation Model (FESM). Spatial statistics using the kappa coefficient and F-score at six river sites indicate the FESM modeled flood extent vs. accepted NWS standard HEC-RAS extents were correlated between 0.7 and 0.99. Furthermore, the time to complete a FESM river flood model vs. NWS current procedures was expedited from months to days, and in some cases, only required a few hours.   Decision makers can use Flood SAF(ER), combined with local, specific knowledge of the critical infrastructure, vulnerable neighborhoods, and roads at risk during a river flooding episode to proactively prepare or more efficiently respond in real-time rescue operations. Deep core partner relationships with city and county officials are initiated, cultivated, and maintained through direct project involvement. In addition, inter-agency water-data collaboration with the U.S. Geological Survey (USGS), USACE, and several regulatory river authorities has been bolstered. This presentation will highlight the need for river flood modeling, explain the GIS methodology for developing a river flood extent using FESM, tour the SAF(ER) web-application, and showcase resulting inter-agency partnerships.

Biography
Jared Allen is a Senior Meteorologist and GIS focal point at the NOAA/National Weather Service (NWS) Austin/San Antonio, Texas forecast office. He has provided direct weather briefings and support to city, county, state, and federal emergency manager officials during high impact weather events for nine years. He has worked some of the highest profile severe weather and flooding events over the past 5 years including the historic Memorial Weekend Flooding and Halloween Flood during 2015 across Texas and the historic record crests of the Mississippi River in 2011. He briefed 2-Star Generals of the U.S. Corps of Engineers daily at the Mississippi Valley Division before and during the record stages of the Mississippi River that resulted in demolition of Bird's Point Levee to protect New Orleans. Through the inter-agency partnership with the USACE and using the Flood Event Simulation Model, Jared has developed an intuitive web-mapping application to increase Situational Awareness for Emergency Response (SAF(ER)) during flooding episodes for the NWS. Jared has co-authored a USACE publication on rainfall distribution per Mississippi River sub-basin in a post-analysis of the record 2011 event and how it compared to the designed hypothetical maximum rainfall for the flood control system. Jared holds a master's degree in GIS and a bachelor's degree in operational meteorology from Mississippi State University. Outside of work, he enjoys traveling, hiking, running, and landscape photography.

H6: Complex Flood Control Projects

Moderator: Edward Beadenkopf, PE, CFM, Atkins, edward.beadenkopf@atkinsglobal.com

Determining Residual Flood Risk Associated with a Complex Levee System Fort Bend County, TX

Jonathan Simm, PhD, C.Eng., Bsc, HR Wallingford, j.simm@hrwallingford.com
Additional Author(s): André MacDonald, Sugar Land, TX

The United Kingdom probabilistic flood risk systems analysis process has been presented at previous ASFPM conferences. The approach incorporates the effects of levees under a full range of return period hydraulic loadings and actuarial valuations of property damage. Using Monte-Carlo simulation, the analysis process not only rigorously analyses the economic value of the residual flood risk behind the levees taking account of levee fragility and but also includes a back calculation in which the residual flood risk is attributed to each levee segment. This presentation now provides the first full application of the approach to a US context - the Brazos River floodplain, Texas. The application was motivated by the need to inform future investment in the various primary and secondary levees of a complex urban system. A series of adjoining Levee Improvement Districts (LID2, FC LID, FC LID2, LID14, LID15, LID19 and MUD46) have been built over the last 30- 40 years in the Sugar Land area of Fort Bend County, Texas. Each district comprises a series of levee systems as well as a series of hydraulic control facilities such as pumps and internal drainage ditches. The LID2 ring levee was built first. Other ring levees were then added as urban development moved downstream. Some of the original levees are now internal to the main perimeter levee and it was unclear whether the residual flood risk attributable to these internal levees was sufficient to justify improvement to the same standard as the primary levees. This presentation will describe the investigations and analysis process for the Sugar Land levee system and show how the anticipated outcomes will support future decision-making on investment in levee improvements. It will be of interest to levee and floodplain managers seeking to make levee investment and floodplain management decisions in similar complex levee systems.

Biography

Dr Jonathan Simm is a Technical Director for Flood and Coastal Management at HR Wallingford with responsibility for developing technical capabilities in the areas of performance, risk, materials and sustainability. He joined HR Wallingford in 1992 after an early career working with consulting engineers in feasibility studies, design and construction supervision of coastal and maritime works.   Jonathan has a passion for developing ideas that are directly usable by practitioners and over the last 15 years he has developed new ideas and approaches for sustainable asset management, integrating engineering thinking and analysis about reliability of defences with issues of deterioration and whole-life costs. He has also been involved for 25 years in producing guidance documents for coastal and hydraulic engineering, the most recent of which was the International Levee Handbook.   The paper being presented relates to Jonathan's involvement in the development and application of new flood risk systems analysis procedures.

The FM Area Diversion Project: Protecting Fargo-Moorhead, ND from Catastrophic Flooding

Eric Dodds, AE2S, eric.dodds@ae2s.com
Additional Author(s): Nathan Boerboom, PE, CFM, City of Fargo, ND

Federal and local public officials have worked for decades trying to solve flooding problems facing Fargo, ND and Moorhead, MN. The flat floodplain combined with a northerly-flowing Red River create a perfect storm of risky flood waters facing the community almost every spring.   A project has been developed by the U.S. Army Corps of Engineers and local sponsors to divert flood waters around the metro area. The FM Area Diversion Project is a complex undertaking that includes 12 miles of embankment, 30 miles of channel, 19 highway bridges, four railroad crossings, three river control structures and two aqueduct structures. It has been federally appropriated and the Corps' is planning to start construction in the fall of 2016.   One driving force behind this massive public protection project, is the incorporation of a Public-Private Partnership (P3). P3 efforts have been successful with projects like tollways, but this is the first project done by the Corps of Engineers to use this funding method. This presentation will: •Explain the flooding history in the FM region, along with a brief summary of project development.   •Explain the complexity of the engineering behind this massive project.   •Outline how the P3 process is expected to help reduce cost, shorten construction timelines, and help the Corps' find a new way to finance large-scale projects. •   Explain the funding approaches being used for this massive $2 billion Project.   •Explain the organizational structure that the local sponsors of the Project have established, and the relationship between the local sponsors and the federal government.

Biography
Eric Dodds is a Program Manager for Advanced Engineering and Environmental Services, Inc. (AE2S) and is working on the Fargo-Moorhead (FM) Area Diversion Project, which is a $2 Billion flood risk reduction project for the Fargo, ND and Moorhead, MN metropolitan area.   Eric has been employed by AE2S in Fargo, ND since 200flood3 and has served the role of Design Engineer, Project Manager, Operations Manager, and now Program Manager. He has worked on a multitude of utiity and civil infrastructure projects for the City of Fargo over his career, and began working on the Program Management team for the FM Area Diversion Project in 2011.   Eric earned both a Bachelor of Science in Civil Engineering and a Master of Science in Environmental Engineering from North Dakota State University in 1999 and 2001, respectively. Eric has been recognized for his leadership skills by local business associations as well as national and local professional associtions.   Eric lives in West Fargo, ND with his wife and two children. He is extremely dedicated to his family's activities, including travel baseball, basketball, volleyball, and dance. He enjoys hunting, fishing, other outdoor activities, and supporting NDSU by serving as a board member on the Team Makers club and the Advisory Board for the Civilt Engineering department.

The Bottoms: A 2D Analysis of Trinity River Levee Interior Drainage System

Sirak Bahta, PE, CFM, City of Dallas, TX, sirak.bahta@dallascityhall.com
Additional Author(s): Jack Young, PE, CFM; Jarred Overbey, PE, CFM, Halff Associates

The City of Dallas was founded on the banks of the Trinity River, the largest river entirely contained within the State of Texas. In the 1930's, the original East and West Levee Systems were completed to protect Downtown and West Dallas from the destructive power of the river. Since that time, the Dallas Floodway Levee System has been upgraded to include sumps and drainage systems for the 51 square miles of watershed protected by the levees. The sumps rely on a combination of conveyance and storage to move stormwater to the six pump stations which discharge into the Trinity River.   In 2016, the City of Dallas begin a pilot study to analyze Charlie Sump, a part of the West Levee System. The contributing watershed contains two large streams, two interconnected sumps, and a large network of storm sewer and is drained by a combination of pressure sewers and the Charlie Pump Station. The goal of the study was to determine the existing flooding conditions and impacts that redevelopment of "The Bottoms" neighborhood would have on the surrounding system. A 2D analysis was used to determine the extents of flooding from the riverine system, storm sewer system, and the sumps. The 2D model also allowed the City to better understand the impacts development has on flooding due to changes in sump storage and runoff timing.   The success of the "Bottoms" project reaffirmed the City's desire to move forward on studying the entire East and West Levee System through the City of Dallas FEMA CTP program. The results will be used in the regulation of development, operation of the pump stations, and planning for expansion of the Dallas Floodway Levee System. This presentation will highlight how 2D modeling can be used to better understand flooding hazards and regulation in urban levee areas.

Biography
Sirak Bahta started with the City of Dallas in 1995 in the Public Works Department. In 2007, he moved into the Floodplain Management Department, now known as Trinity Watershed Management. Mr. Bahta is a Senior Program Director and oversees all aspects of design and construction for the City's pump station rehabilitation projects.

H7: Tools to Inform Decision Making

Moderator: Greg Williams, CFM, Delaware DNREC, gregory.williams@state.de.us

Complex Levee System Fort Bend County, TX

Brian Batten, PhD, CFM, Dewberry, bbatten@dewberry.com

It is essential to proactively recognize relative risk across both small and broad geographies in order to identify and prioritize actions to improve flood resiliency. Sea level rise in combination with projected increases to precipitation have the potential to exacerbate both coastal flooding and stormwater drainage – presenting a challenging issue for coastal communities. When combined with future development and growth, the flood impacts have the potential to increase substantially. Coastal communities face potential liabilities and impacts to their bond ratings for overlooking hazards in their planning process.   In the past many planning efforts have been undertaken in the absence of, or with limited information of natural hazards and their associated impacts in the present day and future. This is a product of many factors, such as availability of hazard/risk information, achieving understanding of the implications to the planning effort, and ability to measure the effectiveness of measures. Successful resilience planning is a product of a nexus of multiple disciplines that encompass the problem and a solid

understanding of how risk may evolve in the future and where to allocate resources to achieve the maximum benefit.   Although the impact of hazards is specific to each community, flexible frameworks can be brought to bear to effectively quantify and present future risk information to serve a broad array of stakeholders. Our presentation will show examples of risk quantification and presentation through two case studies where building level risk was conflated over geographic communication frameworks. Our first case study in North Carolina will demonstrate how this approach was applied to communicate future risk to stakeholders from state-level decision makers to community planners. A second case study in Virginia Beach Virginia will illustrate the application of this framework to identify and prioritize flood risk management projects and targeted outreach efforts.

Biography
Dr. Brian K. Batten is senior coastal scientist and project manager with Dewberry's resilience solutions group. He was more than 18 years of experience providing project direction and oversight for studies concerning coastal flooding, coastal erosion, sea level rise and resilience. Brian has led sea level rise vulnerability analyses to support awareness, outreach, and adaptation planning for the states of Florida, New York and North Carolina. He is a technical lead on FEMA's efforts considering sea level rise in future mapping products, as serves as the project manager for Virginia Beach's multi-year study to assess and implement adaptation measures to address SLR impacts. Brian received a B.S. in Marine Sciences from Coastal Carolina University, a M.S. in Marine Environmental Sciences, and a Ph.D. in Coastal Oceanography from the Marine Sciences Research Center at the State University of New York, Stony Brook.

Empowering Communities: New Technologies to Engage on Flooding Rains
Raymond Laine, PhD, Ozengage, ray@ozengage.com.au

Laurie Anderson once said 'technology is the campfire around which we tell our stories'. With advancements in hydrologic and hydraulic modelling, water management knowledge systems and visualization, technological fire-starters enabling community focused floodplain management conversations are emerging. This presentation explores existing public participation tools available to flood practitioners and presents the theory, development and results of two new emerging engagement mechanisms; engagement decision support systems and mixed reality visualization (holograms) to assist in the flood risk management cycle. Trial results of these new engagement mechanisms demonstrate enriched social learning and decision making, empowering communities to learn about, spark conversations, prioritize and make more informed choices about complex flood risk management options for their local catchment.

Biography
Dr Raymond Laine is a senior flood engineer by day and innovative community engagement software developer by night. He has extensive experience in flood, coast and estuary management, numeric modelling and community engagement. Ray holds multiple degrees in engineering, science and creative arts and has won national and international awards for his work and research. He is passionate about collective urban and engineering design, disaster resilience, risk communication and informed civic decision making.

2017 Coastal Master Plan Data Viewer
Andrea Galinski, ASLA, CFM, Lousiana Coastal Protection & Restor. Auth., andrea.galinski@la.gov
Additional Author(s): Mandy Green, Melanie Saucier

As communities across the nation face increasing threats from coastal flooding and sea level rise, there is a great need to provide accurate information about current flood risk, how this risk may change over time, and possible solutions to increase resilience. The Coastal Protection and Restoration Authority (CPRA) developed an innovative "2017 Master Plan Data Viewer" to help coastal Louisiana communities better understand their current and future flood risk, as well as to provide information about the state's holistic restoration and risk reduction strategy to increase community resilience. This web-based, geospatial visualization tool integrates and displays results from CPRA's 2017 Coastal Master Plan modeling effort which produced data about current and future changes in land loss, flood risk, and economic damages in coastal Louisiana. In addition, projects recommended for the master plan (restoration, structural /nonstructural risk reduction) are included to provide communities with more information about strategies to increase community resilience. Key features include: • Action oriented data- information is curated to help identify at-risk populations (such as low income, minority, and elderly) and to show the critical areas for project implementation; • Current and future conditionsdata includes current day, near term (10 years), and long-term (50 years) flood depths for storm surge-based flood events; and • Dynamic interaction- various fields enable users to select three different environmental scenarios (Low, Medium, and High), plan implementation scenarios (With/Without Plan), and flood event sizes (50, 100, and 500-year flood events). The viewer provides supports state and local decision making by providing a centralized source for flood

depth, damage, and socio-economic vulnerability data, as well as state recommended risk reduction projects. The viewer also helps communities develop locally appropriate resilience measures and hazard mitigation efforts.

Biography

Andrea is a member of the 2017 Coastal Master Plan Delivery Team with a focus on the development of the Flood Risk and Resilience Program. Andrea assists with CPRA's nonstructural program development including the Flood Risk and Resilience Program policy recommendations. She also has expertise in community outreach/engagement and graphic communication and has worked on the development of CPRA's award winning Master Plan Data Viewer. Andrea holds a Master of Landscape Architecture for Louisiana State University. Andrea received a Master of Landscape Architecture from Louisiana State University and a transdisciplinary Bachelor of Philosophy degree in "Human Ecology" from Penn State University. She also has received the Certified Floodplain Manager certification (2012). She currently lives in Baton Rouge with her husband, two young children, dog, two cats, and a revolving flock of suburban chickens.

H8: Gray + Green Infrastructure = Better Projects
Moderator: Chip Hague, CFM, Charlotte Cnty., Fl, hoyie.hague@charlottecountyfl.gov

Advanced Sustainable Urban Stormwater Infrastructure
Mark Joersz, Advanced Drainage Systems, mark.joersz@ads-pipe.com

This presentation will teach attendees how to evaluate, design and constructed advanced urban and public infrastructure stormwater management solutions that meet EPA and other regulators guidelines for volume reduction, water quality and peak flow attenuation. Nationally, we continue to mature with regards to how states, counties and communities efficiently manage stormwater. Classically defined green infrastructure, such as bioretention, rain garden and pervious pavement have been implemented with the intent of reducing runoff and improving water quality. With the correct design for the site, proper construction technique and sequencing, followed by frequent and adequate maintenance, this infrastructure has shown to function adequately. In dense urban environments, additional stormwater mitigation challenges exists, such as combined sewers, costly right-of-way and congested utility corridors.   Unfortunately time and time again, the design, installation and/or maintenance of this infrastructure are not adequate for a variety of reasons. Many alternative techniques have been implemented to increase service life, reduce maintenance and improvement consistency of performance. This discussion will focus on national and regional use and acceptance of leading trends in subsurface infiltration BMPs. It will outline design and construction techniques being utilized by regions, States and communities to cost-effectively reduce runoff volume and improvement water quality through direct and indirect measures while reducing the cost of land use. Case studies will also be presented to demonstrate use of these techniques.

Biography

Mark Joersz ("Jerz") Advanced Drainage Systems, Inc. (ADS)   Mark is the Regional Engineer and Engineered Products Manager for Advanced Drainage Systems, Inc. He leads field activities with public agencies to educate and encourage the utilization of high performance drainage products in Missouri and Illinois. Prior to his current role, Mark was the Central Region Director of Engineering. He graduated from the Missouri S&T (formerly the University of Missouri – Rolla) in 1995 with a BSCE, followed by a M.A. in Management in 2001 from Webster University – St. Louis. Mark has conducted a wide variety of regional technical training to associations such as MfSMA, APWA of MO and IL, Illinois and Missouri Societies of Professional Engineers, Missouri and Kansas Water Environment Associations and Society of Military Engineers (SAME). He is a member of the American Public Works Association, Water Environment Federation, Missouri Association of County Transportation Officials, Association of General Contractors (AGC) and participates in activities with the ASCE, MfSMA, SITE and Society of Professional Engineers. He lives in St. Louis and is married with 4 children.

Kenilworth, IL Green Streets: Combining Porous Asphalt & Permeable Parkways to Reduce Flooding in a Combined Sewer Area
Joy Corona, PE, CFM, Bleck Engineering Co., jcorona@bleckeng.com
Additional Author(s): Patrick Brennan, Village of Kenilworth

The Village of Kenilworth, Illinois has experienced severe street and basement flooding, especially within the portion of the town served by a combined sewer system. After significant flooding in 2008, the Village embarked upon a path to identify and mitigate the causes of sewer surcharging and flooding. The initial study determined that the 1920's

infrastructure system provides only 15-20% of the needed capacity. To address this problem, the Village initiated a Green Streets Program that is aimed at reducing flooding and improving water quality throughout the Village through the installation of municipal separate storm sewer system and the use of green infrastructure. Cumberland, Roslyn Avenues and Melrose Road were selected as the first streets for improvement.

The ultimate design includes 4363-linear feet of porous asphalt streets, underground detention, porous turf parkways and a separate storm sewer system. A potential long term design component, which would maximize flood reduction benefits, includes a separate storm sewer outfall into Lake Michigan. The inclusion of the Green Infrastructure approach not only has typical environmental benefits such as increased infiltration and evaporation, which in turn reduces the volume of runoff and improves runoff quality, but is intended to provide sufficient BMPs to procure a permit from the IEPA for a separate storm sewer outfall into Lake Michigan. The overall project cost is approximately $6.5 million. The presentation will further discuss Bleck's design selection process, public outreach efforts, construction implementation, current function of the system and lessons learned. At the time of the conference the project will be installed approximately 9 months.

Biography
Joy has over 20 years of experience in water resources, with the last 15 years as Bleck's water resources expert. She has completed numerous flood plain studies, public flood control projects, stormwater management reports, provided permit review and inspection services and integrated green infrastructure into projects at both the private and public level. She has also created a Stormwater Pollution Prevention Program Plan template that is being utilized throughout the region for MS4 compliance with new NPDES regulations. She came to Bleck with comprehensive experience in water resource projects after five years with the Lake County Stormwater Management Commission as their permit engineer, and continues to provide them consulting services in both regulatory and planning capacities. Joy is a respected lecturer, speaking at conferences and workshops throughout the region.   Joy was retained by the Village of Kenilworth in 2014 to review, address public concerns, make recommendations and associated plan revisions on this project. She was integral in the final design, permitting and construction oversight.

Integrating Green & Grey Public Infrastructure within a Framework of Multiple Ownership
Laura Mwirigi Rightler, PE, CFM, Civil Design, lrightler@civildesigninc.com
Additional Author(s): Adonis Smith

Daley/Broadview/Gill/Hedda Storm Sewer project is a part of the City of Maryland Heights (the City) Capital Improvement Program (CIP). The impacted project area is nestled between Midland Creek to the south and its tributary to the north within the Fee Creek Watershed in St Louis County. Following an initial assessment, CDI and the City established that the neighborhood experienced frequent flash floods exceeding the existing systems capacity and leading to overflowing of structures, system backup, yard ponding, and turning existing flow paths and streets into temporary rivers. The tributary to the north was prone to frequent bank overtopping and is downstream of a constricting culvert. Consequently, it was determined that the proposed design explore an alternative beyond the minimum requirement of the 20-minute, 15-year design storm to address significant volume reduction with detention. The proposed stormwater network includes linear BMP's composed of ADS StormTech subsurface structures. While this technology is in use in multiple private development sites, this specific project proposes green infrastructure installation within public ROW in series with grey infrastructure. Therefore, portions of the system will remain under the City's jurisdiction for maintenance and inspection with connected upstream and downstream sections under the Metropolitan St. Louis Sewer District's jurisdiction. Challenges Addressed: •Communicating project goals to the community •Identifying local stormwater deficiencies versus regional flood mitigation concerns •Meeting community needs, project scope, and agency regulations simultaneously •Limitations of approved design applications •Existing utilities   Project Goals •Reduce frequent overland flooding and erosion •   Reduce frequency of system overloads Conclusion This presentation will discuss successful collaborative practices, effective tools in communicating flood risk objectives to the community and implementation of innovative solutions to complex stormwater runoff and floodplain management problems, while also working within the framework of multiple regulators.

Biography
Laura Mwirigi Rightler is a Project Manager with Civil Design Inc. CDI, with 17 years analysis, design and project management experience in water resources, environmental, site development, construction management and international civil engineering projects. Her experience includes inflow/infiltration (I/I) analysis, sanitary and storm sewer design, stormwater hydrology, detention basins, erosion and sediment control, floodplain (H/H) modeling and mapping, dam inundation mapping, levee hydraulic modeling and sensitivity analysis and landfill cell construction design. Ms. Rightler holds a Bachelor of Science degree in Civil Engineering from Jomo Kenyatta University of Agriculture & Technology (JKUAT), Nairobi. A Masters in Information

Design & Technology from Georgia Institute of Technology (GA Tech), Atlanta and a Masters degree in Civil Engineering from the Missouri University of Science and Technology (MST), Rolla. Ms. Rightler is a registered Professional Engineer in Missouri, Illinois, Kentucky, and Virginia and a Certified Floodplain Manager. Her expertise in the water resources applications includes GIS, HEC-RAS, HEC-HMS, Hydraflow, PondPak, Flowmaster, WaterCAD, UNET, Geopak Drainage and Autodesk Storm and Sanitary Analysis.

J1: FEMA Mitigation Policies & Requirement

Moderator: Janet Thigpen, CFM, ASFPM District 1 Chapter Director, STC Reg'l Planning Bd., jthigpen@co.chemung.ny.us

Averting a Second Disaster: Leading Financial Oversight Practices Following Disasters

Michael Herman, Ernst & Young, michael.herman@ey.com

Effectively managing your federal grants is a critical component your communities' strategy for an effective mitigation policy. Subrecipients (county and local governments and private non-profits) continue to be subject to scrutiny from FEMA and the Department of Homeland Security Office of Inspector General on grants they receive particularly, disaster and other mitigation grants. Post disaster Stafford Act grants (406 Mitigation and HMGP) continue to be the largest source of all hazards mitigation funding. The purpose of this session is to present floodplain managers with the issues they will need to address before a disaster, not to make them experts but to familiarize them what they need to do, now before the disaster strikes when they have the time, to focus and develop relationships. This will be done using real world examples and current best practices including focusing on many new changes inducing the "Super Circular", FEMA's pilot programs and the latest from the DHS OIG's reports. The key to successful grants is not just getting the grant written but keeping the funds on the back end. A particular focus is paid to why grant management should be top of mind to recipients of FEMA, HUD and other federal disaster grants, and how leading practices can be implemented including: •   How to prepare before a disaster strikes •   Response period priorities — avoiding common pitfalls that cause problems later   •Recovery period actions to mitigate weakness, monitor activity, ease grant closeout and help with OIG audits   Additional emphasis will be placed on new developments including: •   Section 428 Alternative Procedures, implemented by the Sandy Recovery Improvement Act of 2013

Biography

Michael is a Senior Manager in EY's Insurance & Federal Claims Services group. Prior to his tenure at EY, Michael had over 20 years of providing policy and strategic analysis and guidance to government agencies, non-profit organizations, trade associations and businesses. His primary focus has been on policy, legislative and grant issues, including audits oversight and investigations.   •Michael has worked on numerous disasters from the Virgin Islands to Alaska, including: Hurricane Katrina, "the Perfect Storm" and both World Trade Center attacks. •Michael is currently assisting state and local agencies in the aftermath of Superstorm Sandy with billions of dollars in Federal grants.   •Michael is currently assisting a hospital in South Carolina with Federal Disaster grants in the aftermath of devastating floods in 2015 •Michael served as the Senior Counsel for the United States House of Representatives, Committee on Transportation and Infrastructure – Emergency Management Subcommittee, where he drafted legislation, provided oversight and conducted investigations of FEMA's disaster programs including the Public Assistance program and FEMA's mitigation program. In this capacity, Michael served as counsel for 25 hearings on FEMA's emergency management programs including numerous hearings on the Public Assistance program and the recovery from Hurricane Katrina. •   Michael served at FEMA from 1995 to 2007, where he was deployed as a Field Attorney to numerous disasters from the U.S. Virgin Islands to Wasilla, Alaska; worked with all three National Emergency Response Teams (ERT-N); and served on both National Response Coordination Center (NRCC) Teams. •Michael led the Legislative Regulatory and Policy Team in FEMA's Office of General Counsel, and also provided legal counsel to senior program officials, including FEMA's disaster and mitigation programs, Urban Search and Rescue Program (US&R) and the Disaster Declaration Unit. He also managed FEMA's disaster deployed attorneys.

FEMA's Support for Hazard Mitigation & Resiliency: Preparing for the Impacts of Climate Change

Jordan Williams, CFM, CDM Smith, williamsjo@cdmsmith.com
Additional Author(s): Eric Kenney, PE, CFM, CDM Smith

Hazard Mitigation Assistance (HMA) provided by the Federal Emergency Management Agency (FEMA) is focused on funding projects that support risk reduction due to natural and man-made disasters. In response to The President's Climate Action Plan, Executive Order 13653 (Preparing the United States for the Impacts of Climate Change), and FEMA's Climate Change Adaptation Policy (2011-OPPA-01), FEMA is taking steps to ensure its programs account for the impacts of climate change and include planning for mitigation actions in support of climate resilient infrastructure and communities. In particular, HMA has been expanded to meet the goals of long-term climate resilience and funding now supports cost-effective project grants that incorporate flood risk reduction and drought mitigation. These methods include the use of green infrastructure, accounting for environmental benefits of mitigation projects and other eligible hazard mitigation activities that reduce disaster losses and protect

life and property from further disaster damages. FEMA recommends communities consider the impacts of climate change in their mitigation actions and is evaluating ways to encourage the use of green infrastructure in HMA projects.   CDM Smith supported FEMA to research mitigation activities which reduce risks associated with climate change. The research included an evaluation of various technical and implementation considerations. Using this research FEMA identified mitigation actions that provide risk reduction benefits for flood and drought, and support climate change resiliency. This presentation will provide a summary of the FEMA Hazard Mitigation Grant Program, a review of the Climate Resilient Mitigation Actions (CRMA) now eligible under HMA programs, Benefit-Cost Analysis guidance for CRMA projects, and tips for preparing a grant application. Mitigating the impacts of climate change in risk reduction activities increases resilience and reduces damage from natural hazards and, therefore, reduced costs to rebuild communities post-disaster. FEMA encourages all communities consider climate change in their hazard mitigation planning and projects.

Biography
Ms. Williams is a project manager and water resources planner with CDM Smith with experience in benefit cost analysis (BCA), FEMA hazard mitigation grant programs, FEMA Risk MAP program, and watershed and floodplain management and planning. Ms. Williams graduated from Lehigh University in 2005 with a B.S. in Environmental Science and a B.S. in Statistics and received a Master's in Water Resources Management from Duke University in 2007.

Mitigation Benefits Estimator: Automating the FEMA BCA Toolkit for Structure-based Project Prioritization
Paul Vidal, Stantec, paul.vidal@stantec.com
Additional Author(s): Jarred White, EIT

In order to assist with the prioritization of hazard mitigation funding, FEMA Region II commissioned a study to understand the potential flood damages, hazard mitigation need, and risk reduction benefits throughout the State of New Jersey. To answer these questions, an innovative model, the Mitigation Benefits Estimator (MBE), was developed to parallel FEMA's Benefit-Cost Analysis (BCA) Toolkit. This model estimates probabilistic flood risk and generates estimated benefit-cost ratios for every available structure in the state. The resulting information can then be used to evaluate and prioritize mitigation project alternatives and scenarios (e.g., elevation and acquisition projects) at the structure level or as aggregated projects. In addition to the estimation of mitigation benefit-cost ratios, the results provide added-value benefits including estimated damages at various flood recurrence intervals and annualized risk. Results are viewable in ArcGIS promoting broad usage by stakeholders. Further, results allow users to visualize flood risk and potential mitigation benefits to aid in the understanding of risk (e.g. flood-prone "hot spots") and better target cost effective mitigation projects, Ultimately, the results reduce the barriers to implementing mitigation projects by providing an estimated benefit-cost ratio for each structure without having to employ a full FEMA BCA.   The MBE was developed with input from a multi-disciplinary stakeholder group comprised of state, federal, academic representatives to ensure use of best available data and functionality for end users. Further, the methodology employed is transferrable to other jurisdictions with similar data available.   This presentation will present a methodology to automate wide-scale estimated BCAs for use in large scale, structure-specific risk reduction and prioritization of mitigation projects. This allows federal, state, and local stakeholders to communicate risk consistently across the state and aid in complex decisions around mitigation strategy implementation.

Biography
At national, state, and local levels, Paul has applied his skills in Geographic Information Systems (GIS) and application design and development for a wide range of fields, including transportation, civil engineering, water resources, mitigation, site evaluations, and hazard mapping. From flood study and digital conversion projects to national metric tracking system for FEMA, Paul has applied his analytical expertise for various clients, scales, and purposes. In addition to these projects, his responsibilities include geoprocessing, spatial analysis, workflow analysis, interface design, and database architecture and other facets of high-level geographic research and application development. His GIS and application development expertise provided on the Community Hazard Assessment and Mitigation Planning System (CHAMPS) in Nashville has helped the project win an American Council of Engineering Companies of Tennessee Grand Award in the Mapping and Technology Category. Attending Miami University (Ohio), Paul earned his bachelor's degree in Zoology and Environmental Science. Today, Paul is an Associate and Senior Software Developer at Stantec and serves as a National Technical Leader for Information Technology.

J2: Local & Coastal Flood Loss Reduction Initiatives

Moderator: William Nechamen, CFM, ASFPM Regulations Cmte. Co-Chair, New York State DEC,
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US Military Sites on the Frontlines of Rising Seas

Shana Udvardy, CFM, The Union of Concerned Scientists, sudvardy@ucsusa.org
Additional Author(s): Erika Spanger-Siegfried, Kristy Dahl, Astrid Caldas, PhD

Sea levels are rising as global warming heats up the planet. Many military bases along the US East Coast and Gulf of Mexico are at risk of permanently losing land to the ocean in the decades ahead. The Department of Defense and the U.S. military are working to prepare itself and its forces for the inevitable impacts by investing in science and scenario planning tools and flood risk mitigation activities at installations. However, as the seas rise, high tides will reach farther inland, tidal flooding will become more frequent and extensive, and when hurricanes strike, deeper and more extensive storm surge flooding will occur.   The Union of Concerned Scientist's recent analysis, US Military on the Frontlines of Rising Seas, finds that by 2050, most of the 18 military installations evaluated will see their number of floods per year jump from about 10 today to roughly 260 with intermediate rates of sea level rise. Roughly half of the sites could flood daily if land-based ice melts at a higher rate, and four sites could lose more than 20 percent of their land due to daily high-tide flooding. Sites at risk include the East Coast's largest naval shipyard, the Portsmouth Naval Shipyard in Maine, and the site of Marine Corps recruit training for the past 100 years, the Marine Corps Recruit Station Beaufort in South Carolina. With its considerable resources and political power, the military is in a position to lead the way in climate adaptation for its own sites and the communities that surround them, and perhaps, to leverage a science-based national political conversation as well. This session will provide an overview of UCS's methodology, an overview of the sea level rise, land loss, and storm surge findings, and highlights from specific military installations.

Biography

Shana Udvardy is the Climate Preparedness Specialist with the Union of Concerned Scientists (UCS) where she is working on sea level rise and permanent inundation analysis under UCS's Climate and Energy Program. Previously, she worked as the Climate Adaptation Policy Analyst under the Weathering Climate Risks program at the Center for Climate and Air Policy (CCAP). In this role, Shana advanced corporate and community preparedness for extreme weather and climate change impacts. Previously, she led flood risk and climate adaptation initiatives as president of Udvardy Consulting and as the director of flood management policy for American Rivers. Prior to joining American Rivers, Udvardy led the Georgia Conservancy's water program advocacy efforts that helped establish a comprehensive statewide water plan for Georgia. She also previously worked for the Smithsonian's Monitoring and Assessment of Biodiversity program where she led a comprehensive biodiversity assessment and monitoring program in Perú. Shana was a Peace Corps volunteer in Nicaragua where she promoted soil and water conservation. She is a Certified Floodplain Manger (CFM), holds a M.S. in Conservation Ecology and Sustainable Development from the University of Georgia's Odum School of Ecology, and a B.A. from Syracuse University's Maxwell School.

Flood Smart Communities: Municipalities Working Together To Build Flood Resilience

Jayme Thomann, AICP, CFM, Genesee/Finger Lakes Regional Planning Council, jbreschard@gflrpc.org
Additional Author(s): Stevie Adams, CFM, The Nature Conservancy

Floodplain management standards are based on a national program (NFIP) with success largely dependent on local enforent. Obstacles are inherent in this structure as every local government has some degree of local autonomy and every state legislature retains some degree of local government control. This combined with the dynamic nature of flowing water, which does not observe political boundaries, leads to development in one community potentially impacting others—with very few incentives to work together.   Flood Smart Communities is a case study that worked with three adjacent municipalities in New York State to proactively and collaboratively tackle the issue of shared floodplain management by utilizing No Adverse Impact principles. Our approach used community-based decision-making to collectively identify specific objectives and actions to reduce flood risk and increase resiliency. Each step of the process developed organically under the direction of municipal representatives. Without direct assistance from the federal or state government—and guided only by a multi-disciplinary Project Team—a Flood Smart Action Plan was developed with intentionally wide-ranging recommendations so that local decision-makers have a range of real options and choices to implement.   This presentation will explain the Flood Smart Communities approach, which can serve as a model for other communities interested in working across municipal boundaries to tackle regional flood problems. It will describe the vulnerability assessment that mapped social, economic, and structural indicators with physical susceptibility, and other tools crafted by the Project Team based on locally identified needs such as floodplain ordinance language, a review of floodplain activities for Community Rating System participation, an inter-municipal agreement for

a Floodplain Protection Overlay District, property owner decision-trees, and flood attenuation recommendations.   Altogether, this case study demonstrates that collaboration takes a variety of forms and that there is no "one size fits all" solution for No Adverse Impact. See: http://www.gflrpc.org/floodsmartactionplan.html

Biography
Jayme Thomann is a Senior Planner at Genesee/Finger Lakes Regional Planning Council (G/FLRPC) in Rochester, New York where she has been providing comprehensive planning support to a nine county region for over ten years. She has received certification from the American Institute of Certified Planners (AICP) and is a Certified Floodplain Manager (CFM). Jayme's focus areas are water resources and general municipal planning. Water resources planning includes Federal Phase II Stormwater Regulation assistance, participation with County Water Quality Coordinating Committees, stormwater and floodplain management planning, watershed planning and implementation. She began her career at Dewberry in Fairfax, Virginia working with the NFIP and participated in FEMA's Public Assistance program during active hurricane seasons and the 2001 World Trade Center disaster. Other experiences include environmental planning work and cultural resource documentation on Long Island. Jayme graduated from Mary Washington College in 2000 with a dual Bachelor of Arts in Historic Preservation and Geography and Cornell University with a Master of Arts in Historic Preservation Planning in 2005.

Strategies for Smart Growth & Long-term Flood Risk Reduction: Tipton, IN Case Study
Sheila McKinley, AICP, CFM, Christopher Burke Eng., smckinley@cbbel-in.com

Too many communities continue to experience devastating social, economic, and physical damages from flooding. Even with the use of expensive, engineered solutions to reduce flood risk, flood damage losses continue to increase. Moreover, climate change projections suggest that floods will intensify in most regions of the United States, especially in the Midwest and Northeast. These trends are creating a sense of urgency among communities to look for better ways to deal with flooding and build flood resilience particularly in states that are expected to experience increased flooding in the future.   In 2014, the EPA and FEMA published a first of its kind report on smart growth strategies for disaster-resilient communities. This report promotes a sustainable planning approach to development so communities become more resilient to future flooding by protecting vulnerable undeveloped lands, siting development in safer locations, and designing development so it is less likely to be damaged in a flood.   Recognizing the value of this approach, the Indiana DNR and Silver Jackets secured funding from FEMA to apply these smart growth strategies and prepare a pilot flood resilience plan in Indiana. The City of Tipton was chosen as the pilot community due to its significant vulnerability to flooding and flood-related losses during the most recent major flood in April 2013, the city leaders' willingness to explore new flood resiliency approaches, and the extensive previous flood risk management studies and plans that have been already developed.   This presentation will discuss the devastation of past flood events, an overview of the studies that resulted in no feasible structural solutions, and the specific smart growth policies for the different flood resilience planning areas. While examples will be specifically from Tipton, Indiana, this flood resilience approach can be applied to similar flood prone communities.

Biography
As the Planning Director at Christopher Burke Engineering, Sheila is responsible for overseeing the development of stormwater, floodplain, and green infrastructure planning and policy projects throughout Indiana. She has a long-time interest in land use and its influence on water resources. This interest and her collective 20 years of experience have allowed her to develop and apply an integrated and holistic approach to water quality and quantity related projects. Sheila lead the planning team responsible for the development and preparation of the Tipton Flood Resilience Plan.   Sheila holds a Masters in Landscape Architecture degree from the University of Illinois in Urbana-Champaign and a Bachelor in Landscape Architecture from the University of Guelph in Ontario, Canada. She is a member of the American Planning Association (APA), American Society of Landscape Architects (ASLA), and the Association of State Floodplain Managers (ASFPM). Sheila is a certified planner under the American Institute of Certified Planners (AICP), a Certified Floodplain Manager (CFM), and LEED Green Associate.

J3: 2D Modeling Solutions for Unique Conditions
Moderator: Rocky Keehn, PE, D. WRE, ENVSP, LEED AP, CFM, Common Sense WRE, rocky.j.keehn@commonsensewre.com

Overland Flow Modeling Through Joliet, IL Using HEC-RAS 2D
Aaron Thomas, CFM, Illinois State Water Survey, abthomas@illinois.edu

The City of Joliet is located southwest of Chicago in Will County, Illinois along the Des Plaines River. Though Joliet is protected from Des Plaines River flooding by a flood wall, it could be inundated by a failure of I & M Canal embankments upstream of the flood wall. The I & M Canal embankments were constructed between 1836 and 1848 as part of the canal transportation system. Because these historic embankments are not designed and maintained as levees, they are considered "non-levee embankments" and cannot be accredited as providing flood protection.   STARR performed flow calculations to determine that flow that could enter City in the event the I & M Canal Embankments did not provide risk-reduction from the 1% annual-chance event. This information was provided to Illinois State Water Survey, who later used a HEC-RAS 2-D hydraulic model to map the flood risk within the City.   The Illinois State Water Survey used a HEC-RAS 2-D hydraulic model to determine flow paths and flood elevations through the City, approximately 2.5 miles to the outlet. The community was presented with the draft modeling and flood hazard mapping results during a meeting in the summer of 2015. The mapping products consisted of 1% flood depth and elevation-grids, and a floodplain comparison map, which shows the effective mapping overlain by the proposed flood hazard mapping.   This presentation will share the methodology used to determine and communicate the flood hazard risk in an area behind a flood wall structure resulting from overland flow entering at a location upstream of the flood wall structure.

Biography
Mr. Thomas is a project water resources engineer with the Coordinated Hazard Assessment and Mapping Program (CHAMP) at the Illinois State Water Survey (ISWS). ISWS is a state cooperating technical partner with FEMA, along with our partner the Illinois Department of Natural Resources. Mr. Thomas's engineering career also includes working as a private consultant. Mr. Thomas is involved with floodplain modeling and mapping projects in the State of Illinois. He has a Master's in Civil and Environmental Engineering from the University of Illinois, Champaign-Urbana. He is a licensed professional engineer and certified floodplain manager in the State of Illinois.

2D Modeling for a 1D LOMR in a 3D World: Three "Simple" Stories
Rachel Pichelmann, PE, CFM, SHE, rpichelmann@sehinc.com

SEH has recently completed three LOMR studies which included the use of 2D models for varying purposes: to update the hydrologic analysis for a complex urban system, to evaluate interior flooding conditions for a new flood risk management system, and to evaluate a significant flow split condition at a creek/roadway crossing.   As evidenced by these three LOMR studies, real-world hydraulic conditions often are not properly represented by 1D computations. Each study required unique applications of the 2D models, and the results were incorporated in different ways to support each multifaceted LOMR request. This presentation will focus on the use of 1D/2D and 2D models to more accurately analyze three complicated floodplains.   For the first LOMR study, a 1D/2D hydrologic and hydraulic model was developed using xp2D to simulate the interaction between the storm sewer system and surface flows in an urban floodplain. The 1D/2D modeling results were used to modify discharge rates in the 1D HEC-RAS model of the surface flow system. For the second LOMR study, a 1D/2D hydrologic and hydraulic model was developed using xp2D to estimate ponding levels for interior drainage areas of a new flood risk management system. For this study, the flat terrain allowed for interaction between multiple interior drainage ponding areas, which was represented using direct rainfall, a survey-based terrain, and inlet controls. For the final LOMR study, a 2D hydraulic model of an open channel system was developed using SRH-2D to simulate a breakout flow condition which diverted flow to a different watershed. The 2D modeling results confirmed field observations of breakout flows being conveyed by a state highway, and were significant enough to be mapped as part of the LOMR, potentially resulting in the roadway being mapped as a Floodway.

Biography
Rachel Pichelmann is a Professional Engineer and Certified Floodplain Manager at SEH specializing in floodplain management and hydrologic and hydraulic analyses. Rachel's project experience spans across the Midwest and includes developing and evaluating hydrologic and hydraulic models, conducting flood studies, completing dam failure analyses, and designing hydraulic structures and systems. Rachel has provided the hydraulic analysis and mapping required for several successful LOMRs, and has also developed 2D models of complex systems using a variety of programs.

HEC-RAS Hydraulic Modeling Methods of Densely Populated Areas
Jesse Pope, CFM, Gannett Fleming, jpope@gfnet.com
Additional Author(s): Ashley Mengle, GISP, CFM

The US Army Corps of Engineers HEC-RAS hydraulic modeling software provides different methods for modeling flood events in densely populated areas. Methods include adjusting the Manning's n coefficient values and modifying the terrain data to include structures within the floodplain. A combination of these methods can be used within 1D and 2D modeling. The discussion will present the importance of including structures in a hydraulic analysis and how each

method was implemented in a dam breach analysis in Norwich, CT. The 100-year and the Probable Maximum Flood dam breach events were analyzed in 2D unsteady flow simulations. Each scenario was performed using different terrain datasets, each terrain representing one method of modeling a densely populated areas within the floodplain. The purpose of the presentation is to display how each method will affect the inundation extents and water velocities. Determining factors as to when each method is recommended will also be discussed. In addition, the discussion will present the use of automated processes in GIS to develop a bathymetric stream channel surface for both 1D and 2D hydraulic modeling. The workflow includes 3-D visualization tools, and several channel estimation techniques for both large and small streams.

Biography
Jesse Pope is a Hydraulic and Hydrologic Designer at Gannett Fleming, Inc. located in Camp Hill, PA. He earned a Master of Science degree at Utah State University in civil engineering with an emphasis in hydraulics. Pope's efforts have focused on hydraulic modeling of river systems and dam breach analyses.

J4: Nature-based Flood Reduction II
Moderator: Brian Killen, CFM, Stantec, brian.killen@stantec.com

*Innovative & Emerging State Policies & Programs Incentivizing Nature-based Solutions for Erosion, Risk Reduction & Environmental Benefits
Sarah Murdock, The Nature Conservancy, smurdock@tnc.org
Additional Author(s): Alice Tripp, Ana Tinsler

Across the country, states are building support for implementation of natural infrastructure for erosion and flood risk reduction. Through policy analysis and state manager interviews, The Nature Conservancy has identified more than thirty policy mechanisms in seventeen states that promote or facilitate the use of natural infrastructure. Policy mechanisms include permits, laws, codes, grant programs, and management programs. The economic and ecological value of natural capital in coastal and riverine areas, especially erosion and flood-prone areas, has become increasingly relevant in the wake of increased flooding events across the U.S. from storms like Superstorm Sandy and increased intense rain events. Densely populated coastal and riverine areas are being challenged to adapt to the increasing risks of flooding being amplified by climate change at an unprecedented rate. Coastal habitats, recreational opportunities, and natural buffers are diminishing as disaster recovery costs are escalating at exponential rates yearly, further encouraging the need for alternative solutions to mitigating storm surges and increased precipitation with seawalls, revetments, levees and other structures. Ms. Murdock will share research conducted by The Nature Conservancy, summarizing existing state policies that promote investments in natural infrastructure, identify common challenges, and highlight the diversity of policies. She will highlight and delve into a few policies to exemplify the diversity of policies and early results on how they are affecting investments in natural infrastructure as a tool in reducing flood risk.   The purpose of this session is to broaden the awareness of the types of actions states can take to reduce their erosion and flood risk and increase multiple environmental benefits through the use of natural infrastructure. We hope to create a dialogue among states to increase knowledge sharing and promote the use of natural infrastructure as a common tool for community resilience.

Biography
Sarah W. Murdock serves as the Director of U.S. Climate Resilience and Water Policy at The Nature Conservancy. Her 30-year career has spanned work in the public, private and now nonprofit sector on environmental and energy policy. In the past 12 years working at the Conservancy, she has spent her time focused on policy, advocacy, communications, and executing projects that inform our climate policy work. Currently she focuses her time managing developing and implementing Conservancy climate resilience and water related policy positions. She spends much of her time focused on developing strategy related to federal flood hazard risk reduction and informing and proofing this work through TNC place-based conservation efforts. Prior to working at the Nature Conservancy. Murdock served as a consultant working with environmental and energy clients to develop strategic solutions to government, regulatory, and community outreach challenges. Prior to being a consultant, she served on the staff of United States Senator John F. Kerry of Massachusetts concentrating on environmental and energy policy. She holds a B.A. in environmental science from Colby College and a M.A. in urban and environmental policy from Tufts University. She also completed the Sea Education Association semester of independent oceanographic research aboard 100-foot schooner. She is married, a mother to a teenage son, and resides in Scituate, MA.

Mapping Floodplains, Populations At Risk, & Opportunities for Nature-based Risk Reduction for the Continental US

Kris Johnson, PhD, The Nature Conservancy, kjohnson@tnc.org
Additional Author(s): Oliver Wing, Paul Bates, Joe Fargione, Chris Sampson, Andrew Smith

Flooding is one of the costliest and most damaging types of natural hazards in the world. In the US alone, flooding has caused nearly $100 billion in damages during the last decade and future damages are expected to rise due to climate change and continued development in high risk areas. However, the ability to plan for and mitigate flood risk is limited by the lack of comprehensive, consistent and accurate mapping of floodplains in the U.S. Although floodplain maps exist for most urban areas and much of the country, there are significant gaps in coverage and existing maps are highly variable in their age and accuracy. Also, the vast majority of floodplain maps depict 1% chance (the so called '100-year') flood events, and in some areas the .2% chance event as well, but information about more frequent flooding events is lacking nearly everywhere. Additionally, information regarding where and how many people are at risk from flooding is insufficient to inform efforts to target risk reduction effectively. The advent of rigorous, large-scale flood models provides an opportunity to generate consistent, contiguous floodplain maps that can characterize multiple flooding frequencies. We used these new floodplain data sets combined with demographic and land cover data to: 1) quantify and map the number of people at risk from extreme as well as more frequent events; and 2) identify opportunities for conservation and restoration as part of a nature-based approach to flood risk reduction.   This presentation will share results from an integrated spatial analysis of the continental U.S. We will describe the large-scale flood model outputs utilized in this project, explain the additional data sources and spatial analyses completed, and discuss how these multiple data were integrated to quantify people at risk and identify opportunities for conservation and restoration.

Biography
Kris Johnson is the Senior Scientist for the North America Freshwater Program of The Nature Conservancy. In this role he leads collaborative scientific projects around the country that highlight opportunities for land use that can both support communities and sustain healthy and productive ecosystems. Prior to joining The Nature Conservancy, Kris was the Sustainability Scientist at the University of Minnesota's Institute on the Environment where he collaborated with federal, state and local partners to catalyze integrated forest management and build resilience in northern Minnesota. He received a bachelor's degree from Bowdoin College and completed an MS and PhD in Conservation Biology at the University of Minnesota. Kris was a Fulbright Scholar, a MacArthur Scholar, and remains a Senior Fellow in Sustainable Agricultural Systems at the University of Minnesota.

Nature-based Floodplain Mgmt. Exists & Federal Agencies Should Know How to Implement It

Jonathon Loos, American Rivers, jloos@americanrivers.org
Additional Author(s): Eileen Shader

Recent federal policies such as the Federal Flood Risk Management Standard (FFRMS) attempt to improve consideration of natural features and nature-based approaches in federal management of riverine floodplains (E.O. 13690). The FFRMS provides specific instructions to federal agencies, stating that "Where possible, an agency shall use natural systems, ecosystem processes, and nature-based approaches when developing alternatives for consideration." While these instructions are commendable, there is a lack of guidance and relevant examples of how nature-based approaches can be utilized in floodplain management- particularly in riverine floodplains. States and regional authorities have made significant progress in utilizing nature-based approaches because they provide multiple benefits. We highlight some specific examples of these projects, and discuss how they can help guide federal efforts. Some recommendations for replicating these successes in federal projects are clear; FEMA must develop frameworks for incorporating fluvial and ecosystem processes into floodplain development standards, such as through erosion hazard zones, river channel migration zones, and identifying critical functional floodplain habitat. In doing so, agencies can utilize floodplains as a solution to flooding, not just an area of risk. Nature-based approaches will benefit from better use of programs that incentivize maintaining natural floodplain functions, such as the Community Rating System. Further, these programs must use climate-informed science to be most effective. State and regional climate models already exist to guide infrastructure and floodplain management; federal agencies should utilize this data where possible.   This presentation will define what nature-based floodplain management is, how regional and state authorities have implemented it around the country, and how federal agencies can look to these efforts to advance their own projects and policies.

Biography
Jonathon is the Lapham Fellow at American Rivers, where he has focused on developing science-driven concepts for floodplain restoration. He's currently located in Seattle, WA working to advance multiple-benefit floodplain reconnection projects in both

wild and urban watersheds. Prior to the Fellowship Jonathon carried out research exploring use of natural infrastructure in flood adaptation efforts in Northern New England watersheds.

J5: Partnerships for Mapping & Modeling Success
Moderator: Chris Budd, CFM, Atkins, chris.budd@atkinsglobal.com

A Modern CTP Program Vision: Our Operational Approach for the Next Five Years
Laura Algeo, PE, FEMA HQ, laura.algeo@fema.dhs.gov

FEMA has been working for over a year to provide updated guidance and tools to the CTP community. The 2015 CTP Program Feedback Survey facilitated the development of five operational goals to advance the CTP Program. An Operations Planning Integrated Planning Team (Ops Plan IPT) worked together for six months to develop initiatives and actions to support the program goals listed below: 1. Design and Develop a CTP Program Training Plan 2. Improve CTP Program Collaboration   3. Identify and Improve CTP Program Tools and Resources 4. Implement performance measures and metrics 5. Identify communications resources and best practices   There are 11 objectives which support these goals and which set the framework for future program planning. This session will provide an overview of the Ops Plan, its impacts and the first actions the program is taking toward immediate programmatic improvements.   This presentation will be geared toward CTPs, FEMA personnel, and contractors

Biography
Laura Algeo is an Emergency Management 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 4. 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.

Value of Local Partnerships: Texas Water Development Board CTP Program
Cindy Engelhardt, CFM, Halff Associates, cengelhardt@halff.com
Additional Author(s): Manuel Razo, GISP, CFM, Texas WDB

The Texas Colorado River Floodplain Coalition (TCRFC) is a coalition of sixteen counties and sixty communities in Central Texas. In 2010, TCRFC prepared a Flood Modeling and Mapping Need Assessment (MNA) coordinating with the Texas Water Development Board (TWDB) to build a database of prior, current, and planned flood studies. The data collected from this effort was then used to apply for FEMA funding through the TWDB's CTP program. It was determined that the San Bernard watershed ranked the highest in the MNA, had available leverage, and also ranked high on the FEMA Coordinated Needs Management Strategy prioritization. Therefore, a FEMA CTP Grant was awarded to TWDB/TCRFC for the San Bernard HUC.   In 2011, FEMA officially awarded TWDB/TCRFC grant funding for the San Bernard watershed. The goal of the project was to utilize planning information previously developed by the TCRFC communities to document the Discovery Process, prepare floodplain mapping, and update floodplain maps for areas within the San Bernard watershed. The Discovery process was a success with 100% local engagement achieved utilizing pre-discovery individual meetings, a discovery meeting, and extensive outreach through phone conversations and email. All leveraged data was locally funded by Wharton County and the City of East Bernard. This data was previously adopted as best available risk information and was being used for regulatory purposes. In addition, this information was reviewed and coordinated with Fort Bend County that requested a map update using the new information along the San Bernard River. Wharton County encouraged Fort Bend County to use their data to ensure both sides of the San Bernard River in each County would have consistent mapping.   Due to the local buy-in and extensive watershed outreach efforts, the preliminary map appeal period ended in September, 2016 without any documented appeals!

Biography
Ms. Engelhardt is a civil engineer who focuses on water resources engineering projects. She has conducted numerous hydrologic and hydraulic studies throughout Texas as well as extensive public outreach. She has a technical expertise with

modeling and mapping software as well as versed experience with FEMA's Risk MAP program serving as the Project Manager for three Texas CTPs.   Having worked on several TWDB projects, Ms. Engelhardt is uniquely knowledgeable with the TWDB Flood Protection Planning grant program, as well as, FEMA's Hazard Mitigation Programs. Through these projects she has formed a trusted working relationship with TWDB staff. Having attended many of the FEMA CTP workshops, Ms. Engelhardt understands FEMA's requirements and brings valuable expertise, leadership, and creativity for the CTP projects.

Risk MAP: Use the Data You Already Have for a Better Result!
Claire Jubb, AICP, CFM, Charlotte Cnty. Bd. of Cmsnrs., claire.jubb@charlottecountyfl.gov

This presentation will show how working with data every jurisdiction has can improve any remapping project.   In this instance, Charlotte County FL is part of the ongoing Risk MAP project. However, wanting to ensure the maximum amount of local involvement in the process, Charlotte County, in partnership with the City of Punta Gorda, requested that FEMA involve us more in the process. Rather than the traditional collaboration points, the County has been involved in the Intermittent Data Submittal (IDS) meetings and has hired their own consultant to help work with FEMA consultants to improve collaboration and the quality of data. At the same time, Charlotte County digitized all of its elevation certifications – not only into downloadable pdf's, but also digitized the elevation data points and created various GIS layers to illustrate the elevation of structures. As part of the Risk MAP process, the County provided FEMA with these elevation points, along with all elevation points recorded as part of any type of public works effort to aid in the accuracy of the models. The aim is to avoid a lengthy and costly challenge period at the end of the project and be able to present a project to the elected officials and the citizens that both FEMA and Charlotte County can stand behind as one that uses the most accurate data and technology to support any changes in BFE. The presentation will include a strong live demo portion linking directly to the layers, illustrating the data we currently have available in terms of structure elevation (over 100,000 elevation points), how we collected and maintain the data, and some of the potential impacts this data may have on the flow of coastal inundation and therefore BFE's.

Biography
After receiving a degree from the University of Wales College Cardiff in Wales, Claire went to work for the complaints department of a major high street bank. This gave Claire the experience and skills needed to work in a political environment. Claire Jubb is the Community Development Director for Charlotte County in the southwest of Florida. She has worked for the department for thirteen years, working her way up from Business Services Supervisor to the department head. She is responsible for the strategic direction and day to day running of a land management department of approximately 100 people. Claire has been a Certified Floodplain Manager since 2007, the County's CRS Coordinator since 2006 and a member of the American Institute of Certified Planners (AICP) since 2016. Claire is responsible for all aspects of floodplain management within the County and is also the County's project manager for the current Risk MAP project. Claire is also very active in the Florida Floodplain Managers Association and currently holds the position of Associate Director of Legislation and is very involved in policy making and policy direction in terms of floodplain management and the National Flood Insurance Program (NFIP). Claire's passion is the streamlining of processes through the use of increased collaboration, cooperation and technology and Claire has played a very active part in the development of innovative and advanced land management applications and management systems. An experienced and respected public speaker, Claire has presented to the National Association of County's (NACo), Public CIO, the Governing Institute and many other local, state and national events. Claire's Main topic surrounds floodplain management, technology and resiliency on a local, state and national level.

J6: Levees in RVII: Mapping, Mgmt., & Insurance
Moderator: Sally Cook, CFM, Manatee Cnty., FL, sally.cook@mymanatee.org

FEMA RVII Levee Mapping Strategy
Rick Nusz, PH, PHG, CFM, FEMA RVII, rick.nusz@fema.dhs.gov
Additional Author(s): Will Zung & Anish Pradhananga, Stantec

FEMA Region VII has identified and sequenced a total of fifty-five flood hazard mapping projects known to include accredited and/or non-accredited levees. Many involving multiple levee systems. Some of these projects are projected to receive an effective Flood Insurance Rate Map as late as 2027. This sequencing does not yet account for the forty countywide projects funded in FY16 or others that will be funded in the future, of which, many will also have levees. To address existing and future levee-related challenges, Region VII has developed its own levee mapping strategy. Objectives of the strategy include reducing project costs, schedules, and risks. While increasing the efficiency of and consistency between Mapping Partners, and engaging

stakeholders throughout the project.   The strategy was developed around four key considerations: 1) challenges experienced to date with projects that includes levees, 2) major types of Region VII mapping projects, 3) initial project scoping that considers levees, and 4) a defined and consistent process for executing levee projects.   This presentation will include a number of levee-mapping scenarios based on an assumed mapping approach and associated engineering analysis criteria, the effective flood hazard zone and accreditation status, and FEMA's Coordinated Needs Management Strategy (CNMS) tool. It will also include a Levee Decision Table developed to create a consistent process for executing projects. The table also identifies when to hold levee meetings, the major topics to be presented, and any data or documentation to be pursed or obtained.   This presentation will inform others on how Region VII is using their experience in addressing the challenges of conducting flood hazard studies that involve levees. It will also provide best-practices and tools that could be used by others to plan and execute their projects.

Biography
Rick is a certified Professional Hydrologist, Hydrogeologist, and Floodplain Manager with technical, scientific, and managerial expertise in hydrology, hydraulic engineering, and water resources. Since 2003 he has served as Senior Hydraulic Engineer for FEMA Region VII. As well as Regional Program Manager under FEMA's Map Modernization and Risk MAP Programs. Prior to working at FEMA, he was a Senior Hydrologist with the URS Corporation in Kansas City, Missouri where he was primarily responsible for managing and leading numerous hazardous and toxic waste investigations and flood hazard studies. Rick has twice been nominated as President of the American Institute of Hydrology, Kansas Section. In addition to providing technical and regulatory expertise to Region VII, he routinely teaches at FEMA's Emergency Management Institute on higher standards in floodplain management, advanced hydrology and hydraulics concepts, and flood risk determination and mapping.

What's Your Story? FEMA RVII Levee Data Documentation for the Future to Share Our Past
William Zung, PMP, CFM, Stantec, will.zung@stantec.com
Additional Author(s): Anish Pradhananga, PE, CFM; Rick Nusz, CFM, RG

Federal levee data inventory has made great progress over the years including FEMA's coordination and integration of data with the USACE and their National Levee Database. FEMA Region VII with the support from their Regional Service Center, STARR II, maintains levee related data for FEMA's business needs which includes accreditation status on effective FIRMs, Provisionally Accredited Levee agreements, and data certification to 44 CFR 65.10. The Risk MAP program and the Analysis and Mapping Procedures for Non-Accredited Levees (LAMP) approach have emphasized the need for data collection and collaboration with stakeholders towards risk communication and long-term project planning using credible data and advanced 2D modeling for flood hazard analyses. To accommodate these needs, the RSC is producing a FEMA Region VII levee database with mapping and reporting tools to both document the history of events including media stories, as well as supporting data analyses including top of levee elevation for freeboard above the base flood. Uses of these tools will provide a 'Levee Story' with maps, text, and tables to quickly support the Region's data needs from rapid response activities, to FEMA mapping project planning, and even support resiliency with watershed master planning or emergency preparedness planning to communicate risk from living behind levees.

Biography
Will is currently the Water Resources Manager in the Kansas City area office of Stantec. He also is the Levee Lead and Regional Service Center deputy lead for STARR II, the FEMA Production and Technical Service provider for FEMA Region VII, supporting levee related flood hazard mapping and flood risk communication. He is a graduate of the University of Missouri - Rolla and the University of Kansas with 18 years of experience as a hydrologist with a background in hydrologic and hydraulic modeling and floodplain management. He is a Project Management Professional, Certified Floodplain Manager, and Envision Sustainability Professional experienced with FEMA's National Flood Insurance Program. Will has a wife, a 10 year old daughter, and 7 year old son.

Communicating Full Risk Insurance Rates in the Heartland
Louie Greenwell, GISP, CFM, PRIME AE Group, lgreenwell@primeeng.com
Additional Author(s): Dane Bailey, Kansas Dept. of Agriculture

The Kansas Division of Water Resources, a Cooperating Technical Partner with FEMA, was preparing for the release of new regulatory flood mapping for the City of Salina, Kansas and needed to assess the potential impacts the new flood hazard information may have on the City's flood insurance premiums. Instead of communicating map changes using terminology like "in" vs "out", they needed a better way to visualize which areas of the community would see increases or decreases in their insurance rates and the associated percent change. Session attendees will see an innovative and cost-effective approach to

estimate flood depths and insurance rate changes at the structure level, and how this information can be used to communicate non-subsidized flood insurance rates including areas behind levees.

Biography
Louie currently serves as Director of GIS - Water Resources for PRIME AE Group. He has a diverse background in GIS implementation that has covered many levels of federal, state and local government. His experience includes GIS implementation planning, applications and database development, infrastructure and asset management, and floodplain management. He has a BS in Geography from the University of Louisville and is an active member of several professional organizations serving as former Treasurer of the Cumberland Chapter of URISA and current Co-Chair of the Professional Development Committee of ASFPM. Louie also serves on the Certification Board of Regents for ASFPM's Certified Floodplain Manager (CFM) program.

J7: Case Studies in Risk Communication
Moderator: Stephanie Routh, HzP, CFM, Dewberry, srouth@dewberry.com

Interagency Collaboration & Decision Support Services in the 2015 Meramec River Record Flood
Jonathon Thornburg, NOAA, NWS, jonathon.thornburg@noaa.gov
Additional Author(s): Steve Buan, Mike DeWeese, Dustin Goering, Mark Fuchs, NOAA, NWS

An unusual extreme rainfall event occurred over the Meramec and lower Missouri River watersheds between Christmas 2015 and New Year's Day 2016. Eight to ten inches of rain fell along a 60 mile wide band across the basin causing historic flooding, and resulting in 14 flood related fatalities in the state of Missouri. Several levees and roadways where overtopped leading to mass evacuations and road closures of essential transportation infrastructure. A river flood exceeding record levels presents many challenges to government officials charged with protecting the public from the resultant hazards and mitigating impacts. First the flood must be accurately predicted which is not a trivial task. Those predictions must be effectively communicated to floodplain and emergency managers, as well as law enforcement. The predictions provided will evolve as rainfall forecasts change and conditions on the river become dynamic with increasing flows. Communicating changes to the public on new predictions, and the scientific reasoning for these changes, is a difficult challenge. Coordination and collaboration must increase amongst agencies to accurately account for what becomes a rapidly evolving, life changing, event for people living and working in the impacted watershed. This presentation will discuss the flood prediction process by the National Weather Service from the initial soil conditions going into a significant rainfall event to the final crest as the flood moves out of the watershed. It will demonstrate how forecasters evaluate an ensemble of forecast rainfall scenarios to provide the greatest lead time possible while issuing high confidence, accurate river forecast. It will also discuss National Weather Service collaboration with the United States Geological Survey and Army Corps of Engineers regarding river flow measurements, observational equipment integrity issues. Flood protection levee systems will be analyzed as they relate to flood prediction accuracy and risk communication during the flood.

Biography
Jonathon Thornburg has been a Hydrologist for the National Weather Service's North Central River Forecast Center (NCRFC) since 2009. He specializes in real-time hydrologic and unsteady hydraulic modeling, along with being the in-house GIS specialist at NCRFC. His early career skills were put to the test as the principle forecaster for the historic flooding on the Grand and Illinois Rivers in 2013. He was also heavily involved with the river forecast process in the significant flooding that occurred over Missouri and Illinois in late December 2015. He is currently the primary forecaster for several rivers across Iowa and Illinois. Jonathon has a Master's Degree in Water Resource Sciences from the University Of Minnesota-Twin Cities and a Bachelor of Science in Geography and Earth Science from Minnesota State University-Mankato

New Technology Helps Citizens & Community Officials Before, During & After Flood Events
Susan Beth Wilhelm, EI, CFM, Oklahoma WRB, beth.wilhelm@owrb.ok.gov
Additional Author(s): Charles O'Malley

New Technology Helps Citizens and Community Officials Before, During and After Flood Events... Sharing Developments for LWC-TADD Sign Emergency Alerts, HWM Collection and Report Documentation   Many communities share the daunting task of communicating their message of "Emergency Awareness" to their citizens. Within FEMA Region VI, the state of Oklahoma had the largest number of disasters during FY-2016, including flooding, tornado, earthquakes, wild fires and ice storms. During these

disasters the increasing need to contact the public faster and across a larger geographic area was apparent. Learn how we utilized today's technology with our own further development to reach a larger population base, a greater geographic area and a wider range of public knowledge from the novice to the Floodplain Management expert as we reduced the capture time, documentation time and delivery time. Experience and understand the coordinating efforts between Oklahoma Water Resources Board (OWRB), FEMA - Region VI, National Oceanic & Atmospheric Administration (NOAA) and Oklahoma Floodplain Managers Association (OFMA) as we worked together to establish physical emergency signage at Low Water Crossings (LWC), coordination with social media emergency alert system applications, official collection data application for High Water Mark collection and Community Assistance Visit (CAVs) applications for new SFHA development documentation.   Learn how we developed the software scripts, reporting applications, coordinated mapping to be utilized with the physical TADD (Turn Around Don't Drown) signs, Community Officials and the Social Media to reach citizens of Oklahoma. Included in the presentation are various aspects utilized to develop the final products; python scripts, collection data application tools, Arc GIS Mapping, Analog Peak Precipitation, cfs, stream staging graphs, photographic data, HAZAS Insurance data, new precipitation prediction modeling and historic documentation from previous disaster events and new development. Visualize the final products derived for the TADD Sign Emergency Alert Coordination at Low Water Crossings, Community SFHA Development reporting documents, High Water Mark collection tools for local community officials and more. This presentation will allow you to take back the knowledge to your state the procedures learned, components utilized, lessons learned and the future possibilities for proven valuable resources when faced with a disaster within your home state to better notify your citizens as well as a look at the Oklahoma TADD Sign for the future.

Biography
Bio – Susan Beth Wilhelm   Beth is a native of Tidewater Virginia where she attended Old Dominion University; BS in Mechanical Engineering and minor in Fine Arts. Working in the Naval Shipyards onboard ships and Industrial Commercial buildings where she concentrated on HVAC, Geothermal and Potable Water Systems as well as General Construction Inspection. She relocated to Birmingham, Alabama (ROLL TIDE) and continued her career in mechanical engineering and hydrology, teaching, and the fine arts. She is a member of the National Watercolor Society. Moving to Oklahoma in 2009, she has worked in the civil engineering field as a Project Manager concentrating in Storm Water Management, H & H studies, Sanitary Waste and Potable Water Systems, and Public and Private Dam construction. Beth holds various certifications in HUD and ADA Inspection. Beth is presently employed with the Oklahoma Water Resources Board (OWRB) in the Planning and Management Division under the Floodplain Management Section. She received her Certified Floodplain Manager (CFM) certification in 2015 and became a member of the Oklahoma Floodplain Managers Association (OFMA). In 2016 Beth holds the office of Secretary of OFMA and chairs the TADD Sign and Traveling Trunks Committees. OWRB responsibilities include CAVs, CTP Program Management and Community Development Reviews; OWRB /OFMA Workshops and L-273 Instruction; FEMA Disaster Coordination where she coordinated the High Water Mark Project to be utilized for historic and future inundation mapping development; Sustainability Community Planning and NFIP coordination throughout Oklahoma. Presenter at the 2016 ASFPM Conference in Grand Rapids Michigan on the High Water Mark Project.

Communication Challenges During the Historic December 2015 Floods in Missouri
Megan Terry, CFM, NOAA, NWS, megan.terry@noaa.gov

Rainfall totals in excess of six inches across much of the Missouri Ozarks led to historic flooding in late Deber of 2015. Several locations over extreme southwest Missouri received accumulations exceeding one foot. Notable impacts included 13 flash-flood related fatalities (all occurring in vehicles), over two hundred swift water rescues, closures of major highways and interstates, rivers rising to all-time record levels, dam releases over 70,000 cubic feet per second (cfs) at Table Rock Lake inundating neighborhoods along Lake Taneycomo near Branson and Hollister, and dam releases over 100,000 cfs at Bagnell Dam flooding homes along the Lake of the Ozarks and below Bagnell Dam.   Challenges were many during this event from a National Weather Service Operations standpoint. Since the event occurred on a holiday weekend, in Winter, many core partners were "unplugged". Visitors to the region were unfamiliar with the high flood frequency in the Ozarks.   Forecasters were challenged with how "dramatic" to be in messaging before the event began.   In this presentation, I'll discuss how we addressed these challenges and used new on-line tools to help convey the flood threat before the event and communicate impacts during and after the flood. I'll also reach out to flood plain managers for help with impact statements along our more flood prone rivers.

Biography
Megan Terry is the Service Hydrologist (SH) at the National Weather Service (NWS) in Springfield, Missouri, a position held since 2009. Prior to being the SH, she was a forecaster at NWS Norman, OK from 1994 to 1998, and a forecaster at NWS Springfield from 1998-2009. She earned a Bachelor of Science degree in Geography from Louisiana State University in 1990 and a Bachelor of Science degree in Meteorology from the University of Oklahoma in 1993. Megan is responsible for overseeing

the NWS Springfield Hydrology Program. This includes providing hydrology training to the operations staff, coordinating with partners such as the US Geological Survey, US Army Corps of Engineers and Emergency Management Officials, developing new river forecast points in coordination with NWS River Forecast Centers, maintaining all hydrology-related software, and updating the local Advanced Hydrologic Prediction Services (AHPS) web page.

J8: Stormwater Modeling to Enable Better Local Decisions
Moderator: Bill Brown, PE, Flood Science Ctr. Director, ASFPM, bill@floods.org

Programs, Projects & Policies Creating Resiliency in Phoenix, AZ
Valerie Swick, CFM, Flood Ctrl. Dist. of Maricopa Cnty., AZ, vas@mail.maricopa.gov
Additional Author(s): Doug Plasencia, PE, CFM; Geoff Brownell, PE, CFM

In the summer of 2014, the metro Phoenix area experience a series of extreme rainfall events creating isolated flooding, but largely resulting in little damage. Local media insisted that Phoenix had dodged a bullet. The reality is that the metro area came through relatively unscathed because of decades of work by the Flood Control District of Maricopa County (District), the local municipalities, and other project partners. Through coordinated programs, policies, and projects, the metro Phoenix area is well positioned to absorb the impacts of storm events beyond the design storm, and can serve as a model for other communities across the country.   With longstanding policies in place, today the focus is mostly on more accurately defining urban flood hazards within the County. The District is in the process of completing Area Drainage Master Studies and Plans to safeguard most of the Phoenix metro area. As technology and modeling methodologies improve, many of these plans are now being updated to leverage these new advances. The District has integrated aerial mapping with LiDAR to develop planimetrics supporting new FlO-2D modeling. The District has also supported significant development of two-dimensional hydrologic modeling. These new mapping and modeling approaches enables the District and municipal partners to predict flow paths and water depths with unparalleled accuracy. A structured alternative selection process has been adapted to include Hazus, as well as community acceptance to rank and prioritize potential solutions to flood hazards. A robust citizen engagement and advocacy approach has been utilized to provide flood hazard information to the public while receiving active feedback on potential solutions.   This presentation will detail how this approach, coupled with strong stakeholder engagement and coordination, has helped local municipalities develop consensus support for CIP goals. This process also provides cities and the public, tools to better manage their flood risk.

Biography
Valerie Swick has worked for the Flood Control District of Maricopa County in Phoenix, Arizona for almost 30 years. For the past 16 years she has been a project manager for the Planning Branch where she plans regional drainage projects. She has also been an adjunct facility for the Water Resources Technology program at Gateway Community College where she has taught surface water hydrology courses for the past 17 years. She received her Bachelor of Science degree from the University of Arizona in Watershed Management.   Ms. Swick holds certifications as an Engineer-in-Training, a Certified Floodplain Manager, and a Professional Hydrologist. Ms. Swick has been involved in professional floodplain management organizations and held offices in both the Arizona State Floodplain Management Association and the Association of State Floodplain Managers, the premier national floodplain management organization.

Community Benefits of Defining an Urban Overland Flowpath
Glen Taffinder, PE, CFM, City of Austin, TX, glen.taffinder@austintexas.gov
Additional Author(s): Kim Patak, PE, CFM, Freese & Nichols

The MLK TOD is a redeveloping area in east Austin. The City completed a hydraulic capacity assessment of the existing storm drain infrastructure within the area using a two-dimensional hydraulic model. The detailed assessment identified numerous urban overland flowpath inundation areas outside the City's right-of-way and regulatory floodplain that would be underestimated by adhering to the minimum requirements for an existing drainage assessment described in the City's Drainage Criteria Manual (DCM). The areas of inundation include a large open space property that is in the permitting process for development.   The developer is not aware of the amount of surface water impacting the property when the system reaches capacity during frequent storm events. The City is in a unique position to provide detailed surface and subsurface capacity and flooding information to assist the developer in appropriately designing drainage improvements for the tract due to the detailed modeling completed by the City. However, this capacity and urban flooding information has not been available in the past and the City does not have a mechanism to require city permit reviewers to make the information regulatory nor available to the public and relies on Capital

Improvement staff to communicate with permitting staff to convey information. Thus, the City is charting new waters in how to use the results of more detailed urban flood analysis in working with other city departments and private landowners and developers to improve the City's drainage infrastructure through public-private partnerships (P3). This presentation will discuss the City's current Urban (Local) Flood Hazard Mitigation efforts, development policy for drainage analysis and potential need to evolve using urban flood hazard mapping. The MLK TOD case study will also be presented, including lessons learned, current coordination efforts, and P3 status.

Biography
Mr. Taffinder is a Civil Engineer with the City of Austin Watershed Protection Department in Austin, Texas. He has a Bachelors and Masters degree in Civil Engineering from Texas A&M University (College Station). The first seven years of his career were in the private sector predominantly spent designing wastewater treatment facilities. For the past 18-years he has been in the public sector with the City of Austin with his primary focus on stormwater hydrology and hydraulics. Mr. Taffinder has worked on several stormwater capital improvement projects during his tenure with the City of Austin including; a large regional stormwater detention pond, improvement of roadway stream crossing for all weather access up to the 100-year storm event, channel improvements, development and implementation of a dam safety program for small stormwater detention ponds, several local flood hazard mitigation projects (primarily stormdrain) totaling over 45 million dollars, and a project with the Corps of Engineers that lead to the removal of more than 100 houses from the 100-year floodplain - many with repetitive flood losses.

Evaluating Release Rates for Specific Watersheds in Cook County, IL
Amanda Flegel, PE, CFM, Illinois State Water Survey, aflegel@illinois.edu
Additional Author(s): Dan Feltes, PE, CFM, Metro. Water Reclamation Dist. of Greater Chicago

The Metropolitan Water Reclamation District of Greater Chicago's (MWRDGC's) Watershed Management Ordinance (WMO) requires that a development's allowable release rate will be based on a watershed specific release rate after and including May 1, 2019. The Illinois State Water Survey (ISWS) developed a methodology to evaluate watershed specific release rates. The objective was to determine regulatory release rates for development in each watershed which mitigate the impacts of development by maintaining 1% annual chance (a.k.a. 100 year return period) flood event levels at or below current levels throughout the watershed. The methodology and selection criteria were tested using two pilot areas in Cook County to assess the method's strengths and weaknesses, reliability, and ease of application. The Stony Creek and Upper Salt Creek watersheds were selected as they are both urban, but typify the land use variation across Cook County urban and suburban areas. The evaluation was performed by comparing the base models, which are founded on the available hydrologic and hydraulic models completed from previous Detailed Watershed Plans (DWP), with future scenario models. Several analyses were completed identifying the sensitivity of the selected future scenario parameters. The results of the analysis of the two pilot areas were examined for trends that could simplify selection of release rates in other watersheds in Cook County. The methodology that has been developed provides a science-based tool that balances stormwater regulation management with the benefits of the spatial variation of regulatory release rates utilizing available data.

Biography
Amanda Flegel is a project engineer with the Coordinated Hazards Assessment and Mapping Program with the Illinois State Water Survey. She has been with the Illinois State Water Survey for the past 11 years conducting hydrologic and hydraulic studies and developing digital floodplain maps in the State of Illinois and is experienced in FEMA's RiskMAP project implementation. Ms. Flegel is currently a co-chair for the Cooperating Technical Partner subcommittee of ASFPM. She graduated from the University of Illinois with her BS in Civil Engineering and is a licensed engineer in the State of Illinois. Ms. Flegel is the ISWS project lead for the Watershed Specific Release Rate Determination project.